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Presentation

The *Multidisciplinary Journal of Contemporary Research* is honored to present its Volume 3, Number 2 , an issue that reaffirms our commitment to the generation, integration, and dissemination of scientific knowledge from a reflective, humanistic, and interdisciplinary approach. This issue brings together a solid and diverse academic output that articulates the areas of **Health** Sciences and Social Sciences addressing current issues from theoretical, clinical, and applied perspectives, with the aim of providing answers to the contemporary challenges facing our communities in the educational, healthcare, and social spheres.

Health Sciences

This section presents highly relevant studies that address medical, dental, psychological, and neuropsychiatric aspects. Articles such as *Regenerative Medicine as a Therapeutic Alternative for Chronic Diseases and Serious Injuries* highlight innovative advances in biomedicine and their therapeutic implications. Research that links body posture with functional conditions, such as *Temporomandibular Joint Disorders and Their Relationship with Craniocervical Postures*, is also included, as are relevant studies on mental health and eating behavior, such as *Inhibition and Depression as Predictors of Food Addiction in the Ecuadorian Population.*

In the dental field, works such as *Factors related to sleep bruxism in children and adolescents and Temporomandibular joint disorders*, and Comparative analysis of the clinical performance of *Bulk resins are presented. Filled and*

fiber-reinforced implants: *a systematic review in restorative dentistry*, which offer key evidence for clinical practice. Also highlighted is the review *Cognitive Behavioral Therapy in the Treatment of Postpartum Depression*, which reinforces the importance of evidence-based psychological interventions for perinatal mental health disorders.

The section is enriched with several case reports that document complex clinical situations, including: Legg- *Perthes -Calvé disease or Juvenile Osteochondritis Deformans* and *Pneumonia complicated by influenza type A in a pediatric patient*, which illustrate the challenges of pediatric diagnosis and treatment. Likewise, relevant cases are presented such as *Systematic review and meta-analysis of reliability of assessment instruments for Frontotemporal Dementia*, *Plasmacytoid dendritic cell leukemia*: *study and diagnosis of a case*, *Pneumonia complicated by lung abscess and pleural effusion*, and *Kaposi's sarcoma* (*KS*): *a case report*, which offer readers a direct window into clinical practice based on real-life experiences.

Social Sciences

In the field of social sciences, this edition includes contributions that examine human behavior, educational processes, and sociocultural realities from a critical and inclusive perspective. Studies such as *Emotional Dysregulation as a Factor in Obsessive-Compulsive Disorder*: *A Systematic Review*, *Impulsivity, Disordered Eating Behavior, and Their Relationship with Food Addiction in an Ecuadorian University Population*, and *Impaired Mental Health, Expressive Suppression, and Stress as Predictors of Eating Disorders*, which address psychosocial well-being from multiple angles, are presented.

In the educational and linguistic fields, the articles *Self-regulated stand out*. *strategies and English grammar learning in online environment* and *Integrating culture into English teaching process*: *a path to meaningful Communication*, which reflects on independent learning and the role of

culture in teaching English. Likewise, *Bullying Assessment Tools in Prevention and Intervention Programs in Latin America* provides a review of key tools for addressing school violence from a preventive perspective.

Emerging topics such as the impact of social media and emotional intelligence in adolescents are addressed in *Emotional Intelligence and the Use of Social Media in Adolescents*, while the article *Structural Analysis of the Personality of Incarcerated Women and Their Dominant Traits* offers an in-depth analysis of psychosocial dynamics in prison settings.

A set of research projects aimed at institutional and pedagogical strengthening are also included. The *microcurricular design for developing research capabilities* and *the Problem-Based Learning Program for Competency Development in Physiology Students* present proposals for improving higher education. The reality of vulnerable populations is also highlighted through the study " *Educational Situation of a Population with Multiple Disabilities*: *Lennox- Gastaut Syndrome*," and community initiatives such as " *Artisanal Production*: *Establishment of a Women's Association of Toquilla Straw Weavers in the Nazón Parish" are highlighted*.

Finally, the volume is complemented by research with an economic and regional focus, such as " *Determining Factors of Competitiveness in SMEs in Latin America"* and "*Network of Editors and Scientific Journals of Ecuador* ," which analyze the relationship between scientific knowledge, productive development, and editorial strengthening in the Latin American context.

This academic compendium reflects the wealth of approaches and the social relevance of the research presented. Each article represents an effort to understand and transform our realities through evidence, critical reflection, and human sensitivity. We invite our readers to explore

this edition with the conviction that science, when shared and engaged, becomes a powerful tool for change.

Editorial Committee

Multidisciplinary Journal of Contemporary Research

Latin American Editorial Network of Contemporary Research

Editorial

The 21st-century leader: beyond technical skills

El líder del siglo XXI: más allá de las competencias técnicas

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Abstract

In the context of digital transformation, accelerated by artificial intelligence, automation, and globalization, there is a growing need to rethink leadership as a human, ethical, and transformative competence. This editorial proposes that true leadership goes beyond administrative management: it involves inspiring, mobilizing, interacting, and supporting with empathy, self-awareness, and a critical vision. Leadership, viewed from an approach based on soft skills such as assertive communication, resilience, emotional intelligence, and collaboration, should be oriented

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toward collective well-being and the construction of inclusive and sustainable environments. Therefore, the key role of educational leadership as an agent of social change and guarantor of human development is highlighted. Finally, the need to train authentic leaders capable of responding sensitively and responsibly to contemporary challenges, contributing to a more just and equitable society committed to peace and sustainability, is emphasized.
Keywords: Leadership competences, socioemotional skills, soft skills, authentic leadership.

Resumen

En el contexto de la transformación digital, acelerado por la inteligencia artificial, la automatización y la globalización, surge la necesidad de repensar el liderazgo como una competencia humana, ética, y transformadora. Esta editorial propone que el verdadero liderazgo va más allá de la gestión administrativa: implica inspirar, movilizar, interactuar, y acompañar con empatía, autoconciencia y visión crítica. El liderazgo visto desde un enfoque basado en habilidades blandas como la comunicación asertiva, la resiliencia, la inteligencia emocional y la colaboración, debe orientarse al bienestar colectivo y a la construcción de entornos inclusivos y sostenibles. Por lo tanto, se destaca el papel clave del liderazgo educativo como un agente de cambio social y garante del desarrollo humano. Finalmente, se resalta la necesidad de formar líderes auténticos, capaces de responder con sensibilidad y responsabilidad a los desafíos contemporáneos, contribuyendo a una sociedad más justa, equitativa y comprometida con la paz y la sostenibilidad.

Palabras clave: Competencias de liderazgo, habilidades socioemocionales, habilidades blandas, liderazgo auténtico.

How should leaders respond to the accelerated changes humanity is facing in a context of digital transformation? In times where artificial intelligence (AI), automation, and globalization are shaping the world, there is an urgent need to rethink the qualities of a good leader from a more human, empathetic, and transformative perspective.

Leadership is a dynamic process of influence, motivation, and the development of shared goals (Orús, 2014). It's not just about directing, but also about mobilizing diverse talents and diverse backgrounds toward shared goals. Therefore, effective leadership includes competencies such as self-confidence, empathy, organization, service orientation, adaptability, and initiative (Goleman, 1995). At the same time, a good leader inspires rather than controls, resolves conflicts proactively, encourages cooperation, sets hopeful goals, and communicates clearly (Northouse, 2016).

The education of the future is not built exclusively on technological advances or curricular reforms. Its true essence lies in the quality of human interaction and in the ability of leaders to manage from a sensitive, visionary perspective that adapts to the different realities of the context in which they operate (Gomez, 2008) . Therefore, leadership competencies must evolve toward a more collaborative, sustainable, ethical, flexible, and adaptable approach to the challenges of a changing society.

Leadership or management cannot be limited to a purely administrative function or the management of resources and processes. Today, it requires an inspiring, motivating figure capable of guiding and supporting operational processes from a reflective perspective, recognizing the central role of their team, and bringing into play soft skills such as empathy, assertive communication, collaborative work, resilience, and emotional intelligence—essential competencies for a good leader in an uncertain, changing, and complex world (Goleman, 2002).

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We live in a globalized context marked by constant change and transformation in societies. In this scenario, authors such as Ganga-Contreras et al. (2017) highlight the importance of authentic leadership, understood as one that, when making decisions, it is essential to consider the impact they have on others. Authentic leaders avoid adopting vertical, imposing, or contrary measures to the well-being of their collaborators.

Authenticity in leadership is related to the creation of a positive work environment, self-awareness, the ability to positively influence others, self-regulation in conflict resolution, as well as the building of relationships based on trust, empowerment, and humanism in making transcendental decisions. These decisions should contribute to reducing tensions, inequalities, injustices, and social fractures. In this sense, it is necessary to train leaders with critical, reflective, flexible, and adaptable thinking, with ethical awareness and solid interpersonal skills (Harvard, 2021) .

As UNESCO (2021) points out, “humanity faces a crossroads: we must rethink leadership from a collaborative, inclusive, and supportive perspective to ensure peace, justice, and the sustainability of the planet” (p. 7). It is therefore necessary to promote an education that cultivates leaders committed to human dignity, capable of responding with sensitivity, creativity, and social responsibility to the challenges of peaceful interglobal coexistence and shared well-being.

When we think of leadership, we don’t just conjure up images of someone who guides or inspires, but rather of a role model, someone who leaves a significant mark on the lives of others. Beyond demonstrating exceptional qualities, leading involves transforming through example, influencing with a reflective and flexible approach to building a legacy based on what is authentically human (Sierra Villamil, 2016). In the educational context, leadership takes on an even deeper meaning: leadership acquires a strategic, ethical, and sustainable meaning over

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time. The priority should no longer be competitiveness or individualism, but rather professionalism, humanity, and leadership exercised with quality and warmth for the common good.

It is essential to understand that leadership transcends the business or organizational sphere. It is primarily manifested in people who, by assuming positions of influence, directly impact the lives of others, becoming agents of social change, entities that write the history of peoples. These leaders recognize potential, listen and maintain fluid communication with their work team, act with integrity and orient their actions toward achieving common goals, always promoting collective well-being (Castro et al., 2020) . In this sense, innovation and power should not limit the implementation of soft skills, much less undermine the desire for a more just and equitable world. As Fullan (2001) states, "true leadership is not imposed; it is built on the ability to inspire and mobilize others toward meaningful change" (Fullan, as cited in Montecinos & Uribe, 2016, p. 94).

True leadership demands the development of socio-emotional competencies and a transformative vision that "integrates empathy, effective communication, and socially conscious decision-making" (Moral & Villardón-Gallego, 2021, p. 105). Furthermore, it must respond to contemporary challenges through a critical and reflective approach, capable of positively influencing the social groups they lead (Sahlberg, 2020, p. 143).

In conclusion, in a world characterized by complexity and digital transformation, the qualities of a good leader must transcend the administrative to become a more human entity. This editorial has reflected on the need to train leaders with ethical awareness, social sensitivity, and soft skills, capable of facing the challenges of the 21st century with a collaborative, empathetic, and sustainable vision. As UNESCO (2021) reiterates, rethinking leadership from a humane and supportive perspective is key to ensuring peace, justice, and global

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sustainability. Investing in leaders who inspire, mobilize, and support operational processes with quality and warmth will allow us to build resilient, equitable societies committed to a more just world for all.

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Temporomandibular joint disorders and their relationship with craniocervical postures

Trastornos de la articulación temporomandibular y su relación con posturas craneocervicales

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Abstract

Introduction: The temporomandibular joint is a bilateral synovial joint between the mandibular condyle and the mandibular fossa of the temporal bone. **Objective:** The objective of this research is to analyze the association between temporomandibular joint disorders and alterations in craniocervical postures. **Methodology:** A narrative review was carried out. Information collection was applied to the following databases: Scopus, PubMed, Web of Science, Google Scholar, from August 2024 to November 2024. **Conclusions:** The posture in which the head is located influences the position of the cervical spine and an alteration in this can cause problems in dental occlusion. Among the abnormal cervical postures, the following postures stand out: kyphotic, lordotic, and flattened. Craniocervical dysfunction is an anomaly in which the head is positioned forward with respect to the axial axis of the body and is usually associated with the appearance of temporomandibular disorders.

Keywords: Dentistry, rehabilitation, health, epidemiology, disorders, temporomandibular joint, craniocervical postures.

Resumen

Intr**oducción**: La articulación temporomandibular es una articulación sinovial bilateral entre el cóndilo mandibular y la fosa mandibular del hueso temporal **Objetivo:** El objetivo de esta investigación consiste en analizar la asociación entre trastornos de la articulación temporomandibular y alteraciones de posturas craneocervicales. **Metodología:** Se efectuó una revisión narrativa. La recolección de la información se aplicó en las bases de datos: Scopus, PubMed, Web of Science, Google académico, durante agosto de 2024 a noviembre de 2024. **Conclusiones:** La postura en la que se encuentra la cabeza influye en la posición de la columna cervical y una alteración en esta puede causar problemas en la oclusión dental. Entre las posturas cervicales anómalas, se destacan las posturas: cifótica, lordótica y aplanada. La disfunción cráneo cervical es una anomalía en la que la cabeza presenta una posición adelantada con respecto al eje axial del cuerpo y suele asociarse con la aparición de trastornos temporomandibulares.

Palabras clave: Odontología, rehabilitación, salud, epidemiología, trastornos, articulación temporomandibular, posturas craneocervicales.

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1. Introduction

The cranial and facial structures including the oral cavity along with its dental organs correspond to one of the most complex and complicated areas of the body that contributes to a series of orofacial disorders including temporomandibular disorders, orofacial pain disorders, myofascial, oral injuries, dental disorders, among others. Temporomandibular disorders being significantly a public health problem, affecting approximately 31% of the adult population, and orofacial pain among the most common of these problems with related symptoms of temporomandibular joint dysfunction and chronic head and neck pain, tension, migraine or mixed type, with an estimated prevalence of 20% of the general population (1,2).

Temporomandibular disorders symptoms can be observed across a wide age range, from 20 to 40 years, with women being more susceptible to these disorders than men (1,2). Furthermore, these craniofacial structures are closely related to feeding, communication, vision, and hearing, impacting appearance, self-esteem, and personal expression, which in turn can significantly affect psychological and functional status. Abnormal craniocervical postures can cause problems in the temporomandibular joint and, consequently, altered dental occlusion (1,2,3). The objective of this research is to analyze the association between temporomandibular joint disorders and altered craniocervical postures.

Due to the high health impact and varied etiologies, the management of these temporomandibular disorders tends to be approached from different medical and dental perspectives. However, each specialist addresses the functional problem according to their area of expertise. Therefore, therapeutic management may be limited, and a comprehensive approach requires a multidisciplinary team .

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2. Methodology

A narrative review was conducted regarding temporomandibular joint disorders and their relationship with craniocervical postures. The search strategy considered criteria such as relevance and origin of data, objective content development, and scope of the research. Based on these parameters, 22 publications were selected, including literature review articles, original articles, textbooks, and clinical cases related to the object of study, published in the last two decades, in English and Spanish. Data collection was performed using the following databases: SCOPUS, PubMed, Web of Science, and Google Scholar. The study was conducted from August 2024 to December 2024.

3. Development

3.1. Anatomy of the temporomandibular joint

The temporomandibular joint is a bilateral synovial joint between the mandibular condyle and the mandibular fossa of the temporal bone, its complex anatomy is characterized by highly incongruent skeletal surfaces which are therefore separated by a fibrocartilaginous disc into two independent chambers: the superior temporodiscal space and the inferior condylar disc space respectively. This division aims to provide joint stability by enlarging the contact area and provides the temporomandibular joint with dynamic and kinematic behavior, allowing jaw movements with 6 degrees of freedom under the heaviest load on the body's joints ranging from 50 to 80 kilopascals (kPa) (2).

The disc is morphologically biconcave with thick anterior and posterior bands and a thin intermediate zone. Anteriorly, the superior

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belly of the lateral pterygoid muscle inserts into the disc. The inferior belly has variable insertions, including the condyle, the joint capsule, and the disc. Posteriorly, it has a bilaminar zone of connective tissue that joins the temporal bone to the disc. The temporomandibular, sphenomandibular, and stylomandibular ligaments support the temporomandibular joint. The temporomandibular joint is one of the most complex joints in the human body. It behaves as a ginglymoarthroidal joint, which allows both rotational and translational movement of the mandibular condyle on the axis of the glenoid cavity, like a "hinge and glide" joint, with the purpose of maximizing oral opening (3).

3.2. Functions of the temporomandibular joint

Normal temporomandibular joint function requires synchronized and coordinated movement of the disk, condylar head, and masticatory muscles. The mandibular condyle normally aligns with the temporal fossa and posterior band of the disk at the 11 or 12 o'clock position. With mandibular opening, the condyle translates anteriorly to align with the articular eminence. The disk moves with the condyle, with the intermediate zone aligned with the eminence. A pathological intra-articular disk may obstruct these ranges of motion (3,4).

3.3. Constitution of the craniocervicalmandibular system

The craniocervical mandibular system is made up of articular and bony structures. (5) Among the articular structures are the cervical spine, which allows mobility of both the neck and the head. This part has 7 vertebrae; C1 and C2 form the upper cervical spine, and from C3 to C7 is the lower cervical spine. The tongue is a muscular organ that interacts with the articular and bony structures, helps coordinate the movements of the lower jaw, and has direct contact with the teeth (6).

The parts that make up the bone structure are the skull complex which has the function of protecting the brain, serves as support for

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the facial structure, includes cranial cap, skull base, facial bones, joints, and paranasal sinus (7). Another element is the lower jaw or mandible, which is the bone located in the lower part of the face, articulates with the temporal bone of the skull and facilitates the movements of the mouth, its oral functions are speech and facial functions are chewing and finally the hyoid bone which is U-shaped, located in the upper part of the larynx and in the lower part of the jaw. It is suspended by muscles and ligaments that contribute to the complex movements of mastication and speech (8).

Cervical joint problems can cause stress on the capsular elements and ligaments, which work together to provide support and stability to the structures involved. This can lead to headaches, neck pain, atlantoaxial subluxations (C1 and C2), and also generate neurological problems (9).

3.4. Craniocervical joints and cervical vertebrae

The craniocervical joints are linked to the spine because it maintains a connection with the cervical vertebrae that form the cervical spine in the neck. C1-C2 and C7 are atypical vertebrae because they do not have common characteristics and from C3 to C6 are typical because it does have them (10). In this region is the atlanto-occipital joint located between the occipital bone of the skull and C1 (Atlas) which is the first cervical vertebra, whose shape is like a ring. Its primary function is to execute flexion movements and head movements such as tilting. Another joint is the atlanto-axial because it is between the first vertebra C1 and the second vertebra C2 which is shaped like a tooth helps rotate the head (11).

The C7 is a prominent vertebra with the longest and most spinous process relative to the other vertebrae. Therefore, it provides more support and helps distribute weight to both the neck and head. It is also more visible because it is the bone located at the back of the neck. The C3-C6 vertebrae are smaller vertebrae with shorter spinous processes (10).

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3.5. Usefulness of imaging studies in TMJ disorders

The primary method for diagnosing temporomandibular joint disorders is a clinical examination, supported by extensive imaging analysis using radiographs, non-stress MRI or CT, and functional testing. Magnetic resonance imaging (MRI) has been widely used to assess temporomandibular joint characteristics such as disc morphology, disc position, and joint effusion. Although not considered the gold standard for bone evaluation of the temporomandibular joint, this modality has been used for these purposes; however, it is recommended to correlate bone diagnosis with CT (4).

Finding correlations between structural changes of the temporomandibular joint and clinical features can help guide patient management and provide prognostic information. Rudisch in 2001 showed that temporomandibular joint pain has been correlated with several MRI findings including: internal derangements, degenerative condylar changes, joint effusion, and medullary edema. Currently, Sang in 2024 limits MRI as a diagnostic aid in patients who primarily suffer from masticatory muscle pain (myalgia), as no relevant results were obtained in studies (1).

3.6. TMJ disorders

Temporomandibular joint disorder (TMJD) is a term used to describe musculoskeletal disorders of the jaw system, comprising the temporomandibular joints and their associated musculature. Pathological changes can affect all joint tissues, including the articular cartilage, disc, subchondral bone, and synovial membrane. Degenerative changes are often considered the result of mechanical impairment (2).

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3.7. Temporomandibular joint disorders.

Below are a number of disorders that can affect the temporomandibular joint (2):

1 Joint pain
- a. Arthralgias
- b. Arthritis

2 Joint disorders
- a. Disc disorders
  - i. Disc displacement with reduction
  - ii. Disc shifting with intermittent locking reduction
  - iii. Disc displacement without reduction with limited opening
  - iv. Disc displacement without reduction without limited opening
- b. Hypomobility disorders other than disc disorders
  - i. Adhesions and adhesions
  - ii. Ankylosis
    1. Fibrous
    2. I mean
- c. Hypermobility disorders
  - i. Dislocations
    1. Subluxation
    2. Dislocation

3. Joint diseases
- a. Degenerative joint disease
  - i. Osteoarthritis
  - ii. Osteoarthritis
- b. Osteochondritis dissecans
- c. Osteonecrosis

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d. Neoplasia

e. Synovial chondromatosis

4. Fractures

5. Developmental / congenital disorders

a. Aplasia

b. Hypoplasia

c. Hyperplasia

Masticatory muscle disorders

1. Muscle pain

a. Myalgia

i. Local myalgia

ii. Myofascial pain

iii. Referred myofascial pain

b. Tendinitis

c.Myositis

d. Spasm

2. Contracture

3. Hypertrophy

4. Neoplasia

5. Mobility disorders

a. Orofacial dyskinesia

b. Oromandibular dystonia

6. Masticatory muscle pain attributed to systemic/central pain disorder

a. Fibromyalgia/generalized pain

Headache

1. Headache attributed to temporomandibular disorders

Associated structures

1.. Coronoid hyperplasia (2).

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3.7.1 . Arthralgia

Pain of temporomandibular joint origin on palpation or that is affected by movement, function or parafunction of the jaw (2,3).

3.7.2. Rheumatoid Arthritis

Inflammatory autoimmune disease, symptoms include pain of joint origin with characteristics of inflammation or infection over the affected joint: edema, erythema, associated symptoms occlusal changes. Magnetic resonance imaging is the most accurate modality (95%) for diagnosis, with destruction of the articular disc and bilaminar zone, resulting in an abnormal position of the disc with decreased biconcave morphology, this proliferation of synovial widening suggests data of rheumatoid arthritis and is the precursor of bone changes (3).

3.7.3. Internal disorders

Internal derangement is defined as an abnormal anatomical relationship of the articular disc to the mandibular condyle, articular eminence, and glenoid fossa. It accounts for 70% of temporomandibular joint symptoms, and is more common in women between their second and fourth decades of life. Trauma, malocclusion, bruxism, stress, and primary bone abnormalities are known causes. Early in the disease, patients may present with discomfort, pain, abnormal range of motion, and clicking sounds during mouth opening and closing. Chronically, patients may complain of pain and decreased range of motion, symptoms commonly confused with myofascial pain syndrome, the latter being a stress-related disorder involving extracapsular masticatory muscles, while temporomandibular joint syndrome refers to an abnormality or disorder involving the joint itself (3).

3.7.4. Disc displacement with reduction

Intracapsular biomechanical disorder involving the condyle-disc complex. In the closed mouth position, the disc is anterior to the condyle

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and is reduced when the mouth is opened. Medial and lateral displacement of the disc may be present, and clicking and popping sounds may occur with disc reduction (2,3).

3.7.5. Disc displacement with intermittent locking reduction

Closed mouth position, the disc is in the anterior position to the condyle and is reduced to the oral opening, when this is not reduced, an intermittent limited mandibular opening occurs, presenting clicking and snapping noises (2,3).

3.7.6. Disc displacement without reduction with limited opening

Closed mouth, the disc is positioned anterior to the condyle and the disc does not reduce with oral opening, persistent limited mandibular opening. Also known as “closed lock” (2,3).

3.7.7. Disc displacement without reduction without limited opening

Mouth closed, the disc position anterior to the condyle and the disc does not reduce with oral opening, it is not associated with limited opening (2,3).

Wilkes in 1990, proposed a classification to adequately standardize the pathology of internal disorders, the Wilkes classification divides temporomandibular joint disorders into five increasing stages of internal disorders, with stages I and II referring to acute and chronic reductive

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displacement of the disc, while stages III, IV and V refer to acute, subacute and chronic non-reductive displacement of the disc, respectively. Stage V mentions osteoarthritis (3,13,14).

Table 1. Wilkes classification of internal disorders of the temporomandibular joint.

Stage I	Early reduction of disc displacement, without pain or limitation, early opening click.
Stage II	Late reduction disc displacement, one or more episodes of pain, mid-to-late opening click, and transient blocks.
Stage III	Non-reducing disc displacement – acute/subacute, with multiple painful episodes, blockage, restricted mobility.
Stage IV	Non-reducing disc displacement - chronic, with increasing functional disturbance.
Stage V	Non-reducing disc displacement – chronic with osteoarthritis, crepitus, scraping, pain symptoms, restricted movement, limited function.

Fountain: Drawn from Pope (3), Dimitroulis (13) and Elledge (14).

Dimitroulis in 2013 proposed a new classification based on 5 increasing degrees of joint pathology (3, 13, 14).

Table 2. Dimitroulis classification of temporomandibular joint pathology.

Category	Clinical presentation	Image
1	Arthralgia, joint pain with limited oral opening movement	Structurally normal joint
2	Intermittent clicking associated with intermittent joint pain and locking	Disc displacement with reduction

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3	Chronic pain Closed lock	Disc displacement without reduction Disc exhibits normal contour
4	Severe joint pain, limited chewing function, reduced mouth opening	Disc degeneration, deformation and perforation. Early condylar changes.
5	Constant crepitus, mild to moderate pain, reduced masticatory function, intermittent blockage	Degenerative joint disease, end-stage disc and condyle degeneration, destructive, catastrophic.

Source: Prepared from Pope (3), Dimitroulis (13) and Elledge (14).

3.7.8. Adhesion and adhesions

Restricted mandibular movement with deflection towards the affected side on opening, adhesions secondary to joint inflammation, adhesion in the upper or lower joint space characterized by intermittent clicking (1,2).

3.7.9. Ankylosis

Most common cause of trauma, less common cause of infections or inadequate surgical treatment of the condylar area. Fibrous ankylosis, no predominant bone changes, severe limited capacity for oral opening, deviation towards the affected side. Bone ankylosis, radiographic evidence of bone proliferation, with marked deviation to the affected side (1,2).

3.7.10. Condylar subluxation/hypermobility

It represents a hypermobility disorder involving the condyle-disc complex and articular eminence. When the mouth is opened, the condyle-disc complex is placed anterior to the articular eminence, making it

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impossible for mandibular closure. Condylar hypermobility is observed in patients with Ehlers-Danlos syndrome (1,2).

The duration of the dislocation may be momentary or prolonged, when the patient can reduce the dislocation by himself it is called subluxation, when the patient needs the assistance of the doctor to reduce the dislocation and normalize mandibular movement it is known as dislocation (1,2).

3.7.11. Degenerative joint disease

Osteoarthritis, also known as degenerative joint disease, is the clinical and pathological outcome of a number of disorders and conditions characterized by joint deterioration with concomitant bony changes at the condyle and/or articular eminence, leading to pain, disability, and structural insufficiency in synovial joints. Primary osteoarthritis can be localized and generalized when three or more joint sites are involved, and is distinguished from secondary osteoarthritis, which follows a clearly defined predisposing disorder or disease (12).

Over the years, in addition to genetic background, mechanical and psychological stress has been consistently linked to pain conditions and impaired function associated with the temporomandibular joints and masticatory muscles (12).

The development of all types of degenerative diseases of the temporomandibular joint is associated with multiple etiological and risk factors, among which we can mention: trauma, functional overload, age, systemic diseases, hormonal factors (12).

Collagen genes are associated with different types of bone and cartilage dysplasias where osteoarthritis is part of the more complex phenotype. Physiologically, osteoarthritis as a disease involves the production of cytokines by cartilage, synovium and bone. Cytokines such as TNF (tumor necrosis factor), IL-1 and IL-6 are produced by chondrocytes, macrophages, T cells and osteophytes in response to tissue damage. Pro-MMPs (matrix metalloproteinase), released by synovites and

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macrophages contribute to tissue damage, T cells and B cells are recruited by the cytokine environment in the synovial fluid and contribute to local synovitis. Bone cells release several cytokines most notably IL-6 and RANKL (receptor activator of nuclear factor ligand) (2).

3.7.12. Systemic arthritis

Joint inflammation resulting in painful symptoms or structural changes caused by systemic diseases including: rheumatoid arthritis, juvenile idiopathic arthritis, spondyloarthropathies (ankylosing spondylitis, psoriatic arthritis, infectious arthritis, Reiter's syndrome), gout, autoimmune diseases and other mixed connective tissue diseases (scleroderma, Sjögren's syndrome, lupus erythematosus). Condylar resorption may be associated with malocclusion (12).

3.7.13 Osteochondritis dissecans

Joint condition in which there are osteochondral fragments, associated with pain, inflammation, joint noises and limitation of mandibular movements (3,12).

3.7.14. Osteonecrosis

This symptomatic condition, also called avascular necrosis, may involve the temporomandibular joint in patients with disc displacement without destruction. Theoretically, the anterior disc compromises extraosseous and venous blood flow to the condyle by compressing the insertion of the lateral pterygoid muscle into the mandibular condyle. Computed tomography images may show sclerosis of the subchondral bone; magnetic resonance imaging shows decreased T1 and T2 signal (12).

3.7.15. Neoplasms, tumors and similar conditions

Rare condition in the temporomandibular joint, defined as the result of tissue proliferation involving the temporomandibular joint with histological characteristics that may be benign (81%) or malignant, may

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present inflammation, pain during limited oral opening function, crepitus, occlusal changes and sensory-motor changes, facial asymmetry (12).

Synovial chondromatosis is a benign neoplasm resulting from intra-articular proliferation of cartilaginous nodules originating from the synovial membrane, it is common in other joints, its symptoms involve pain, swelling, crepitation and limited movement, diagnostic aids are computed tomography and magnetic resonance imaging, findings include widening of the joint space, joint effusion, soft tissue edema, irregular joint surfaces and multiple loose calcified bodies that resemble ossified bodies on tomography as isodense signal, loose bodies are often found in the superior joint space, causing destruction and sclerosis of the articular eminence / glenoid fossa (12).

3.7.16 Traumatic conditions

Mandibular fractures occur most frequently in motor vehicle accidents, condylar fractures represent between 25 and 50% of mandibular fractures, and are classified for study into fractures of the condylar head (extra or intracapsular) and condylar neck (high, middle and low) resulting in most cases a malocclusion and altered function. The fractured fragments are generally displaced medially by the action of the lateral pterygoid muscle. Computed tomography and three-dimensional reconstructions are useful for surgical planning and evaluation of adjacent structures (12).

3.7.17, Condylar deficiency Aplasia

Condylar deficiency includes complete or partial absence of the condyle and incomplete development of the articular fossa and eminence resulting in facial asymmetry., Common causes of aplasia include rheumatoid arthritis, juvenile idiopathic arthritis, radiation therapy

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and parathyroid hormone related processes affecting chondrocyte differentiation. Aplasia is also associated with syndromes such as Goldenhar, hemifacial microsomia, Treacher Collins syndrome, Proteus syndrome, Morquio syndrome and auriculocondylar syndrome, Agenesis is associated with external ear, auditory canal and middle and inner ear anomalies (12).

3.7.18. Hypoplasia

Incomplete development of the mandibular condyle, which may be secondary to trauma or congenital anomalies, results in facial asymmetry and micrognathia (1,2,12).

3.7.19. Hyperplasia

Exaggerated development of the mandibular condyle, with a non-neoplastic increase in cells. It usually presents unilaterally, exposing facial asymmetry. It may be idiopathic or associated with endocrine disorders. The condyle may be normal or elongated (1,2,12).

3.7.20. Myalgia

Pain of muscular origin, in masticatory muscles upon palpation or oral opening, which is affected by movement (2,12).

3.7.21. Local myalgia

Pain of muscular origin in the masseter and temporalis on palpation with localization of pain at the palpation site during myofascial examination (2,12).

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3.7.22. Myofascial pain

Pain of muscular origin that extends beyond the site of palpation, but with the limit of the muscle when examined (2,12).

3.7.23. Referred myofascial pain

Pain of muscular origin with reference to pain beyond the limit of the muscle when palpated during examination (2,12).

3.7.24. Tendinitis

Pain of tendon origin affected by jaw movement and function. Replication of this pain occurs with masticatory tendon provocation tests (2,12).

3.7.25. Myositis

Pain of muscular origin with clinical characteristics of inflammation and infection (2,12).

3.7.26. Spasm.

Sudden, involuntary, reversible tonic contraction of a muscle that can cause severe pain (2,12).

3.7.27. Contracture

Shortening of a muscle due to fibrosis of tendons, ligaments, or muscle fibers, associated with a history of radiation therapy, trauma, or infection. It is frequently observed in the masseter muscle (2,12).

3.7.28. Hypertrophy

Enlargement of one or more muscles that is generally not associated with pain and may be secondary to chronic muscle tension, genetic

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cause, diagnosis is based on clinical evaluation considering craniofacial morphology and ethnicity (14).

3.7.29. Orofacial dyskinesia

Involuntary movement that may involve the face, lips, tongue, jaw, generally in psychotic patients with prolonged treatment of antipsychotics of the phenothiazine and butyrophenone group (14).

3.7.30. Oromandibular dystonia

Characterized by strong contractions of the face, lips, jaw and tongue that cause difficulty in opening and closing the mouth, affects chewing and speech, associated with neurological disorders or exposure to medications, can affect the muscles of the neck, eyelids, larynx (2,14).

3.7.31. Fibromyalgia

Disorder characterized by generalized musculoskeletal pain, accompanied by fatigue, sleep, memory, mood (2,14).

3.7.32. Headache attributed to temporomandibular disorders

Temporomandibular disorders and headache are closely related to pathologies, primary headaches such as migraines, episodic tension or chronic daily pain are common in patients with symptoms of temporomandibular disorders, it occurs with provocation tests of the masticatory system (2,14).

3.7.33. Coronoid hyperplasia

Progressive lengthening of the coronoid process that prevents mandibular opening when it is obstructed by the zygomatic process (2,14).

Recognizing the causes of pain and dysfunction associated with temporomandibular disorders is important for guiding treatment decisions. Systemic considerations may be associated with the etiology of temporomandibular disorders; these are not commonly considered by

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clinicians but can be assessed by most specialists. Relevant information from the patient at the time of history-taking is also limited, and it is considered irrelevant to not mention them unless specifically requested (4).

The most important part of diagnosing temporomandibular disorders is differentiating common diseases from clinically significant but unusual conditions, as well as conditions that are more serious and require urgent attention. This is the case with neoplasms, such as chondrosarcoma of the temporomandibular joint, a malignant lesion that may initially share signs and symptoms with some of the common diagnoses of temporomandibular disorders, such as pain in the preauricular region and limited mouth opening. Another example that requires urgent attention is temporal arteritis, which is an inflammatory condition of the temporal vessels with some symptoms similar to those of temporomandibular disorders, such as headache, pain in the temporal region, and limited mouth opening. However, temporal arteritis is a medical emergency that can cause permanent blindness if not treated promptly (14). Some of the differential diagnoses for orofacial pain that can mimic temporomandibular disorders are mentioned below in Table 3.

Table 3. Differential diagnoses of temporomandibular joint disorders

Neuropathic pain	Trigeminal neuralgia
	Glossopharyngeal neuralgia
	Postherpetic neuralgia
	Traumatic neuralgia
	Burning mouth syndrome
	Burning mouth syndrome
	Atypical odontalgia
	Atypical facial pain

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Odontogenic pain	Dental caries
	Periodontal disease
	Dental abscess
	Dental sensitivity
	Cracked tooth syndrome
	Pericoronitis
Intracranial pain	Tumors
	Aneurysms
	Bleeding
	Infection
Pain attributed to adjacent structures	Ear
	Nose
	Throat
	Eyes
	Paranasal sinuses
	Salivary glands
	Lymph nodes
	Cervical region
Headaches not attributed to temporomandibular disorders	Migraine
	Cluster headaches
	Tension headaches
	Temporal arteritis
	Referred pain
	Psychogenic pain

Source: Prepared from Elledge (14)

3.8. Normal posture

When conceptualizing posture, it cannot be seen as a static action. According to Andrade, in 2016, a normal posture is "one where a minimum of energy expenditure is required. The joints receive a minimum load and the muscular kinematic chains remain aligned" (15). During the process

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of species evolution, the human species has differentiated itself by the acquisition of new brain structures, with greater cortical representations due to the functions of its hands in gripping and activities they perform together. Therefore, it had to adopt the bipedal position, giving rise to the intervention of gravity, generating structural changes, adapting and obtaining the human posture. Significant changes are observed in the physiological curvatures of the spine, such as: kyphosis and lordosis (15).

To maintain a static position requires certain elements such as muscular reflexes that maintain the joints of the body and dynamic posture other elements are found. The physiological posture in a static position is acquired through muscular reflexes that fix the joints of the human body, while in a dynamic process there are several factors that provide an adequate posture, such as proprioceptive receptors, exteroceptives that include vision, hearing, touch and the central nervous system (16).

To adapt to posture, there are the following models: Biomechanical, Psychosomatic and Neurophysiological or cybernetic. The neurophysiological theory is the most obvious, since it implies that posture needs information received from various input and output receptor systems such as: vestibular, oculomotor, pedal input and the stomagnatic apparatus, which through the central nervous system achieves correction of posture, balance and tone (16).

The correct posture can be evaluated in a simple and effective way by examining the plumb line, which is just a rope with a plumb line at the end to keep it stable, which should reach the base of the feet, this being the reference point, to do this the plumb line is placed suspended on the patient and viewed from the back, where the feet are parallel in relation to the rope and laterally the plumb line should go in front of the lateral malleolus (17).

According to Kendall et al (17), in the correct posture they can be observed with the following parameters:

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3.8.1. Side view:

- Neutral head, without inclinations,
- Posterior to the coronal suture
- External auditory canal
- Odontoid process of the axis
- The spine must maintain its physiological curvatures,
- Flat scapula in relation to the upper back
- Sacral promontory
- The hip and knee joint must be in extension,
- The ankle joint should be at 90 degrees.

3.8.2. Rear view:

- Head aligned, neutral position
- Midline of the head
- The spinous processes of the spine must be aligned
- Shoulders should be aligned, neither too depressed nor too raised.
- The shoulder blades should be equidistant from each other, 8 cm apart.
- Lower limbs parallel as well as the feet, without deviations.

3.8.3. Previous view:

- Head aligned in neutral position
- Facial symmetry
- Straight shoulders in relation to each other
- Parallel knees
- Feet on the floor and parallel.

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Correct posture is influenced by antigravity muscular forces and gravity, therefore, the force of gravity that influences the body must be balanced by the muscles that have the function of opposing this force and maintaining balance. Each individual will have unique characteristics, defined by muscle tone and trophism, the condition of ligaments, and bone surfaces (18).

3.8.4. Normal curves of the spine

There are four normal or physiological curvatures in the spine: at the cervical region, a convex curve pointing forward is observed; in the dorsal region, a convex curve pointing backward; and in the lumbar region, this curve is convex forward. When the lumbar spine is in a normal position, it corresponds to a neutral spine (17).

3.8.5. Abnormal posture

Considering the normal curves of the spine, there may be abnormal curves that cause incorrect posture. According to Kendall (17), the following stand out:

3.8.5.1. Kyphotic posture , observed from the sagittal plane we will find: head directed forward, with the cervical spine hyperextended, abducted scapulae, dorsal spine with increased kyphosis, lumbar region with hyperextension, forward tilt of the pelvis and hip in flexion, at the level of knees they are hyperextended and ankles in plantar flexion.

3.8.5.2. Lordotic posture , observed from a sagittal plane: the head is in a neutral position, the cervical and dorsal spine are normal, however, in the lumbar spine there is hyperlordosis, that is, it is hyperextended, the pelvis is observed with anterior inclination,

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knees in slight hyperextension and the ankle in slight plantar flexion.

3.8.5.3. Flattened posture, examined in a sagittal plane, we can observe: that the head is forward, cervical spine in extension, upper dorsal spine in hyperflexion and the lower spine straight, the lumbar curve is rectified, in posterior inclination we can see the pelvis, hips and knees in extension and the ankles in slight plantar flexion.

Another anomaly seen from the coronal plane, from the back are the deviations or lateralized postures of the spine that could be muscular alterations, which lead to the column convexity of this, leading the hip and its analogous structure to change its normality; There are also alterations where changes are observed at the level of shoulders where the head can be aligned, but what corresponds to the shoulder joint from the scapulas are elevated or rotated. Alterations in postures are observed, the patterns related to the predominance of the use of a limb, in the case of a person who uses his right hand, it can be noticed that the right shoulder is lower than the left, the pelvis is deviated to the right and the right hip is higher than the left, with a slight deviation of the spine, this predominance can occur from a very young age in the individual (17).

Likewise, the curvatures observed from the frontal plane that are lateralized are abnormal (17), this very common dysfunction that alters the anatomy of the spine is scoliosis, which is where the spine presents lateral displacements where the vertebrae are rotated, whose diagnosis is in the coronal plane (16).

3.9. Relationship between craniocervical dysfunction and temporomandibular disorders

Due to its joint relationships, the posture of the head influences the position of the cervical spine, and an alteration in this can cause occlusion

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problems. Considering that the first cervical vertebra (atlas) joins the head through the articular condyles of the occipital, in addition to a large number of muscular insertions that connect between both structures. When the head is in a straight position, the jaw is at rest and there is between 2 and 4 mm of disocclusion. When there is an alteration in the occlusion, it will directly affect the Temporomandibular Joint (TMJ) (19).

Craniocervical dysfunction (CHD) is an anomaly in which the head is positioned forward with respect to the axial axis of the body. It is accompanied by symptoms such as cervical pain due to the excessive force exerted by the cervical muscles in their effort to maintain the balance of the head, causing limitation of movements and postural changes (20). CHD can arise from bad posture habits such as excessive use of mobile devices, mouth breathing, in the latter case, when there is mouth breathing the jaw descends and causes a decrease in the tension of the suprahyoid muscles, causing the hyoid to be positioned more backward and downward (21).

Some of the clinical characteristics presented by patients with DCC are: a reduction of the suboccipital, posterior cervical, upper trapezius and splenius muscles; hyperextension of the cervical spine, forward shoulders, loss of control of the shoulder blade and alterations in the head and neck muscles (21).

Due to the anatomical relationship of the structures of the craniocervical-mandibular system, in most cases patients with CCD also present temporomandibular disorders (TMD). Bautista et al. (20) evaluated 87 participants with TMD, resulting in 69% presenting CCD.

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TMD has a multifactorial etiology. A relevant factor is that the function of the masticatory muscles influences the transverse growth of the craniofacial skeleton in the areas where they exert their direct action, as well as in areas of the arch where the molars are erupting (22).

On the other hand, if there is a physiological curvature of the cervical spine, it will be rectified or inverted, due to tension in the cervical fascia that is fixed to the hyoid bone, which causes a posterior traction of the latter. The aforementioned results in a lowering of the normal position of the tongue and jaw (19).

4. Conclusions

The temporomandibular joint is a bilateral synovial joint between the mandibular condyle and the mandibular fossa of the temporal bone, its complex anatomy is characterized by highly incongruent skeletal surfaces which are therefore separated by a fibrocartilaginous disc into two independent chambers: the superior temporodiscal space and the inferior condylar disc space respectively.

The position of the head influences the position of the cervical spine, and any alteration in this position can cause occlusion problems. Abnormal cervical postures include: kyphotic posture, lordotic posture, and flattened posture.

Craniocervical dysfunction (CHD) is an anomaly in which the head is positioned forward with respect to the axial axis of the body.

Due to the anatomical relationship of the structures of the cranio-cervical-mandibular system , in most cases patients with DCC also present temporomandibular disorders.

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5. Contribution of the authors

MDOS : Introduction, development and final review of the article
KLCG : development and final revision of the article
AMUV : development and final review of the article
LESP : methodology, development and final review of the article.
MGCR : development and final review of the article.

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Plasmacytoid dendritic cell leukemia - case study and diagnosis

Leucemia de células dendríticas plasmocitoides - estudio y diagnóstico de un caso

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Abstract

Plasmacytoid dendritic cell leukemia (pDCL) is a rare and aggressive neoplasm that affects the skin, lymph nodes, and may spread to the bone marrow. Recognized by the WHO as a distinct entity since 2016, it has a median survival of 12 to 16 months. Although sometimes associated with Epstein-Barr virus and HIV, its exact etiology remains uncertain. Genetic characteristics include deletions in chromosomes 4, 9, and 13, and overexpression of oncogenes.

The case study describes a 49-year-old patient with a history of type 2 diabetes mellitus who presented with symptoms of leukopenia, neutropenia, and thrombocytopenia. Agranulocytosis was initially suspected, but subsequent tests confirmed plasmacytoid dendritic cell leukemia and its progression.
Keywords: Leukemia, Cells, Dendritics, Case Reports

Resumen

La leucemia de células dendríticas plasmacitoides (pDCL) es una forma rara y agresiva de cáncer que afecta la piel y los ganglios linfáticos y puede extenderse a la médula ósea. Desde 2016 la OMS la reconoce como una entidad independiente, con una expectativa de vida media de 12 a 16 meses. Aunque a veces se relaciona con los virus Epstein-Barr y VIH, su causa exacta sigue siendo desconocida. Genéticamente se caracteriza por deleciones en los cromosomas 4, 9 y 13, y la sobreextensión de oncogenes

El caso clínico describe a un hombre de 49 años con diabetes mellitus tipo 2 que presentó síntomas de leucopenia, neutropenia y plaquetopenia. Inicialmente se sospechó de agranulocitosis, pero las pruebas confirmaron leucemia de células dendríticas plasmocitoides y su progresión.
Palabras clave: Leucemia, Células, Dendríticas, mieloide aguda, neoplasia maligna

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1 Introduction

Blastic plasmacytoid dendritic cell neoplasia (BDPCN) is a malignant disease whose precursor is the plasmacytoid dendritic cell (PDC). It is characterized by affecting the skin and lymph nodes, although it can evolve to a disseminated form and infiltrate the bone marrow. Initially classified as acute myeloid leukemia (AML), the World Health Organization (WHO) recognized it as an independent entity in 2016. This neoplasia is distinguished by its aggressive behavior, rapid systemic dissemination, and a median survival of 12 to 16 months. Its incidence is low, representing less than 1% of malignant neoplasms, and is more common in men than women, with a ratio of 3:1, predominating in the sixth decade of life; however, there are case studies in patients under 40 years of age (1,2).

The etiology of NBCDP is not well defined. Although it has been associated with Epstein-Barr virus (EBV) and human immunodeficiency virus (HIV), studies have not established a clear correlation. At the molecular level, this neoplasia presents deletions in chromosomes 4 (4q34), 9 (9p13-p11 and 9q12-q34) and 13 (13q12-q31), which contain several tumor suppressor genes with low expression of Rb1 and LATS2, in addition to high levels of oncogenes (HES, RUNX2, FTL3) without association with amplification (2).

The typical clinical picture of NBCDP includes skin lesions, lymphadenopathy, and organomegaly, consistent with the descriptions in this report. Skin lesions vary in size, shape, and color and may present as tumors, nodules, and plaques, generally affecting the face, trunk, and extremities (2,3).

Since NBCDP shares several common clinical and diagnostic features with acute leukemias and aggressive T-cell lymphomas, differential diagnosis is challenging and requires a thorough workup, in particular the detection of the defining immunophenotype is essential (3).

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Diagnosis requires extensive immunophenotypic analysis due to overlap with other neoplasms, in addition to clinical and histopathological correlation. There is no standardized treatment; however, improved outcomes have been observed in patients treated with a regimen similar to that for acute lymphocytic leukemia and consolidation with allogeneic transplantation (4).

2 Clinical case

A 49-year-old married man, a driver from Azogues and resident in Cuenca, with a secondary education, presented a history of type 2 diabetes mellitus treated with metformin and two episodes of COVID-19. He also had a family history of type 2 diabetes mellitus in his parents and siblings. He initially presented with lower back pain associated with colitis and intolerance to dairy and citrus fruits. These symptoms persisted, leading him to seek medical attention due to persistent lower back pain and food intolerance, which prompted additional testing.

During the consultation, her vital signs were: temperature of 36 degrees Celsius, heart rate of 80 beats per minute, respiratory rate of 20 breaths per minute, blood pressure of 120/76 mmHg, oxygen saturation of 88%, and capillary blood glucose of 444 mg/dL. Physical examination revealed a poor general appearance and edema of the right lower extremity with petechiae.

Initial blood tests revealed leukopenia, neutropenia, and low platelet count, while imaging studies appeared normal. Agranulocytosis was initially suspected, but the neutropenia persisted and became severe, prompting a bone marrow aspiration and biopsy (bone marrow analysis and immunophenotype). Preliminary results showed 48% myeloid blasts, suggesting possible acute leukemia. After repeat testing, the diagnosis of acute myeloblastic leukemia was confirmed, and chemotherapy was prescribed, managing pegfilgrastim (6 mg subcutaneous).

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The patient's progress was unfavorable, with petechiae on the lower extremities and intermittent fever, suggesting infection. Blood tests showed a leukocytosis of 81,050 and a hemoglobin of 8.1 mg/dL. An abdominal CT scan revealed an abdominal collection with upper intestinal obstruction, leading to a total colectomy with ileostomy. The patient's progress continued unfavorably, developing septic and hypovolemic shock with acute renal failure, and he died four months after diagnosis.

3 Analysis

Myelodysplastic syndromes (MDS) are clonal diseases of the bone marrow characterized by ineffective hematopoiesis, presenting as morphological dysplasia of the hematopoietic elements and peripheral cytopenias, with a high risk of progressing to acute leukemia in the future (5).

This condition is more common in patients who have received chemotherapy, radiation therapy, or both. In some cases, patients are asymptomatic, and diagnosis is made through a complete blood count or bone marrow examination, which may reveal anemia, thrombocytopenia, pancytopenia, and neutropenia (5).

Most patients present with signs and symptoms related to cytopenias, such as pallor, epistaxis, hematochezia, hematuria, bruising, and petechiae (6).

A group of clonal hematopoietic stem cell disorders, the myelodysplastic syndromes, are characterized by the presence of multiple hematopoietic stem cell mutations, most frequently in genes involved in RNA splicing (7,8).

The following chart describes the progression of hematopoietic stem cell disorders, focusing on myelodysplastic syndromes and their progression to leukemia. Its contents are detailed below:

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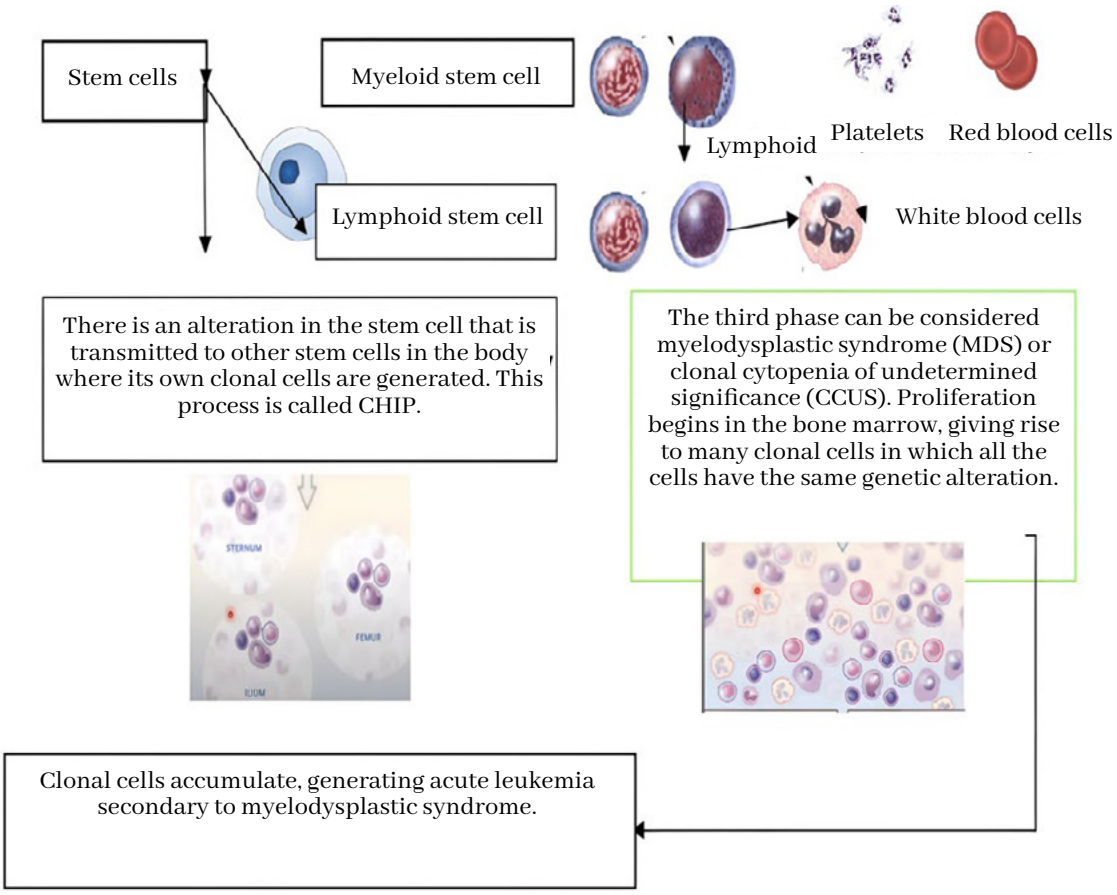
Figure 1



Pathophysiology of leukemia. Prepared by: Dután I, González C, Matute N, Rodríguez A.

Myelodysplastic syndromes (MDS) according to their morphological and genetic characteristics. It includes subtypes such as those with dysplasia of one or more cell lines, ring sideroblasts, isolated deletion of chromosome 5, and refractory anemia with excess blasts (types I and II). Unclassifiable variants and those with myeloproliferative characteristics, such as chronic myelomonocytic leukemia, are also described. This classification allows for diagnosis and prognosis in patients with MDS, as shown below:

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Table 1: Classification of myelodysplastic syndrome

TYPE OF MDs
MDs with single-line dysplasia
MDs with multilineage dysplasia
MDs syndrome with ring sideroblasts • with single-line dysplasia • with multiline dysplasia
MDs with isolated detection of chromosome 5
Refractory anemia with excess blasts • Type I • Type II
Unclassifiable MDs
Myelodysplastic/myeloproliferative syndrome
Chronic myelomonocytic leukemia • Type 0 • Type I • Type II

Discussion

Among the main differential diagnoses are acute acute myeloid leukemia (AML) with monocytic differentiation, chronic myelomonocytic leukemia, nasal type extranodal NK T-cell lymphoma, and panniculitic T-cell lymphoma (9).

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Differentiating between a**cute myeloid leukemia (AML) and** plasmacytoid dendritic cell leukemia (pDCL) requires an assessment of clinical, immunophenotypic, morphological, and genetic characteristics. Clinically, both AML and pDCL present similar symptoms, including fever, fatigue, cachexia, and cytopenias, which may be due to bone marrow infiltration by malignant cells. pDCL is usually associated with skin lesions, hepatomegaly, and lymphadenopathy (10).

Morphologically, acute myeloid leukemia cells have Auer bodies, whereas pDCL cells lack them. In AML, leukemic cells display myeloid markers such as CD13, CD33, CD117, and MPO (myeloperoxidase). In contrast, pDCL displays an immunophenotypic profile with expression of CD4, CD56, CD123, and certain specific markers BDCA-2 and TCL1 (10,11).

Nasal-type extranodal NK/T-cell lymphoma occurs predominantly in and around the nose, but can also affect other parts of the body. It is associated with Epstein-Barr virus (EBV) infection. Histologically, it has an angiocentric and angioinvasive pattern with a wide area of necrosis. Plasmacytoid dendritic cell leukemia can present with systemic symptoms and cutaneous involvement and is not usually limited to a specific region such as the nose. The patient's clinical presentation is also useful, since NK/T-cell lymphoma is characterized by nasal symptoms and obstructive masses, whereas dendritic cell leukemia does not show this pattern (12).

To differentiate between a panniculitis T-cell lymphoma (PPCTL) and a (pDCL) a complex evaluation must be made regarding its clinical presentation and some morphological characteristics (13).

LPCTL presents with subcutaneous skin lesions resembling panniculitis, primarily affecting the extremities. Histologically, there is an infiltrate of atypical lymphocytes in the subcutaneous tissue, with adipocyte necrosis and cytoskeletal formation. Lymphocytes in LPCTL display T cell markers such as CD3, CD4, or CD8, and a loss of markers found in normal T cells. Furthermore, they may express cytotoxicity, as evidenced by the expression of granzyme B, perforin, and TIA-1 (14).

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Blastic plasmacytoid dendritic cell neoplasia (BPDCN) is a rare entity characterized by the malignant proliferation of a blastic plasmacytoid dendritic cell. The true incidence of this disease is unknown due to its rarity and the difficulty of diagnosis (2).

In most patients, the condition presents with cutaneous plaques or nodules of variable size, shape, and color, primarily affecting the extremities, trunk, and face; progressing to bone marrow involvement (90%). Extracutaneous involvement is common and includes regional lymph nodes (40%–50%), splenomegaly (44%), and hepatomegaly (42%) (15).

In this particular case study, the patient presented for colitis. A physical examination revealed multiple purple spots on the trunk and lower extremities. A complete blood count revealed severe cytopenias with markedly decreased cellular and immunological immunity. He was referred to the hematology department, where a PAMO (Molecular Biology Report) was performed, confirming the condition.

Pemmaraju et al. (14), in their research emphasizes the heterogeneous nature of the disease, where patients may initially present with skin lesions, followed by progression to a systemic disease. In addition, Sánchez E (18), in his case analysis, agrees with the other authors about the presence of skin manifestations as an initial sign of this neoplasia, as it was in the patient in our study.

However, Pemmaraju et al. (14) contrast the above by indicating that in a significant group of patients, skin lesions may be absent or minimal, which complicates the initial diagnosis and delays therapeutic intervention. This aspect underlines the importance of a high clinical suspicion and the need for exhaustive immunophenotypic studies in any case of unexplained cytopenia or systemic symptoms that could be associated with BPDCN (14).

Flores-Angulo et al (1) highlight that the diagnosis of BPDCN is based on the identification of specific immunophenotypic markers, such as CD123, CD4, and CD56, through flow cytometry. These markers are

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critical for differentiating BPDCN from other hematologic malignancies, given that clinical manifestations may be nonspecific or shared with other diseases. In their reported case, the combination of histologic and immunophenotyping studies was key to establishing the definitive diagnosis. On the other hand, in the article by Avilés et al (2), the relevance of an early diagnosis to improve the patient's prognosis is emphasized. They underline that the diagnosis is often difficult due to the rarity of the disease and the lack of familiarity of many clinicians with BPDCN. Avilés et al (2) also mention that confirmation of the diagnosis often requires collaboration between hematologists, dermatologists, and pathologists, given that BPDCN can present characteristics that affect multiple systems, something that was also necessary in the case we are analyzing.

For their part, the article by Martini M, Russo V, and Fabbri A (13), in Annali dell'Istituto Superiore di Sanità (Italy) offers an in-depth insight into plasmacytoid dendritic cell leukemia, focusing on the molecular and biological aspects of the disease, unlike other studies that tend to focus on clinical aspects or specific case reports. While the Italian article provides a detailed perspective on the pathogenetic mechanisms of BPDCN and its implications for diagnosis and treatment, Spanish studies such as those by Flores-Angulo et al. and Avilés et al. present more practical approaches focused on clinical cases and management in local contexts due to limited access to resources and technology.

Regarding treatment, Pemmaraju and Kantarjian (14) focus more on clinical innovations such as the use of tagraxofusp and other targeted therapeutic approaches that have demonstrated efficacy in clinical practice. These investigations provide insight into how therapies based on the latest advances are applied in the real-world management of BPDCN. While Martini et al (13) lays the groundwork for future research and potential treatments by unraveling the molecular mechanisms, providing a detailed insight into them; which is crucial for the development of new therapeutic strategies.

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Currently in Latin America in Chile, although NBCDP may initially appear as a localized cutaneous tumor, an aggressive treatment could be considered initially, including allogeneic hematopoietic progenitor cell transplantation (TAloCPH); considered the best option during the first complete remission, increasing overall survival and disease-free survival, without relapses within the first 27 months (2). In the studies conducted by Avilés et al (2), the use of HiperCVAD followed by TAloCPH with a mean follow-up of 14.6 months. At the time of the study, the first patient had died with disease, the second was in documented relapse in skin and bone marrow, and the third was alive with no evidence of neoplastic disease, demonstrating that the treatment received was not optimal for the patients (15).

5. Treatment

Treatment of dendritic cell leukemia, especially in cases of blastic plasmacytoid dendritic cell leukemia (BPDCN), usually includes: High-intensity chemotherapy with Hyper-CVAD regimens (cyclophosphamide, vincristine, doxorubicin, and dexamethasone), is essential to rapidly reduce the disease burden (16).

Tagraxofusp-erzs (SL-401) immunotherapy, a CD123-targeted agent, has been approved for the treatment of BPDCN. This agent binds to the CD123 receptor and delivers a toxin that kills cancer cells (17).

Other treatment alternatives include Hematopoietic Stem Cell Transplantation (HSCT), which seeks to replace diseased bone marrow with healthy hematopoietic stem cells from the donor, providing an opportunity for a potential cure (18).

To date, in our country there is not enough evidence on what is the best treatment, due to the lack of schemes for the management of this atypical neoplasia, however, it has been assured that the combination of

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conventional chemotherapy based mainly on the Hyper-CVAD scheme, together with adequate monitoring, prolongs survival (19).

As for the patient in our study, he was treated with two cycles of Pegfilgrastim with the aim of achieving an antineoplastic and immunomodulatory effect among other effects. He was also scheduled for HyperCVAD, which he received until his death (20).

6 Conclusions

Plasmacytoid dendritic cell leukemia (pDCL) is a rare and aggressive hematological malignancy that presents a significant challenge in both diagnosis and treatment. The described case study reveals the complexity of the disease, highlighting the need for a multidisciplinary approach to its management. Despite receiving appropriate medical care and aggressive treatment with chemotherapy, a Hyper-CVAD regimen, and pegfilgrastim, the patient showed an unfavorable clinical course, culminating in severe complications and a negative outcome. This case underscores the difficulty in early diagnosis and the urgent need for more effective and personalized treatments to improve the prognosis of patients with pDCL.

The diagnostic approach to plasmacytoid dendritic cell leukemia should be comprehensive and include a broad spectrum of immunophenotypic and genetic testing to differentiate it from other myeloid neoplasms and lymphomas. The lack of standardized treatment and the limited efficacy of current regimens highlight the need for continued research. The incorporation of new targeted therapies and improved understanding of disease biology could offer hope for improved management and potential improvements in survival for patients affected by this extremely rare and challenging neoplasm.

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7. Contribution of the authors

PF: Data collection, analysis of results, discussion, final review of the article.
ID: Data collection, analysis of results, discussion, final review of the article.
CG: Data collection, analysis of results, discussion, final review of the article.
AR: Data collection, analysis of results, discussion, final review of the article.
NM: Data collection, analysis of results, discussion, final review of the article.

8.- Approval of the ethics committee and consent to participate in the study

Interventional studies involving animals and humans, and other research requiring ethics committee approval, must state the authority/ institution that approved the study and provided the code of ethics.

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Bullying assessment tools in prevention and intervention programs in Latin America

Instrumentos de evaluación del acoso escolar en programas de prevención e intervención en Latinoamérica

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Summary

Bullying and cyberbullying are challenging situations for health systems worldwide; assessment is a necessary mechanism for establishing diagnoses and guiding interventions. The objective of this study was to identify the assessment tools used in bullying and cyberbullying prevention or intervention programs implemented in Latin America with primary and secondary school students. A search was conducted for articles (Spanish and English) published in the last 20 years (2004–2024) in the databases PubMed, Web of Science, Scielo, and Scopus. Twelve articles were included, indicating that the instruments used assess dimensions such as victimization, perpetration, justification of bullying, and prosocial behavior, as well as the roles in which students are immersed. The reliability and validity of the instruments are discussed, and the development and validation of robust and culturally sensitive tools is suggested.
Keywords: Bullying; assessment; childhood; adolescence.

Resumen

El bullying y ciberbullying son situaciones desafiantes para los sistemas de salud a nivel mundial; la evaluación se constituye en un mecanismo necesario para establecer diagnósticos y orientar las intervenciones. El objetivo de este trabajo fue identificar las herramientas de evaluación utilizadas en programas de prevención o intervención frente al acoso escolar y ciberacoso que se implementaron en Latinoamérica con estudiantes de primaria y secundaria. Se desarrolló una búsqueda de artículos (español e inglés) publicados en los últimos 20 años (2004-2024) en las bases de datos PubMed, Web of Science, Scielo y Scopus. Se incluyeron 12 artículos, que permiten señalar que los instrumentos aplicados evalúan dimensiones como victimización, perpetración, justificación del acoso escolar y comportamiento prosocial, así como los roles en los que están inmersos los estudiantes. Se discute sobre la confiabilidad y validez de los instrumentos, y se sugiere el desarrollo y validación de herramientas robustas y culturalmente sensibles.
Palabras clave: Acoso; evaluación; infancia; adolescencia.

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1. Introduction

Bullying and cyberbullying are phenomena that, due to their proliferation, are positioned as challenging situations for health systems worldwide (Páez et al., 2020; Gómez Tabares and Correa Duque, 2022). In fact, in Latin America, according to Herrera-López et al. (2018), the prevalence of bullying is approximately 29% and that of cyberbullying would fluctuate between 2% and 42%. In Cuenca, Ecuador, it was found that 28.3% of students were victims of bullying, of which 20.7% were victims of bullying, 4.3% were cybervictims, and 3.4% were victims of both bullying and cyberbullying (Ordóñez-Ordóñez and Prado, 2019). In this situation, Avilés-Martínez (2013) refers to the importance of evaluation as a mechanism to establish diagnoses in terms of quality and quantity of bullying and cyberbullying, but also as a method to design effective and efficient interventions for these problems.

Bullying is conceptualized as a set of aggressive behaviors, carried out intentionally and repeatedly, based on an imbalance of power (real or perceived) between the victim and the perpetrator (Olweus, 1998, 2007). This problem also represents a breach of ethics, as it involves breaking established social norms (Ortega, 2020). Cyberbullying is an indirect variant of bullying (Smith et al., 2008) that develops through the repeated and premeditated transmission of hostile messages through digital tools (Dennehy et al., 2020; Tokunaga, 2010). Among the most common forms of cyberbullying are messages, calls and emails, as well as offensive posts on digital social platforms, which are intended to intimidate and humiliate the victim, who usually shares the same school environment with the bully (Cedillo-Ramírez, 2020).

Given this situation, different assessment methods have been developed to determine the frequency, duration, and intensity of this type of violence (Lucas-Molina et al., 2016), as well as to identify the characteristics of the students involved, the context in which it occurs,

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and the psychological consequences of in-person or virtual bullying (Avilés-Martínez, 2013). Among other tools, interviews, questionnaires, checklists, focus groups, and individual or collective scales have been identified (Vera-Giraldo et al., 2017). However, the most commonly used instruments are self-report inventories, psychometric instruments, and behavioral observation (Gutiérrez-Ángel, 2019).

According to Pereira-Gallindo (2014), the diversity of available tools can generate anxiety in professionals responsible for assessing bullying, whether in person or online, when selecting the most appropriate method. In this sense, the objective of this work was to identify the assessment tools used in bullying and cyberbullying prevention or intervention programs implemented in Latin America with primary and secondary school students. This document may be relevant for teachers, psychologists, researchers, and governmental and non-governmental organizations involved in educational issues, as well as in promoting healthy school coexistence and positive relationships between children and adolescents.

2. Methodology

This manuscript is based on a systematic review of prevention and intervention programs for online and in-person bullying. A search was conducted for articles (Spanish and English) published in the last 20 years (2004–2024) in the databases PubMed, Web of Science, Scielo, and Scopus. The terms *bullying, cyberbullying, virtual bullying, intervention, program, prevention,* and their English translations were used for this search, applying the Boolean operators OR and AND in the search protocol.

In this context, articles were selected that included interventions or programs targeting bullying in primary and secondary school students, ranging in age from 5 to 19 years, and that evaluated their effectiveness through group comparisons (experimental and control) or pre- and post-test analysis. Studies conducted outside of Latin America were discarded.

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In total, 396 articles were identified; after eliminating 43 duplicates and reviewing titles and abstracts, an additional 315 studies were excluded. Finally, 38 full articles were analyzed, of which 26 were discarded, leaving 12 for the final review (see Figure 1).

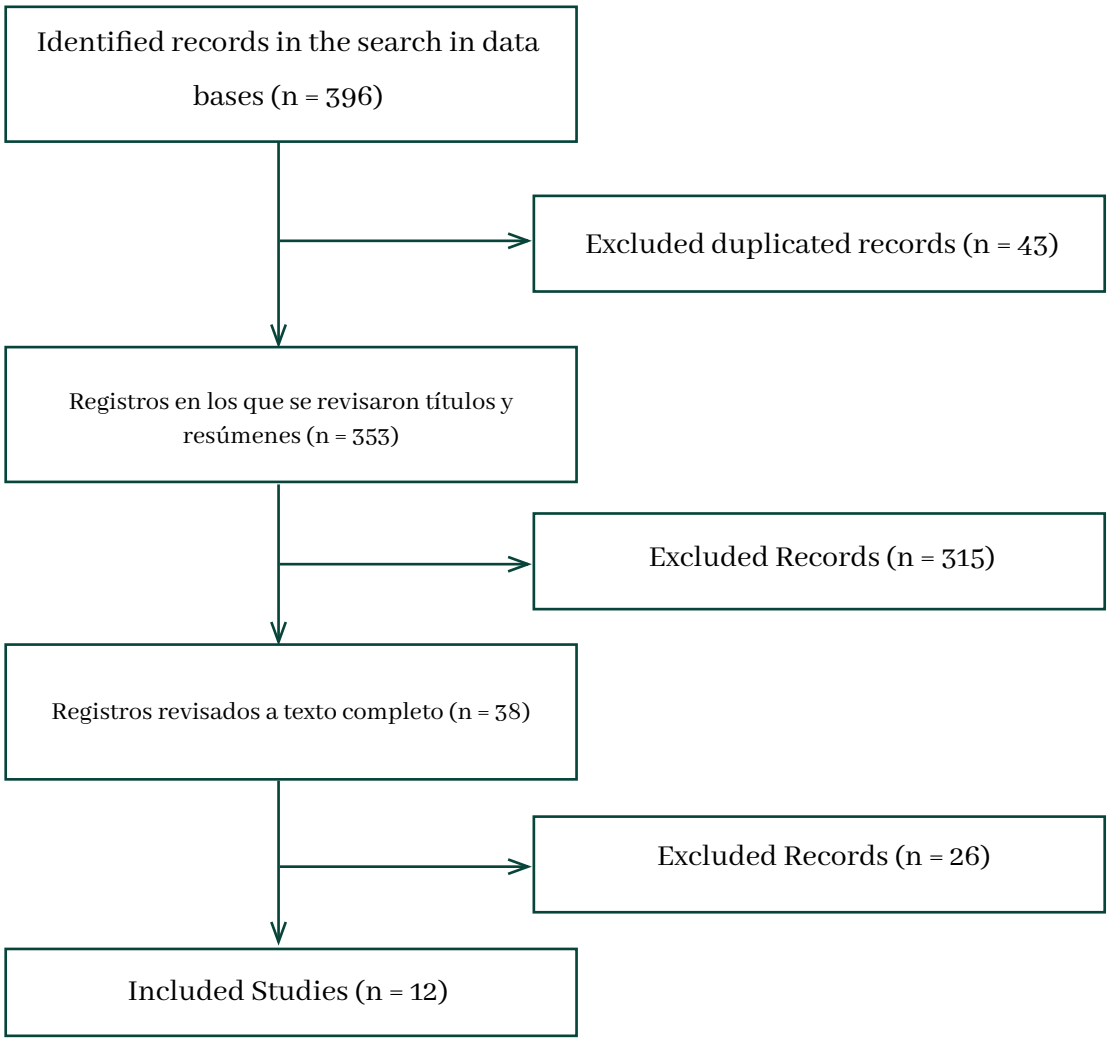

Figure 1: Flowchart of the search and selection process.
Source: Own elaboration, 2024

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3. Development

Before presenting the results, it is important to note that five of the included studies were conducted in Brazil, three in Mexico, three in Chile, and one in Peru. A brief description of the instruments used to assess bullying in the included prevention or intervention programs follows (Table 1).

3.1. Links program

Pérez et al. (2013) used the *Secondary School Questionnaire on Peer Abuse due to Abuse of Power* , which evaluates four dimensions, namely: Witness of Bullying, consisting of 18 questions with a range of results ranging from 18 to 72 points, reporting a Cronbach's alpha of 0.80; Victim of Bullying, consisting of 12 questions, with a range of results from 12 to 49 points and a Cronbach's alpha of 0.72; Aggressor-Victim of Bullying, consisting of 10 questions, with a range of results ranging from 13 to 52 points and a Cronbach's alpha of 0.22; and, Bullying Aggressor, consisting of 9 questions with results ranging from 9 to 36 points and a Cronbach's alpha of 0.46; the authors indicate that there is a positive correlation between the score and the presence of bullying.

They also applied the *Internet Experiences Questionnaire* adapted to the Chilean context by Lecannelier et al. (2011). The instrument consists of 28 questions and assesses the presence of in-person or virtual bullying. For the research, they used nine questions to identify students who were victims of cyberbullying; they did not report the Cronbach's alpha for the instrument. Furthermore, they implemented the intervention program with a population of students ranging in age from 9 to 18 years (Pérez et al., 2013).

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3.2. Violence Zero Note

In this research, they used the revised version for teachers of *The School Violence Scale* developed by Stelko-Pereira and Williams (2013). The instrument is composed of the following subscales: frequency of victimization used by students, with a Cronbach's alpha of 0.85; severity of victimization used by students, with a Cronbach's alpha of 0.78; knowledge of student victimization by other students, with a Cronbach's alpha of 0.90; and, risk behaviors by students, with a Cronbach's alpha of 0.89 (Stelko-Pereira and de Albuquerque, 2016).

They also administered the revised student version of the *School Violence Scale* (Stelko-Pereira, Williams, & Freitas, 2010). The instrument consists of 5-point Likert-type questions and four subscales. The first assesses student victimization by other students and is composed of two factors: 1) the frequency of physical (two items, $\alpha = 0.64$), psychological (two items, $\alpha = 0.63$), and property (two items, $\alpha = 0.64$) violence; and 2) the severity of the physical (three items, $\alpha = 0.80$) and psychological (four items, $\alpha = 0.70$) violence episodes. The second assesses student victimization by school employees and presents two factors: 1) interpersonal victimization (four items, $\alpha = 0.72$) and 2) property damage (two items, $\alpha = 0.71$) (Stelko-Pereira and de Albuquerque, 2016).

The third scale focuses on violence perpetrated by another student and is composed of three factors: 1) perpetration of physical violence (six items, $\alpha = 0.83$), non-physical violence (five items, $\alpha = 0.71$), and virtual violence (two items, $\alpha = 0.5$). The last scale investigates students' risk behaviors (five items, $\alpha = 0.81$). The study was conducted with students and teachers from sixth to ninth grade (Stelko-Pereira and de Albuquerque, 2016).

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3.3. Emotional competencies program

Martínez-Vilchis et al. (2018) applied an adapted version of the *Cyberbullying Questionnaire* (*CBQ*) *to the Mexican population*. This question consists of 33 questions answered on a Likert-type scale and allows for the evaluation of three dimensions: victimization with 14 items (α = 0.93), perpetration with 14 items (α = 0.80), and justification with 5 items (α = 0.89). The victimization and perpetration dimensions assess the frequency with which cyberbullying situations were experienced or carried out. The population with which they implemented the program consisted of students aged 15 to 17 (Martínez-Vilchis et al., 2018).

3.4. Cyber coexistence program (Pozas et al., 2018)

Pozas et al. (2018) conducted their research with students aged 15 to 18, to whom they applied an adapted version of the *Cyberbullying Questionnaire* (*CBQ*) (Gámez-Guadix et al., 2014). The version they applied consisted of 33 questions with answers on a Likert-type scale and allowed them to evaluate three dimensions, which are: victimization with 14 items (α = 0.939), perpetration with 14 items (α = 0.801), and justification with 5 items (α = 0.895) (Pozas et al., 2018).

3.5. #Tamojunto

Gusmões et al. (2018) developed a scale for their research based on three other questionnaires (*European Union Drug Abuse Prevention Questionnaire, World Health Organization for Drug Use Questionnaire, and Pesquisa Nacional de Saúde do Escolar Questionnaire*), whose questions were answered in a binary way (yes or no); to evaluate bullying (received or executed) they used two questions, which were: In the last 30 days, how often did your classmates bother you or bully you? and In the last 30 days, have you scolded, mocked, manipulated, intimidated, or bothered any of your classmates?

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To assess physical violence (whether experienced or committed), they used two questions: In the last 30 days, have you been physically attacked at school? and In the last 30 days, have you physically attacked someone at your school? They also worked with a population of students between the ages of 11 and 15 (Gusmões et al., 2018). No results were found regarding the reliability or validity of the instrument used.

3.6. Intervention in bullying, anger and depression

In this research, they used the *Peer Violence Scale* (Cajigas et al., 2006). The instrument is composed of 43 items grouped into five dimensions: the first, *External Influences,* which consists of two subdimensions (transgressive behavior and adult behavior regarding bullying) and focuses on the influence of student and adult behavior on aggressive behavior; *Attitude Toward Violence* , which is composed of two subdimensions (facilitating behavior and lack of control attitude) and assesses aggressive behavior, physical violence, and problem-solving strategies (Vanega-Romero et al., 2018).

The third dimension is *Prosocial Behaviors* , which assesses supportive behavior among peers; the fourth is *Aggressive Behaviors,* which consists of three subdimensions (argument, threat, and teasing) and evaluates the frequency with which students engage in aggressive behavior among peers; and the fifth is *Victimization,* which focuses on identifying the number of students who are bullied; they report a Cronbach's alpha for the scale of 0.96; they also intervened with students between the ages of 12 and 16 (Vanega-Romero et al., 2018).

3.7. Active-Start Intervention

Hormazábal-Aguayo et al. (2019) used an extract from the *Single Questionnaire on School Well-being* (*CUBE*) (Ministry of Education of Peru, 2013). The extract applied omitted questions related to virtual bullying and was composed of 10 questions with 4-point Likert-type responses.

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These questions asked about the frequency with which students were exposed to bullying situations (physical, verbal, and social exclusion) in the last seven days. A Cronbach's alpha of 0.81 is reported for the scale. They also intervened with students aged 8 to 10 years old (Hormazábal-Aguayo et al., 2019).

3.8. ProCiviCo

Palacios et al. (2019) assessed aggression, victimization, friendships, and antipathy in seventh-grade students (M=12.32) through peer nomination activities. For aggression, they asked students to identify peers who best fit the description of behaving aggressively or teasing others; for victimization, they asked about students who best fit the description of being the victim or being teased; for friendship, they asked about peers with whom they shared recess; and for antipathy, they asked about students with whom they preferred not to share recess. No validity or reliability data were found.

3.9. Brief anti-bullying intervention

In this research, they administered the self-report *Bullying Questionnaire* to students aged 10 to 17. The questionnaire consists of 23 questions on a Likert-type scale ranging from 1 to 3 about bullying, and 23 questions about victimization in the past 30 days. It also allows for the identification of forms of bullying (physical, verbal, and indirect bullying), with higher scores indicating greater prevalence of bullying (Bottan et al., 2019). No results were found regarding the reliability or validity of the instrument used.

3.10. CONVIVE Program

In this research, they used the CUVE [3] *-ESO School Violence Questionnaire* (Álvarez-García et al., 2013). The instrument, which was applied to students aged 12 to 15, allows the evaluation of different

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dimensions of bullying (interpersonal isolation, verbal aggression between student and teacher, verbal aggression between peers, disruptive behavior in classes, physical aggression and threats, aggression through digital media, indirect physical aggression, and aggression from teachers towards students). It is composed of questions with answers on a Likert-type scale of 1 to 5 points and has a Cronbach's alpha of 0.94 (Santa-Cruz and Ríos, 2022).

3.11. #NoBullying Intervention

In this study, they applied the *Cartoon Test* (Smith et al., 2018). This instrument, used to assess students' perceptions of bullying, is composed of eight dimensions and was validated in eight countries, including Brazil. The research population consisted of adolescents aged 12 to 17 (Fernandes and Dell'Aglio, 2023). No results were found regarding the reliability or validity of the instrument used.

3.12. #Tamojunto 2.0

The instruments used to assess bullying in this research were the same as those used in #Tamojunto (Valente et al., 2023) and the Brazilian version of the Olweus Bully/Victim Questionnaire (Ferreira-Junior et al., 2022). The latter questionnaire asks students about their experiences with bullying in the past 30 days. It contains seven dichotomous (yes or no) questions about victimization and eight about bullying perpetration. Higher scores indicate greater prevalence of perpetration or victimization (Valente et al., 2023). No validity or reliability statistics were found.

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3.13 Discussion

Having briefly described the instruments used to assess bullying in prevention and intervention programs developed in Latin America, it is possible to present some ideas for discussion. Similar to what was indicated by Avilés-Martínez (2013), in the present review two types of evaluation instruments were identified, which are: self-report instruments applied directly to the participating students (Pérez et al., 2013; Stelko-Pereira and de Albuquerque, 2016; Martínez-Vilchis et al., 2018; Pozas et al., 2018; Gusmões et al., 2018; Vanega-Romero et al., 2018; Hormazábal-Aguayo et al., 2019; Palacios et al., 2019; Bottan et al., 2019; Fernandes and Dell´Aglio, 2023; and Valente et al., 2023), and hetero-report instruments that are applied to external observers, for example teachers (Stelko-Pereira and de Albuquerque, 2016).

Likewise, Avilés-Martínez (2013) points out the importance of self-report techniques, since by taking into account the point of view of each participant, the diagnosis and decision-making regarding the intervention are facilitated. These techniques include peer nomination exercises, an evaluative activity that was implemented by Palacios et al. (2019) in their research to identify the presence of aggression, victimization, friendships, and antipathy.

In this context, Vera-Giraldo et al. (2017) indicate that the techniques to assess bullying include dimensions such as: aggressive behavior, intimidation and identification of the role that students occupy in the different types of violence. However, regarding the behaviors, the instruments included in this review are not limited to the dimensions indicated by these authors, since they include victimization, perpetration, justification (Martínez-Vilchis et al., 2018; and Pozas et al., 2018; Bottan et al., 2019), bullying, physical violence (Gusmões et al., 2018), prosocial behaviors (Vanega-Romero et al., 2018), friendships and antipathy (Palacios et al., 2019).

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Regarding the role of students, it was found that some scales allow differentiation between witness, victim, aggressor-victim and aggressor (Pérez et al., 2013), but other tools focus exclusively on the victim role, as is the case of the *School Violence Scale* (Stelko-Pereira and de Albuquerque, 2016). Likewise, unlike what was reported by Vera-Giraldo et al. (2017), none of the instruments included for the evaluation of bullying addresses dimensions of anxiety or stress symptoms.

On the other hand, it is necessary to agree with what Avilés-Martínez (2013) pointed out, when they mention that the diversity of instruments generates difficulties in comparing the prevalence and, in this case, the effectiveness of the programs included, since unlike the research carried out by Martínez-Vilchis et al. (2018) and Pozas et al. (2018) in which they use the *Cyberbullying Questionnaire* (*CBQ*), as well as those of Gusmões et al. (2018) and Valente et al. (2023), in which they generated an evaluation instrument for the *#Tamojunto programs,* the remaining seven investigations used different evaluation tools.

This difficulty is exacerbated by the fact that, similar to what Vera-Giraldo et al. (2017) found, not all studies report data on the validity and reliability of the instruments used. In the case of this review, seven of the included articles reported data on Cronbach's alpha, while the remaining five studies did not mention any of these statistics (Gusmões et al., 2018; Palacios et al., 2019; Bottan et al., 2019; Fernandes and Dell'Aglio, 2023; and Valente et al., 2023).

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Table 1
Summary of feature research and evaluation tools

Program	First author	Year	City / Country	Ages / courses	Assessment instruments	Dimensions or description	Cronbach's alpha
Links Program	Perez	2013	Santiago de Chile / Chile	9 to 18 years old	Secondary school questionnaire on peer abuse due to abuse of power	Witness to bullying	0.80
						Victim of bullying	0.72
						Aggressor-victim	0.22
						Bullying aggressor	0.46
					Internet Experiences Questionnaire	Evaluate the presence of in-person or virtual bullying	NR
Violence Note Zero	Stelko	2016	São Paulo / Brazil	Sixth to ninth grade	The School Violence Scale revised version for teachers	Frequency of victimization	0.85
						Severity of victimization	0.78
						Knowledge of victimization	0.90
						Risk behaviors	0.89
					School Violence Scale revised version for students	Victimization of students by other students	0.64
						Frequency of physical violence.	0.63
						Frequency of psychological violence.	0.64
						Frequency of property violence.	0.80
						Severity of physical violence.	0.70
						Severity of psychological violence.	0.72
						Victimization of students by employees	0.71
						Interpersonal victimization.	0.83
						Damage to property.	0.71
						Violence perpetrated by another student	0.5
						Perpetration of physical violence.	0.81
						Perpetration of non-physical violence.	
						Perpetration of virtual violence.	
						Student risk behaviors	
Emotional Competencies Program	Martinez	2018	Toluca / Mexico	15 to 17 years old.	Cyberbullying Questionnaire (CBQ).	Victimization.	0.93
						Perpetration.	0.80
						Justification.	0.89
Cyber coexistence program	Pools	2018	Mexico City / Mexico	15 to 18 years old	Cyberbullying Questionnaire (CBQ).	Victimization.	0.939
						Perpetration.	0.801
						Justification.	0.895
#Tamojunto	Gusmões	2018	São Paulo, Federal District, São Bernardo do Campo, Florianópolis, Tubarão and Fortaleza / Brazil	11 to 15 years old	Self-made questionnaire.	Bullying.	NR
						Physical violence	NR
Intervention in bullying, anger and depression	Vanega-Romero	2018	Yucatan / Mexico	12 to 16 years old	Peer Violence Scale	External influences	0.96 (Overall scale)
						Transgressive behavior.	
						Adult behavior regarding bullying.	
						Attitude towards violence	
						Facilitation behavior.	
						Attitude of lack of control.	
						Prosocial behaviors	
						Aggressive behaviors	
						Quarrel.	
						Threat.	
						Joke	
						Victimization	

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Active.Start Intervention	Hormazábal-Aguayo	2019	Santiago de Chile / Chile	8 to 10 years	Single Questionnaire on School Well-being.	Evaluates the frequency with which students were exposed to physical and psychological bullying and social exclusion.	0.81
ProCiviCo	Palaces	2019	Santiago de Chile / Chile	Seventh grade students with an average age of 12.32 years.	Nomination by students	Students were asked to identify peers who best fit the descriptions of aggression, victimization, friendships, and dislike.	NM
Brief anti-bullying intervention	Bottan	2019	Porto Alegre / Brazil	10 to 17 years old	Bullying Questionnaire	Bullying. Victimization	NM
CONVIVE Program	Santa Cruz	2022	Trujillo / Peru	12 to 15 years old.	CUVE3-ESO School Violence Questionnaire	Interpersonal isolation. Verbal aggression between student and teacher. Verbal aggression between classmates. Disruptive behavior in classes. Physical aggression and threats. Aggression through digital media. Indirect physical aggression. Aggression of teachers towards students	0.94 (Overall scale)
#NoBullying Intervention	Fernandes	2023	Porto Alegre / Brazil	12 to 17 years old.	Cartoon Test	It is composed of eight dimensions and allows us to understand students' perceptions of the presence of bullying.	NM
#Tamojunto 2.0	Valente	2023	São Paulo, Fortaleza and Eusébio / Brazil	11 to 15 years old.	Questionnaire developed by Gusmões et al. (2018)		NM
					Olweus Bully/Victim Questionnaire	Victimization	NM
						Perpetration	NM

Note: NM = Not mentioned. Prepared by the authors, 2024.

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4. Conclusions

After presenting the results and discussing the findings, it is concluded that bullying and cyberbullying prevention and intervention programs developed in Latin America between 2004 and 2024 used a variety of tools, but limitations related to their validity and reliability were found. Although Brazil, Mexico, and Chile are leaders in the management, development, and implementation of these programs, challenges persist related to the standardization and adaptation of the tools to the social and cultural context of the region.

The information reported in the included articles shows that the assessment instruments used include dimensions such as victimization, perpetration, justification of bullying, and prosocial behavior, and that they focus on determining the roles students play (observer, victim, bully-victim, and bully). Furthermore, their application shows promising results. However, in some cases, the reliability reported is insufficient, while in others, it is not declared.

In this regard, emphasis is placed on conducting appropriate assessments as a foundation for the design and implementation of effective programs that promote harmonious school coexistence and positive interpersonal relationships among students in the region. Furthermore, it is suggested that the development and validation of robust and culturally sensitive assessment tools be continued, as well as those that allow for better identification of the dynamics of bullying, both in person and online, and of the roles played by each member of the school community. Likewise, the development of scales that involve different sources of information (students, teachers, and parents) should be considered.

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5. Contribution of the authors

DRF: conceptualization, methodology, research, writing of the original draft, initial review and editing.

WOO: final review of the article and editing.

MGC: research, writing of the original draft and editing.

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Integrating Culture into English Teaching Process: A Path to Meaningful Communication

Integración de la cultura en el proceso de enseñanza de inglés: Un camino a la comunicación significativa

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Abstract

This study investigates the role of culture in the English teaching process as a path to meaningful communication. The research explains how local cultural elements influence teaching effectiveness of English as a Foreign Language (EFL). Using a descriptive design, a mixed method was employed to gather data through surveys, checklist, and classroom observations fieldnotes. The findings highlight teachers' perceptions of culture as a vital component in language acquisition, as well as explore the effective strategies used to incorporate cultural aspects into teaching practices. Additionally, the study identifies the benefits of cultural integration, such as enhanced student motivation and engagement, alongside challenges, including limited resources and varying levels of teachers' training. This research offers valuable insights into optimizing cultural integration in EFL classrooms, contributing to a more inclusive and effective teaching-learning process.

Keywords: cultural elements; perceptions, training; cultural integration.

Resumen

Esta investigación aborda el rol de la cultura en la enseñanza del inglés como un instrumento para lograr una comunicación significativa. La investigación expone cómo los elementos culturales locales influyen en la efectividad de la enseñanza del idioma inglés. Utilizando un diseño descriptivo y método mixto, se recopilaron datos mediante encuestas, listas de verificación y notas de campo para las observaciones de clase. Los resultados revelan la percepción de los docentes, quienes consideran la cultura como un componente clave en la adquisición del idioma, destacando estrategias efectivas para integrar aspectos culturales en la enseñanza. Adicionalmente, se identifican beneficios como el aumento de la motivación y el compromiso estudiantil, junto con desafíos como la falta de recursos y niveles diversos de formación docente. Esta investigación ofrece aportes significativos para optimizar la integración cultural en la enseñanza del inglés como lengua extranjera, promoviendo un proceso de aprendizaje inclusivo y efectivo.

Palabras clave: elementos culturales; percepción; formación; integración cultural

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1. Introducción

In today's globalized world, language teaching is no longer limited to acquired vocabulary and grammar Heidari (2014) emphasizes the strong connection between culture and language learning, underscoring that language is a fundamental means of communication, making cultural understanding essential for effective foreign language teaching. In Ecuador, the Ministry of Education (2023) includes cultural elements in its English as a Foreign Language curriculum, aiming to enhance education, equity, and inclusion. Learning a second language provides access to new cultural perspectives and fosters tolerance, strengthening students' connection to their roots and enhancing their openness to diversity.

However, Shrestha (2016), defines local culture as the complex whole of society's knowledge, beliefs, and customs, frequently misunderstood as "indigenous culture". On the other hand, English teaching in Ecuador often overlooks local culture, focusing instead on foreign cultural elements that may not align with Ecuadorian values, customs, and traditions. Consequently, this integration is often challenging, requiring teachers to navigate differences and adapt their approaches using effective strategies.

Considering that Ecuador is linguistically diverse, with 13 indigenous languages recognized alongside Spanish, teachers must adapt their methods to address cultural diversity and create a supportive learning environment. This study seeks to address the role of culture in English teaching at the Language Center, shedding light on how cultural awareness influences teaching practices and elevates the language teaching experience. The Language Center at the University in Ecuador, serves students from varied cultural backgrounds and aims to offer inclusive, high-quality language instruction.

Rohmani and Behroozizad (2021), highlight the importance of including students' cultural diversity and experiences in teaching, which can engage students and improve communicative competences. The researchers

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believe that developing abilities to integrate social factors and diverse cultural backgrounds promote students' tolerance and "validate students' realities" Burgin (2019), as well as reduce student's lack of interest in learning a foreign language. According to the sociocultural theory by Vygotsky, stimulating students to talk about familiar cultural factors helps them to expand their sense of autonomy and critical thinking. Daniel & Burgin (2019), conclude that there is a big necessity of training teachers over multilingualism and pluriculturalism in order to understand and identify effective and academic needs.

This study serves as a practical reference for teachers, since it analyzes effective strategies of integrating culture into the language teaching process. Considering Ecuador's diverse cultural heritage, it aligns with the United Nations' Sustainable Development Goal 4. Consequently, the Ministry of Education in Ecuador has established The English Language Learning Standards (ELLS) for an EFL teacher such as knowing and understanding the nature and role of cultures in order to construct supportive learning environments for students. As well as applying the knowledge about culture values and beliefs, understanding the negative effects of racism and discrimination on students' learning process. These standards aim to promote students' and teachers' engagement in learning about Ecuadorian cultures and cultures of English-speaking countries.

The general objective of this study is to explain the role of cultural elements on the English teaching process among teachers at the Ecuadorian University's Language Center in Ambato and understanding what is the role of culture in teaching EFL? reflecting on teachers' experiences, student relationships, and sociocultural dynamics in real-life contexts. This also shed light to describe the perception of English teachers on culture in the English language teaching process and answer the subproblem on what is the English teachers' perceptions on culture in the English Language teaching process? As well as explore teachers' activities in teaching culture to respond on What cultural activities do teachers implement at the Ecuadorian University's Language Center in Ambato?

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This study explores three main aspects: (1) culture and (2) culture in the English language teaching and learning process. The independent variable centers around the role of culture in ESL teaching, sociocultural theory, interculturality in ESL, and the Ecuadorian cultural context. The dependent variable examines cultural factors in the classroom, strategies for teaching practice, teacher-student relationships, and the challenges of integrating culture into the EFL classroom. Defining culture is challenging due to its diverse interpretations

Over time, culture has evolved, influenced by technological advances and globalization, and now includes dimensions such as local, national, and institutional cultures (Sheresta, 2016). Culture extends beyond language and plays an essential role in socialization and communication, impacting not only personal interactions but also educational contexts. Education and culture are interdependent, and their relationship has been shaped by historical, religious, and societal transformations. Freedman (2016) and Ertugruloglu (2024) emphasize that education acts as a tool for cultural preservation and transmission.

In Ecuador, intercultural mediators help students navigate between their own and the target culture. Integrating cultural knowledge in EFL instruction allows students to grasp pragmatic aspects of English, such as idiomatic expressions and social norms, enhancing engagement and motivation. This is particularly crucial in task-based and communicative language teaching methods. Vygotskian sociocultural theory emphasizes the role of social interaction and cultural context in second language acquisition (SLA) (Ahmed, 2017).

This theory is key to understanding the dynamics of language learning, suggesting that teachers provide culturally relevant tools and scaffold learning to suit the learner's Zone of Proximal Development (ZPD). Vygotsky's theory also underlines the importance of play, collaboration, and culturally mediated learning in fostering language development. As the world becomes more interconnected, sociocultural theory remains relevant for ESL and

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EFL teaching, highlighting how culture shapes cognitive development and language acquisition.

Interculturality refers to the dynamic process through which people from different cultural backgrounds interact, negotiate, and develop mutual understanding (Fernandez, 2018). In EFL teaching, it encourages students and teachers to become global citizens, respectful of diverse cultures. However, many EFL teachers lack the skills to incorporate interculturality effectively into their classrooms, pointing to the need for professional development (Aziz et al., 2020). Incorporating intercultural elements into EFL teaching helps students not only learn a new language but also appreciate the complexities of different cultures, promoting tolerance and engagement in global contexts.

Research on Ecuadorian culture in ESL emphasizes the need to integrate intercultural content into classrooms. Studies (Ruggiero, 2015; Fernández & Cedeño, 2018) indicate that Ecuadorian teachers often focus more on intercultural attitudes than on knowledge and skills, primarily concentrating on English-speaking cultures while neglecting local ones. Addressing local cultural contexts in EFL classrooms enhances students' cultural awareness and competence, making language learning more relatable and effective. Additionally, incorporating local culture provides a valuable source of teaching material, allowing students to compare and contrast cultures.

Shrestha (2016) argues that effective EFL teachers need cultural proficiency, but many lack formal training in integrating culture into their classrooms. Clouet (2017) suggests that teachers with experience in global academic communities are better equipped to incorporate intercultural elements into their lessons. Teachers play a vital role in creating a culturally inclusive classroom environment, using culturally relevant materials and strategies to enhance students' learning experiences. UNESCO's standards for EFL teachers in Ecuador emphasize the importance of understanding the role of culture in education, promoting an inclusive and engaging learning environment.

Culture has been bound to education for decades, that is why many researchers have investigated the relationship between culture and

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education. Rohmani (2021) made an investigation of Culture Teaching in EFL Classrooms, he analyzes the teachers' beliefs, attitudes, and classroom practices. His explanatory research contributed to claim the importance of teaching culture in EFL in order to engage students' cultural comprehension as well as using effective teaching strategies to improve their communicative competences. He has developed this research providing enough information on how to develop meaningful learning to students.

On the other hand, Putry (2022) focuses his research on teachers' effectiveness training, explaining the relevance of teachers' role while teaching cultural competences in EFL classrooms. He supports the idea of collaborative learning between teachers and students, in order to amend teachers' professional skills and knowledge of the target culture. She explains the reason for having technology as one of the most updated and useful tools since pandemic. Similarly, Shrestha (2016) thrived his research based on 3P fundamental models; Perspective, Practices and Products. Consider the last as technology, music or literature, so the things people create, share and transfer to others.

These researches aim to effectively integrate native culture and target culture in order to compare and complement the teaching - learning process. The use of effective teaching strategies promotes students' own culture awareness as it is established by the Ecuadorian Ministry of Education. Nevertheless Yaman (2017) presents sufficient information to balance the use of cultural elements and materials in order to create an intercultural learning with students' easy adaptability to new cultures.

Among these analyses, Choudhury (2018) believes that learning a new language including its culture, may lead students to forget their own identity, he explains the analogy of current issue between American and British language and culture, it's well known that there are some linguistic relation and differences between both cultures. Considering this TESOL established that the learning - teaching process should be based on enhancing intercultural competences within learners, rather than promoting any kind of romance or superiority of the target language over the native.

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Daniel & Burgin (2019) through their research gave an essential input for Ecuadorian perception and reality of the role that culture plays in EFL teaching. The researchers consider one of the main problems of teaching EFL in Ecuador, is that it has a huge cultural and linguistic diversity, in consequence there aren't enough multilingual educators. Rugiero (2015) presents through a documentary some of the specific problems of education in Ecuador, at the same time she shares some strategies of immersing culture awareness in EFL classrooms.

On the other hand, Choudhury (2018) and Putry (2022) are convinced that there is a small risk in implementing culture in teaching - learning EFL. Choudhury supports the idea of using authentic materials which are aligned with specific needs of students, while Putry (2022) considers that using an appropriate teaching strategy is vital in effective teaching. In addition, Yaman (2017) suggests creating a balance between cultural elements in EFL classrooms and materials in target language, as well as facts in native language.

So, all the theories analyzed brace the significance of teaching culture in EFL, Rohmani (2021) claims that this contributes to engaging students' comprehension and communicative competences, Nevertheless Sariyildiz (2017) mentions some clear challenges such as insufficient time to include culture into the EFL curriculum. As a result, this analysis is a key helper to provide a route to develop and obtain the results for this research.

2. Materials and Methods

2.1 Research Settings

This research was in the urban area in the Ambato city, Tungurahua province, specifically in one of the well-known private University's Language Center, which is well equipped with updated technological resources as well as the appropriate academic area. The research was handled by the academic period

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of September to November, where the specified instruments were shared by teachers at the Language Center for two weeks.

2.2 Population and Sample

The population of the study belongs to teachers of a private Language Center of a well-known University of Ambato, who are 15 in total. The instruments were applied to the total of the participants in order to get more reliable information. The teachers participating in the survey shared similar characteristics since they teach to students' groups from level A1 to C1, this was useful to analyze each teachers' experiences with culture. However, it is important to ensure the confidentiality of participants' responses and maintain anonymity in the reporting of results.

2.3 Research design

The design of this research is descriptive as Creswell (2018) cited in one of the studies that aims to describe the relationship between the independent variable as culture with the second variable, the dependent one that focuses on culture and immersion of it into the EFL teaching process. This stage focused more on gathering quantitative data to establish a deep understanding and then move to qualitative data collection. By using the specific method, research approach and appropriate instruments this study provided the correct analysis for the results.

2.4 Research approach

This study responds to the mixed approach, since it collected the quantitative and qualitative data (Smith 2020). The quantitative data was collected by a survey with likert scale questions (strongly agree; agree; disagree; strongly disagree) in order to analyze the teachers' perception of the role of culture in the EFL teaching process. While the quantitative data was used to gather information throughout the descriptive class observation field notes and

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checklist (yes/no valuations) of teachers' intercultural elements used in EFL classrooms considering the culture in the teaching-learning process. Nonetheless, mixed methods offer overcoming limitations of individual methods and generating richer insights giving reliability to the research (Creswell, 2018).

2.5 Instruments and techniques

The instruments implemented in this study were validated by two experts in the EFL teaching and the techniques used to collect data are described as follow:

The class observation was conducted with an observation list and field notes to 15 teachers in order to explore teachers' strategies and cultural elements in EFL classrooms. According to Creswell (2018) this technique also allows the researcher to collect actual behaviors and interactions in their natural setting as well as qualitative data which served to complement the quantitative analysis previous to establish conclusions of the study. Additionally, this instrument provided feedback of the benefits of implementing culture in the development of the EFL teaching process.

The survey was adapted to likert scale format (strongly agree, agree, disagree, strongly disagree), which ensures consistency in responses, making analysis easier as Cohen (2018) mentions. This was beneficial to gather information about the teachers' perception over the role of culture in English language teaching. Also, this instrument assisted by identifying the relationship between teachers and students, and was part of the qualitative data analysis. So, using these instruments enhanced research through triangulation, ensuring validity and reliability by corroborating findings from multiple sources.

2.6 Data collection

Considering this research is a descriptive work it is important to mention that the data is represented in tables by using the Jamovi program to take

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the measures of central tendency which was useful to gather information and results obtained in the survey and observation checklist, which lead to conclusions. While the results from the field notes were used to complement the information acquired.

2.7 Data processing

A survey, observation sheet and a checklist were used to relate qualitative and quantitative data and support teachers' perspectives by analyzing the survey. The results of the survey were presented through excel. Descriptive and inferential statistics were used. The qualitative data was represented by categorizing and analyzing it with the indicators that helped to support the outcomes about the influence of culture over the teaching - learning process. These data were analyzed based on the class observations and checklist identifying effective strategies and challenges in the teaching-learning culture process. The data was transcripted and organized in excel. Considering that the names remained anonymously providing teachers a code as teacher 1, teacher 2 and so forth.

3. Results

In order to answer the sub-question: What do English teachers perceive of culture in the English Language teaching process at Ecuadorian University's Language Center in Ambato city?, 15 teachers completed and returned the survey before being observed in order to gather data information from the survey based on indicators as the following:

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1.1. Tables

Table 1

Survey results about Institutionality

Institutionality	Strongly agree	Agree	Disagree	Strongly disagree
As a teacher at the Language Center, I consider that the Center has been supportive in terms of providing resources and training for cultural competence.	29.4 %	41.2 %	29.4 %	0%
As an educator at the University's Language Center, I consider it promotes cultural awareness and sensitivity among teachers and students.	29.4 %	41.2 %	29.4 %	0%
As a teacher of the University's Language Center I believe that the values and mission of the Language Center aligns with culture sensitivity and equity.	41.2 %	29.4 %	23.5 %	5.9%

3.1 Institutionality, the table 1 below illustrates the final results of teachers' perceptions over support and inclusive education at the University's Language Center, collecting a huge percentage of acceptance in the promotion of cultural awareness and sensitivity among teachers and students, as well as providing resources and training. A minority of participants (41%) supported the idea that cultural integration is valued at the Language Center. On the other hand, there was also a small number of teachers that suggested the mission and vision of the center doesn't align with equity. It is worth noting the possible bias in these responses.

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Table 2

Survey results about teacher's cultural awareness

Cultural Awareness	Strongly agree	Agree	Disagree	Strongly disagree
As an educator I feel well-prepared to teach cultural aspects in my EFL classes and there are enough cultural materials to include in EFL classrooms.	47.1 %	35.3 %	17.6 %	0%
As an educator, I understand how different cultural norms affect my students' behavior and participation in class.	70.6 %	23.5 %	5.9 %	0%
As an educator I consider that culture plays an important role in the teaching-learning process and the cultural content increases student motivation and engagement in EFL classes.	47.1 %	35.3 %	17.6 %	0%
As an educator, I believe that by promoting a good atmosphere in class, students feel comfortable sharing social and cultural experiences.	82.4 %	17.6 %	0%	0%

3.2 Cultural Awarenesss, table 2 provides the results obtained from the preliminary analysis of the second group of the survey's questions, where we found a huge number of participants (82%) believe in the importance of a helpful classroom environment for encouraging students to share their social and cultural perspectives. This consensus highlights a common practice in creating an inclusive and open atmosphere. A (70.6%) show a strong understanding of how cultural norms shape students' classroom behavior.

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However, the 17.6% disagreement on two questions (related to being trained and cultural content's impact on motivation) suggest areas for improvement, like providing more resources, workshops, or training opportunities. Consequently, the absence of "strongly disagree" responses reflects overall positive perceptions and a disposition to incorporate cultural elements into EFL teaching.

Table 3

Survey results about teacher's social cultural sensibility.

Socio-cultural Sensibility	Strongly agree	Agree	Disagree	Strongly disagree
In my opinion as an EFL teacher, I believe including cultural content in EFL classrooms is essential for effective language teaching.	76.5 %	23.5 %	0%	0%
As an EFL teacher, I consider it relevant to include elements of local culture in English language lessons.	82.4 %	17.6 %	0%	0%
As an educator, I believe that encouraging students to explore how local social issues in their own cultures relate to those in other societies help them to be tolerant and aware of situations in real context.	70.6 %	29.4 %	0%	0%
In my opinion, I believe that promoting an inclusive classroom environment helps all cultures to be equally respected.	82.4 %	17.6 %	0%	0%

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3.3 Socio-cultural Sensibility, table 3 shows an overview of the results of questions related to socio-cultural factors that may influence the teaching-learning process. There was statistically significant support (76,5%) on the importance of including cultural material in EFL classrooms. This unanimous agreement highlights a shared understanding of the connection between culture and language, as well as the significance of equipping students with cultural competence in EFL contexts. Also (82,4%) supported that integrating local culture into EFL lessons aligns with the need for students to connect global English use with their cultural identity, stimulating a sense of embracing inclusivity in the classroom. Educators agree on the importance of having an inclusive classroom, emphasizing its role in valuing diverse cultural backgrounds.

Table 4

Questions results about technology

Technology	Strongly agree	Agree	Disagree	Strongly disagree
As an educator, I believe technology makes language learning more active in class.	76.5 %	23.5 %	0%	0%
As an educator I am aware of the potential of digital devices in EFL and multicultural classrooms	70.6 %	29.4 %	0%	0%
As an educator I find that technology helps students from different cultures participate more actively in class.	52.9 %	47.1 %	0%	0%

3.4 Technology, over table 4 it's presented in the analysis of data where 76.5% of educators strongly agree and 23.5% agree that technology makes language learning more active in the classroom. This result shows the value educators

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place on technological tools to promote engagement and interactivity during language instruction. In addition, 70.6% of educators demonstrate strong awareness of how digital tools can support teaching in linguistically and culturally diverse classrooms. This suggests confidence in using technology for addressing the needs of multicultural learners, although there might be varying levels of comfort with the full range of available tools. Inversely, a smaller percentage (47.1%) suggest that while technology is seen as beneficial, its effectiveness in promoting cross-cultural interaction may depend on how it is implemented.

To answer the second sub-question: What cultural activities do teachers implement at Ecuadorian University's Language Center in Ambato, September - December 2024. There was a checklist used in class observations, to gather supportive information to answer this question; providing the following results:

Table 5

Results of the checklist based on effective communication in EFL classrooms

Effective communication	Yes	No
The teacher uses examples, expressions, and language that are culturally appropriate and meaningful for the students' backgrounds.	73,30%	26.7%
The teacher integrates culturally diverse examples, metaphors, or idioms to support language learning.	66,70%	33.3%
The teacher adapts the level of formality, tone, and communication strategies based on the students' cultural norms and expectations.	100%	0%
The teacher avoids using language or topics that could be offensive or uncomfortable for students from different cultures.	100%	0%
The teacher creates opportunities for students to share their cultural backgrounds through discussions or group work.	80%	20%

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The teacher incorporates cultural icebreakers or discussions that encourage students to explore differences and similarities between their cultures.	60%	40%
The teacher uses understandable statements and questions all students including cultural factors from different backgrounds.	80%	20%
The teacher uses technological tools with cultural elements to enhance understanding and support explanations.	86.7%	13.3%
The teacher integrates differences between the target culture and native culture to develop a better understanding	86.7	13.3%
The teacher shows full understanding of the target language and culture.	73.3%	26.7%

3.5 Effective communication, As shown in table 5, there is a significant support (100%) of adapting teachers' level of formality, tone, and strategies according to students' cultural norms and expectations to avoid potentially offensive or uncomfortable topics, showing strong cultural sensitivity. A greater number of teachers (86.7%) use technological tools with cultural elements to support their teaching and this was confirmed on the class observations. Also, most teachers (80%) create opportunities for students to discuss their cultural backgrounds, while others do not, indicating there is room to strengthen this practice further. In addition, 60% of teachers use dynamic icebreakers or culturally meaningful language; idioms and metaphors in order to explore cultural differences and similarities.

Table 6

Checklist results based on motivation

Motivation	Yes	No
The teacher uses a dynamic introduction of a topic using cultural elements in the classroom.	66.7%	33.3%
The teacher encourages students from different cultural backgrounds to communicate and collaborate on tasks.	66.7%	33.3%

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The teacher organizes group work that encourages students from different cultures to collaborate, fostering motivation through social interaction.	53.3%	46.7%
The teacher provides feedback in ways that are culturally appropriate and motivational for each student.	60%	40%
The teacher builds student confidence by encouraging them to express their cultural identity in English, motivating them to engage more.	66.7%	33.3%
The teacher inspires students to explore cultural topics independently, fostering intrinsic motivation for learning.	46.7%	53.3%
The teacher shares their own cross-cultural experiences or examples to build rapport and motivate students through storytelling or personal connections.	66.7%	33.3%
The teacher uses technology to connect students with learners from other cultural backgrounds (e.g., pen pals, international chats), enhancing motivation through real-world communication.	73.3%	26.7%
The teacher brings social and actual issues to motivate students to give their own perspective of the situation by using communicative skills and critical thinking.	80%	20%
The teacher shows awareness of students' cultural motivations for learning English (e.g., academic goals, family expectations) and adapts lessons accordingly.	53.3%	46.7%
The teacher differentiates tasks and activities to match the diverse cultural learning styles and motivational drivers of students.	73.3%	26.7%

3.6 Motivation, Table 6 results highlight initial checklist analysis, showing 66.7% of teachers encourage cultural identity expression and use personal stories to build rapport. However, only 53.3% promote cross-cultural group work, and 46.7% inspire autonomous exploration of cultural topics, indicating a need for improved motivation strategies.

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Table 7

Analysis of the checklist results based on tolerance and adaptability

Tolerance and adaptability	Yes	No
The teacher uses examples, expressions, and language that are culturally appropriate and meaningful for the students' backgrounds.	73.3%	26.7%
The teacher shows respect for cultural diversity by addressing and integrating different cultural norms and values into the classroom.	100%	0%
The teacher adapts the level of formality, tone, and communication strategies based on the students' cultural norms and expectations.	100%	0%
The teacher ensures that turn-taking in discussions is managed in a culturally sensitive way, allowing students from cultures that may value silence or indirectness to contribute comfortably.	93.3%	6.7%
The teacher actively works to raise students' awareness of cultural stereotypes and the harm they cause, fostering a more tolerant mindset.	86.7%	13.3%
The teacher facilitates activities that build understanding of global cultures and issues, enhancing students' tolerance.	46.7%	53.3%
The teacher integrates cultural celebrations or traditions into the classroom, promoting a greater understanding and acceptance of diversity.	46.7%	53.3 %
The teacher encourages positive communication and discourages any negative or intolerant remarks in class discussions.	100%	0%
The teacher intervenes immediately when intolerance or disrespect occurs and addresses it constructively.	100%	0%

3.7 Tolerance and adaptability are evident in EFL classrooms, with 93.3% of teachers practicing inclusive turn-taking. Strong positive communication fosters respect, though only 46.7% facilitate activities on global cultures, leaving over half lacking tolerance-building components. Cultural celebrations are similarly underrepresented, hindering diversity appreciation.

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4. Discussion

What is the role of culture in the English language teaching process among teachers and students at the Language Center, Ecuadorian University in Ambato, September - December 2024?

Understanding the vital role that education plays in culture and vice versa is well comprehended by the Language Center's teachers, which supports the affirmation of Shrestha et al. (2016) and Freedman et al (2016) that see culture as a crucial tool for survival. The results show that the role of culture in the English language teaching process at the Language Center is multifaceted, involving educators' cultural awareness, socio-cultural sensibility, and integration of technology to promote intercultural competence. Teachers strongly value cultural elements in their teaching practices, recognizing their impact on students' learning experiences, participation, and motivation.

Despite the agreement of using culture in EFL teaching, some challenges were encountered such as the availability of cultural resources and well-trained professionals. Nevertheless, addressing this gap may encourage teachers to gradually incorporate cultural content into their classes as Sariyildiz et al. (2017) mentions. So, these findings underscore the need for continued support and professional development to strengthen the cultural dimension of EFL education, ultimately enriching the learning experience for students. Considering that culture influences how teachers design interactions, emphasizing the importance of personalizing communication styles to meet the needs of students from different cultural contexts.

There is untapped potential for leveraging global and local cultural contexts to deepen students' cultural competence. By addressing these areas, the Language Center can further enhance the effectiveness of cultural integration in the English teaching process, benefiting both teachers and students. So, this fosters a strong commitment in creating a safe, equitable learning space where all cultural perspectives are valued.

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What do English teachers perceive of culture in the English Language teaching process at Ecuadorian University's Language Center in Ambato?

According to the last collection of results there is a huge acceptance of culture in the EFL teaching process. Teachers' perceptions are aligned with several key themes: institutionality, cultural awareness, socio-cultural sensibility, and the role of technology in fostering cultural integration. As the Ministry of Education and Ministry of Culture mention understanding our identity, art and culture promote intercultural exchanges over the world by letting students learn more about our country. So having the support of the institution and members of it, is perceived as an essential factor for an effective development of the teaching and learning process.

In addition, the results showed a deep understanding of teachers over being well prepared for intercultural EFL classrooms. Teachers' perceptions indicated that there is an urgent necessity of preparing professionals who work as a cultural mediator to understand their own culture as well as students' background. This helps students grab the pragmatic aspects of English (Clouet ,2017) such as idioms, humor, and social norms and can be achieved through literature, films or students' areas of interest in order to motivate them.

While analyzing the gathered data of socio-cultural sensibility agree with Candlin (2014) notion, who supports the idea of creating learning environments where all cultures are equally valued and represented. So, during the survey teachers reflected on the necessity of using social issues to increase students' curiosity while creating long-life content. As Vygotsky's theory highlights the role of social interaction and cultural context in learning.

Consequently, the use of technology showed an important impact on teaching and learning process according to teachers' perceptions. It can be used as a fun way to reinforce cultural knowledge and foster global

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connections. While technology is seen as beneficial, there is room for growth in using it specifically to promote intercultural collaboration and understanding. Teachers recognize its potential but may lack strategies to fully leverage it for cultural education.

So, despite the positive acceptance and perceptions, there were some challenges identified. Putry (2022) emphasizes that teachers should acquire adequate training, while teachers noted a lack of sufficient cultural materials, which might delay their ability to consistently integrate cultural content.

What cultural activities do teachers implement at Ecuadorian University's Language Center in Ambato, September - December 2024.?

Considering the gathered results from the checklist and class observations, it appears that teachers are aware of the importance of using formal and appropriate communication in order to connect with students, avoiding offensive or uncomfortable topics. This aligns with Azmie (2022) theory, which focuses on teachers' abilities to apply and integrate an effective teaching strategy based on students' cultural background, creating opportunities for them to exchange, discuss and explore different cultures.

In addition, Yaman (2017) mentioned the importance of including cultural material of the native language and target language, in order to balance and establish intercultural tolerance and empathy among students in the EFL classrooms. This was observed during observations, this facilitated the learning process for students by using diverse examples, metaphors and even icebreaker activities where students feel free to express and work collaboratively based on their cultures. It is important to mention that the absence of cultural material of the native language could leave the language competency incomplete and students could forget their culture and adopt the target culture as their own (Shrestha, 2016)

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Motivation plays an essential role in the teaching-learning process when incorporating culture in EFL classrooms. The results showed that although teachers adapt tasks to diverse cultural styles, there are inconsistencies in encouraging independent cultural exploration, affecting intrinsic motivation and language skill development. This is aligned with Yaman et al. (2017) that agrees building a good classroom atmosphere will contribute to students' confidence.

5. Conclusion

As it has been shown, culture plays a fundamental role in the English language teaching process at the Language Center in Ambato and that is how teachers perceive it. They recognize the importance of having the support of the institution, by promoting cultural awareness and socio-cultural sensibility to foster effective language acquisition. At the same time technology plays an important role in multicultural and pluricultural EFL classrooms, since it facilitates the learning and teaching process in the modern world.

Teachers value the inclusion of both global and local cultural content to provide contextually relevant lessons to increase student engagement, foster inclusivity, and enhance motivation. One clear example of this, are virtual dual immersion sessions which encourage students to connect with peers worldwide, fostering cross-cultural communication and motivation, considering that technology has a positive impact on students when teachers implement it as a factual tool to develop communication competences rather than just gamifying classes.

Furthermore, most teachers feel well-prepared to teach cultural aspects, emphasizing that effective strategies in the teaching-learning process are based on creating an inclusive classroom atmosphere where students are encouraged to share and respect diverse social and cultural experiences, yet a lack of sufficient authentic cultural resources was identified as a constraint. This highlights a gap between teachers' readiness to integrate native and

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target language culture and their access to the necessary tools. Teachers demonstrate significant strengths in cultural understanding, adaptability, and promoting inclusive communication practices.

Even Though the short period of observations, findings demonstrated that integrating culture in EFL classrooms not only enhances language learning but also developed meaningful participation of students in a multicultural world.

Incorporating collaborative learning activities focused on cultural topics such as team working on worldwide cultural topics or Ecuadorian culture can help to overcome challenges in English teaching at the Language Center. Systematic integration of cultural content, resources, and teacher training is essential, bearing in mind that institutional support is overriding.

Further research should explore students' perspectives on the role of culture in their learning process as well as evaluate the long-term impact of culturally integrated teaching on language acquisition and intercultural competence.

6. Contributions of Authors

MMAC: Introduction, theoretical framework and interpretation of the results.
MRA: Revision, validation of instruments, and direction of the research.
JJRP: Application of instruments, and methodology.
AASC: Application of instruments, processing data, and conclusions.

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Self-regulated strategies and English grammar learning in online environment

Estrategias autorreguladoras y el aprendizaje de la gramática Inglesa en un entorno de aprendizaje en línea

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Abstract

This study investigates the impact of self-regulated learning (SRL) strategies on English grammar learning in an online environment among beginner university students. A quantitative descriptive design was employed, involving 213 participants selected through systematic sample at a public university in Ecuador. Data were collected using a Likert-scale survey to identify SRL strategies and an Achievement Grammar test to evaluate proficiency in different grammar areas, such as verb tenses, sentence structure, and punctuation. The findings revealed that while students frequently used goal-setting and resource management strategies, self- monitoring and self-assessment were less used. The achievement grammar test showed high levels of grammar proficiency, with 91.1% of students achieving excellent scores, although challenges still persisted in specific areas like subject-verb agreement and punctuation. The study concludes that promoting diverse SRL strategies, especially those involving self- evaluation, could enhance grammar learning outcomes in online settings.

Keywords: Self-regulated learning strategies; English grammar; online environment.

Resumen

Este estudio investiga el impacto de las estrategias del aprendizaje autorregulado (SRL) en el aprendizaje de la gramática inglesa en un entorno en línea entre estudiantes universitarios principiantes. Se empleó un diseño descriptivo cuantitativo, con la participación de 213 estudiantes seleccionados, mediante muestreo sistemático de una universidad pública en Ecuador. Los datos se recopilaron a través de una encuesta tipo Likert para identificar las estrategias de SRL y una prueba de gramática para evaluar áreas como los tiempos verbales, la estructura de las oraciones, y la puntuación. Los hallazgos revelaron que los estudiantes utilizan frecuentemente estrategias como la fijación de metas y la gestión de recursos, pero hacen un menor uso de la autoevaluación y el auto- monitoreo. La prueba de gramática mostró altos niveles de competencia, con un 91.1% de estudiantes alcanzando puntajes excelentes, aunque persisten desafíos en áreas específicas como la concordancia sujeto- verbo y la puntuación. El estudio concluye que promover estrategias variadas de SRL, particularmente aquellas relacionadas con la autoevaluación, podría mejorar los resultados de aprendizaje gramatical en entornos en línea.

Palabras clave: Estrategias de aprendizaje autorregulado; gramática inglesa; entorno en línea.

1. Introducción

Nowadays, learning autonomously has become an important ability for students in online environments, especially when dealing with complex areas such as English grammar. Thus, students should adopt self-regulated learning (SRL) strategies; as García et al. (2018) and Sins et al. (2024) pointed out, these strategies help students to set goals, monitor processes, and use effective study habits to reach their academic success. Furthermore, Razavipour et al. (2020) stated that grammar includes the rules and structures to create clauses and sentences. Hence, in situations where there is no teacher interaction, these strategies become even more important, as they help students manage grammar difficulties and master their rules. In an ideal scenario, self-regulated learning strategies would empower students to take control of their learning process and overcome the challenges that grammar presents in online learning environments.

Despite the popularity of self-regulated strategies as an approach to learning English grammar in online environments, some students still struggle with the usage of these strategies. Many students in Ecuador face challenges in learning English due to socioeconomic factors that limit access to language education, inadequate teachers' instruction, insufficient teacher training, lack of technological sources, and low levels of language proficiency (Newman et al., 2023; Tamayo & Cajas, 2020).

Within a public university in Loja, the integration of an online environment has highlighted these challenges, impacting students' learning processes. However, research on SRL strategies and learning English grammar has focused on traditional classrooms, leaving a gap in the impact of self-regulated strategies and English grammar learning in an online environment. This study therefore aims to address this gap by examining the SRL strategies used by beginner university students in online environments and exploring their effectiveness in improving English grammar achievement.

Previous studies have explored the impact of self-regulated learning (SRL) strategies on English grammar achievement. For instance, Aliasin et al. (2022) examined the effectiveness of self-regulated learning strategies on learning English relative clauses among EFL students. Similarly, Wardani et al. (2023) explored the relationship between self- regulated strategies and English grammar achievement among undergraduate students. Moreover, Hunutlu (2023) provided an overview of self-regulation strategies in the online learning process, suggesting that SRL strategies increase students' academic achievement and online learning experience in EFL/ESL contexts. Thus, Chansri et al. (2024) found positive correlations between self-regulated learning strategies such as interpretation, self- assessment, and persistence and English language skills.

Studies, like those by Aliasin et al. (2022) and Wardani et al. (2023), mainly focused on advanced learners or traditional classrooms, avoiding how beginners use self-regulated strategies in online settings. Research has highlighted the benefits of these strategies for improving academic performance, but more attention needs to be given to how these strategies impact English grammar learning in an online environment among beginner university students (Newman et al., 2023; Tamayo & Cajas, 2020). Therefore, there is still a gap when it comes to beginner students learning English grammar in an online setting. For this reason, this study aims to fill this gap by examining which self-regulated strategies

are the most commonly used by university students for learning English grammar in online environments. The results will offer valuable insights into tailored strategies that can better support this group of learners, contributing to a more inclusive view of self-regulated learning in language education.

The relevance of this study extends across multiple groups, including educators, curriculum designers, and policymakers in language education. For educators, understanding how beginner students use self-regulated strategies to learn English grammar in an online setting can help shape teaching methods that promote student's independence and engagement in virtual se-

ttings. Curriculum designers can use these insights to create resources and activities that meet the students' needs, which could improve grammar learning outcomes. Moreover, for policymakers, this study emphasizes the need to include self-regulation strategies to better prepare students for online learning. By addressing these areas, this research provides a foundation for improving English grammar learning in online environments. The purpose of this study is to investigate the impact of self-regulated learning strategies on English grammar learning in an online environment among beginner university students.

With this information in mind, this following section examines the roles of self-regulated learning (SRL) strategies in improving English grammar skills among beginner university students in online environments. SRL strategies, such as goal-setting, self-monitoring, and self-assessment, are important for fostering autonomy and critical thinking in language learning (García et al., 2018; Hunutlu, 2023). These strategies enable students to identify strengths and weaknesses, manage resources, and adjust their study habits to overcome challenges in English grammar learning (Schunk & Greene, 2017; Zimmerman, 2015).

Research highlights the positive impact of SRL strategies on academic outcomes. For instance, Aliasing et al. (2022) found significant improvements in grammar skills when students employed goal-setting and self-monitoring. Similarly, Chansri et al. (2024) demonstrated enhanced grammar performance through self-assessment practices. Effective SRL strategies also include metacognitive approaches like self-questioning, which promote deeper understanding (Zimmerman, 2015), and resource management, where multiple tools such as grammar textbooks or mobile apps are used to enhance the learning process (Usher & Schunk, 2018).

Despite their benefits, students face challenges in their English grammar learning due to the complexity of rules. Common difficulties include mastering verb tenses, subject-verb agreement, sentence structure, the appropriate use of prepositions, articles, or modifiers (Murphy, 2019; Najat, 2020). In addition, word order and proper use of punctuation often present

challenges, especially in questions and negative statements. SRL strategies help students address these issues by promoting systematic, self-control, and effective study habits (Jakešová & Kalenda, 2015; Jafarkhani et al., 2019).

Furthermore, study habits were included as complementary techniques to SRL strategies. Well-developed routines improve learning retention and foster adaptability in the learning process (Jafarkhani et al., 2019). However, further research is needed to understand how beginner university students actually use SRL strategies in online context, since most of the studies focus on advanced learning or traditional classrooms (Aliasin et al., 2022; Wardani et al., 2023). Addressing this gap can enhance the effectiveness of SRL strategies for English grammar learning and support better academic outcomes for students within online learning environments.

2. Materials and Methods

Research setting

This research was conducted at a public university located in Loja, Ecuador. The context of this study involves an online learning environment where students engage in self- regulated learning activities as part of their English grammar coursework, delivered through Moodle. This online setting allows a controlled digital context where students are encouraged to practice self-regulated learning strategies, fostering autonomy in their learning process.

Research participants

The population for this study consists of approximately 474 beginner university students, from which 213 students were selected using systematic sampling. As Creswell (2014) claimed, systematic sampling is a probability method where participants are selected at regular intervals from a population list, reducing bias. An online calculator determined the sample size, ensuring a 95% reliability level with a 5% error range. This sample size provides suffi-

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cient data to analyze the correlation between self-regulated strategies and English grammar learning. The sample includes students from four groups, as outlined in Table 1 below.

Table 1

Sample of population

Group A	Group B	Group C	Group D	Total
54	53	53	53	213

Research approach

A quantitative approach was used to evaluate and describe the impact of self-regulated learning strategies on English grammar learning. Quantitative research involves the collection and analysis of numerical data to identify patterns and trends (Creswell & Guetterman, 2019). In this regard, this approach allows a description of how students use self-regulated learning strategies in an online environment. To achieve the study's objectives, an Achievement Grammar Test was used to evaluate students' knowledge of English grammar, and Likert Scale Survey collected insights on which self-regulated strategies students used for learning English grammar.

Research design

A descriptive design was used to provide an understanding of the self-regulated learning strategies used by beginner university students and their English grammar achievement. As Creswell and Guetterman (2019) explained, descriptive design helps to understand the

patterns and trends in the context without attempting to explain the causality between variables. Likewise, Wiersma (2000) claimed, descriptive research is used to observe and describe aspects of a situation as it naturally occurs, focusing on understanding patterns or phenomena without manipu-

lating the variables. This study aimed to investigate the impact of self-regulated strategies on English grammar learning in an online environment among beginner university students. Additionally, it intends to identify which self-regulated learning strategies were the most commonly used by students and evaluate the students' achievement in English grammar learning.

Data collection sources and techniques

To achieve the study's objectives, two primary data collection instruments were used: an Achievement Grammar Test and a Likert Scale Survey. In addition, both of these instruments were applied through Google Forms. The Achievement Grammar Test consisted of 20 multiple-choice questions divided into five specific sections aligned with the indicators being investigated. These sections focused on the following grammar aspects: *verb tenses, sentence structure, word order, subject and verb agreement, and punctuation.* The Likert Scale Survey was designed to gather quantitative data regarding students' perceptions on self-regulated learning strategies. This Likert scale is a type of agreement scale that measures participants' levels of agreement or disagreement with specific statements. The survey included statements related to the self-regulated strategies, such as *goal-setting, self-monitoring, goal-setting, metacognitive, resource management, study- habits, and self-control*. Each statement in the survey was rated on five-point Likert scale, with Strongly agree assigned a value of 1, *Agree* a value of 2, *Neutral* a value of 3, *Disagree* a value of 5, and *Strongly disagree* a value of 5. Therefore, this survey allowed a detailed understanding of students' self-regulated learning strategies used for English grammar learning. These instruments aligned with the study's quantitative approach, allowing the comprehension of the patterns and trends of self-regulated strategies and English grammar learning.

Both instruments were validated to ensure the research process. *Construct validity* was used to confirm that the instruments measured the intended variables accurately. Additionally, *Validity by Experts* was conducted by

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five specialists in English language as second language, who checked the instruments for clarity, coherence, and relevance. To quantify the validity, the V de Akaike (AIC value) was calculated for each instrument. The Achievement Grammar Test obtained a value of 1,10, indicating a high level of validity, while the Likert´s Scale Survey achieved a value of 1,13, confirming its design. These validation measures ensured the instruments for collecting the necessary data for the study.

Data analysis

In the data analysis, descriptive statistics was used to identify the self-regulated strategies that students use when learning English grammar. This analysis focused on summarizing and interpreting the frequency in applying the self-regulated learning strategies. Moreover, measures such as means, standard deviations, maximum, and minimum values were calculated to analyze the quantitative data. Therefore, in order to

analyzed the qualitative and quantitative data, JAMOVI software was used in conducting the descriptive and statistical analysis, allowing a clear understanding of the variables.

Procedure

This study was conducted in sequential phases to ensure the investigation of the self- regulated learning strategies and English grammar achievement. This research process followed these phases:

1. **Preparation phase**
   - Literature review: An extensive literature review was conducted. The information related with self-regulated learning strategies and their impact on English grammar learning was supported by identifying some previous studies. This phase helped to emphasize the research questions, the objectives, instruments, and methods.

- Instruments design and validation: Based on the objectives, the Achievement Grammar Test was created with 20 multiple-choice questions, divided in five aspects: verb tenses, sentence structure, word order, subject-verb agreement, and punctuation. Thus, the Likert Scale Survey included statements for identifying the most common self-regulated strategies such as goal-setting, self- monitoring, goal-setting, metacognitive, resource management, study-habits, and self-control. Therefore, both instruments were reviewed by experts to ensure validity.

2. **Sampling and participants selection**

- A sample of 213 students from a public university in Loja, Ecuador, was selected from an approximate population of 474 beginner university students. An online calculator determined the sample size, ensuring a 95% confidence level with a 5% margin of error.

3. **Data collection phase**

- Achievement grammar test: The achievement grammar test was administered to participants via Google Forms. Previously, the students were informed about the objectives and the structure of the test which measured their knowledge in English grammar in the specific aspects; verb tenses, sentence structure, word order, subject and verb agreement, and punctuation.
- Likert Scale Survey: Following the grammar test, the Likert scale was administered through Google Forms to collect data regarding the most common self-regulated learning strategies used by students for learning English grammar.

4. **Data analysis phase**

- Descriptive statistical analysis: JAMOVI software was used to present the. Descriptive statistical analysis on the data collected from both the Achievement Grammar Test and the Likert Scale survey. Subsequently, the analysis focused on identifying

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students' grammar achievement and self-regulated learning strategies.

5. **Interpretation and Conclusion**

- The results were interpreted based on the research objectives. The most commonly used self-regulated strategies were identified, along with trends in student's grammar performance. Thus, conclusions were drawn based on these findings, providing insights into how self-regulated strategies might support English grammar learning among beginner university students.

3. Results

3.1. Likert scale Survey

This section aligns with the research objective:
To identify the most commonly self-regulated learning strategies that students use for learning English grammar.

Table 1
Descriptive statistics of the self-regulated strategies

	N	Mean	SD	Minimum	Maximum
1.Goal-setting	213	4.07	0.801	1	5
2. Self-monitoring	213	4.05	0.760	1	5
3. Self-assessment	213	4.03	0.795	1	5
4. Metacognitive	213	4.05	0.766	1	5
5. Resource management	213	4.14	0.806	1	5
6. Study habits	213	4.00	0.885	1	5
7. Self-control	213	4.14	0.764	1	5

Note. Results based on the general findings of the survey on student's perceptions of self-regulated strategies

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The data described in Table 1 presents students' frequency of self-regulated learning strategies usage. With a sample of 213 students, the descriptive statistics highlight the trends and variability of the strategies.

For starters, the mean scores for all self-regulated strategies fall within a very high range, 4 being the lowest and 4.14 being the highest. This indicates that respondents do not frequently engage and partake in the usage of these strategies. Specifically, Resource management and Self-control share the highest mean scores, being the ones that students partake in the least. These strategies are followed by Goal setting, 4.07, which is still relatively high and presupposes a low emphasis on setting goals to be achieved and proposing a clear objective.

Self-monitoring and Metacognitive strategies share a mean score of 4.05, which means that students do not place a particular or high level of importance on tracking self- progress and higher-order thinking strategies. Similarly, Self-assessment, 4.03, is also not very frequently used, as students do not engage much in this process. Lastly, Study habit is

the least scored strategy with a mean of 4, being the one strategy, that students take part in the most. However, as 5 is the maximum score, it is still not a highly valued strategy and it indicates that while students do engage with it, they do not partake in it all that often, only in a moderate amount.

Moreover, the standard deviations (SD) for the proposed strategies go from 0.760 to 0.885, indicating that while there exists a degree of variability in responses, students, for the most part, have a very consistent perception regarding their use of self-regulated strategies. For instance, Self-monitoring (0.760) obtained the lowest SD, which illustrates that students' responses do not vary that much and there is a very clear consensus among the use of this specific strategy. Self-control (0.764), Metacognitive strategies (0.766), and Self- assessment (0.795) share the three following lowest SDs. Then, the following SDs belong to Goal setting (0.801) and Resource management (0.806). Lastly, the highest SD is assigned to Study habits (0.885), which indicates a moderate level of indecisiveness in the responses provided by the students regarding this strategy.

Ultimately, the range of responses that go from 1 (minimum) and 5 (maximum) across all strategies illustrates that respondents used all the options provided in the Likert scale. Notwithstanding, the mean scores indicate that the responses leaned towards the higher and more negative options on the scale. This means that students have a somewhat negative or indecisive perception of their use of self-regulated strategies.

All in all, the findings suggest that students do not perceive themselves as people who frequently implement self-regulated strategies in their learning process. As it can be appreciated the differences among mean scores are relatively small with very low SD; however, the slight differences could inform students' preferences regarding the different strategies.

Table 2
Percentage distribution of responses on Self-regulated learning strategies

Self-regulated strategies	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Goal-setting	32.4 %	44.6 %	21.6 %	0.5 %	0. 9 %
Self-monitoring	0.5%	0.5%	22.1%	47.4%	29.6%
Self-assessment	0.5%	1.4%	23.0%	45.1%	30.0%
Metacognitive	0.5%	0.5%	22.5%	46.5%	30.0%
Resource management	0.5%	2.8%	15.0%	45.5%	36.2%
Study habits	0.9%	4.2%	20.7%	42.3%	31.9%
Self-control	0.5%	0.5%	18.8%	45.1%	35.2%

Note. The table shows the percentage of responses for each self-regulated learning strategy evaluated on a five-point Likert scale: strongly agree, agree, neutral, disagree, and strongly disagree.

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Table 2 delves into the percentages obtained by each self-regulated learning strategy. These percentages indicate the perception students have regarding the strategies. The

survey used a five-point Likert scale with responses ranging from strongly agree to strongly disagree.

First and foremost, as can be appreciated in the table, Goal-setting is the strategy with the most positive responses, with 32.4% strongly agreeing and 44.6% agreeing. This indicates that students highly value this strategy and deem it effective for their learning. Then, 21.6% remain neutral, 0.5% disagree, and 0.9% strongly disagree. This demonstrates a moderate level of skepticism or doubtfulness from students regarding the use of this specific strategy.

However, Self-monitoring received significantly lower levels of agreement. For instance, only 0.5% strongly agree and 0.5% agree. Then, 22.1% remain neutral, and the remaining either disagree (47.4%) or strongly disagree (29.6%). These negative responses by students highlight the fact that students do not engage in self-monitoring very often and they do not perceive it as effective for their learning process.

Furthermore, continuing with Self-assessment, only a small number of respondents provided positive responses. Specifically, 0.5% of respondents strongly agree, while 1.4% agree. A surprising number of respondents, 23%, chose to remain neutral. On the other hand, 45.1% disagree, and the remaining 30% strongly disagree. These results suggest that students undervalue evaluating their progress and reflecting on their learning by themselves, which is an integral aspect of self-regulated learning strategies.

Similarly, Metacognitive strategies also received mostly responses falling within disagreement options. Particularly, 0.5% of respondents strongly agree, 0.5% agree, and 22.5% remain neutral. Conversely, a surprising percentage of 46.5% disagree and 30% strongly disagree. This suggests that metacognitive strategies are not highly popular among students, whether due to a lack of knowledge or interest.

As for Resource management, there is a very slight rise in the agreement categories, although this is minimal. To illustrate, 0.5% strongly agree, and 2.8% agree. However, fewer students remain neutral, lowering the percentage to 15%. Concerning the negative responses, almost half of the students, 45.5%, disagree, and the remaining 36.2% strongly disagree. As has been the trend, the responses inclined more towards negative perceptions, indicating an estrangement from students regarding this specific self-regulated learning strategy.

Likewise, regarding Study habits, 0.9%strongly agree, 4.2% agree, and 20.7% chose to be neutral with their response. The remaining percentage is divided into two remaining categories: disagree (42.3%) and strongly disagree (31.9%). This highlights a very high level of skepticism and hesitancy about the effectiveness of Study habits as a self-regulated strategy that could potentially enhance students' learning.

Lastly, Self-control also received answers that strongly lean toward the more negative responses. For instance, only 1% is equally divided into two categories: strongly agree (0.5%) and agree (0.5%). Additionally, 18.8% remain neutral, 45.1% disagree, and 35.2% strongly disagree with the usage of this strategy. These results illustrate that students hardly ever engage in Self-control as a learning strategy, most of them being either doubtful or unconvinced about its value.

Overall, the responses do not change much in each strategy, leaning more towards the negative responses. As can be seen, very low percentages fall within the positive options, meaning that students do not frequently engage with self-regulated learning strategies. This could mean that students do not have the necessary knowledge about the proposed self- regulated learning strategies, making them ambiguous options in their learning process.

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3. 2. Achievement Grammar test

This section aligns with the research objective:

To evaluate students' achievement in English grammar learning by using the self-regulated learning strategies.

Table 3
Descriptive statistics of the Achievement Grammar test

Final score	
N	213
Mean	18.7
Median	20
SD	2.31
Mínimum	7
Maximum	20

Note. Estimates based on the final score obtained in the Grammar Achievement Test

Table 3 presents the descriptive statistics derived from the Achievement Grammar test. This test was scored out of a maximum of 20 points and was administered to a sample of 213 students. This table is a visual illustration of students' overall performance and how their scores are distributed.

The mean score obtained by students on the achievement test is 18.7, which indicates that students had a very remarkable performance. A fact that is further supported by the median score of 20, which informs that at least half of the total number of students obtained the maximum score possible. This reflects a very high level of grammar proficiency among a significant section of the overall sample.

Moreover, even though the minimum score obtained by students in the sample is 7, the SD of 2.31 indicates that the majority of scores are fairly close to the mean (18.7). While it is true that the SD indicates a moderate level of variability, it is not overly high and the scores are generally grouped around the higher end of the spectrum. This also goes in alignment with the maximum score of 20, which showcases outstanding grammar proficiency.

In conclusion, the majority of students performed remarkably well on the test, as suggested by the high numerical values of the mean, median, and perfect maximum score. Notwithstanding, the minimum score and the degree of variability suggest that there are students who struggled with properly completing the test and might not have as high of a grammar proficiency.

Table 4

Achievement Grammar Test Equivalents

Grammar test	Frequencies	% Total	% Accumulated
Excellent (15.1 – 20)	194	91.1 %	91.1 %
Good (10.1 – 15)	14	6.6 %	97.7 %
Regular (5.1 – 10)	5	2.3 %	100.0 %

Table 4 depicts the data distributed across the scale utilized to group the obtained scores and make a qualitative equivalent. In this case, three categories were recognized: Excellent, Good, and Regular. As can be appreciated, the majority of students, 91.1%, fall within the range assigned to Excellent, so their scores range from 15.1 to 20. This indicates a very high level of mastery regarding grammar. Additionally, 6.6% of students achieved scores within the range of 10.1 to 15, which is equivalent to a "Good" rating on the grammar test. Lastly, a very low percentage of 2.3% obtained scores between 5.1 and 10, being assigned a "Regular" grammar proficiency. In summary, while the majority of students demonstrate high grammar proficiency, there is a small portion of the sample that had either a somewhat satisfactory or poor

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performance. Therefore, efforts should be placed upon this minority to better their performances.

Table 5
Descriptive statistics of indicators from Achievement test

	N	Mean	Median	SD	Minimum	Maximum
Verb Tenses	213	3.80	4.00	0.568	0.00	4.00
Sentence Structure	213	3.81	4.00	0.510	1.00	4.00
Word Order	213	3.84	4.00	0.501	1.00	4.00
Subject-Verb Agreement	213	3.63	4.00	0.731	0.00	4.00
Punctuation	213	3.62	4.00	0.735	0.00	4.00

Table 5 provides descriptive statistics for the five indicators that the achievement test was divided into: verb tenses, sentence structure, word order, subject-verb agreement, and punctuation. Each indicator is scored out of 4 points and since there are 5 indicators, it equals the 20 points of the overall test. The test was administered to 213 students.

To start, concerning the mean scores, it can be appreciated that students had a very high level of accomplishment across all the indicators, with mean scores ranging from 3.62 to

3.84. Specifically, Word order (3.84) has the highest mean score, indicating that students have minimal problems with this indicator of grammar. Word order is closely followed by Sentence structure (3.81) and Verb Tenses (3.8), which means that students have little issues with recognizing proper sentence structure and the accurate tenses of the verbs.

Then, Subject-Verb Agreement (3.63) and Punctuation (3.62) follow, and while these obtained the lowest mean scores, students are still highly proficient at recognizing the proper subject-verb agreement and being able to properly use punctuation marks.

Continuing with the median scores, the fact that it is 4 across all aspects suggests that at least half of the students obtained the perfect score in each

and all indicators. These findings indicate that the majority of students have a very high level of grammar proficiency. Furthermore, this fact is further supported by the maximum score which is also 4 across all indicators. This highlights the fact that students' scores lean more towards higher grades, which in turn positively reflects on students' level of grammar proficiency.

Additionally, the SDs that range from 0.501 to 0.735, show very minimal level of variance in the scores obtained. Particularly, Word order (0.501) has the lowest level of variance, showcasing a more general consensus in the scores obtained. This indicator is closely followed by Sentence Structure (0.510) and Verb tenses (0.568), which highlight a slightly higher level of variance. On the other hand, Subject-Verb Agreement (0.731) and Punctuation (0.735) have the highest levels of variance, meaning that students may have struggled more in these two indicators than in the other three. However, since the SDs are moderately low, the scores do not change much, and this indicates that students have an overall good grasp of grammar knowledge.

Lastly, the minimum scores being 0 for Verb Tenses, Subject-Verb Agreement, and Punctuation, and 1 for Sentence Structure and Word Order, show that some students do have a very low level of grammar proficiency, albeit very few. Therefore, some emphasis should be placed on these aspects so that these scores can be made higher. In conclusion, it can be appreciated that the majority of students have a high level of grammar as perceived by their remarkable performance on the achievement grammar test. However, a very minimal portion of the sample still needs to further work on the refinement of their grammar skills.

Figure 1

Mean scores across all indicators of the Achievement test

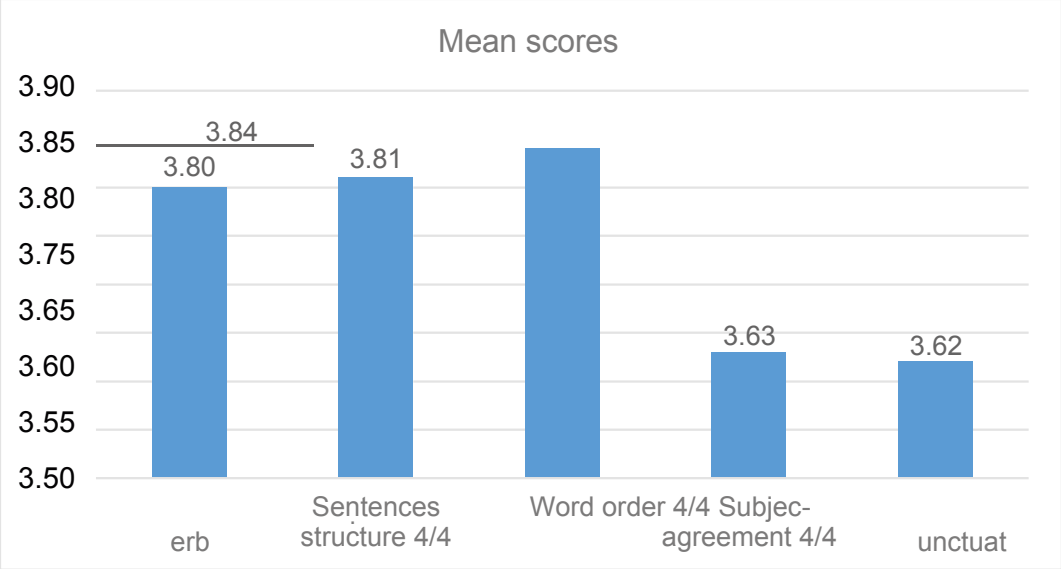

Figure 1 is a visual representation of the mean scores obtained by students on the achievement grammar test in each indicator. As can be seen, there are five general indicators, namely, Verb tenses, Sentence structure, Word order, Subject-verb agreement, and Punctuation. This figure is presented with the objective of facilitating understanding.

As it can be easily appreciated, Word order obtained the highest mean score of 3.84 out of 4 possible points. This is closely followed by Sentence Structure (3.81) and Verb tenses (3.80) which only have a 0.01 difference among them. Moreover, they are followed by Subject-Verb Agreement with an average score of 3.63, which also has a difference of 0.01 with the lowest scoring indicator, Punctuation with 3.62 out of 4.

As these scores are exceptionally remarkable, it can be said that students have a very high level of proficiency across all the indicators in the grammar test, with minimal differences. For instance, students have little to no trouble with effectively arranging words and sentences in a way that is logical and grammatically correct. Additionally, they can accurately conjugate verbs and use them in appropriate contexts. Likewise, students are modera-

tely successful at ensuring that the subjects and verbs agree in both number and person, while also being capable of using the proper punctuation marks to grammatically enhance their writing. All in all, students are proficient across all the indicators, having high scores in all of them. Moreover, some indicators are slightly higher than others, which indicates what are the strengths and weaknesses students have regarding grammar proficiency.

4. Discussion

This study addresses the self-regulated learning (SRL) strategies and English grammar learning among beginner university students in an online environment. Using a descriptive design and a quantitative approach, the study aimed to answer these two questions:

1. Which self-regulated learning strategies are most commonly used by students for learning English grammar?
2. How do self-regulated learning strategies affect students' achievement in English grammar?

By addressing these questions, the study provides insights that can help students to understand the effectiveness of SRL strategies, enhancing autonomy and improving their language proficiency. Likewise, for teachers and the professional community, this study provides insights that could help instructional practices, enabling the development of pedagogical strategies that integrate SRL effectively.

Which self-regulated learning strategies are most commonly used by students for learning English grammar?

The results from the Likert Scale Survey revealed that students frequently use strategies such as *goal-setting* and *resource management*, while strategies like *self-monitoring* and *self-assessment* are less used. These results align with

the studies by Aliasin et al. (2022) and Chansri (2024), which emphasize the effectiveness of goal-setting in helping students to stay focused and improve their academic performance. As Boonlom et al. (2024) stated, students who set their goals showed effectives learning behaviors and better motivation to achieve their academic objectives.

However, there is a limited application of certain strategies, such as *self-monitoring* and *self- assessment*, which are important for long-term academic performance. Therefore, this indicates that students prefer to use organizational strategies over reflective practice as Vargas et al. (2018) mentioned. In addition, considering the research from Pabón and Espinel (2023) identified challenges in the implementation of self-assessment in higher education, such as confusion, need for more time and effort, and lack of preparation in both students and teachers. As a result, these barriers limited the application of self-monitoring and self-assessment, contributing to the preference for organizational strategies.

How do self-regulated learning strategies affect students' achievement in English grammar?

On the other hand, the results from the *Achievement Grammar Test* showed that most of the students had a high level of proficiency, with many students scoring in the "excellent" range. This is related to the research of Wardani et al. (2023), who identified a positive impact of self-regulated strategies on English grammar learning. However, it is worth mentioning that specific areas, such as *subject-verb agreement and punctuation*, showed significant differences in scores. This is supported by Schneider and McCoy (1998) who analyzed the grammatical errors in the students' writing activities and found that subject-verb agreement is one of the most problematic areas. Therefore, these findings suggest that while self-regulated strategies are beneficial for students and can enhance English grammar, Wang et al. (2021) suggested, the impact of SRL may be limited to the grammatical areas that require more attention or specific instruction.

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Indeed, there are discrepancies between the use of self-regulated strategies and the variations in grammar achievement may be attributed to the beginner level of the participants. Zimmerman (2015) argued that beginner students often lack the metacognitive skills necessary to implement strategies such as *self-monitoring* and *self- assessment*. Moreover, the online learning environment may have added additional challenges, as students with limited prior exposure to digital tools and autonomous learning may struggle to truly benefit from these strategies (Hunutlu, 2023).

This study supports the existing literature that emphasizes the self-regulated strategies for learning English grammar. However, it also highlights specific problems in how beginner students use these strategies, especially those related to self-monitoring and self- assessment. These difficulties could be attributed to the limited experience of the participants, which can reduce their ability to engage in self-regulation processes. Additionally, the challenges within the online learning environment may influence the student's ability to use self-regulated strategies effectively. For instance, socioeconomic factors that limit access to language education, inadequate teachers' instruction, insufficient teacher training, lack of technological sources, and low levels of language proficiency could have shaped students' perceptions and behaviors (Newman et al., 2023; Tamayo & Cajas, 2020).

While the findings provide valuable insights into the impact of self-regulated learning strategies on English grammar learning among beginner university students, alternative explanations must be considered to understand some factors that could have influenced these results. One possible factor is the influence of students' prior educational experiences, since beginner learners often use strategies that are familiar to them, which may reflect the practices emphasized in the educational settings. Furthermore, the research by Basántez (2016), revealed that students use strategies they were previously exposed in their education. This indicates that beginner students use familiar strategies when facing new academic challenges.

Another factor could be the reduced interactions with teachers and other classmates, this might lead learners to emphasize the usage of strate-

gies that do not need external feedback, such as resource management. As Navas et al. (2024) mentioned, the lack of these interactions may limit the use of strategies that rely on collaboration and feedback, inclining students toward the autonomous methods.

In addition, students' limited exposure to digital tools and autonomous learning may have reduced their ability to use or engage with other complex strategies like self-assessment. This finding supports the work of Sui et al. (2023) who highlighted the importance of technological environments to promote self-regulated strategies. The researchers found that the usage of web-based self-assessment tools directly influences students' self- regulation.

Moreover, the high level of proficiency students demonstrated in the Grammar Achievement test could be attributed to test-taking motivation or perhaps external preparation efforts. Nevertheless, the differences in some grammar indicators such as subject-verb agreement and punctuation may be related to L1 language transfer, where students apply rules from their first language that interfere with English grammar patterns.

Lastly, socioeconomic issues may have influenced students' perceptions of self-regulated learning. Factors such as limited access to resources, lack of technology literacy, and other responsibilities like work or family commitments could have influenced the usage of certain self-regulated strategies over others as suggested by (Newman et al., 2023; Tamayo & Cajas, 2020). These contextual factors highlight the complexity of learning in online environments and emphasize the need for targeted support to address these challenges.

Furthermore, this study employs a descriptive design and a quantitative approach to examine the use of self-regulated learning (SRL) strategies among beginner university students in online environments and their impact on English grammar learning. As a descriptive study, its scope focuses on observing and analyzing the frequency of SRL strategies and English grammar achievement. The focus on beginner students and the online learning context

provides specific insights into this population, making the results important for similar educational contexts.

Despite the contributions, there are some limitations in the study. One limitation is the self-reported nature of the *Likert scale survey*, which may introduce bias since students' responses might not reflect the exact use of self-regulated learning (SRL) strategies. Additionally, the sample was obtained from a single university in Ecuador, which restricts the generalization of the findings to broader populations. Hence, the context of the online learning environment may have influenced how students adapted and used SRL strategies in English grammar learning. Also, the lack of direct teacher interaction and limited guidance within the digital environment could have affected the results of strategies such as self-monitoring and self-assessment.

On the other hand, the *Achievement Grammar Test* measures students' proficiency in specific areas of grammar. However, its scope is limited to these indicators, which means it does not provide a comprehensive view of the student's overall grammatical abilities. For example, the test might not check how students apply grammar rules in real-life contexts, such as writing essays or engaging in conversations. This narrow focus may ignore important aspects of the language use that are relevant for practical language competencies.

Nevertheless, the methodology has some strengths. The use of quantitative instruments, such as the Likert Scale Survey and the Achievement Grammar Test, allowed for an objective evaluation of students' strategies and performance, ensuring the data collected was consistent and measurable. Furthermore, the usage of systematic sampling provided a reliable representation of the target population, enhancing the credibility of the results. In conclusion, while the study offers comprehension of the self-regulated learning strategies and English grammar achievement, addressing these aforementioned limitations in the

future could enhance the application of the findings, contributing to a better understanding of the topic.

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5. Conclusions

Beginner university students in an online environment frequently use goal-setting and resource management as self-regulated learning strategies. These strategies help students organize their study routine and use the academic resources to achieve academic success.

The result of the Achievement Grammar Test showed high grammar proficiency among students, with 91.1% achieving excellent scores. Specific strengths were observed in indicators like word order and sentence structure, demonstrating students' competence in these areas.

While students showed frequent use of organizational strategies, the application of self- assessment and self-monitoring was notably limited. This indicates potential gaps in their approach to evaluating progress and adjusting learning methods.

Despite the high achievement, challenges were identified in specific areas such as subject- verb agreement and punctuation. These aspects require additional attention to support students' comprehensive grammar learning.

The study shows that students would benefit from more support in using self-regulation strategies like self-assessment and self-monitoring. Teachers should provide resources or activities that encourage students to regularly check their progress and modify their learning methods.

6. Author's contribution

IAMJ: Conceptualization, data collection, analysis of results, discussion
EJCC: Introduction, conclusions, and recommendations.

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Pneumonia Complicated by Lung Abscess and Pleural Effusion. Case Report and Review of the Literature

Neumonía Complicada por AbscesoPulmonar y Derrame Pleural. Presentación de un caso y revisión de la literatura

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Summary

Pneumonia is an acute lung infection that can lead to serious complications, such as lung abscesses and pleural effusions. It is estimated to account for 15% of hospitalizations in children under 5 years of age, and complications occur in 5–10% of cases. In this context, we present the clinical case of a 5-year-old patient with cough, high fever, and respiratory distress, supported by clinical and laboratory criteria confirming the diagnosis of complicated pneumonia. Furthermore, we review the literature on the disease, its complications, diagnosis, and treatment, emphasizing that proper detection and management are crucial to reduce the incidence of complications and promote effective recovery. This case underscores the complexity of managing complicated pneumonia in pediatrics, where surgical intervention was essential. Multidisciplinary follow-up facilitated recovery, highlighting the importance of early diagnosis and appropriate treatment.
Keywords: complicated pneumonia, lung abscess, pleural effusion, surgical intervention, multidisciplinary treatment, diagnosis.

Resumen

La neumonía es una infección pulmonar aguda que puede provocar complicaciones graves, como abscesos pulmonares y derrames pleurales. Se estima que es responsable del 15% de las hospitalizaciones en niños menores de 5 años, y las complicaciones ocurren en el 5-10% de los casos. En este contexto, se presenta el caso clínico de un paciente de 5 años con tos, fiebre alta y dificultad respiratoria, respaldado por criterios clínicos y de laboratorio que confirman el diagnóstico de neumonía complicada. Además, se revisa la literatura sobre la enfermedad, sus complicaciones, diagnóstico y tratamiento, enfatizando que la detección y el manejo adecuados son cruciales para disminuir la incidencia de complicaciones y favorecer una recuperación efectiva. Este caso subraya la complejidad del manejo de la neumonía complicada en pediatría, donde la intervención quirúrgica fue fundamental. El seguimiento multidisciplinario facilitó la recuperación, resaltando la importancia del diagnóstico temprano y un tratamiento adecuado.
Palabras clave: neumonía complicada, absceso pulmonar, derrame pleural, intervención quirúrgica, tratamiento multidisciplinario, diagnóstico.

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1. Introduction

Pneumonia is an acute infection of the pulmonary parenchyma that can be caused by various pathogens, including bacteria, viruses, and fungi. This disease represents one of the leading causes of morbidity and mortality in the pediatric population worldwide. According to the World Health Organization (WHO), pneumonia is responsible for approximately 1.5 million deaths annually in children under five years of age, which underscores the importance of its prevention and appropriate treatment [1]. The clinical presentation of pneumonia can vary from mild forms, which are managed as an outpatient, to severe forms requiring hospitalization and intensive care.

The prevalence of pneumonia varies significantly by geographic region, socioeconomic status, and patient age. A study by Liu et al. (2019) reported that the prevalence of pneumonia in children under five years of age in developing countries is approximately 20% to 30%, while in developed countries, the figure is considerably lower, around 5% [2]. This disparity highlights the need for targeted interventions in vulnerable populations and access to adequate medical care.

Complications associated with pneumonia, such as pleural effusion and lung abscess, are of particular concern in pediatric management. These complications may arise due to inflammation and fluid accumulation in the pleural cavity, which may require invasive procedures such as thoracentesis or video-assisted thoracoscopy for resolution [3]. Pneumonia is the leading cause of pleural effusion (PE) in children, and approximately 20–40% of children present with it. Early identification of these complications is crucial to improve clinical outcomes and reduce associated mortality.

Research in the field of pneumonia has advanced in recent decades, with an increasing focus on identifying risk factors, improving treatment strategies, and implementing vaccination programs. The introduction of

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pneumococcal and influenza vaccines has proven effective in reducing the incidence of pneumonia in the pediatric population [4]. However, despite these advances, pneumonia remains a significant public health challenge, especially in contexts of poverty and lack of access to health care.

The objective of this research is to describe a clinical case of pneumonia with complications, specifically associated with the presence of pleural effusion, addressing the clinical characteristics, diagnostic methods used, patient evolution and therapeutic interventions performed for its comprehensive management.

2. Clinical case

A 5-year-old male patient, with vaccinations up to one year of age in his card, reports incomplete and pending Chickenpox (15 months) and DPT at 18 months (first booster), as a significant history of hospitalization in another health center for 5 days due to respiratory failure, accompanied by a wet cough, emetizing on one occasion with food content. During this hospitalization, he presented with a high-grade fever of 39.9 ° C that partially responded to antipyretics, he began with respiratory difficulty characterized by tachypnea, as there was no improvement in the family, he requested voluntary discharge and came to our health center on their own.

On arrival, with support of a non-rebreathing mask, he appears dehydrated with a pale appearance. Cardiorespiratory examination shows nasal flaring, tachycardic, tachypneic, in (p90-99) for his age. On auscultation, regular air entry, hypoventilation in the left lung, he presents respiratory difficulty, prolonged capillary refill of 4 seconds, temperature of 37.3 ° C and persistent cough. Evaluated with a Wood Downes Score of 6p - Moderate.

Among our first interventions, oxygen was placed by AF 16 Liters with FiO2 50%. Among the laboratory tests, a complete blood count

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showed leukocytosis 22,800 associated with neutrophilia and a CRP 268 in the context of clinical symptoms with PEWS assessment of 4 points, and it was decided to hospitalize and expand the studies.

A chest X-ray was performed, which showed left basal radiopacity with blurring of the left costodiaphragmatic angle, and a chest computed tomography with a pulmonary window showed or showed a lung abscess in the lower lobe and free fluid in the left pleura. Evaluated by the infectious disease service, who initially prescribed IV Ceftriaxone 75 mg/kg/day every 24 hours and IV Clindamycin 40 mg/kg/day every 6 hours. Serological studies included blood cultures and urine culture, without bacterial growth, swabs for viral uptake upon admission for RSV, and PCR for COVID, which were negative.

The patient remains in regular clinical condition with oxygen support via a high-flow nasal cannula. He persists with respiratory difficulty and is reassessed with a 3-point Wood Downes test. He was evaluated by the pediatric surgery service, who reported that the patient required surgical treatment. Prior to improving hemodynamics, a red blood cell transfusion was indicated due to a hemoglobin level of 8.4 and a hematocrit of 24.2. He was scheduled for diagnostic video-assisted thoracoscopy + pulmonary decortication with fibrin removal + placement of a left chest tube + placement of a left subclavian central venous catheter. The findings were: Pachypleuritis, multiple fibrin collections, abscess in the lower lobe, lateral basal segment, and free fluid in the pleura of 50cc. 5 days after his first intervention, he was scheduled with the pediatric surgery service for a left lower lobectomy + pleural cavity lavage + chest tube placement + pleurovac change. Findings: Cavitary lesion with necrosis and abundant fibrin involving the left lower lobe. The following studies were performed as part of the approach:

1. Pleural fluid: Cytological - cytochemical: cloudy appearance, leukocytes 0.721, 10 ´3/ul polymorphonuclear 89.8%, glucose 7.42, proteins 5.19 g/dl, LDH 5215 U/L, rivalta negative

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2. Gram stain and Ziehl stain, culture and PCR/Tb DNA of pleural fluid: negative.
3. Gram stain, Ziehl stain, culture and PCR/Tb DNA of gastric aspirate: negative.

Approached in intermediate care in the context of his clinical picture, he is considered to have complicated pneumonia, with findings of an abscess in the left lung, tuberculosis has already been ruled out. His antimicrobial coverage should be directed especially at Gram-positive germs: Streptococcus pneumoniae, S. aureus. The infectious disease service suggests management with Ceftriaxone and vancomycin for 21 days. Intravenous antibiotic treatment is prescribed with Ceftriaxone 75 mg/kg/day IV every 24 hours and Vancomycin 40 mg/kg/day IV every 6 hours, completing the regimen for 21 days.

Furthermore, during hospitalization, on day 14, the patient developed a clinical picture with suspected viral infection accompanied by abundant hyaline rhinorrhea. A swab for respiratory virus was requested, which was positive for parainfluenza 1. His management was symptomatic.

His evolution was favorable, before being discharged he was found hemodynamically stable, neurologically alert, mobility preserved, connected, with no signs of respiratory distress, right lung field well ventilated, left lung field slightly hypoventilated, chest tube wound healed, he performed respiratory exercises with triflow (respiratory incentive spirometer) every 4 hours, with adequate oral tolerance, without signs of abdominal alarm, having control analysis leukocytes: 6.78 with neutrophils: 41, lymphocytes: 39, hemoglobin: 11.7, hematocrit: 33.8, platelets: 447, CRP: 3.69. Biopsy: Leukocyte fibrin exudate devoid of stroma. No granulomas or pathogenic microorganisms were identified. Control echocardiogram reported as normal, without pericardial effusion. Patient did not present fever peaks and showed improvement in respiratory distress. The patient was kept under surveillance and discharge was scheduled with instructions for outpatient follow-up, follow-up by specialists, and the recommendation to complete the pending vaccination schedule.

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1.1 Figures, Tables and Diagrams

Table 1.

Auxiliary examinations performed on the patient

Laboratory Tests	Results	Reference Value
Blood Count	Leukocytes: 22,800 /uL	4,000 - 10,000 /uL
	Neutrophils: 76.1%	40% - 75%
	Lymphocytes: 12.3%	20% - 45%
	Hemoglobin: 8.4 g/dL	11.5 - 15.5 g/dL
	Hematocrit: 24.2%	34% - 44%
	Platelets: 750,000 /mm³	150,000 - 450,000 /mm³
	CRP: 268 mg/dL	< 5 mg/dL
	PCT: 1.13 mg/dL	< 0.5 mg/dL
Blood Count (Control)	Leukocytes: 6,780 /uL	4,000 - 10,000 /uL
	Neutrophils: 41%	40% - 75%
	Lymphocytes: 39%	20% - 45%
	Hemoglobin: 11.7 g/dL	11.5 - 15.5 g/dL
	Hematocrit: 33.8%	34% - 44%
	Platelets: 447,000 /mm³	150,000 - 450,000 /mm³
	PCR: 3.69 mg/Dl	< 5 mg/dL
Blood Culture	No growth	-
Urine Culture	No growth	-
Tuberculosis Studies	Non-reactive	-
Swabs for RSV and COVID PCR	Negatives	-
Swab for Influenza Type I	Positive	-
Echocardiogram	Normal, without pericardial effusion	-
Catheter Culture	No bacterial growth	-
Catheter Gram	No growth	-
Biopsy	Leukocyte fibrin exudate, without granulomas or pathogenic microorganisms	-

Source: Prepared by the author

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Figure 1. Chest X-ray with condensation image in the left hemithorax, area of alveolar infiltrate with blurring of the left costodiaphragmatic and cardiophrenic angle

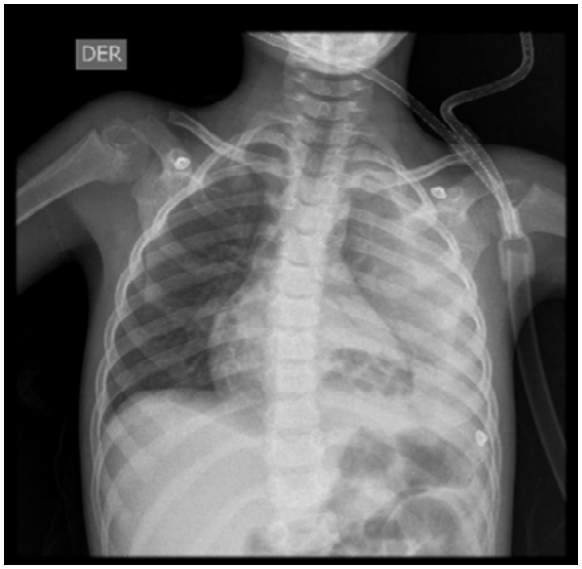

Figure 2. Lung window computed tomography showing a left lower lobe lung abscess with a thick-walled cavity and air-fluid level.

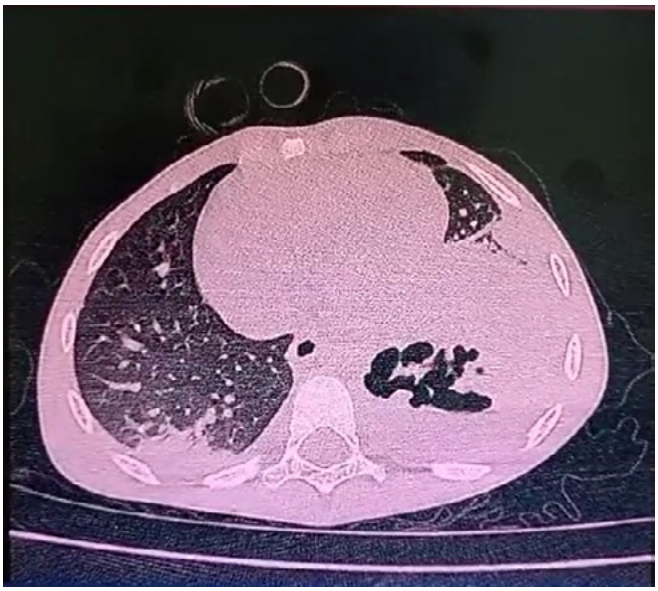

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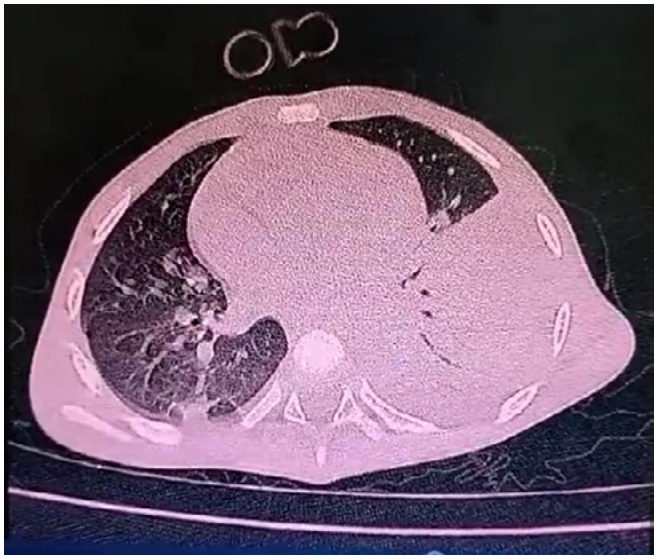
Figure 3. Computed tomography in the pulmonary window showing a left pleural effusion, evidenced by the accumulation of fluid in the pleural space, partially displacing the pulmonary structures.



3. Discussion

The case presented describes a 5-year-old male patient with a complex clinical presentation including complicated pneumonia, pleural effusion, and lung abscess. This type of presentation is relatively common in pediatrics, especially in children with a history of previous respiratory infections. According to a recent study, respiratory infections are a leading cause of morbidity and mortality in children, and complicated pneumonia can result in hospitalization and intensive treatment [5].

The patient's clinical history, which includes high fever, cough, and shortness of breath, is indicative of a severe respiratory infection requiring immediate medical attention. The progression of symptoms from a dry cough to a wet cough, accompanied by vomiting and high fever, is a pattern that may indicate progression of the disease to complicated pneumonia [6]. Identification of symptoms such as tachypnea and

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shortness of breath are criteria for severity that warrant hospitalization and intensive management [7].

The patient had an incomplete vaccination schedule for his age, with a valid vaccination card showing that he was still due for chickenpox (15 months) and DPT at 18 months (first booster), which is a negative aspect in his medical history. Vaccination is essential to prevent severe infections, as it reduces the incidence of pathogens such as Streptococcus pneumoniae and Haemophilus influenzae, which are common germs that cause pneumonia in this age group [8]. However, his previous hospitalization for respiratory failure suggests an underlying vulnerability to respiratory infections. It is important to note that, although vaccination decreases the risk of pneumonia, it does not completely eliminate it, especially in children with underlying conditions.

The decision was made to hospitalize the patient due to his symptoms, which presented a high risk of decompensation. Considering the clinical features, risk factors, and laboratory results, such as leukocytosis and elevated CRP, which are markers of inflammation and infection, it was decided to initiate empirical antimicrobial therapy due to the suspicion of involvement of the most common bacterial infectious agents in our community, such as Streptococcus pneumoniae, Staphylococcus aureus, and Haemophilus influenzae. Leukocytosis and elevated acute-phase reactants are common indicators of bacterial infection and support the decision to initiate antibiotic treatment. The CT report confirmed the presence of complications associated with pneumonia, such as lung abscesses, which can arise in the context of an untreated or poorly managed infection. These complications, together with the time of disease progression, justify the urgent need for appropriate antibiotic treatment to prevent further deterioration in the patient's health. Furthermore, it has been documented that viral infections can predispose to bacterial superinfections, which is increasingly common in clinical practice [9]. Chest X-ray and CT confirmed the presence of a lung abscess and pleural

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fluid, justifying subsequent surgical intervention, considering that these abscesses can develop between 1 to 3 weeks after a lung infection [10].

Video-assisted thoracoscopy and subsequent lobectomy are justified procedures in cases of complicated lung abscesses, especially when there is significant involvement of the lung parenchyma. Surgical intervention is often necessary to drain abscesses and improve pulmonary ventilation [11]. Fibrin removal and pleural fluid management are crucial to prevent further complications and improve respiratory function, especially in cases where the lung abscess is large (usually larger than 5 cm), presents significant clinical symptoms such as respiratory distress, persistent fever or productive cough with purulent sputum, or does not respond to adequate medical treatment after 48–72 hours. Furthermore, drainage is indicated in the presence of significant pleural effusion or empyema, as well as in patients with comorbid conditions that may complicate recovery. The Wood-Downes scale modified by Ferrés is an essential clinical tool to assess the severity of respiratory distress in pediatric patients with complicated pneumonia. This scale considers parameters such as respiratory rate, accessory muscle use, tachypnea, cyanosis, and abnormal breath sounds, allowing the classification of symptom severity and guiding rapid therapeutic decisions. The application of this scale would be crucial in determining the need for more intensive interventions, such as respiratory support or surgery. Evaluation with this scale helps tailor clinical management and guide decisions regarding antimicrobial treatment and possible surgical interventions, ensuring appropriate care. [12]. Radiological evaluation showing an abscess that does not resolve with medical treatment also warrants intervention, and consultation with pediatric surgery or pulmonology specialists is recommended to determine the most appropriate drainage method. [13].

The administered antibiotic treatment, which included ceftriaxone and vancomycin, is adequate to cover a wide range of pathogens, including those commonly associated with complicated respiratory tract

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infections. This regimen is justified by the presence of germs frequently detected in different age groups, such as Streptococcus pneumoniae and Staphylococcus aureus (including methicillin-resistant strains - MRSA), and that is why this regimen was chosen, since these pathogens are relevant in the pediatric population and can contribute to the severity of infections. [14]. The treatment duration of 21 days is consistent with the guidelines for the management of complicated pneumonias in pediatrics, reinforcing the importance of an aggressive approach in the treatment of these infections. Although shorter courses may be appropriate in certain situations, in the context of complicated pneumonias, conventional therapy remains the preferred option to ensure complete eradication and prevent complications [15].

It is essential to emphasize the importance of not self-medicating, as this can hamper bacterial isolation in cultures and complicate infection management [16]. Patient progress to a hemodynamically stable state without respiratory distress at discharge is a positive indicator of treatment effectiveness. Normalization of hematologic parameters and absence of bacterial growth in cultures are also encouraging signs suggesting resolution of the infection.

4. Conclusions

This case highlights the complexity of managing complicated pneumonia in children, where early identification and appropriate treatment are essential to improve outcomes. Furthermore, vaccination against Streptococcus pneumoniae is crucial to prevent pneumonia and other related infections in children under 5 years of age. In Ecuador, the implementation of the pneumococcal conjugate vaccine (PCV10) in 2011 and the use of PCV13 in the private sector since 2010 have improved coverage against the most common serotypes. PCV10 protects against

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33.3% of the serotypes identified in this population, while PCV13 covers 66.6%, highlighting its superior efficacy compared to local epidemiology. However, the emergence of serotypes such as 19A and 15A, which are not included in PCV10, indicates the need to adjust vaccination strategies for better prevention. It is crucial to continue monitoring the predominant serotypes through epidemiological reports such as those from SIREVA II, which will allow for the adaptation of immunization policies and strengthen the protection of children in Ecuador. This will provide a protective factor in preventing severe respiratory infections in the pediatric population.

5. Abbreviations

WHO: World Health Organization
DP: Pleural Drainage
PCR: C-reactive protein
DPT: Diphtheria, Pertussis, and Tetanus
KG: Kilograms
IV: Intravenous
DNA: Deoxyribonucleic Acid
TB: Tuberculosis
ATB: Antibiotics
LDH: Lactate Dehydrogenase
AF: High Flow
FIO2: Fraction of Inspired Oxygen
PEWS: Pediatric Early Warning Score
RSV: Respiratory Syncytial Virus
PCV10: 10-Valent Pneumococcal Conjugate Vaccine
PCV13: 13-Valent Pneumococcal Conjugate Vaccine
SIREVA II: Bacterial Resistance Surveillance System

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6. Contribution of the authors

First author initials: Data collection, case description, literature and analysis.

Second author initials: Systematic review and case discussion

Third author initials: Final case review and updated literature contribution

Fourth author initials: Initial corrections, figures and tables

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Risk factors related to sleep bruxism in children and adolescents. A sistematic review

Factores de riesgo del bruxismo en niños y adolescentes. Una revisión sistemática

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Abstract

Introduction: sleep bruxism in children and adolescents is a multifactorial disorder that integrates genetic, emotional, physiological and environmental factors. Aim: to systematically map available studies on risk factors associated with sleep bruxism in children and adolescents. Methodology: This scoping review included 13 observational studies to systematically map risk factors related to bruxism. Eligibility criteria were articulated to the PCC framework (population, concept, context). Results: The influence of genetic predisposition, emotional stress, physiological conditions (such as gastro-oesophageal reflux) and socio-environmental variables such as family dynamics and exposure to electronic devices are highlighted. In addition, disparities were detected in subgroups, such as children with developmental problems or those influenced by recent social transformations, such as the COVID-19 pandemic. Conclusion: Hereditary susceptibility, neurological abnormalities, emotional stress and inadequate sleep environments are among the most important determinants. Despite advances in the understanding of this disorder, significant gaps remain in the literature, in terms of longitudinal research and specific subpopulations.

KEYWORDS: risk factors, sleep bruxism, children, adolescents, review.

Resumen

Introducción: bruxismo del sueño en niños y adolescentes es un trastorno multifactorial que integra factores genéticos, emocionales, fisiológicos y ambientales. Objetivo: mapear sistemáticamente los estudios disponibles sobre los factores de riesgo asociados al bruxismo del sueño en niños y adolescentes. Metodología: Esta revisión de alcance incluyó 13 estudios observacionales para mapear sistemáticamente los factores de riesgo relacionados con el bruxismo. Los criterios de elegibilidad se articularon al marco PCC (población, concepto, contexto). Resultados: Se destaca la influencia de la predisposición genética, la tensión emocional, las condiciones fisiológicas (como el reflujo gastroesofágico) y las variables socioambientales, como la dinámica familiar y la exposición a dispositivos electrónicos.

Además, se detectaron disparidades en los subgrupos, como los niños con problemas de desarrollo o aquellos influenciados por las transformaciones sociales recientes, como la pandemia de la COVID-19. Conclusión: Entre los determinantes más importantes se encuentran la susceptibilidad hereditaria, las anomalías neurológicas, la tensión emocional y los entornos de sueño inadecuados. A pesar de los avances en la comprensión de este trastorno, sigue habiendo considerables vacíos en la literatura, en lo que respecta a las investigaciones longitudinales y a subpoblaciones específicas.
PALABRAS CLAVES: factores de riesgo, bruxismo del sueño, niños, adolescentes, revisión.

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1. Introduction

Sleep bruxism (SB), a widely studied orofacial disorder, has a significant impact on children and adolescents, with studies suggesting a higher prevalence in these age groups compared to adults, which could be attributed to neurodevelopmental and physiological factors .(1)

The disorder is characterized by involuntary jaw movements during sleep, resulting in tooth attrition, muscle discomfort and decreased quality of life; however, research has identified no significant differences in quality of life metrics between pediatric and adolescent populations with and without bruxism(2). In addition, genetic factors have been implicated in the etiology of bruxism, indicating a genetic predisposition to its development; stress and psychological disorders are also recognized as crucial contributing factors, highlighting the complex interplay of psychological and physiological components in the manifestation of the disorder .(3)

Therefore, the impact of sleep bruxism goes beyond dental health, because it is associated with elevated frequencies of arousal during sleep, which can correlate with attention and behavioral problems in children(1). In addition, sleep bruxism has been associated with cardiovascular complications and headache, underscoring its potential systemic implications(4) . Therefore, early identification of risk factors is imperative to avoid serious repercussions for oral and general health .(5)

Identification of risk factors for sleep bruxism in children and adolescents is critical due to the different physiological and psychological characteristics of these age groups compared to adults. In this regard, research indicates that central nervous system hyperactivity is a significant factor, with studies showing that children with high levels of

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stress and certain personality traits, such as a high sense of responsibility, are more likely to develop sleep bruxism . (6)

Additionally, environmental and social factors, such as family dynamics and exposure to stress, have been identified as influential, with children who experience more stress in their environments being at greater risk(7) . In addition, sleep bruxism in children is associated with increased arousal during sleep, which can lead to attention and behavioral problems during the day, highlighting the impact of the disorder on cognitive and behavioral functioning(1) . Anamnestic information, such as the presence of ENT and respiratory disorders, as well as oral habits such as pacifier use, also play a role in predicting sleep bruxism, suggesting that clinicians should consider these factors during evaluations(8) . In addition, altered sleep patterns, such as late bedtime and sleep debt, are associated with increased levels of inflammatory biomarkers, indicating that poor sleep hygiene may exacerbate systemic inflammation and potentially contribute to the development of sleep bruxism . (9)

Despite the progress made in sleep bruxism research, there are numerous deficiencies in the academic literature that prevent a complete understanding of the risk factors related to this disorder among child and adolescent populations. Consequently, it is imperative to examine the existing evidence to delineate the fundamental concepts and guide further research on this complex topic. Hence, the scoping review was conducted with the purpose of systematically mapping available studies on risk factors associated with sleep bruxism in children and adolescents in order to identify key concepts, patterns, and gaps in existing knowledge.

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2. Methodology

A scoping review was conducted according to the guidelines outlined in the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis and PRISMA-ScR extension (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) . (10)

Eligibility criteria were articulated using the PCC framework (population, concept, context). The population considered comprised children and adolescents aged 0-18 years. The concept encompassed risk factors related to sleep bruxism, including physiological, genetic, psychological, social, and environmental determinants. The context encompassed studies conducted in a variety of clinical, community, or population settings, with no geographic or language restrictions. Therefore, the resulting research question was: What is known in the scientific literature about risk factors (concept) related to sleep bruxism (context) in children and adolescents (population)?

A systematic search of PubMed, Scopus and Web of Science electronic databases was carried out, complemented by manual searches of gray literature and citations of relevant articles. To formulate the search strategies, which were adapted to the specifications of each database, the following keywords and MeSH/DeCS terms were used: “bruxismo del sueño”, “Sleep Bruxism”, “factores de riesgo”, “Risk Factors”, “niños”, “Child”, “adolescentes”, “Adolescent”. The resulting search equation was: ((“sleep bruxism” OR “Sleep Bruxism”) AND (“risk factors” OR “Risk Factors”) AND (“children” OR “Child” OR “adolescents” OR “Adolescent”)).

For the selection of papers, priority was given to observational studies that showed the relationship between bruxism and risk factors, regardless of language, geographical location, time, but they had to be full-access manuscripts. Studies that were literature reviews, were not conducted in children or adolescents and those in which the subject

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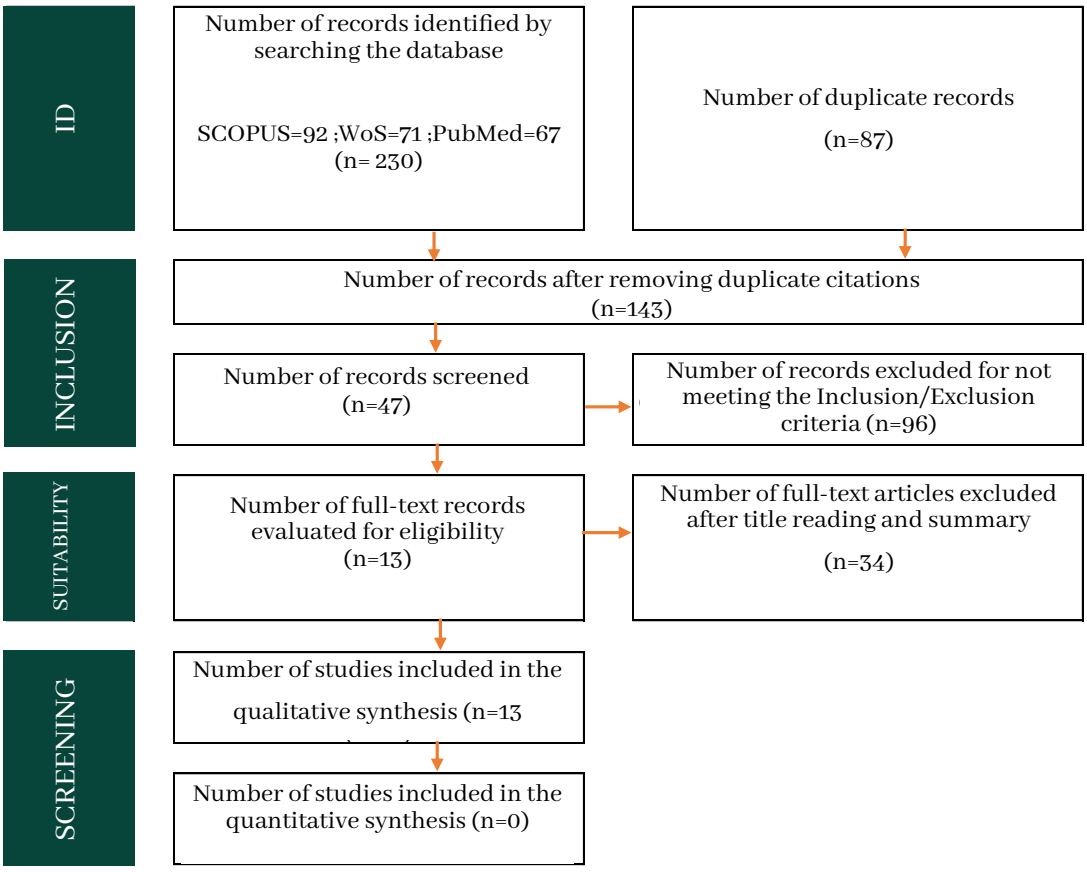
matter was not related to sleep bruxism or its risk factors were excluded. As a result, 13 articles were included in the research (See Figure 1).

The identified studies were imported into reference management software and duplicates were systematically removed. Subsequently, two independent reviewers (C.L and A.V) screened the titles and abstracts, followed by a thorough review of the full text to determine the final inclusion of articles. Any discrepancies were resolved by discussion or by consulting a third reviewer (P.O).

Figure 1.

Flow chart of the systematic search.



Note: Source: Prepared by the authors based on a systematic search.

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Relevant data were extracted using a predefined form that included information on the study design, population, risk factors assessed, methodologies for diagnosing sleep bruxism, and main results. The data were synthesized descriptively, systematically mapping the evidence according to risk factor categories and clarifying existing knowledge gaps.

The analysis incorporated a narrative synthesis to elucidate key findings, delineating patterns and trends present in the existing literature. No formal assessment of risk of bias or methodological quality was conducted, as this is not mandatory for scoping reviews. The results are presented in tables for ease of interpretation, and include comprehensive details on study characteristics and geographic distribution.

3. Results

In Table 1, it can be seen that the research included in this review demonstrates a significant prevalence of sleep bruxism among pediatric and adolescent populations, highlighting the multifaceted nature of the associated risk factors, which encompass physiological, behavioral, and environmental dimensions.

Gonçalves et al.(11) documented a prevalence rate of 43% among school-aged children, correlating this phenomenon with hereditary predispositions and respiratory complications, while Serra-Negra et al.(12) highlighted the importance of parafunctional activities, such as dental wear and lip incompetence, as key factors.

In addition, Ferreira-Bacci et al.(13) established a connection between psychological disorders and bruxism, identifying stress as a substantial factor requiring interdisciplinary intervention, particularly in children showing distinct behavioral traits. These findings accentuate the need for a more holistic clinical and psychological evaluation aimed at elucidating the etiology of sleep bruxism in the pediatric demographic.

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In contrast, factors that correlate with bruxism in at-risk populations or in individuals with specific conditions have been thoroughly examined in the literature. De Souza et al.(14) identified significant correlations between bruxism and gastroesophageal reflux as well as involuntary movements in children diagnosed with developmental disabilities(15), while Souza et al.(16) clarified that habits such as sucking and cross-biting significantly increase susceptibility to bruxism in adolescents, independent of cognitive functioning.

So too, contemporary research by Laganá et al.(17) has clarified the connections between bruxism and variables related to sleep-disordered breathing, including oral breathing and snoring. In this context, the findings underscore the need for personalized intervention strategies that respond to the unique circumstances prevailing in each population subgroup .(18)

Ultimately, longitudinal and retrospective investigations provide invaluable information on fluctuations in the prevalence of sleep bruxism, as well as its association with environmental and technological influences. Delima et al.(19) demonstrated a marked increase in bruxism cases during the COVID-19 pandemic, and attributed this increase to increased access to electronic devices and inadequate parental education, while Bahammam(20) emphasized the validation of specific questionnaires aimed at improving diagnostic accuracy among adolescents. Marceliano and Gaviã(21) illustrated the association between biological rhythm disturbances and behaviors such as nighttime teeth clenching with bruxism, while Emodi-Perlman et al.(8) emphasized the predictive importance of anamnestic factors, including oral breathing(22) , in the context of bruxism. These findings reinforce the critical importance of integrating more refined diagnostic tools and preventive measures to effectively address the multifaceted dimensions of this condition in diverse settings.

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Table 1

Characterization of the documents included in the study

Autor	Título	Año	Objetivo del estudio	Tipo de estudio	Muestra	Puntos de resultados
Gonçalves et al. (11)	Variables associated with bruxism in children and adolescents	2009	To evaluate the variables associated with bruxism and its prevalence in schoolchildren and adolescents aged 4 to 16 years	Cross-sectional and descriptive	680 schoolchildren, aged between 4 and 16 years, randomly selected from 19 public schools in Brasilia, Brazil.	Prevalence of bruxism was 43%; associated factors included heredity, respiratory problems, headaches, and restless temperament; there were no differences by gender.
Serra-Negra et al. (12)	Signs, symptoms, parafunctions, and associated factors of parent-reported sleep bruxism in children: A case-control study.	2012	To investigate the association between clinical signs and symptoms, parafunctions, and associated factors of sleep bruxism in children.	Case control	360 children, with 120 children diagnosed with sleep bruxism and 240 children without the condition, as reported by their parents. The children were 8 years old and were selected from public and private schools in Belo Horizonte, MG, Brazil.	Significant association between sleep bruxism and parafunctions such as tooth wear and teeth clenching; physical factors such as lip incompetence and muscle pain are prevalent.

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Ferreira-Bacci et al. (13)	Behavioral problems and emotional stress in children with bruxism	2012	To evaluate the behavioral profile of a group of children diagnosed with bruxism, focusing on the relationship between behavioral and emotional problems and the occurrence of this condition.	Observational, cross-sectional, and descriptive.	Eighty children aged 7 to 11 years, with a mean age of 8.8 years, seeking routine dental care at the Pediatric Dentistry Clinic of the Ribeirao Preto School of Dentistry, University of Sao Paulo, Brazil.	82.76% of children with bruxism have psychological disorders; there is a notable relationship with stress and the need for psychological evaluation.
de Souza et al. (14)	Factors associated with bruxism in children with developmental disabilities	2015	To investigate the factors associated with bruxism in children aged 1 to 13 years with developmental disabilities.	Observational, cross-sectional, and descriptive.	389 dental records of children aged 1 to 13 with developmental disabilities, specifically cerebral palsy and intellectual disability.	Factors associated with bruxism include gastroesophageal reflux, involuntary movements, and female gender; emphasizes relevance in developmental disabilities.
Meyer y Oliveira (15)	Sleep Bruxism and Orthodontic Appliance among Children and Adolescents: A Preliminary Study	2016	To evaluate the association between sleep bruxism and orthodontic treatment in children and adolescents.	Retrospective, cross-sectional, descriptive	The study included a total of 66 participants, consisting of 44 children undergoing orthodontic treatment and 22 children awaiting treatment.	27.3% of patients awaiting orthodontic treatment have sleep bruxism; interceptive orthodontics reduces the prevalence to 75%.

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Sousa et al. (16)	Prevalence and associated factors to sleep bruxism in adolescents from Teresina, Piauí	2018	To identify the prevalence and factors associated with the clinical manifestation of sleep bruxism (SB) in children with and without cognitive impairment.	Observational, descriptive study	180 individuals. These individuals were divided into three groups: Group 1 included those without cognitive impairment, Group 2 consisted of individuals with Down syndrome, and Group 3 consisted of individuals with cerebral palsy.	Prevalence of sleep bruxism of 23%; habits such as sucking and crossbite increase its likelihood.
Laganà et al. (17)	Sleep bruxism and sdb in albanian growing subjects: A cross sectional study	2021	To evaluate the correlation between sleep bruxism and risk factors for developing obstructive sleep apnea syndrome (OSAS) in a sample of growing Albanian subjects.	Observational, Cross-sectional	310 subjects, including 173 females and 137 males.	Prevalence of sleep bruxism of 41.3%; correlation with mouth breathing, snoring, and night sweats.
de Almeida et al. (18)	Prevalence of Sleep Bruxism Reported by Parents/Caregivers in a Portuguese Pediatric Dentistry Service: A Retrospective Study	2022	To determine the prevalence of sleep bruxism (SB) in a sample of pediatric patients attending the Pediatric Dentistry Service in Lisbon.	Retrospective observational	385 patients.	Prevalence of 17.6% in children; decreases with age; need for awareness among parents.

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Delima et al. (19)	Impact of the CO-VID19 pandemic on sleep quality and sleep bruxism in children eight to ten years of age	2022	To determine the impact of the COVID-19 pandemic on sleep quality and the possible occurrence of sleep bruxism (SB) in children aged eight to ten years.	Longitudinal cohort study.	105 children aged eight to ten years. The sample was derived from a previous cross-sectional study, where 739 children were initially contacted, and after attempts to locate them, 105 children participated in the longitudinal assessment.	Increase in sleep bruxism during the pandemic; associated with electronic devices and low parental educational level.
Bahammam (20)	Validation of Sleep Bruxism Ques-tionnaire Toward the Experience of Jaw Pain and Limitation of Jaw Movement in Saudi Arabian Adolescents	2022	Validate the sleep bruxism questionnaire, specifically related to the experience of jaw pain and limitation of jaw movement in Saudi adolescents aged 10 to 19 years.	Cross-sectional survey study	200 participants, including both male and female adolescents aged 10 to 19 years.	Association between bruxism and jaw pain; successful validation of the questionnaire.
Marceliano y Gaviã (21)	Possible sleep bruxism and bio-logical rhythm in school children	2023	Verify whether children with possible sleep bruxism exhibited alterations in their biological rhythm	Cross-sectional observational study.	178 parent-guardian-child.	Bruxism associated with alterations in biological rhythm and teeth clenching during wakefulness.
EmodiPerl-man et al. (8)	Sleep Bruxism in Children—What Can Be Learned from Anamnestic Information	2023	To evaluate the role of anamnestic information in predicting possible sleep bruxism in children aged 4 to 12 years.	Retrospective cross-sectional exploratory study.	521 children aged 4 to 12 years, selected from an initial group of 1911 dental records.	Factors such as mouth breathing and ENT problems increase the likelihood of bruxism; prevalence of 16%.

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Kumar et al. (22)	Systemic Condition Associated with Bruxism A Case Report	2023	Report a case of bruxism associated with asthma in a pediatric patient.	Case report	1 patient	Successful management of bruxism in an asthmatic child with a night guard; link to respiratory problems.

Note: Source: Own elaboration based on systematic search.

In Table 2, the synthesis of the scientific literature on the risk factors associated with sleep bruxism in children and adolescents identifies a multifactorial etiology that incorporates genetic, emotional, behavioral and physiological dimensions. Gonçalves et al.(11) highlight heredity as a consistent element, with a considerable prevalence of bruxism among school-age children (43%), in addition to respiratory complications, headaches and difficulties in falling asleep. Furthermore, Serra-Negra et al.(12) recognize dental wear and bruxism during wakefulness as relevant factors, which accentuates the importance of monitoring parafunctional behaviors. Ferreira Bacci et al.(13) corroborate the interconnection between bruxism and psychological disorders, such as attention deficit, anxiety and stress, proposing a profound association between emotional variables and the manifestation of this condition.

In contrast, research with specific demographic data has facilitated the identification of distinctive factors in vulnerable subpopulations. De Souza et al.(14) highlight that, in children with developmental disabilities, elements such as gastroesophageal reflux and involuntary movements are key determinants, while Meyer and Oliveira(15) document the ramifications of orthodontic intervention and hereditary influences on the prevalence of sleep bruxism. In addition, Sousa et al.(16) delineate factors pertinent to dental anomalies, such as crossbite and sucking behaviors, while Laganá et al.(17) clarify the association between bruxism and respiratory diseases, such as obstructive sleep apnea, underscoring the need to evaluate these conditions in tandem.

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Regarding psychosocial and environmental determinants, De Almeida et al.(18) and Delima et al.(19) emphasize the implications of sleep quality and the social environment. Elements such as parental stress, accessibility to electronic devices and the COVID-19 pandemic are significantly correlated with the increased prevalence of bruxism. In addition, Bahammam(20) reinforces the link between emotional determinants, such as anxiety, and sleep disorders. In contrast, Marceliano and Gaviã(21) document that dietary practices and excessive use of digital media exacerbate bruxism manifestations, while Emodi-Perlman et al.(8) emphasize the importance of anatomical factors, such as oral breathing and otorhinolaryngological conditions, in bruxism susceptibility. Ultimately, Kumar et al.(22) offer a perspective focused on respiratory problems such as asthma, correlating these conditions with neuromuscular and emotional disorders.

On the other hand, it is pertinent to point out that although Kumar et al.(22) and Bahammam(20) have been considered for the analysis of factors associated with nighttime bruxism, the research by Kumar et al.(22) yields a clinical case report of bruxism associated with asthma, which limits the extrapolation of their findings, thus attenuating their relevance for a comprehensive analysis. Similarly, Bahammam(20) focused his research on the validation of an instrument to assess bruxism, without conducting a systematic examination of risk factors, which restricts the applicability of his data in this particular context.

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Table 2

Risk Factors Associated with Sleep Bruxism

Author	Age	Diagnosis of SB	Risk factors associated with SB	Conclusions
Gonçalves et al. (11)	680 school children aged 4-16 years (mean: 8.27 years); higher prevalence in deciduous dentition.	Validated clinical examinations and questionnaires, with statistical analysis and pilot study.	Heredity, respiratory problems, headaches, difficulty falling asleep, restless temperament and talking during sleep.	High prevalence of bruxism (43%), significant impact on quality of life, need for early diagnosis and multidisciplinary studies to understand the etiology.
Serra-Negra et al. (12)	360 children (8 years), 120 with SB and 240 without SB, matched for age, gender and socioeconomic status.	Based on AASM criteria and validated parent-collected questionnaires.	Primary canine attrition (OR 2.3), object biting (OR 2.0) and waking-time bruxism (OR 2.3).	Significant association between SB and parafunctional habits; it is recommended to monitor these habits in children and to perform longitudinal studies to better understand their impact.

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FerreiraBacci et al. (13)	80 children aged 7-11 years (mean: 8.8 years); both genders represented.	Clinical and psychological evaluation using structured questionnaires and psychological scales (Rutter-A2, Child Stress Scale).	Psychological disorders (attention deficit, hyperactivity, behavioral problems), emotional stress, anxiety, hostility and depression.	Behavioral and emotional problems are significant risk factors for SB; the need for interdisciplinary approaches (dentistry and psychology) and further research on associated physiological stress factors is highlighted.
de Souza et al. (14)	389 children aged 1-13 years with developmental disabilities; no significant association was found between age and bruxism.	Based on parental reports of audible teeth grinding; binary categorization of presence/absence of bruxism.	Gastroesophageal reflux (OR 2.28), involuntary movements (OR 2.24), female gender (OR 0.44).	Significant associations between SB and neurological factors; the importance of specific approaches to the management of SB in children with developmental disabilities is emphasized.
Meyer y Oliveira (15)	66 children (7-15 years, mean: 10.6 years) at orthodontic treatment; parents were aged 18-69 years.	Based on AASM criteria, with questionnaires and clinical examinations performed by a trained dentist.	Emotional factors, genetics, relationship between SB in parents and children, and discomfort associated with orthodontic appliances.	Emotional factors, genetics, relationship between SB in parents and children, and discomfort associated with orthodontic appliances.

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Sousa et al. (16)	3-10 years and >10 years; similar prevalence between both groups (26.1% vs. 21.6%); no significant differences in prevalence by age.	Parental reports (grinding sounds at least 3 times per week); corroborated with clinical examinations to detect dental wear facets.	Sucking habits (OR 4.44), posterior crossbite (OR 3.04), dental wear facets (OR 3.32).	Prevalence of SB similar in children with and without cognitive impairment (~24%). It is recommended to monitor sucking habits and dental alterations as predictors of BS.
Laganà et al. (17)	310 niños de 6-12 años (media: 8.9 años); se incluyeron más mujeres (56%) que varones (44%).	Cuestionarios validados diseñados para evaluar SB y factores relacionados con el síndrome de apnea obstructiva del sueño (SAOS).	Herencia, sudoración nocturna, respiración oral, ronquidos, obesidad.	Correlación significativa entre SB y factores de riesgo para SAOS; falta de concienciа en padres (46.5% desinformados) resalta la necesidad de mayor educación.
de Almeida et al. (18)	1900 children aged 0-17 years; prevalence of SB decreases with age (0-6 years: 20.7%, 7-11 years: 19.4%, 12-17 years: 14.6%).	Parent/caregiver reports of dental clenching and audible grinding; no clinical confirmation or polysomnography was performed.	Anxiety, stress, aggressiveness, hyperactivity, snoring, nightmares, ADHD (higher risk in children treated with medication).	Overall prevalence of SB: 17.6%; it is recommended to include consultations on SB in pediatric dental appointments to improve parental awareness.

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Delima et al. (19)	105 children aged 8-10 years; sample selected to evaluate the impact of the COVID-19 pandemic on sleep patterns and SB.	Diagnosis based on AASM criteria and Sleep Disturbance Scale for Children (SDSC).	Low parental schooling (RR 2.67), access to electronic devices (RR 1.97), sleep disturbances during the pandemic (RR 1.74).	Significant increase in SB and sleep disturbances during pandemic; intervention and awareness strategies are needed to address these problems.
Bahammam (20)	200 adolescentes de 10-19 años (54.7% mujeres y 45.3% hombres); mayoría en el rango de 10-14 años.	Cuestionarios diseñados específicamente para evaluar dolor de mandíbula y movimiento limitado; incluyó evaluación de consistencia interna (alfa de Cronbach >0.8).	Estrés, ansiedad, depresión, alteraciones en patrones de sueño, exposición al humo de segunda mano.	Validación exitosa del cuestionario de SB; se requiere mayor conciencia en padres y más investigación en diferentes poblaciones.
Marceliano y Gaviã (21)	Children aged 6-14 years (mean: 10.14 years); assessment of sleep patterns and related behaviors.	BRIAN-K scale to assess sleep, daily activities, social behavior, and feeding; diagnosis based on parent interviews and clinical assessments.	Poor sleep quality, teeth clenching during wakefulness (OR 2.04), high sugar consumption, excessive use of digital media.	Children with SB have greater difficulty maintaining biological rhythms; the importance of good sleep in reducing the frequency of SB is highlighted.

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EmodiPerlman et al. (8)	521 niños de 4-12 años; evaluados por anamnesis (informes de padres) sobre comportamientos de SB durante el sueño.	Diagnóstico basado en informes parentales sobre apretamiento dental y ruidos relacionados con SB; no se usaron métodos instrumentales (EMG o polisomnografía).	Respiración bucal (~3 veces mayor riesgo), trastornos ENT, uso de chupetes o chuparse el dedo (~2 veces mayor riesgo).	Factores ENT y respiración bucal son predictores significativos de SB; se recomienda una evaluación clínica detallada y estudios adicionales para explorar estas asociaciones.
Kumar et al. (22)	Not specified; primary focus was management of asthma-related bruxism.	Diagnosis based on clinical examination and intraoral devices; EMG and PSG assessments included as additional options.	Anxiety, stress, asthma, respiratory disturbances, dental occlusion problems.	Bruxism related to respiratory and psychosocial factors; the importance of early intervention to prevent associated complications is emphasized.

Note: SB: Sleep Bruxism. Source: Own elaboration from systematic search.

Overall, the authors agree that the risk determinants associated with sleep bruxism in children and adolescents are multifaceted and combine genetic, emotional and physiological dimensions. While all of the research reviewed provides relevant information, there is compelling evidence for the need for interdisciplinary research integrating dentistry, psychology, and sleep medicine to comprehensively understand the elements contributing to this disorder in the child and adolescent demographic.

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4 Discussion

Sleep bruxism (SB) in children and adolescents represents a complex multifactorial disorder encompassing physiological, psychological, and environmental dimensions. The results of this exploratory review highlight a number of interrelated risk factors, ranging from genetic predispositions to sleep disorders and adverse socioeconomic circumstances. This analysis facilitates the identification of not only consistent patterns in the existing literature, but also gaps that require attention to improve understanding of this condition.

4.1. Genetic predisposition and physiological components

One of the risk factors emphasized in this study is the impact of heredity, corroborated by several previous investigations. Gonçalves et al.(11) established that familial predisposition is an important predictor of SB in children. This finding is in agreement with studies by Serra-Negra et al.(12) , who reported that children with a family history are up to 2.68 times more likely to manifest this disorder. In addition, Liu et al.(7) argue that the genetic association is related to modifications in the basal ganglia, which regulate muscle activity during sleep. This genetic perspective not only underscores the need to evaluate family history, but also to explore possible biomarkers that allow early detection.

In addition, physiological conditions such as gastroesophageal reflux and involuntary movements are also critical, de Souza et al.(14) observed a significant correlation between these conditions and SB, particularly in children with developmental disabilities. This finding is corroborated by Ommerborn et al.(3) , who emphasized that neurological disorders may also aggravate bruxing episodes, particularly in susceptible populations.

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4.2. Psychological and emotional factors

The role of stress and anxiety as catalysts of SB is widely recognized in the literature. FerreiraBacci et al.(13) identified that 82.76% of children with multiple sclerosis have psychological problems, such as anxiety, hyperactivity, and attention deficit. These findings are in agreement with those reported by Luco(3) , who highlights that children with high levels of anxiety are more predisposed to develop this disease due to increased muscle activity during sleep. In addition, Alqaderi et al.(9) documented that adverse emotions, particularly frustration, correlate with more frequent and severe episodes of SB. These data accentuate the importance of integrating emotional regulation strategies into therapeutic interventions.

In contrast, the COVID-19 pandemic provided a unique framework to assess how social isolation and alterations in sleep patterns influenced the prevalence of SB. Delima et al.(19) reported a substantial increase in cases during this period, associated with excessive use of electronic devices and decreased sleep quality. These findings are consistent with those of Alqaderi et al.(9) , who also observed a detrimental impact of prolonged screen time on emotional regulation and sleep hygiene.

4.3. Respiratory conditions and anatomical changes

Respiratory diseases, such as mouth breathing and otorhinolaryngological diseases, also emerge as important determinants. Emodi-Perlman et al.(8) demonstrated that mouth breathing triples the likelihood of bruxism, a finding corroborated by Laganá et al.(17) , who also found that 40% of pediatric patients with bruxism had oral breathing. In addition, ear, nose, and throat disorders, such as recurrent infections or the need for fluid drainage, substantially elevate the likelihood of SB, as demonstrated by Kumar et al.(22) . Therefore, these observations

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underscore the compelling need to incorporate respiratory assessments in the clinical identification of SB.

4.4. Influence of environmental and social factors.

The socioeconomic environment also plays a pivotal role in the manifestation of SB. Delima et al.(19) identified decreased parental education level and unrestricted access to electronic devices as factors that significantly increase risk. These results are consistent with the findings of Liu et al.(7) , who noted that adverse environmental circumstances, such as congestion and lack of structured routines, contribute to dysfunctional sleep patterns that aggravate SB.

In addition, high sugar intake and insufficient dietary practices have also been recognized as risk determinants in pediatric populations with SB. Marceliano and Gaviã(21) emphasized that excessive intake of saccharin-rich food substances alters dopaminergic neurotransmission, which may lead to a higher prevalence of the disorder. In other words, this revelation denotes the need to address nutritional determinants in the clinical management of SB.

4.5. wards a comprehensive understanding of sleep bruxism (SB)

Taken together, the findings of this exploratory review accentuate the multifactorial essence of SB and the need for an interdisciplinary approach to its understanding and management. The data accumulated here reinforce the relevance of evaluating genetic, psychological, physiological, and environmental factors in a holistic manner. In addition, it is imperative to develop longitudinal research to improve understanding of the interactions between these factors and their long-term implications for the oral and overall well-being of children and adolescents.

The results also underscore the importance of raising awareness among health professionals about early detection and appropriate treatment of SB. Recent research suggests that incorporating preventive

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strategies into educational and clinical settings can markedly reduce the prevalence of the disorder and improve the quality of life of affected children(2) . Finally, future research should explore specific interventions tailored to the individual characteristics of each patient, including psychological therapies, habit modification, and specific pharmacological treatments.

5. Conclusion

The comprehensive review facilitated the systematic delineation of existing research on risk determinants correlated with sleep bruxism in pediatric and adolescent populations by discerning key concepts, recurrent motifs, and gaps in knowledge. The findings indicate that sleep bruxism is a multifactorial disease in which genetic, psychological, physiological, and environmental elements merge. Among the most important determinants are hereditary susceptibility, neurological abnormalities, emotional stress and inadequate sleep environments, which are key factors in predicting the manifestation of sleep bruxism.

In addition, the scientific literature recognizes specific determinants, e.g., gastroesophageal reflux, sucking behaviors, use of electronic devices, and the implications of the COVID-19 pandemic, which have been underappreciated in academic discourse and require further scrutiny. The interrelationships between physiologic and psychosocial elements underscore the need for multidisciplinary methodologies incorporating dentistry, sleep medicine, and psychology to thoroughly address this disorder within the pediatric demographic.

Ultimately, this review also highlighted the deficiency of longitudinal research to elucidate causal connections between identified risk factors and sleep bruxism, as well as the paucity of research focused on particular groups, such as children with developmental disabilities. The importance of ongoing research to close these gaps, increase early diagnostic strategies,

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and formulate evidence-based preventive and therapeutic interventions is denoted.

6. Authors' Contribution

CCLR: Initial drafting, data collection, analysis of results, discussion, final revision of the article.

AJVF: Initial draft, data collection, analysis of results, discussion, final revision of the article.

PAOC: Analysis of results, discussion, final review of the article.

7. Ethics committee approval and consent to participate in the study

Not applicable

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Systematic review and meta-analysis of reliability of assessment instruments for Frontotemporal Dementia

Revisión sistemática y metaanálisis de fiabilidad de los instrumentos de evaluación para la Demencia Frontotemporal

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Summary

Introduction: Frontotemporal dementia (FTD) is a progressive form of dementia that affects behavior and cognitive function. Assessing knowledge about this disease is crucial for proper diagnosis and treatment. Several assessment instruments have been adapted and validated in different cultural contexts, but their reliability varies. Objective: To analyze the scientific literature on assessment instruments used to measure knowledge and progression of FTD, in order to perform a meta-analysis of reliability, focusing on Cronbach's alpha in different cultural adaptations and contexts. Methodology: Four scientific databases (Web of Science , Scopus , PsycINFO , and PubMed) on the reliability (Cronbach's alpha) of FTD assessment instruments in various populations. Information was collected on the population, validation method, cultural context, and internal consistency (Cronbach's alpha) of each instrument. Results: Results showed that the internal consistency of the instruments varies according to context. For example, the FTDKS obtained an alpha of .846 in the United States, .740 in Spanish-speaking countries, and .800 in Poland. The FTD-FRS showed an exceptional alpha of .975 in Brazil. The meta-analytic model (nStudies = 3) demonstrated an overall reliability of .85 (CI α = .80 - .90). Conclusion: FTD assessment instruments vary in their reliability depending on the cultural context. Appropriate adaptations are essential to improve its effectiveness in assessing disease knowledge, thus facilitating better diagnosis and patient care.
Keywords: Meta-analysis, reliability, Psychometrics, Frontotemporal Dementia.

Resumen

Introducción: La demencia frontotemporal (DFT) es una forma progresiva de demencia que afecta el comportamiento y la función cognitiva. Evaluar el conocimiento sobre esta enfermedad es crucial para un diagnóstico y tratamiento adecuados. Varios instrumentos de evaluación se han adaptado y validado en diferentes contextos culturales, pero su confiabilidad varía. Objetivo: Analizar la literatura científica sobre herramientas de evaluación utilizadas para medir el conocimiento y la progresión de la DFT, con el objetivo de realizar un metaanálisis de confiabilidad, centrándose en el alfa de Cronbach en diferentes adaptaciones culturales y contextos. Metodología: Se revisaron cuatro bases de datos científicas (Web of Science, Scopus, PsycINFO y PubMed) para recopilar información sobre la confiabilidad (alfa de Cronbach) de las herramientas de evaluación de la DFT en diversas poblaciones. Se recopilaron datos sobre la población, el método de validación, el contexto cultural y la consistencia interna (alfa de Cronbach) de cada instrumento. Resultados: Los hallazgos mostraron que la consistencia interna de los instrumentos varía según el contexto. Por ejemplo, la FTDKS obtuvo un alfa de Cronbach de 0,846 en Estados Unidos, 0,740 en países 2. hispanohablantes y 0,800 en Polonia. La FTD-FRS mostró un alfa excepcional de 0,975 en Brasil. El modelo de metaanálisis (nEstudios = 3) demostró una fiabilidad general de 0,85 (CIα = 0,80-0,90). Conclusión: Las herramientas de evaluación de la DFT presentan variaciones en su fiabilidad según el contexto cultural. Es fundamental realizar adaptaciones adecuadas para mejorar su eficacia en la evaluación del conocimiento sobre la enfermedad, facilitando así un mejor diagnóstico y atención al paciente.
Palabras clave: Metaanálisis, fiabilidad, psicometría, demencia frontotemporal

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Introduction

Frontotemporal dementia (FTD) is an umbrella term for a variety of neurodegenerative disorders characterized by predominant atrophy of the frontal and temporal lobes of the brain, manifesting primarily through changes in behavior, personality, and language (1). Unlike other forms of dementia such as Alzheimer's, FTD occurs in younger individuals, usually between 40 and 65 years of age, with symptoms primarily affecting executive function, social behavior, and in some cases, language and communication skills (2, 3). Clinical variants of FTD include the behavioral variant (bvFTD), characterized by disinhibition, apathy, impulsivity, and loss of empathy, and language variants, such as progressive non-fluent aphasia (PNFA) and semantic dementia (SD), which affect language production and comprehension, respectively (4). In neuropathological terms, FTD is associated with the abnormal accumulation of proteins such as tau and TDP-43, which contribute to progressive neurodegeneration.

Clinical evaluations for FTD are complex due to the overlap of its symptoms with other psychiatric disorders (5, 6). Therefore, it is crucial to develop and validate accurate diagnostic tools to improve the diagnostic accuracy and clinical management of this disease (7, 8). Characterization and follow-up of patients with FTD have demonstrated variable disease progression, underscoring the need for longitudinal studies and detailed clinical reviews (9, 10).

Public awareness of FTD and other forms of dementia remains limited, affecting perception and management of these conditions (11–13). Evidence-based interventions, such as recommendations to distinguish between FTD and psychiatric disorders, are critical for improving diagnoses and providing support to caregivers (14–17).

The development and validation of knowledge scales and assessment tools, such as the FTD Knowledge Scale, are essential to address these

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needs and improve understanding and management of the disease (16, 18).

The overall objective was to analyze the scientific literature on assessment instruments used to measure knowledge and progression of Frontotemporal Dementia, with the aim of conducting a meta-analysis of reliability, specifically Cronbach's alpha, in various cultural adaptations and contexts.

Methodology

Study design

The study followed the preferred reporting items for systematic reviews (19,20) and reliability meta-analyses (21).

Inclusion and exclusion criteria

For the systematic review and meta-analysis of the reliability of assessment instruments for Frontotemporal Dementia, prevalence studies, as well as longitudinal and cross-sectional studies, were included. Participants had to be adults with a confirmed or suspected diagnosis of Frontotemporal Dementia. It was essential that the assessed studies used instruments specifically validated for this condition. Only studies that reported instrument reliability using Cronbach's alpha and McDonald 's omega, a key indicator of internal consistency, were considered.

Studies published in English or Spanish that had been peer-reviewed in academic journals were included. Studies that focused on other forms of dementia or neurocognitive disorders unrelated to Frontotemporal Dementia were excluded. Studies that did not provide data on the reliability of the instruments used or that used tools not psychometrically validated were also excluded. Studies that were not peer-reviewed, such

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as theses, dissertations, technical reports, or unpublished papers, were also excluded from the analysis.

Sources of information

Four scientific databases were used as sources of information: Web of Science , Scopus , PsycINFO , and PubMed , with access to the library of the University of Oviedo (Spain) and the Salesian Polytechnic University (Ecuador). Four databases were selected for their international scientific relevance and high-quality coverage of studies in the social and health sciences. The bibliographies of the articles included in the review were reviewed to reduce exclusion bias due to coverage.

Search strategy

The searches for the systematic review and meta-analysis of the reliability of assessment instruments for Frontotemporal Dementia were conducted on October 2, 2024, following the guidelines outlined in the PRISMA statement (19). In the initial phase, duplicate records with a content overlap greater than 90 % were identified, both algorithmically and by manual verification. Records that did not focus on the assessment of Frontotemporal Dementia were then excluded. Theoretical studies, systematic reviews, or non-systematic narratives were not considered eligible. Two independent researchers reviewed the full texts of the remaining records, comparing their content with previously established inclusion criteria. Disagreements in coding decisions were resolved through deliberation until consensus was reached, classifying studies as included, excluded, or those requiring further discussion.

Coding in this phase was performed using the Rayyan web application (22) and records were categorized into duplicates, deleted, included, excluded, and possible. The reasons for each decision were recorded in detail in the system. Finally, blinding was unblinded to allow

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the investigators to cross-check the results and continue with the study analysis (Figure 1).

Data collection process

A thorough systematic extraction of essential bibliographic data was conducted for the systematic review and meta-analysis of the reliability of assessment instruments for Frontotemporal Dementia. The data collected included author names, publication titles, source journals, and abstracts, providing a comprehensive view of each record. A researcher downloaded these data in RIS format, a standard for bibliographic data exchange, managing each record individually according to the database used.

RIS files were then verified and uploaded to Rayyan (22), a specialized tool for managing and reviewing scientific literature. To ensure accuracy and reduce bias, an independent researcher was recruited as a blind coding partner, allowing for a dual screening process. This meticulous extraction and processing protocol was followed sequentially across the selected databases, ensuring consistency and rigor in data management.

Data extraction process

For data extraction in the systematic review and meta-analysis of the reliability of assessment instruments for Frontotemporal Dementia, two main categories were defined: 1) the methodological characteristics of the included studies and 2) the psychometric properties of the instruments evaluated. The primary reviewer identified the information based on the predefined variables in a working matrix and compared the findings with the external reviewer. Inconsistencies were resolved by joint verification of the data until an agreement was reached.

Regarding the methodological variables, the following data of interest were collected: 1) author and year of publication; 2) title of the study in the original language of publication; 3) journal and quartile; 4) psychometric instrument used and the number of items in its structure;

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5) country, sample size and average age of participants; and 6) reliability measures and, where applicable, the fit indices of the instruments evaluated for Frontotemporal Dementia. The psychometric data of interest were: 1) the reliability of the instrument measured by Cronbach's alpha and McDonald 's omega .

Assessment of the risk of bias of the study

The lead reviewer (AR) and the second reviewer (VQ) analyzed the methodological quality of the included studies, assessing their reliability or internal consistency using Cronbach's alpha for the psychometric instruments used to assess frontotemporal dementia. A Cronbach's alpha value of 0.70 was considered acceptable, in line with established methodological standards. The representativeness of the sample was also assessed in relation to the number of instrument items reported in each study.

The reviewers agreed in 97 % of cases, and discrepancies were resolved through discussion and consensus with a third reviewer (SV). Of the five studies that reported relevant statistical data, the researchers (VQ and AR) decided to document the samples separately, reviewing the full text and comparing the data until reaching a consensus through joint discussion.

Figure 1 illustrates the flow diagram of the systematic review, beginning with the identification of 3456 records through databases, from which 564 duplicate records were removed prior to screening. A total of 2888 records were reviewed, of which 1989 were excluded for not meeting the inclusion criteria. A total of 899 reports were requested for retrieval, but 627 of these could not be retrieved. A total of 272 full reports were assessed for eligibility, resulting in the exclusion of 267 reports. Finally, five studies that reported the reliability (Cronbach's alpha and McDonald's omega) of instruments for assessing frontotemporal dementia and met

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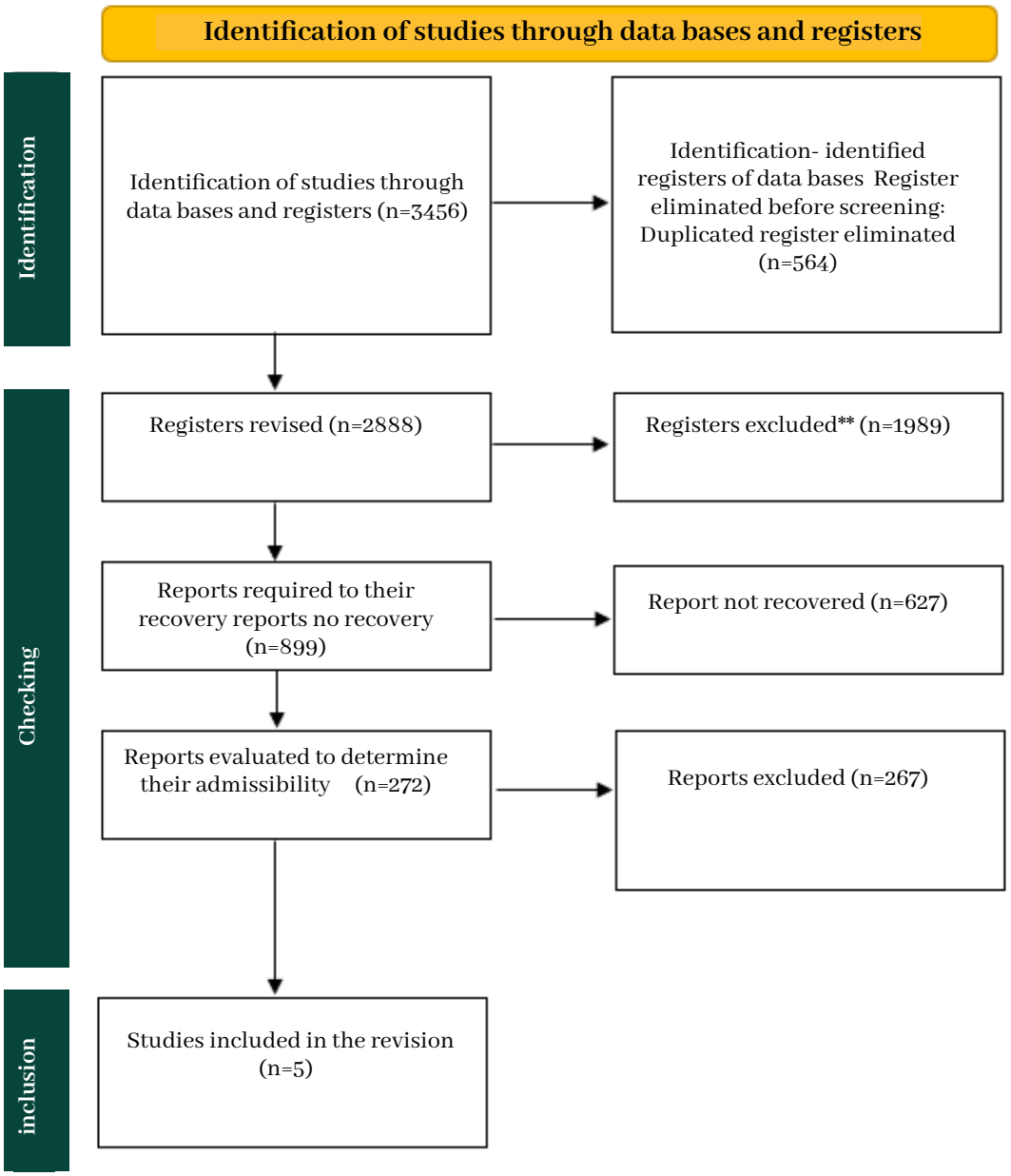
the criteria for the systematic review were included, reflecting a rigorous and methodical selection process.

Figure 1. Flowchart of the systematic review.



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Statistical analysis

This study employed reliability generalizability and meta-analysis approaches to measure internal consistency and model fit indicators of Frontotemporal Dementia assessment instruments in published studies. Pooled reliability was estimated *using Cronbach 's alpha and McDonald 's omega* (23), *transformed using the Hakstian – Whalen* method to facilitate random effects modeling (24). Heterogeneity was assessed using *Cochran's* Q, I^2, H^2 , and τ^2 (25) .

To ensure the reliability of the results, studies with Cronbach's alpha values less than 0.70 or inadequate case-to-item ratios (less than 10:1) were removed using trimming techniques before calculating pooled estimates. Potential publication bias was assessed by visual inspection of funnel plot asymmetry and *Egger 's regression test* (25). By meta-analyzing reliability and validity indicators across diverse applications, this study facilitates generalizations about the effectiveness of existing tools in consistently measuring FTD across diverse samples. All analyses were performed using *Jamovi* and R .

Results

Table 2 presents the descriptives of the selected studies on assessment instruments for frontotemporal dementia, with a total of five studies analyzed.

Regarding the year of publication, the studies are evenly distributed between 2017, 2018, 2020, 2021, and 2022, with one study (20 %) published in each of these years. This suggests that studies on the reliability of instruments for frontotemporal dementia have been relatively consistent over recent years.

Regarding the scientific journals in which these studies were published, the largest proportion (40%) comes from the journal

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Alzheimer's Disease and Associated Disorders , while the other three publications are distributed between Archivos de Neuro- Psiquiatria (20 %), Dementia and Geriatric Cognitive Disorders (20 %) and Neurologia (Barcelona, Spain) (20 %).

Table 1. Articles selected on the reliability of fontotemporal dementia instruments .

No	Authors	Year	Magazine	Quartile	SJR 2023	H-INDEX	Country	Continent	Sample	n items	Cronbach's alpha
1	Wynn and Carpenter (26)	2020	Alzheimer disease and associated disorders	Q2	0.61	109	United States	America	174	4	.846
2	Magrath-Guimet et al. (27)	2022	Neuro-psychiatry archives	Q3	0.34	58	Germany	Europe	134	18	.74
3	Turró-Garriga et al. (28)	2017	Neurology (Barcelona, Spain)	Q4	0.52	50	Spain	Europe	60	30	.897
4	Karasiewicz and Leszko (29)	2021	Dementia and geriatric cognitive disorders	Q2	0.81	123	Switzerland	Europe	869	4	.80
5	Lima-Silva et al. (30)	2018	Alzheimer disease and associated disorders	Q2	0.61	109	United States	America	97	8	.975

Regarding the journal quartile, three of the studies (60%) were published in journals classified in the second quartile (Q2 50%), indicating a medium-high impact level. One study (20 %) was published in a third quartile journal (Q3 75%) and another in a fourth quartile journal (Q4 100%), indicating lower relevance within the field. Regarding

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geographic distribution, the selected studies come from diverse countries. Two studies (40 %) were conducted in the United States, while Germany, Spain, and Switzerland each contributed one study (20 %). Finally, regarding continental distribution, three studies (60%) were conducted in Europe, while the other two studies (40 %) were conducted in America. This suggests a relevant interest in frontotemporal dementia research on both continents.

Table 2. Descriptives of the selected studies on assessment instruments for Frontotemporal Dementia (n = 5).

Year	**n (%)**
2017	1 (20%)
2018	1 (20%)
2020	1 (20%)
2021	1 (20%)
2022	1 (20%)
Magazine	
Alzheimer disease and associated disorders	2 (40%)
Neuro- psychiatry archives	1 (20%)
Dementia and geriatric cognitive disorders	1 (20%)
Neurology (Barcelona, Spain)	1 (20%)
Quartile	
Q2	3 (60%)
Q3	1 (20%)
Q4	1 (20%)
Country	
Germany	1 (20%)
Spain	1 (20%)
Switzerland	1 (20%)
United States	2 (40%)

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Continent	
America	2 (40%)
Europe	3 (60%)

Table 3 shows the descriptives of the selected publications, analyzing several factors such as the impact of the journals, the sample size, the number of items and the reliability measures of the assessment instruments used for frontotemporal dementia.

Regarding journal impact, all studies report both the *SJR* and the *H-INDEX* . The average *SJR* is 0.578, indicating that the journals in which the studies were published have a moderate to high impact in their field. The average *H-INDEX* is 89.8, reflecting a high level of scholarly recognition of these journals, with a range from 50 to 123. This suggests that the studies come from relevant and well-established sources in the scientific field.

The sample sizes used in the studies vary significantly. The average is 267 participants, although the median is lower at 134, indicating that most studies include moderately sized samples. However, some studies present much larger samples, which raises the average. The number of items in the assessment instruments varies between 4 and 30 items, with an average of 12.8, demonstrating diversity in the length of the instruments used.

All studies report *Cronbach 's alpha* as a measure of reliability, with a mean of 0.852 and a median of 0.846, indicating high internal consistency across the instruments evaluated. The range varies between 0.740 and 0.975, suggesting that some instruments have higher reliability than others. However, only one study reports *McDonald 's omega* , with a value of 0.800, also indicating good internal consistency. The lack of further reporting on *McDonald 's* omega limits a broader comparison between the two reliability measures. Overall, the selected studies reflect a solid methodological basis, with instruments that present acceptable reliability and were published in well-recognized academic journals.

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Table 3. Descriptives of the selected publications based on the impact of the journals (SJR and H-INDEX), sample, number of items and reliability (Cronbach's Alpha and McDonald's Omega).

	SJR 2023	H-INDEX	Sample	n items	Cronbach's alpha	Omega McDonald
Report	5	5	5	5	5	1
Does not report	0	0	0	0	0	4
M	0.578	89.8	267	12.8	0.852	0.800
MD	0.610	109	134	8	0.846	0.800
OF	0.170	33.3	339	11.2	0.0901	----
Min	0.340	50	60	4	0.740	0.800
Max	0.810	123	869	30	0.975	0.800

Note. M = Mean, Md = Median, SD = Standard Deviation, Min = Minimum, and Max = Maximum.

Table 4 presents the results of the random-effects model and heterogeneity statistics for two models examining frontotemporal dementia assessment instruments. Model 1 includes five studies, while Model 2 includes three studies.

Regarding the estimates of the combined effects of the studies, Model 1 has an estimate of 0.855, while Model 2 has a slightly lower estimate of 0.846. Both models have a low standard error (se), 0.0358 for Model 1 and 0.0284 for Model 2, indicating precision in the estimates. The Z values for both models are high (23.9 and 29.8, respectively), demonstrating a strong association in the data. The p values are highly significant for both models ($p < .001$), indicating that the estimates are statistically significant.

The confidence intervals (CIs) for the estimates are also narrow, reinforcing the reliability of the results. In Model 1, the confidence interval ranges from 0.785 to 0.925, and in Model 2, from 0.790 to 0.902, suggesting

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that the true parameter values are likely within these ranges, and both models show high consistency.

The heterogeneity statistics show a notable difference between the two models. In Model 1, the Tau value is 0.078, and in Model 2 it is 0.046, indicating less heterogeneity in the second model. Tau^2, which measures the variance between studies, is lower in Model 2 (0.0021) than in Model 1 (0.006), suggesting that the studies in Model 2 are more homogeneous.

The I^2 value is extremely high in both models, with 97.44% for Model 1 and 88.94% for Model 2. This indicates that most of the variability observed between studies is not due to chance, but to real differences between studies, although Model 2 shows less heterogeneity compared to Model 1.

The H^2 values, which also reflect heterogeneity, are considerably high in both models, especially in Model 1 (39,038 versus 9,043 in Model 2), again indicating greater heterogeneity in the first model.

Q statistic , which assesses consistency across studies, is significant in both models ($p < .001$), but the Q value is much higher in Model 1 ($Q = 301.577$) than in Model 2 ($Q = 19.833$), reinforcing the idea that studies in Model 1 have more variability across them.

In summary, both models present robust and significant estimates for the reliability of frontotemporal dementia assessment instruments. However, Model 2 shows less heterogeneity, indicating greater consistency across the studies included in this model compared to Model 1.

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Table 4. Random effects model and heterogeneity statistics of model 1 (n = 5) and model 2 (n = 3) of the assessment instruments for Frontotemporal Dementia.

	Model 1	Model 2
Dear	0.855	0.846
HE	0.0358	0.0284
Z	23.9	29.8
p	< .001	< .001
Lower IQ Bound	0.785	0.790
Upper IQ Bound	0.925	0.902
Tau	0.078	0.046
Tau^2	0.006 (SE= 0.004)	0.0021 (SE= 0.0024)
I^2	97.44 %	88.94 %
H^2	39.038	9.043
df	4,000	2,000
Q	301,577	19,833
p	< .001	< .001

Note. Tau^2 Estimator: Restricted Maximum-Likelihood.

Table 5 presents the results of the assessment of publication bias in two models of assessment instruments for frontotemporal dementia.

In Model 1, the Fail-Safe N value is 70,339,000, with a p value < .001, indicating that a large number of additional null studies would be needed to invalidate the results of the meta-analysis . This suggests that the model is robust and not significantly influenced by the lack of published studies. Model 2 also shows a high Fail-Safe N value (9,740,000), with p < .001, reinforcing the reliability of the results in this second model.

Kendall's Tau test in Model 1 has a value of -0.200 and a p-value = 0.817, indicating no significant correlation between effect size and variance, demonstrating no apparent publication bias. In Model 2, the

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Kendall's Tau value is 1.000, but the *p-value* = 0.333 indicates no significant evidence of bias in that model either.

Regarding Egger 's regression , Model 1 presents a value of -2.418 and a p-value = 0.016, suggesting the presence of a statistically significant publication bias. This implies that there may be some asymmetry in the distribution of the studies included in this model, possibly because studies with less favorable results were not published. On the other hand, in Model 2, the *Egger 's Regression* is 1.859 and the *p-value* = 0.063, which is not statistically significant, suggesting that Model 2 does not present considerable publication bias.

Fail-Safe N values , indicating that they are robust to publication bias, Model 1 shows evidence of bias according to *Egger 's regression* , while Model 2 does not show significant bias according to the tests applied. This shows that Model 2 is more reliable in terms of avoiding publication bias.

Table 5. Assessment of publication bias.

	Model 1		Model 2	
Test Name	Statistical	p	Statistical	p
Fail-Safe N	70,339,000	< .001	9,740,000	< .001
Kendalls Tau	-0.200	0.817	1,000	0.333
Egger's Regression	-2.418	0.016	1,859	0.063

Note. Fail-safe N Calculation Using the Rosenthal Approach

Figure 1 shows the meta-analysis of the reliability of assessment instruments for Frontotemporal Dementia, with a sample of 5 studies (n = 5). Each study is represented by a point indicating the reliability coefficient, with horizontal bars representing the 95% confidence intervals

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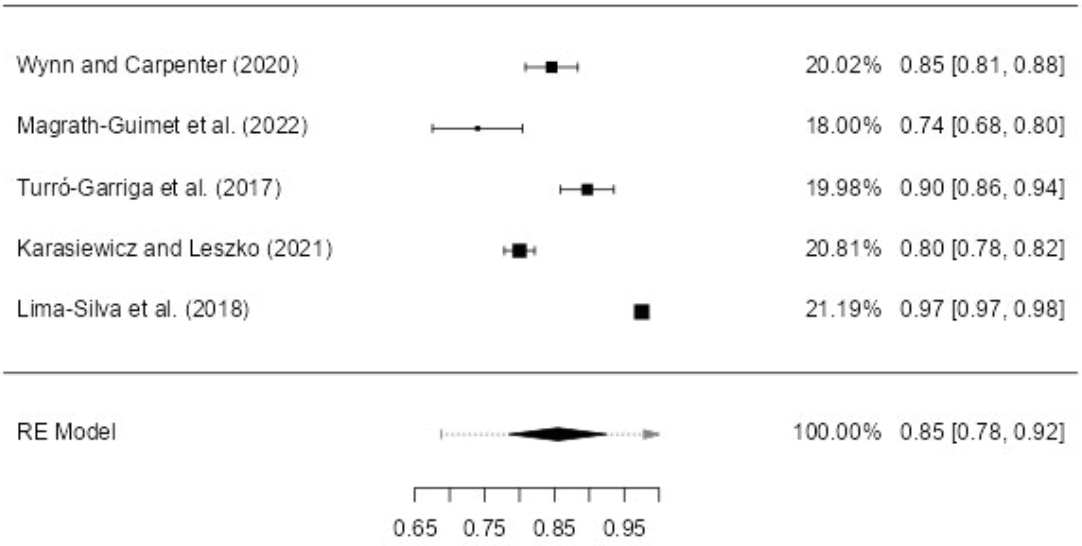
(CI). Reliability coefficients vary across studies, with some wider intervals suggesting greater uncertainty in the results. The overall coefficient, represented by a diamond at the bottom of the graph, indicates a weighted average of the reliability, showing that the instruments generally have adequate reliability. However, some heterogeneity is observed across studies, suggesting differences in the characteristics of the instruments or the populations assessed.

Figure 2. Model 1 of the meta-analysis of reliability of the assessment instruments for Frontotemporal Dementia (n = 5).



It was noted in Figure 2 that the studies are not completely symmetrically distributed around the center line, suggesting the possible presence of publication bias or heterogeneity in the results. Some points are outside the confidence area, indicating studies with more extreme or less precise effects. The asymmetric shape of the graph could reflect the lack of small studies with negative effects or studies with variability in reliability. Although only five studies were included, this visual representation

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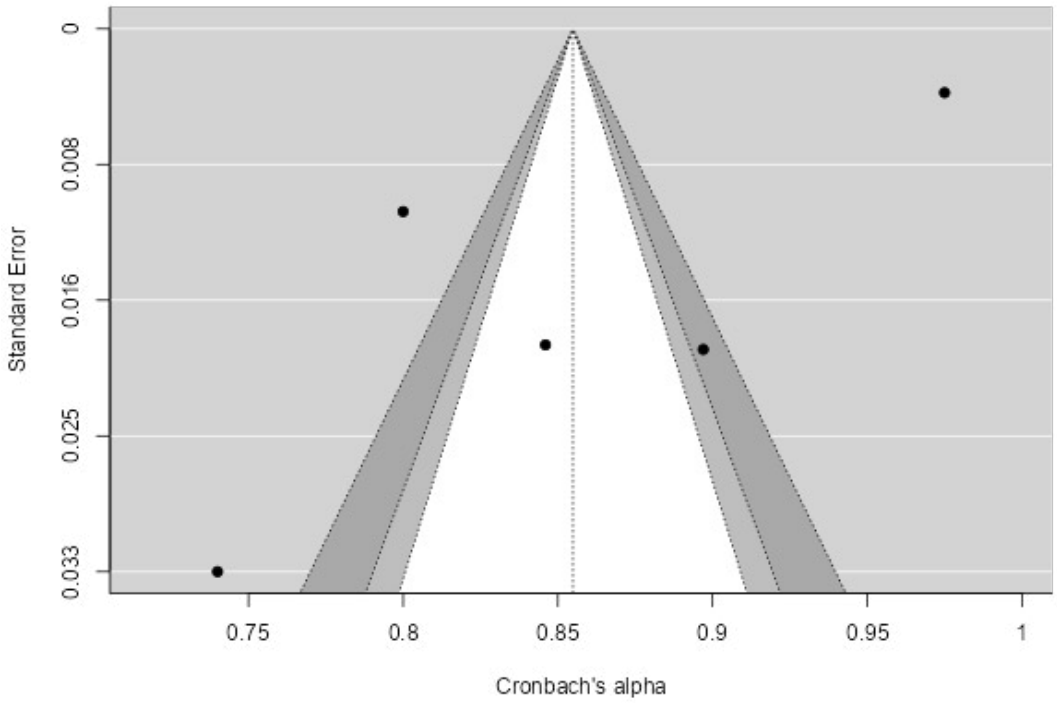
indicates that further examination of the quality and homogeneity of the studies included in the meta-analysis may be necessary.

Figure 3. Funnel plot of Model 1 (n = 5) .



The points in Figure 3 indicate the Tau estimates with and without excluding Model 1. In this case, the graph suggests that excluding Model 1 changes the Tau estimate, indicating that this study could be influencing the overall variability across studies. The red points likely represent the Tau values with and without excluding Model 1, showing that the variability across studies could be reduced or increased depending on whether this particular model is included or excluded. This type of analysis is useful for identifying studies that contribute disproportionately to heterogeneity and for assessing the robustness of the overall meta-analysis results.

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Figure 3. Tau estimates excluding Model 1 (n = 5).

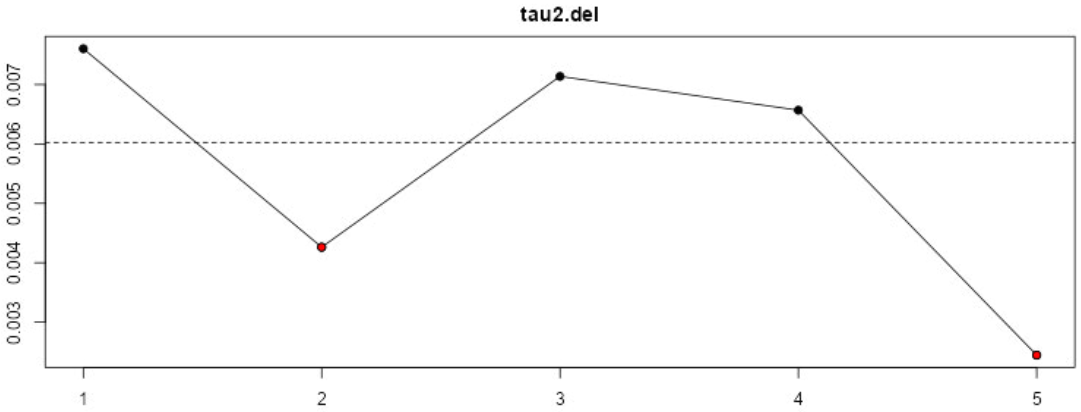

Figure 4 showed a meta-analysis model of reliability for Frontotemporal Dementia assessment instruments, based on three studies. In this analysis, reliability estimates, probably Cronbach's alpha , were displayed for each individual instrument or study, along with an overall summary. The x-axis represented the reliability coefficients, which probably ranged from 0 to 1, with 1 indicating perfect reliability and 0 indicating no reliability. The three studies (n = 3) presented their respective reliability estimates, possibly accompanied by confidence intervals (CIs), which reflected the range within which the true reliability value was expected to lie, with some margin of error. The figure also included a horizontal bar or dot plot showing the reliability estimates for each study. Wider confidence intervals indicated greater uncertainty in the estimates. Finally, the overall meta-analysis model presented a pooled reliability estimate, which summarized the reliabilities of the individual studies.

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Figure 4. Model 2 of the meta-analysis of reliability of the assessment instruments for Frontotemporal Dementia (n = 3).

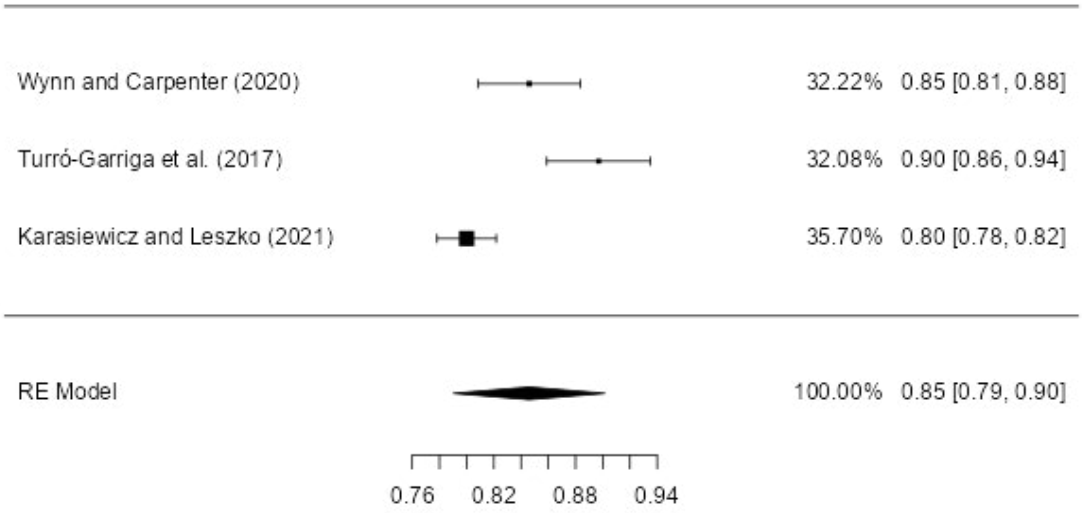

Figure 5 presented a funnel plot corresponding to Model 2, based on 3 studies. This type of plot is commonly used in meta-analyses to detect potential publication bias or to assess symmetry in the data. A symmetrical funnel plot indicates that publication bias is unlikely, while asymmetry may suggest the opposite. In this plot, the points represented the studies included in the meta-analysis . Each point corresponded to a study, and its position depended on the precision of the results (usually represented on the vertical axis) and the effect size or reliability coefficient (on the horizontal axis). The ideal funnel should be symmetrical around a center line (the pooled effect line from the meta-analysis). However, in the figure, one of the studies appeared isolated on the left, which could indicate asymmetry in the plot. This asymmetry could be an indication of publication bias or heterogeneity between the studies, although with only three studies in the analysis, conclusions about the presence of bias should be taken with caution. Additionally, the shaded areas of the graph represented the confidence intervals for the studies. Studies falling within the shaded areas closest to the apex of the funnel indicated greater

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precision, while those further from the apex, such as the study on the left, showed lower precision in their results.

Figure 5. Funnel plot of Model 2 (n = 3).

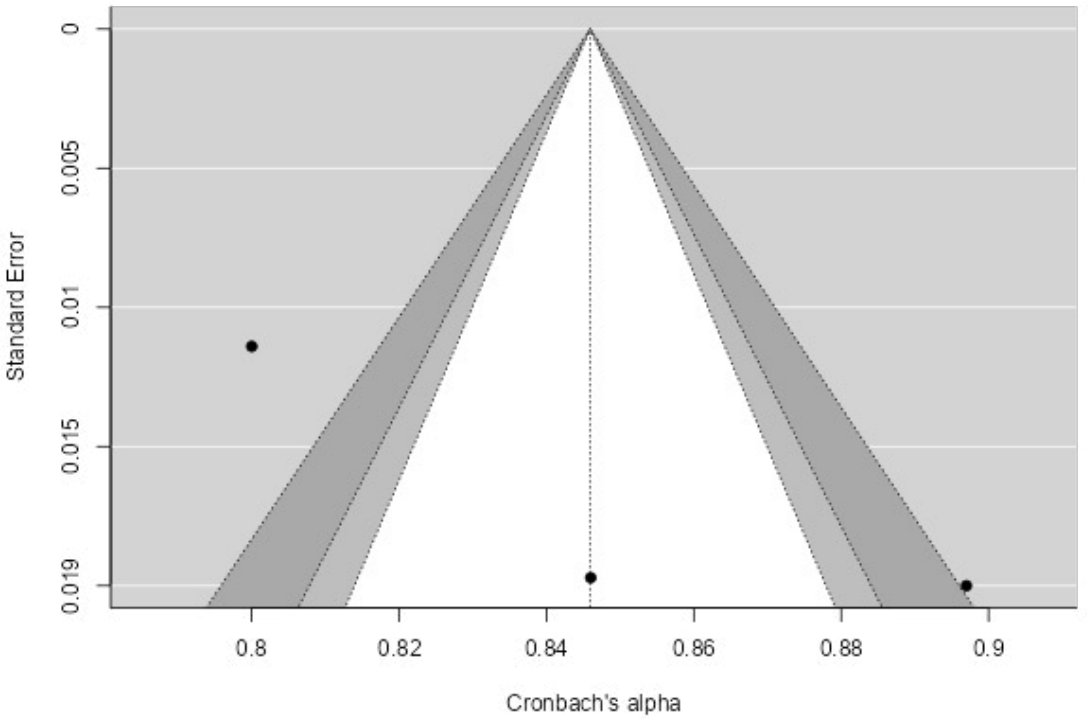

Figure 6 showed the Tau estimates excluding Model 2, based on three studies. Tau is a measure used in meta-analyses to assess heterogeneity among included studies. Specifically, Tau² represents the true variance between studies—that is, the amount of variability in the results that cannot be explained by random error and is attributable to true differences between studies. In this figure, two points were displayed, one on the left and one on the right, representing the Tau estimates when certain outcomes were excluded from Model 2. The red dot in the center of the graph likely indicated the pooled Tau estimate when this exclusion was applied. The fact that the estimates diverged at the extremes could have indicated significant variability between the excluded and included studies, potentially reflecting a high degree of heterogeneity in the data.

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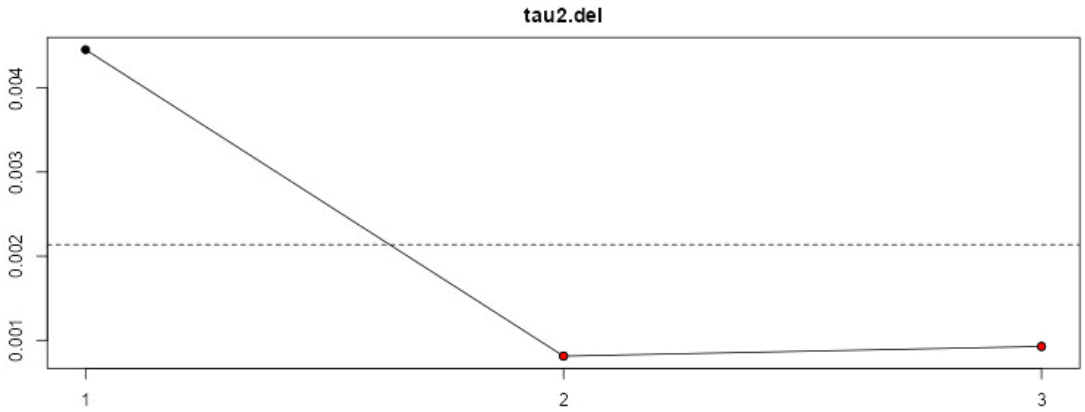
This suggested that, when Model 2 was excluded, the variance between studies remained considerable and that the remaining studies were not completely homogeneous in terms of their outcomes or characteristics. Interpretation of these Tau estimates may have indicated the need to further explore differences between studies or to apply more complex models to adjust for this heterogeneity.

Figure 6. Tau estimates excluding Model 2 (n = 3).



Discussion

The reviewed studies on the adaptation and validation of instruments to measure knowledge about frontotemporal dementia (FTD) highlight rigorous methodological approaches and solid psychometric results. Wynn and Carpenter (26) developed the Frontotemporal Dementia Knowledge Scale (FTDKS) with outstanding internal consistency (α = .846) in a sample of 174 people, including health professionals and caregivers. This instrument, designed to measure knowledge about FTD, covers essential aspects of the disease, such as risk factors, symptoms, progression, and treatment, and has become a useful tool in both clinical settings and educational programs in the United States.

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In a Spanish-speaking context, Magrath-Guimet et al. (27) adapted and validated the FTDKS in Spanish, obtaining acceptable internal consistency (α = .74) with a sample of 134 healthcare professionals. The adaptation followed international guidelines for translation and cross-cultural adaptation, and the results show that this version is applicable in their setting. The usefulness of this instrument lies in its ability to assess knowledge about FTD, which can improve the diagnosis and care of patients with frontotemporal dementia in Spanish-speaking countries, where knowledge about this condition is still limited.

Turró Garriga et al. (28) validated the Frontotemporal Dementia Rating Scale (FTD-FRS) in Spanish, focusing on patients diagnosed with FTD in Spain. This study reported high internal consistency (α = .897) and used the Rasch model to validate the unidimensionality of the instrument. The FTD-FRS allows the evaluation of disease progression and the clinical status of patients, being of great value to professionals who care for people with FTD.

In Poland, Karasiewicz and Leszko (29) adapted and validated the FTDKS in their language, achieving adequate internal consistency in both Cronbach's alpha and McDonald's omega (α = .80, ω = .80). This study included a large sample of 869 people, which allowed evaluating the effectiveness of the instrument in different subpopulations, such as the general population, health professionals and caregivers. The authors concluded that the FTDKS is effective in measuring knowledge about dementia in various contexts, highlighting its convergent and discriminant validity.

Finally, Lima-Silva et al. (30) validated the FTD-FRS in Brazil with impressive results in terms of internal consistency (α = .975) and test- retest reliability (.977). This study focused on patients with FTD and Alzheimer's disease, demonstrating that the FTD-FRS is a valuable tool for assessing the status and progression of dementia. The application of this instrument

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in Brazil reinforces its usefulness for documenting changes related to interventions and for the clinical follow-up of patients with FTD.

Taken together, these studies demonstrate that the adaptations and validations of the FTDKS and FTD-FRS instruments are psychometrically sound and applicable across diverse cultural contexts. These instruments allow for the assessment of knowledge and progression of frontotemporal dementia, which is critical for improving the diagnosis, care, and management of this disease in different populations.

Table 6 presents a comparison of studies on the reliability of instruments for measuring knowledge about frontotemporal dementia (FTD) in different cultural contexts. First, the study by Wynn and Carpenter (26) stands out for its focus on health professionals and caregivers in the United States, although it does not specify the validation method used; however, it is considered effective in a context where knowledge about FTD is already more advanced. On the other hand, Magrath-Guimet et al. (27) adapted the instrument to Spanish-speaking countries through translation and cross-cultural adaptation, obtaining lower consistency, which highlights the importance of cultural adaptation to improve the effectiveness of the instrument. In contrast, the work of Turró-Garriga et al. (28) uses the Rasch model to validate their instrument in patients diagnosed with FTD in Spain, reporting high consistency and unidimensionality , making it a robust tool for clinical assessment. In Poland, Karasiewicz and Leszko (29) evaluated the FTDKS in a diverse context including the general population, healthcare professionals and caregivers, although they did not specify the validation method; their study highlights the effectiveness of the instrument and the need to explore its applicability in different subpopulations. Finally, the study by Lima-Silva et al. (30) focuses on patients with FTD and Alzheimer's in Brazil, obtaining outstanding results in internal consistency, suggesting that it is a useful tool for clinical follow-up and documentation of changes. Taken together, these studies highlight the variability in the reliability of the instruments

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according to the cultural context and the target population, underlining the need for careful adaptation and validation in different settings.

Table 6. Comparison of studies on instruments for measuring knowledge about frontotemporal dementia.

Investigation	Population	Validation Method	Cultural Context	Observations
Wynn and Carpenter (26)	Health professionals and caregivers	not specified	USA	Effective tool, but focused on a context with greater knowledge about FTD.
Magrath-Guimet et al. (27)	Health professionals	Translation and cross-cultural adaptation	Spanish-speaking countries	Inferior consistency; highlights the need for cultural adaptation.
Turró-Garriga et al. (28)	Patients diagnosed with FTD	Rasch model	Spain	High consistency and unidimensionality , robust instrument to assess clinical status.
Karasiewicz and Leszko (29)	General population, health professionals and caregivers	not specified	Poland	An effective instrument in various contexts; it highlights the need to evaluate its applicability in different subpopulations.

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Lima-Silva et al. (30)	Patients with FTD and Alzheimer's	not specified	Brazil	Exceptional internal consistency; useful for clinical follow-up and documenting changes.

Conclusions

The findings of studies on the adaptation and validation of instruments to measure knowledge and progression of frontotemporal dementia (FTD) show that both Frontotemporal Dementia Knowledge Both the Frontotemporal Dementia Rating Scale (FTDKS) and the *Frontotemporal Dementia Rating Scale* (*FTD-FRS*) are valid and reliable tools. These instruments effectively assess both the disease knowledge of healthcare professionals and caregivers, as well as the clinical status and progression of FTD in patients. In each study, cultural and linguistic adaptations followed rigorous procedures, ensuring that the local versions of these instruments retain their original psychometric properties.

The validation of the FTDKS in diverse cultural contexts, including the United States, Spain, Poland, and Spanish-speaking countries, demonstrates its versatility and applicability. The results obtained in various studies suggest that the FTDKS can be effectively used to increase awareness of FTD, a condition that is often misdiagnosed due to a lack of information among healthcare professionals. This reinforces the importance of having tools like the FTDKS to improve diagnostic accuracy and optimize the care of patients with FTD.

Furthermore, the FTD-FRS has proven to be a valuable tool for assessing the status and progression of FTD in patients in clinical settings. Its ability to document changes in disease status and measure

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the effectiveness of interventions is essential for ongoing patient care. Adaptations in Brazil and Spain underscore the relevance of this scale in the clinical context, highlighting its psychometric robustness and contribution to FTD management. In summary, both the FTDKS and the FTD-FRS are key instruments for improving the care of patients with FTD and for training healthcare professionals and caregivers. Their validation in diverse cultural settings demonstrates their robustness and global applicability, allowing for a better understanding and management of frontotemporal dementia in different clinical and educational contexts.

Limitations and future research

Studies on the adaptation and validation of *Frontotemporal Dementia Knowledge The Frontotemporal Dementia Rating Scale* (FTDKS) and the *Frontotemporal Dementia Rating Scale* (FTD-FRS) present several limitations that should be considered. First, many of these studies were conducted with relatively small and specific samples, such as healthcare professionals or caregivers, which limits the generalizability of the results to other populations, such as the general public or patients with different educational levels. The external validity of the instruments could be improved with additional studies that include larger and more diverse samples, both geographically and sociodemographically.

Another common limitation is that most adaptations have focused on specific countries, such as the United States, Spain, Poland, and Brazil, leaving a gap in the validation of these instruments in other regions of the world, especially in developing countries or those with fewer resources for dementia care. This raises the need for additional studies to adapt and validate the scales in other cultural and linguistic contexts, ensuring their applicability in a variety of clinical and educational settings.

Furthermore, although the reviewed studies demonstrated good internal consistency and test- retest reliability, some did not comprehensively assess other important aspects of validity, such as

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convergent and discriminant validity, or the scales' sensitivity to detect longitudinal changes in knowledge or disease progression. This limits the instruments' ability to measure the impact of educational interventions or treatments over time.

Regarding future research, it would be valuable to conduct longitudinal studies examining how knowledge about frontotemporal dementia varies in response to educational interventions, as well as to investigate the sensitivity of the FTD-FRS to detect clinical changes across different stages of the disease. It would also be useful to explore the relationship between knowledge measured by the FTDKS and clinical outcomes in patients with FTD, such as caregiver quality of life and more informed clinical decision-making.

Finally, it would be pertinent to incorporate innovative technologies, such as virtual reality or mobile applications, to complement the use of these scales in the training of healthcare professionals and caregivers. This would allow for greater dissemination and accessibility of the tools, enhancing their usefulness in different contexts and fostering research on their effectiveness in digital environments.

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Determinants of competitiveness in Latin American SMEs. A systematic review

Factores determinantes de la competitividad en las Pymes de América Latina. Revisión sistemática

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Summary

Small and medium-sized enterprises in Latin America face multiple challenges that limit their competitiveness, such as financial constraints, limited technological access, and limited innovation. Although studies on competitiveness exist, no consensus has been established on the determining factors in the Latin American context. The objective was to identify the determining factors of competitiveness in small and medium-sized enterprises (SMEs) in Latin America. To this end, a systematic review of the scientific literature was conducted. The main determinants recognized were financial competencies, strategic planning, innovation, human resource management, organizational framework, use of technology, and eco-innovation. It is concluded that the competitiveness of small and medium-sized enterprises (SMEs) depends on the confluence of internal and external determinants, which emphasizes the need for holistic methodologies that encompass innovative strategies, sustainability, and public policies that foster an environment favorable to business development.

Keywords: Factors, competitiveness, small and medium-sized enterprises, SMEs, Latin America.

Resumen

Las pequeñas y medianas empresas de América Latina enfrentan múltiples desafíos que limitan su competitividad, como restricciones financieras, limitaciones en el acceso tecnológico y escasa innovación. Aunque existen estudios sobre competitividad, no se ha establecido un consenso sobre los factores determinantes en el contexto latinoamericano. El objetivo fue identificar los factores determinantes de la competitividad en las pequeñas y medianas empresas (Pymes) de América Latina. Para ello, se realizó una revisión sistemática de la literatura científica. Los principales determinantes reconocidos fueron las competencias financieras, la planificación estratégica, la innovación, la administración de los recursos humanos, el marco organizacional, la utilización de la tecnología y la innovación ecológica. Se concluye que la competitividad de las pequeñas y medianas empresas (PYMES) depende de la confluencia de determinantes internos y externos, lo que hace énfasis en la necesidad de metodologías holísticas que abarquen estrategias innovadoras, la sostenibilidad y las políticas públicas que fomenten un entorno favorable al avance empresarial.

Palabras claves: Factores, competitividad, pequeñas y medianas empresas, Pymes, América latina, Latinoamérica.

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1. Introduction

Small and medium-sized enterprises (SMEs) face numerous obstacles to maintaining their competitiveness in a dynamic and globalized economic environment. Key impediments include resource constraints, including limited access to capital, technology, and skilled personnel, which hinder their ability to innovate and expand internationally (Chen, 2024; Kwartati et al., 2024) .

Furthermore, SMEs face regulatory and compliance hurdles that hinder their internationalization efforts, forcing them to navigate intricate legal frameworks and acclimatize to varying market conditions (Kwartati et al., 2024) . In this sense, digital transformation constitutes a challenge because firms often face significant capital expenditures, limited understanding of digital technologies, and a deficiency of human resources required to implement and maintain digital initiatives (Chen, 2024) . Likewise, leadership and organizational culture play a critical role in the competitiveness of SME entities, and there are challenges in establishing effective management frameworks and enhancing employee skills (Altman and Cheng, 2024) .

Therefore, SMEs are encouraged to adopt strategic methodologies such as fostering strategic alliances, investing in training and technology, and utilizing digital tools to increase market penetration and innovation, such that by focusing on these strategies, SMEs can strengthen their competitive advantage and ensure sustainable growth in an ever-evolving business landscape (Bahar et al., 2024; Hamadamin and Atan, 2019; Igbokwe, 2024) . Given the above , a holistic approach that combines market intelligence, technology assimilation, and leadership development is imperative for SMEs to thrive in the global economy (Altman and Cheng, 2024) .

From the above, it is evident that SMEs, regardless of their geographic location, constitute a significant component of national economies,

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contributing to job creation, innovation , and economic dynamism. However, some of them face obstacles to achieving success in increasingly demanding markets, characterized by globalization, rapid technological advances, and recent demands for sustainability. However, despite the vast number of studies on competitiveness, no clear consensus has been established regarding the most determining factors in the competitive success of companies, especially in diverse geographic and sectoral contexts. This gap hinders the development of specific and effective strategies to improve their market position.

Therefore, this manuscript aims to identify the determining factors of competitiveness in small and medium-sized enterprises (SMEs) in Latin America through a systematic review of the academic literature.

2. Methodology

2020 methodology guidelines served as the basis for conducting the systematic review, ensuring the rigor, reproducibility, and transparency of the research process.

The research question, in the context of management, aimed to identify the determining factors that influence the competitiveness of SMEs in Latin America. The inclusion criteria were: Articles published in Spanish and English, between 2020 and 2024, that explicitly address competitiveness factors in SMEs and are fully accessible. Theoretical research without an empirical basis and studies conducted on large-scale companies were excluded.

The search was carried out in SCOPUS, Web of Science , PubMed. The search strategy consisted of key keywords related to the research question, such as “competitiveness factors,” “SMEs,” “small and medium-sized enterprises,” “Latin America , “ and their English equivalents. In addition, Boolean operators (AND) and (OR) were used to construct the

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search equation, in order to optimize results and ensure the inclusion of relevant research.

After screening the articles by title and abstract to eliminate irrelevant studies, the preselected articles were read in full, identifying 25 documents that were included for analysis. Two reviewers conducted this process, resolving discrepancies with the participation of a third reviewer if necessary. For data extraction, a structured instrument was used to obtain information from the selected studies, including details on the authors, the year of publication, the methodological framework, and the main findings. This procedure ensured the systematization of the information and facilitated comparative analysis among the studies. Furthermore, the data obtained were analyzed descriptively and complemented with a qualitative synthesis to identify patterns, trends, and discrepancies in the outlined competitiveness variables.

3. Results

The research used PRISMA flowcharts to document the study selection procedure, from initial identification to final inclusion (Figure 1.)

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Figure 1. Flowchart of the systematic search

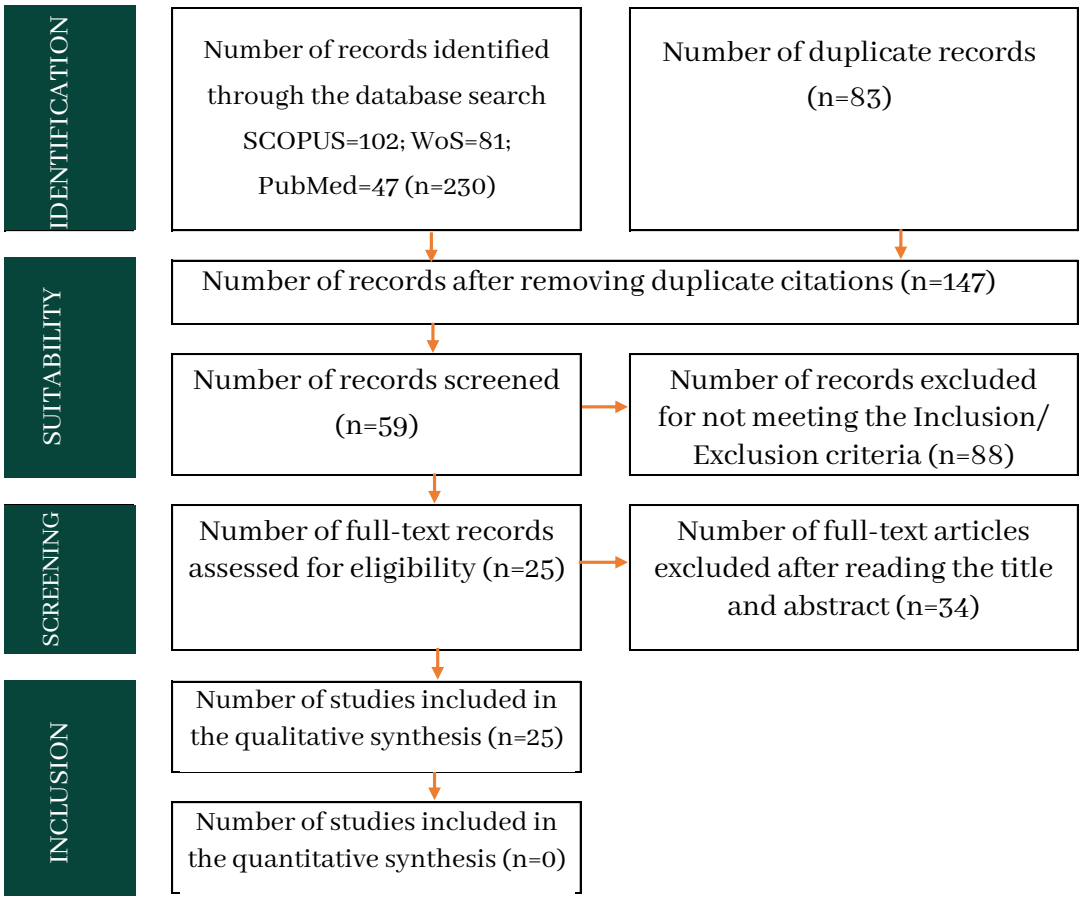

Table 1 provides a comprehensive overview of the bibliographical attributes of research related to competitiveness in small and medium-sized enterprises (SMEs). This research covers diverse geographic contexts, with a particular emphasis on Latin America, including countries such as Ecuador, Colombia, Peru, Mexico, and Brazil. The methodologies employed encompass qualitative and quantitative paradigms, along with mixed-methods studies, demonstrating the diversity of approaches to elucidating the determinants of competitiveness.

Regarding objectives and conclusions, some studies focus on internal elements, such as human resources, strategic planning, and innovation, while others analyze external dimensions, including the impact of social

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media, digitalization, and sustainable practices. For example, in Ecuador, Álvarez-Pico and Zaldumbide- Peralvo (2020) identified key internal and external factors within the construction sector, while Solís Muñoz et al. (2021) highlighted the importance of entrepreneurship and innovation in the canton of Azogues. In contrast, research such as that conducted by Villamonte Blas and Sotomayor Flores (2023) provides an econometric assessment of competitiveness in 20 Latin American countries, emphasizing the relevance of infrastructure and labor efficiency.

Furthermore, the impact of the digital environment and eco-innovation is a recurring theme, as demonstrated by Valdez-Juárez et al. (2023), who outline the affirmative effects of digitalization in Mexico, and Ruiz Zamora et al. (2023), who underline the influence of eco-innovation in Sonora, Mexico. Research also reflects particular challenges, such as the lack of knowledge about e-markets in Costa Rica, as noted by Zerón Bascopé (2023), or the detrimental effects of COVID-19 on competitiveness in Mexico, as indicated by Ibarra Morales et al. (2022).

Thus, the selected research provides a broad perspective on the determinants of competitiveness in SMEs, revealing shared patterns as well as distinct variations depending on the context and sector examined.

Table 1. Summary of bibliographic characteristics of the studies selected for the research.

Authors	Year	Qualification	Study design	Made in:	Conclusions	DOI
Verónica Álvarez David Zaldumbide	2020	Factors determining competitive success in SMEs, a case study in the construction sector	- Qualitative Delphi method with expert consensus. - Two phases: initial and final data evaluation.	- Ecuador - Manabí Province	- The study identified internal and external factors that contribute to competitive success in SMEs in the construction industry. - These factors include human resources, finance, strategic planning, innovation, and city resources.	10.33386/593DP.2020.5-1.322
Ana Beatriz Blanco-Ariza, Ángel Wilhelm Vásquez-García, Rafael García-Jiménez, Enrique Melamed -Varela	2020	Organizational structure as a competitive determinant in small and medium-sized companies in the food sector	- Explanatory research with a quantitative approach. - Participation of 62 companies in the food sector.	- Colombia - Barranquilla	- Organizational structure impacts competitiveness in SMEs in the food sector. - Stronger structures improve communication and operational performance.	10.31876/RCS.V26I2.32429
Ismael Cristofer Baierle , Guilherme Brittes Benítez, Elpidio Oscar Benítez Nara, Jones Luís Schaefer, Miguel Alfonso Sellitto	2020	Influence of Open Innovation Variables on the Competitive Edge of Small and Medium Enterprises	- Survey of 67 SMEs in Southern Brazil. - Ordinary least squares (OLS) regression model used.	- Southern Brazil is the location of the study. - Focus on small and medium-sized manufacturing.	- Most innovation initiatives have a low impact on competitive advantage. - Poorly defined innovation initiatives can jeopardize competitive advantage.	10.3390/JOITMC6040179
Jocelyn Estrella Rodríguez Martínez, Enrique Martínez Muñoz, Danae Duana Ávila, Tirso Javier Hernández Gracia	2020	Measuring the organizational climate in a service-sector SME in the central region of Hidalgo	- Questionnaire administered to employees to assess perceptions. - Analysis of the organizational climate in a service-sector SME.	- Mexico - Central Hidalgo Region	- Poor organizational climate affects employee motivation and satisfaction. - Improving the climate can increase productivity and competitiveness.	10.22579/23463910.154

Ruth Arévalo-Torres, Norman Mora-Sánchez, Andrés Pacheco-Molina	2021	Competitiveness: SMEs and the social network	- Qualitative -quantitative, descriptive with an explanatory approach. - Survey of 254 SMEs in Machala, Ecuador.	- Ecuador - City of Machala	- Social media generates competitiveness in SMEs. - Facebook and WhatsApp are the most widely used social media platforms.	10.33386/593DP.2021.3.575
Luis Alberto Baldeos Ardian , Flor de María Lioo Jordán, Viviana Inés Vellon Flores	2021	Strategic planning and competitiveness of MSMEs in the province of Huaura, Peru	- Design of non-experimental, correlational, and descriptive studies. - Sample of 390 MSMEs in Huaura province.	- Peru - Huaura Province	- Strategic planning influences the competitiveness of MSMEs in Huaura province. - Key dimensions include administrative, production, human resources, and financial planning.	10.36097/RSAN.V1I43.1235
Xiomara Nayel Yoza Calderón, Ronny Anthony Villafuerte Soledispa, María Leonor Parrales Poveda	2021	Business Growth: Market Development Strategy in the MSME Sector	- Descriptive research with a qualitative, non-experimental approach. - Analyzed the market development strategies of Ecuadorian MSMEs.	- Ecuador is the focus of the study. - It analyzes the market development strategies of MSMEs in Ecuador.	- Creativity and innovation are key for MSMEs to remain in the market. - Resilience is also important for business growth and sustainability.	10.51528/RP.VOL8.ID2236
Juan Bautista Solis Muñoz, Mercedes Lucia Neira Neira , Jorge Edwin Ormaza Andrade, Jorge Oswaldo Quevedo Vázquez	2021	Entrepreneurship and innovation: Dimensions for the study of MSMEs in Azogues, Ecuador	- Qualitative-quantitative approach with exploratory and descriptive scope. - Based on the scientific method and bibliographic review.	- Ecuador - Canton of Azogues	- Greater customer value leads to greater entrepreneurship and innovation. - Management efforts should focus on the proposed model.	https://dialnet.unirioja.es/descarga/articulo/7817701.pdf
Ilmar Polary Pereira	2021	Innovation and technologies : success factors in administration of organizations with development and competitiveness	- Data from 1,700 industrial companies and 15,112 service companies. - Statistical analysis: descriptive analysis, correlation, regression testing.	- Brazil - Kazakhstan, Iran, Saudi Arabia, Latin America, Europe, Russia, Bulgaria, Croatia, Georgia, Hungary	- Innovation and management technologies contribute to organizational development. - Competent dimensions of technological capability foster success and sustainability.	10.5585/IJI.V9I1.18400

Manuel Antonio Pérez Vásquez, Mabel Escorcia Muñoz, Erica Tatiana Garavito Campillo	2021	Analysis of Born Global in Colombia: Small and medium-sized enterprises in the Department of Córdoba	- Descriptive-analytical research methodology used. - Supported by empirical studies and database sources.	- Colombia - Department of Córdoba	- Global entrepreneurs born in Córdoba need to improve their competitiveness in global markets. - Entrepreneurs must focus on innovation and technological networks for success.	https://dialnet.unirioja.es/descarga/articulo/8081770.pdf
Noe Tipo-Mamani, Eder Gutiérrez-Quispe	2021	Development of a commercial information system with electronic invoicing for SMEs in the department of Puno	- Experimental quantitative research. - Compares business activities with and without an information system.	- Peru	- Optimizing commercial activities with information systems. - Importance of commercial information systems with electronic invoicing.	10.33386/593DP.2021.3.583
Mauricio Alberto Balarezo-Noboa	2022	Competitive factors of small businesses as perceived by business administration students at the Central University of Ecuador	- Exploratory descriptive method used for the study. - Surveys administered to intermediate-level business administration students.	- Ecuador is the focus country. - Small businesses contribute 25% to GDP.	- Technology improves production processes in small businesses. - Government and university support is essential for competitiveness.	10.33890/innova.v7.n3.2022.2081
Luis Enrique Ibarra Morales, Daniel Paredes Zempual , Esthela Carrillo Cisneros	2022	Impact of COVID-19 on the variables that determine the competitiveness of Mexican micro, small, and medium-sized enterprises	- Quantitative, exploratory, descriptive, and non-experimental. - Presentation of 309 companies in Hermosillo, Sonora.	- Mexico - Hermosillo, Sonora	- COVID-19 significantly impacted human resources, planning, and marketing. - Strategies needed for the success and sustainability of MSMEs.	10.46990/relayn.2022.6.1.532
Elias Wilfredo Quispe Arauco, Rafael Romero-Carazas, Ivan Apaza Romero, Margarita Jesus Ruiz Rodriguez, David Hugo Bernedo-Moreira	2022	Factors and Economic Growth of Peruvian MSMEs	- Qualitative approach with a phenomenological-hermeneutic design. - Involves businesspeople and government officials as informants.	- Peru - City of Iquitos	- Factors of economic growth analyzed from the perspective of entrepreneurs. - The study contributes to the design of public policies for economic development.	10.26668/ businessreview/2022.v7i3.e0689

Jesús Rafael Fandiño Isaza, Silvana Dalmutt Kruger, Antonio Zanin , Vladimir Jhosmell Baquero Márquez, Luz Marina Dávila Coa, Cleunice Zanella, Anderson Conte	2022	Characterization of SME innovation management due to the effects of the Coronavirus: a comparative study between Colombia and Brazil	- Comparative study of SMEs in Colombia and Brazil. - Document analysis based on public and private databases.	- Colombia - Brazil	- COVID-19 caused significant job losses in both regions. - Innovation is essential for competitiveness during crises.	10.22490/25392786.5660
Sara Sofía Luna Mosqueda	2023	Organizational management and innovation of SMEs in the steel industry in Northeast Mexico	- No experimental, descriptive, correlational design was used. - A 35-item questionnaire was administered to 19 executives.	- Northeast Mexico.	- Fostering a culture of adaptation to change is essential. - More research is needed on the drivers of innovation in SMEs.	10.29105/vtga9.2-355
Heli Hassan Diaz Gonzalez, Arturo Cesar Lopez Garcia, Alberto Escobedo Portillo	2023	Competitiveness of SMEs in the environmental industry in the State of Chihuahua	- Construction of statistical data for sectoral analysis. - Analysis of regulations and perspectives of regional actors.	- Mexico - State of Chihuahua	- Growing need for environmental goods and services. - Competitiveness and growth of SMEs in Chihuahua.	10.37467/revhuman.v12.4731
Ricardo N. Villamonte Blas, Carlos Alberto Sotomayor Flores	2023	Incidence of the determinants of competitiveness in Latin America	- Competitiveness determinants were evaluated in 20 Latin American countries. - Dynamic panel data model used with the generalized method of moments.	- 20 Latin American countries studied. - Focus on competitiveness from 2006 to 2017.	- The model is econometrically significant for competitiveness factors. - Key factors: infrastructure quality, labor market efficiency, and corruption control.	10.47189/rcct.v23i37.520
Mario Patricio Padilla Martínez	2023	Business management for good administration of commercial SMEs in the city of Ambato	- Descriptive methodology focused on field research. - Population and sample based on the INEC directory.	- Ecuador - City: Ambato	- SMEs need a knowledge system for process management. - Strategic information must be timely and accurate for entrepreneurs.	10.33262/ap.v5i1.307

Marcia Fabiola Jaramillo Paredes, Fernando Torres Granadillo, Oscar Mauricio Romero Hidalgo, Martha Cecilia Aguirre Benalcázar	2023	Political reflection on competitiveness in Ecuadorian entrepreneurship: A look back to the present	- A non-experimental exploratory design was used for the research. - The sample included 130 rural entrepreneurs from El Oro.	- Ecuador - Focus on rural entrepreneurship and competitiveness	- Strengthening competitiveness requires innovation and investment in human resources. - Economic instability affects competitiveness, leading to repetitive proposals and instability.	10.46398/cuestpol.4177.31
Dante Ayaviri-Nina, Jessica Cáceres-Guzmán, Gabith Miriam Quispe Fernández, Alba Isabel Maldonado Núñez	2023	The Determinants of Success in Entrepreneurship : A Study in the Urban Area of Ecuador	- Descriptive and correlational research design. - Survey conducted with 57 companies in Riobamba.	- Ecuador - Urban area of Riobamba	- Human capital, financial capital, and social capital are the main determinants of entrepreneurial success in the urban area of Riobamba, Ecuador. - Experience, academic education, age, and family investment are significant factors in determining entrepreneurial success.	10.3390/su15065277
Luis Enrique Valdez-Juárez, Elva Alicia Ramos-Escobar, Edith Patricia Borboa Álvarez	2023	Reconfiguration of Technological and Innovation Capabilities in Mexican SMEs : Effective Strategies for Corporate Performance in Emerging Economies	- Quantitative, conclusive, and explanatory research design. - Sample of 4,121 SME managers surveyed via online questionnaire.	- Mexico - Latin America	- Digitalization has significant, positive effects on innovation management and corporate performance. - Barriers to digitalization hinder digital development and transformation, reducing innovation and corporate performance.	10.3390/admsci13010015
Luis Enrique Valdez Juárez	2023	Eco-innovation and open innovation, a factor in enhancing the reputation of SMEs in Sonora.	- Quantitative predictive study using a stratified sampling method. - Sample size of 101 small and medium-sized enterprises.	- Mexico - Located in the Northwest region	- Eco-innovation and open innovation improve the reputation of SMEs. - Sustainable practices improve competitiveness and market presence.	10.46588/invurnus.v18i1.92

Robert Aníbal Luciano Alipio, Hugo Daniel García Juárez	2023	Business management in the development of MSMEs in mining areas of Peru	- Non-experimental design with a quantitative approach. - Data collected at a single point in time.	- Peru - Mining areas in the south	- Business management strongly influences the development of MSMEs. - Planning is key to business growth and sustainability.	10.52080/rvgluz.28.103.16
Uriel Zerón Bascopé	2023	E-Marketplace business model: a marketing channel option for Costa Rican agro-exporting SMEs	- Applied descriptive-exploratory quantitative study design. - Data collected through voluntary surveys.	- Costa Rica is the focus of the study. - The research is aimed at small and medium-sized agro-export companies.	- 91% of the companies surveyed do not use e-marketplaces as a marketing channel. - Reasons for not using e-marketplaces include lack of awareness, dependence on traditional channels, and resistance to membership fees.	10.47633/yulk.v7i2.601

Table 2 presents the determinants of competitiveness in small and medium-sized enterprises (SMEs), highlighting the internal and external dimensions and revealing the prevailing trends and idiosyncrasies according to the Latin American context. Among the internal factors, strategic foresight and human capital management emerge as recurring components that improve operational effectiveness and adaptability. For example, research such as that conducted by Baldeos et al. (2021) and Álvarez-Pico and Zaldumbide- Peralvo (2020) underline the importance of administrative, financial and strategic foresight, as well as human capital optimization to increase productivity and competitiveness.

Regarding innovation and technology, they are considered catalysts for expansion and differentiation in competitive markets. Pereira (2021) and Valdez-Juárez et al. (2023) emphasize the incorporation of digital technologies and innovation paradigms as essential instruments to foster organizational progress and overcome structural impediments. Green innovation and sustainability, examined by Ruiz Zamora et al. (2023), reinforce the importance of environmental practices to improve reputation and consolidate competitive advantages.

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Furthermore, external factors such as infrastructure quality, government policies, and economic conditions directly influence competitiveness. Villamonte Blas and Sotomayor Flores (2023) highlight the implications of labor market efficiency and corruption mitigation in Latin America, while Díaz González et al. (2023) underline the growing demand for environmental products and services in specific sectors. Ultimately , the competent utilization of social media and the assimilation of digital strategies, as explored by Arévalo-Torres et al. (2021), demonstrate their ability to expand the reach of SMEs and optimize their positioning in dynamic markets.

Therefore, a holistic perspective on the determinants of competitiveness in SMEs, combining strategic, technological, and environmental elements, with a focus on sustainability, innovation, and adaptability, emphasizes the need to address these factors in an integrated manner to ensure their competitiveness in diverse contexts.

Table 2. Summary of the determining factors of competitiveness in SMEs

Authors (year)	Qualification	Factors
Alvarez-Pico and Zaldumbide-Peralvo (2020)	Factors determining competitive success in SMEs, a case study in the construction sector	- Internal factors that influence competitiveness include financial capabilities, strategic planning, innovation, and human resource management. - External factors are classified as static and dynamic resources available in cities, which complement competitive advantage. - The relationship between internal and external factors is significant for the competitive success of SMEs in the construction sector.

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Blanco-Ariza et al. (2020)s	Organizational structure as a competitive determinant in small and medium-sized companies in the food sector	- Organizational structure is a key determining factor influencing the competitiveness of small and medium-sized enterprises (SMEs). - Internal factors such as organizational culture, innovation, work organization, and productivity play an important role in improving competitiveness. - The planning and organization of tasks within the company are essential for achieving desired results. - The ability to adapt to environmental changes and establish distinctive strategies is essential for market positioning. - The alignment of internal factors with the organization's overall strategy contributes to its competitive advantage.
Baierle et al. (2020)	Influence of Open Innovation Variables on the Competitive Edge of Small and Medium Enterprises	- The study identifies several innovation variables that influence the competitiveness of small and medium-sized enterprises (SMEs). - Technological trends have a positive impact on shop floor productivity. - Flexibility affects internal aspects of companies. - Customer satisfaction, innovative ideas, and customized supplies contribute to market orientation. - The research indicates that poorly defined innovation initiatives can have a negative impact on competitiveness.

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Rodríguez Martínez et al. (2020)	Measuring the organizational climate in a service-sector SME in the central region of Hidalgo	- The work environment within SMEs significantly influences employee motivation, commitment, and satisfaction, which are critical to competitiveness. - The perception of employees as internal customers is crucial , as their attitudes and performance reflect the company's philosophy and service quality. - Effective communication systems and processes within the organization can improve employee engagement and reduce conflict, contributing to a more competitive stance. - The level of training and development provided to employees affects their skills and attitudes, which are vital to providing quality service to customers. - A positive organizational climate fosters a sense of belonging among employees, motivating them to improve their performance and productivity. - The ability to adapt and implement changes in the work environment can lead to improved service optimization and market competitiveness.

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(Arévalo-Torres et al., 2021)	Competitiveness: SMEs and the social network	- The effective use of social media is a key factor influencing the competitiveness of SMEs, as it allows for better interaction with customers and the collection of valuable information. - The ability to adapt to digital marketing strategies is critical, as many SMEs struggle with the transition from traditional to digital methods due to factors such as fear of change and uncertainty about investments. - Engagement with customer feedback on social media platforms can lead to improved services and product offerings, aligning them with customer needs. - The popularity and functionality of specific social media platforms, such as Facebook and Instagram, play an important role in how SMEs can reach and interact with their target audiences. - The overall economic and productive development of SMEs in Ecuador is influenced by their willingness to adopt updated strategies and tools that enhance their market presence.
Baldeos et al. (2021)	Strategic planning and competitiveness of MSMEs in the province of Huaura, Peru	- Strategic planning for SMEs is an important factor influencing their competitiveness. - Administrative planning, including the implementation of information systems, plays a fundamental role in improving operational efficiency and control. - Financial planning is essential for managing resources effectively and ensuring economic performance. - Human resource planning, which includes policies and incentives, is vital for improving workforce efficiency and productivity. - Overall economic performance and business management efficiency are also key determinants of competitiveness. - The ability to adapt and implement effective marketing strategies contributes to the competitive advantage of SMEs. - A company's infrastructure impacts its operational capabilities and competitiveness.

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Yoza Calderón et al. (2021)	Business Growth: Market Development Strategy in the MSME Sector	- The competitiveness of small and medium-sized enterprises (SMEs) is influenced by creativity and innovation. - Operational resilience is a key factor that helps companies remain in the market. - The ability to adapt to adverse conditions, such as excess supply and high levels of uncertainty, also plays an important role in their competitiveness.
Solis Muñoz et al. (2021)	Entrepreneurship and innovation: Dimensions for the study of MSMEs in Azogues, Ecuador	- The dimensions that influence the competitiveness of small and medium-sized enterprises (SMEs) include customer value, digital transformation, competitive advantage, and leadership. - A higher score on the customer value dimension is associated with increased entrepreneurship and innovation in SMEs. - Competitive advantage also plays an important role in maintaining a positive association with entrepreneurship and innovation.
Pereira (2021	Innovation and technologies : success factors in administration of organizations with development and competitiveness	- Innovation and management technologies are key factors influencing the competitiveness of small and medium-sized enterprises (SMEs). - The dimensions and components of technological capability play an important role in enhancing organizational development. - The competent managerial competencies and skills of those managing companies are critical to success and sustainability. - The application of integrated sustainability management models can provide a viable alternative for organizational development. - Economic and social indicators, along with policies and strategies, also contribute to the competitiveness of SMEs.

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Pérez et al. (2021)	Analysis of Born Global in Colombia: Small and medium-sized enterprises in the Department of Córdoba	- Entrepreneurial characteristics play a fundamental role in influencing the competitiveness of SMEs. - Entrepreneurial cognition is a determining factor that affects how entrepreneurs perceive and respond to market opportunities. - Knowledge factors, including the experience and information available to entrepreneurs, significantly impact competitiveness. - Technology and innovation are essential for SMEs to improve their market position and competitiveness. - Entrepreneurial capabilities, which encompass a firm's skills and resources, are vital for achieving greater competitiveness. - Technological networks can provide SMEs with the support and connections necessary to improve their competitiveness in the global marketplace.
Type-Mamani and Gutierrez-Quispe (2021)	Development of a commercial information system with electronic invoicing for SMEs in the department of Puno	- The research highlights the importance of information management systems in enhancing the competitiveness of small and medium-sized enterprises (SMEs). - Optimizing business activities through the use of e-invoicing systems is a key factor. - The ability to automate processes simplifies tax obligations, which contributes to improved profits. - Improved purchasing and sales processes through efficient data management are important determinants. - The system's ability to generate various reports (e.g., stock reports, sales progress reports, profitability reports) aids informed decision-making. - The usability, security, response time, and scalability of the information system are also critical factors influencing competitiveness.

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Balarezo-Noboa (2022)	Competitive factors of small businesses as perceived by business administration students at the Central University of Ecuador	- Among the factors that influence the competitiveness of small and medium-sized enterprises (SMEs) are human talent, technology, product quality, and administrative management. - Technology is perceived as significantly improving production processes, with 55% of students recognizing its contribution. - The importance of decision-making based on administrative tools is recognized by 81% of respondents. - Support from government, industrial groups, and universities is considered essential, particularly in areas such as financing, technological equipment, market access, and specialized research.
Ibarra Morales et al. (2022)	Impact of COVID-19 on the variables that determine the competitiveness of Mexican micro, small, and medium-sized enterprises	- Factors that influence the competitiveness of small and medium-sized enterprises (SMEs) include human resources, strategic planning, and marketing. - These variables were identified as the most sensitive to the effects of COVID-19 and are directly associated with the competitiveness of SMEs in Hermosillo, Sonora.
Arauco et al. (2022)	Factors and Economic Growth of Peruvian MSMEs	- The study describes factors that drove the economic growth of micro and small enterprises (SMEs) in Iquitos. - It highlights the importance of understanding the intrinsic reality of Peruvian SMEs, which quantitative studies may not capture. - The research highlights entrepreneurs' perspectives as fundamental to analyzing the social phenomenon of economic growth. - It suggests that the findings could inform the design of public policies aimed at boosting the sector's economic development.

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Fandiño Isaza et al. (2022)	Characterization of SME innovation management due to the effects of the Coronavirus: a comparative study between Colombia and Brazil	- Firm size is a determining factor influencing competitiveness. - Uncertainty in task performance affects how SMEs adapt and improve their processes. - The level of technology used by SMEs plays a fundamental role in their competitiveness. - Organizational structure, including role definition and task coordination, impacts SMEs' effectiveness. - The ability to adapt to changes in the environment is essential for maintaining competitiveness. - The use of innovation, including product, process, marketing, and organizational innovations, is vital for differentiating SMEs in a competitive market. - Economic conditions and market dynamics also influence SMEs' competitiveness.
Luna Mosqueda et al. (2023)	Organizational management and innovation of SMEs in the steel industry in Northeast Mexico	- The four determining factors that influence the competitiveness of small and medium-sized enterprises (SMEs) in the steel industry are: - **Innovative Thinking**: This factor stands out as the most significant in driving innovation within SMEs. - **Market Knowledge**: Understanding the market in which SMEs operate is fundamental to their competitiveness. - **Use of Technology**: The adoption and integration of technology play a vital role in improving the operational efficiency and innovative capacity of SMEs. - **Access to Finance**: The availability of financial resources is essential for SMEs to invest in innovation and growth initiatives.

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Díaz González et al. (2023)	Competitiveness of SMEs in the environmental industry in the State of Chihuahua	- The competitiveness of small and medium-sized enterprises (SMEs) in the environmental sector is influenced by the growing need for goods and services that address environmental issues. - The analysis of regulations and policies specifically designed for SMEs plays a fundamental role in determining their competitiveness. - The perspectives and participation of the region's diverse stakeholders contribute to the overall competitive landscape for SMEs. - Statistical data related to the sector provide information on the growth and performance of SMEs in Chihuahua, which is essential for understanding their competitiveness.
	Incidence of the determinants of competitiveness in Latin America	- Among the determining factors that influence the competitiveness of small and medium-sized enterprises (SMEs) are infrastructure quality, labor market efficiency, control of corruption, the development of financial systems, and inflation. - These factors are essential for improving the overall competitiveness of countries, which in turn affects the SMEs operating within those economies.

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Miño Ayala et al. (2023)	Business management for good administration of commercial SMEs in the city of Ambato	- Factors that influence the competitiveness of small and medium-sized enterprises (SMEs) include marketing, market research, advertising and promotion, operations, public relations, corporate image, and financing. - Access to Information and Communications Technology (ICT) is also an important factor, enabling SMEs to improve their operations and reach. - The level of qualified human talent, including compliance with salary obligations, access to security, and growth opportunities, plays a fundamental role in improving competitiveness. - A well-defined organizational structure and strategic decision-making processes contribute to effective management and competitiveness. - The implementation of strategic plans and the ability to adapt to market conditions are essential for the growth and sustainability of SMEs.

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Jaramillo Paredes et al. (2023)	Political reflection on competitiveness in Ecuadorian entrepreneurship: A retrospective look to the present	- The competitiveness of small and medium-sized enterprises (SMEs) is influenced by the demand for innovation. - A stable legal framework and policy environment are essential for sustained economic growth. - The ability to create new products at lower costs and in shorter timeframes improves competitiveness. - The participation of the entire workforce, including external actors such as customers, plays an important role in competitiveness. - The implementation of appropriate technology can reduce production costs while maintaining product quality. - The quality of service provided by SMEs is a key factor that adds value and differentiates them from the competition. - The establishment of networks or alliances can strengthen the knowledge base and support the development of new businesses. - Entrepreneurial experience and entrepreneurial training are essential to overcome challenges and foster innovation. - Economic conditions, such as the impact of crises like the pandemic, can create instability in competitiveness, leading to repetitive and less innovative business proposals.
Ayaviri-Nina et al. (2023)	The Determinants of Success in Entrepreneurship : A Study in the Urban Area of Ecuador	- The main determinants of success in small and medium-sized enterprises (SMEs) include human capital, financial capital, and social capital. - Human capital is influenced by experience, academic education, and age; a higher level of human capital increases the likelihood of success. - Financial capital has a significant impact on entrepreneurial activity and is critical to the sustainability of SMEs. - Social capital, which includes family support and networking, is directly related to the success of ventures. - Other factors that can influence competitiveness include the owner's education, motivation, and entrepreneurial ability.

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Valdez-Juárez et al. (2023)	Reconfiguration of Technological and Innovation Capabilities in Mexican SMEs : Effective Strategies for Corporate Performance in Emerging Economies	- Financial resources are an important factor influencing the competitiveness of SMEs, as limited funds can restrict investment in digital technologies and innovation. - Technological barriers, including a lack of knowledge in the use of technological services and information complexity, impede the adoption of digitalization and innovation. - Organizational barriers, such as the inability to coordinate team skills and manage changes in innovation management, affect the transition to digitalization. - Legal barriers, including privacy issues and regulatory challenges, represent obstacles to the innovative development of SMEs. - The willingness to invest in digital technologies and the availability of qualified personnel are critical to improving competitiveness. - A company's overall digitalization strategy is essential; neglecting it can lead to a loss of market competitiveness.
Ruiz Zamora et al. (2023)	Eco-innovation and open innovation, a factor in enhancing the reputation of SMEs in Sonora.	- Eco-innovation and open innovation are key factors influencing the competitiveness of small and medium-sized enterprises (SMEs). - The implementation of processes focused on environmental protection, combined with technology and knowledge, enhances the reputation of SMEs. - The ability to adopt sustainable practices and eco-innovation contributes to a competitive advantage in the marketplace. - The use of internal and external knowledge supports the development of new technologies and improves operational efficiency. - An organization's reputation plays an important role in attracting customers and maintaining its market presence. - Continuous adaptation and improvement through innovation are essential for sustained competitiveness in a changing business environment.

Luciano Alipio et al. (2023)	Business management in the development of MSMEs in mining areas of Peru	- The planning process is a determining factor influencing the competitiveness of small and medium-sized enterprises (SMEs). - The organization of resources and activities is essential for improving competitiveness. - Management, which involves leadership and motivation, plays an important role in the competitiveness of SMEs. - Control mechanisms are essential for identifying weaknesses and ensuring that planned objectives are met, thus influencing competitiveness. - External factors, such as the economic growth of mining activities and the increase in market size due to higher revenues, also impact the competitiveness of SMEs.
Zerón Bascopé (2023)	E-Marketplace business model: a marketing channel option for Costa Rican agro-exporting SMEs	- The competitiveness of small and medium-sized enterprises (SMEs) is influenced by various external factors, including low production levels, limited knowledge of export processes, and insufficient information on international markets. - A lack of working capital and technology also hampers their ability to compete effectively. - Internal factors such as inadequate quality control and the absence of supportive policies from relevant institutions further reduce their competitiveness. - The choice of business model is critical, as it must align with the company's specific characteristics, including revenue, product offerings, sales methods, and target customer segments. - The ability to innovate, optimize processes, and diversify offerings plays an important role in improving competitiveness. - Developing business linkages or chains with other companies can also contribute to improving competitiveness, although many SMEs have not yet achieved this.

4. Discussion

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Regarding the main congruences and divergences in the academic literature on the determinants of competitiveness in small and medium-sized enterprises (SMEs) in Latin America, it is recognized that financial resources constitute a fundamental element identified by Álvarez-Pico and Zaldumbide- Peralvo (2020), Baldeos et al. (2021) and Valdez-Juárez et al. (2023), who emphasize that the competent management of financial assets is essential to achieve a competitive advantage. Strategic planning, addressed by the same authors together with Miño Ayala et al. (2023), accentuates the importance of designing and executing strategies for operational supervision and organizational advancement.

Innovation emerges as a considerable axis in the research of Baierle et al. (2020), Yoza Calderón et al. (2021) and Valdez-Juárez et al. (2023), who agree that innovative efforts, both in products and processes, are crucial to improve organizational performance. Regarding human resource management, Alvarez -Pico and Zaldumbide- Peralvo (2020), Baldeos et al. (2021) and Ibarra Morales et al. (2022), who argue that the cultivation of human talent and employee motivation have a profound impact on competitiveness.

The organizational framework, highlighted by Blanco-Ariza et al. (2020), Fandiño Isaza et al. (2022), and Miño Ayala et al. (2023), illustrates how a strong internal organization increases coordination and operational effectiveness. In contrast, the use of technology, deliberated by Baierle et al. (2020), Valdez-Juárez et al. (2023), and Luna Mosqueda et al. (2023), reinforces the importance of technological tools to improve productivity and foster innovation.

Green innovation and sustainability, examined by Ruiz Zamora et al. (2023) and Valdez-Juárez et al. (2023), shed light on the beneficial impact of environmentally sustainable practices on corporate reputation. From a more introspective perspective, Rodríguez Martínez et al. (2020) and Balarezo-Noboa (2022) recognize organizational atmosphere as a factor that improves employee motivation and productivity.

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The application of social media and digital methodologies, analyzed by Arévalo-Torres et al. (2021) and Zerón Bascopé (2023), demonstrates how these instruments amplify customer engagement and increase the visibility of SMEs. Human capital, discussed by Ayaviri-Nina et al. (2023) and Balarezo-Noboa (2022), highlights the importance of employee experience, education, and skills for organizational success. Furthermore, social capital, unique to Ayaviri-Nina et al. (2023), emphasizes the role of networks and family support in SME performance.

Access to financial resources, discussed by Luna Mosqueda et al. (2023) and Miño Ayala et al. (2023), emphasizes the need for economic means to implement innovative and expansionary strategies. Ultimately, public policies and infrastructure considerations, identified by Villamonte Blas and Sotomayor Flores (2023) and Díaz González et al. (2023), underline the influence of macroeconomic variables on competitiveness, such as infrastructure quality and labor market efficiency.

5. Conclusion

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The synthesis of the determinants of competitiveness in small and medium-sized enterprises (SMEs) in Latin America demonstrates a multifaceted interconnection between internal and external dimensions, with strategic planning, innovation, the application of technology, and human resource management emerging as essential foundations. The impact of variables such as financial resources, access to capital, and the organizational framework underscores the importance of strengthening companies' operational and strategic infrastructure to ensure their viability and expansion. At the same time, external factors, such as government policies, infrastructure, and social networks, clarify the need for an enabling environment that fosters competitiveness.

Furthermore, the importance of green innovation and sustainability accentuates the transition toward responsible practices that not only enhance corporate reputation but also contribute to equitable development. The fusion of human and social capital, along with the use of digital strategies, amplifies SMEs' ability to adapt to dynamic and intensely competitive markets.

6. Contribution of the authors

JRMG : Article idea, initial drafting, data collection, analysis of results, discussion, final revision of the article.

FMOS : Data collection, analysis of results, discussion, final review of the article.

MPPP : Data collection, analysis of results, discussion, final review of the article.

HAVB : Data collection, analysis of results, discussion, final revision of the article.

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Emotional Dysregulation as a Factor in Obsessive-Compulsive Disorder: A Systematic Review

Desregulación Emocional Como Factor del Trastorno Obsesivo Compulsivo: Una Revisión Sistemática

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Summary

Obsessive-Compulsive Disorder (OCD) is characterized by recurrent intrusive thoughts that generate repetitive behavioral or mental responses. This study describes the relationship between OCD and Emotional Dysregulation (ED), defined as the difficulty in adequately managing emotions, which constitutes a key factor in the severity of symptoms. Through a systematic review in Scopus , Web of Science , and Google Scholar , using the PRISMA method, 8 articles validated with STROBE and CONSORT were analyzed. The results highlight that the most common forms of EED in OCD include low emotional clarity, non-acceptance of emotions, impulsive behaviors due to poor emotional management, and emotional avoidance. It is concluded that the lack of emotional clarity and acceptance are the main factors that aggravate obsessions and compulsions. Therefore, it is recommended to address EED as a central element in psychotherapeutic interventions to treat OCD.

Keywords: Obsessive Compulsive Disorder, Emotional Regulation, Emotional Dysregulation

Resumen

El Trastorno Obsesivo Compulsivo (TOC) se caracteriza por pensamientos intrusivos recurrentes que generan respuestas conductuales o mentales repetitivas. Este estudio describe la relación entre el TOC y la Desregulación Emocional (DsE), definida como la dificultad para gestionar adecuadamente las emociones, y que constituye un factor clave en la severidad de los síntomas. A través de una revisión sistemática en Scopus, Web of Science y Google Scholar, utilizando el método PRISMA, se analizaron 8 artículos validados con STROBE y CONSORT. Los resultados destacan que las formas más comunes de DsE en el TOC incluyen la poca claridad emocional, no aceptación de las emociones, conductas impulsivas por mal manejo emocional y evitación emocional. Se concluye que la falta de claridad y aceptación emocional son los principales factores que agravan las obsesiones y compulsiones. Por ello, se recomienda abordar la DsE como un elemento central en las intervenciones psicoterapéuticas para tratar el TOC.

Palabras clave: Trastorno Obsesivo Compulsivo, Regulación Emocional, Desregulación Emocional

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1. Introduction

Obsessive-Compulsive Disorder (OCD) is a chronic and debilitating mental illness characterized by obsessions (recurring intrusive thoughts, images, or impulses) and compulsions (repetitive mental or behavioral actions) that affect the well-being of those who suffer from it (American Psychiatric Association). Association , 2013). Obsessions may include immoral thoughts, contamination worries, or pathological self-doubt (Purdon, 2021). Compulsions seek to prevent a perceived disastrous outcome and may manifest in mental rituals or overt behaviors, such as hand-washing or constantly checking whether a door is locked (Sibrava et al., 2011). Severe OCD is a severe form of the disorder, characterized by frequent symptoms that can occupy from 4 hours a day to every waking moment, negatively impacting a person's well-being (Huppert & Foa , 2005).

The global prevalence of OCD is 1% to 2%, making it the fourth most common mental disorder in Europe, with rates between 0.1% and 2.3% (Fawcelt et al., 2020 ; Pampaloni et al., 2022). Women are at higher risk, with a rate of 1.5% versus 1.0% in men (Fawcelt et al., 2020). The most frequent obsessions include fear of contamination, self-harm, obsessions with symmetry, and forbidden thoughts, while the most common compulsions are washing, constant checking, and avoidance of triggers (Veale & Roberts, 2014).

Emotional Regulation (ER) consists of the processes by which people influence their emotions, whether in their experience or expression, and can be activated consciously or unconsciously depending on goals or needs (Gross , 1999; Aldao et al., 2010). Gratz and Roemer (2004) highlight key dimensions of a healthy ER, such as emotional clarity, access to strategies, goal-oriented behaviors, emotional awareness, acceptance of emotions and impulse control. On the other hand, Emotional Dysregulation (ED) refers to the inability to manage emotions appropriately, leading

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to maladaptive responses that affect psychological well-being. This phenomenon is related to difficulties in selecting emotion regulation strategies and to the severity of OCD symptoms (Aldao et al., 2010).

Psychotherapeutic work focused on emotional dysregulation (ED) in anxiety disorders and OCD has shown a positive impact on symptom remission and high adaptability to patient needs (Moral and Hervás , 2017). Emotional regulation strategies such as emotional awareness, emotional clarity, acceptance of emotions, impulse control, and goal-oriented behaviors are key to developing prevention and treatment programs (See et al., 2022).

First-line treatments combine Selective Serotonin Reuptake Inhibitors (SSRIs) with Cognitive Behavioral Therapy (CBT), particularly Exposure and Response Prevention (ERP), which has been shown to be highly effective in reducing symptoms (Del Casale et al., 2019; Pittenger and Bloch , 2014; Skapinakis et al., 2016; Öst et al., 2015). However, its implementation is limited due to practical constraints, lack of resources, and concerns about patients' fears of exposure and potential side effects (Colman et al., 2024).

2. Methodology

A systematic evaluation was carried out of the documents found on the scientific digital platforms Scopus , Web of Science , and Google Scholar , which were accessed through the Virtual Library of the Catholic University of Cuenca, introducing thesaurus nomenclature according to each platform, as shown in Table 1. The inclusion criteria for the articles were: a) they must have been published since 2018, b) they must be written in English or Spanish, c) they must use experimental or quasi-experimental methodology, d) they must use populations of all ages. The exclusion criteria were defined as: a) they must have limited access, b) they must be books, c) their content must not have the correlation analysis between DsE

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or RE and OCD. Initially adding between the three databases, there was a total of 50 articles selected to analyze, after discarding those that were repeated or that were written in a language other than English or Spanish, a total of 37 articles were obtained, with this an exhaustive review of titles, contents and accessibility of each document was carried out, having at the end a total of 8 articles that were used for this study, the entire process mentioned above was carried out using the PRISMA Declaration Flowchart (Preferred Reporting Items for Systematic reviews and Meta- Analyses), which serves as a tool to promote quality, transparency and consistency in the presentation of findings from systematic review research, detailed in Figure 1. In addition to this, the methodological quality of the selected articles was analyzed by applying the STROBE Initiative Declaration " Strengthening the Reporting of Observational studies in Epidemiology ", which allowed us to recognize the elements necessary to measure the quality of selected articles and, likewise, the CONSORT Statement " Consolidated" was used for this. Standards of Reporting Trials ", the results of which are shown in Table 3 and Table 4 respectively.

Table 1. Advanced search

Database	Thesaurus nomenclature
Web of Science	OCD (Topic) emotion regulation (Topic) treatment (Topic)
Scopus	(TITLE-ABS-KEY (ocd) AND TITLE-ABS-KEY (emotion AND regulation) AND TITLE-ABS-KEY (treatment)) AND PUBYEAR > 2017 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , " ar ")) AND (LIMIT-TO (SUBJAREA , "NEUR") OR LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "MEDI"))

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Google Scholar	"OCD" AND "emotion regulation" AND "treatment" without the words: " Meta analysis " "medicine" "diagnosis" "psychiatry"

Note. Source: Martínez & Reivan (2025)

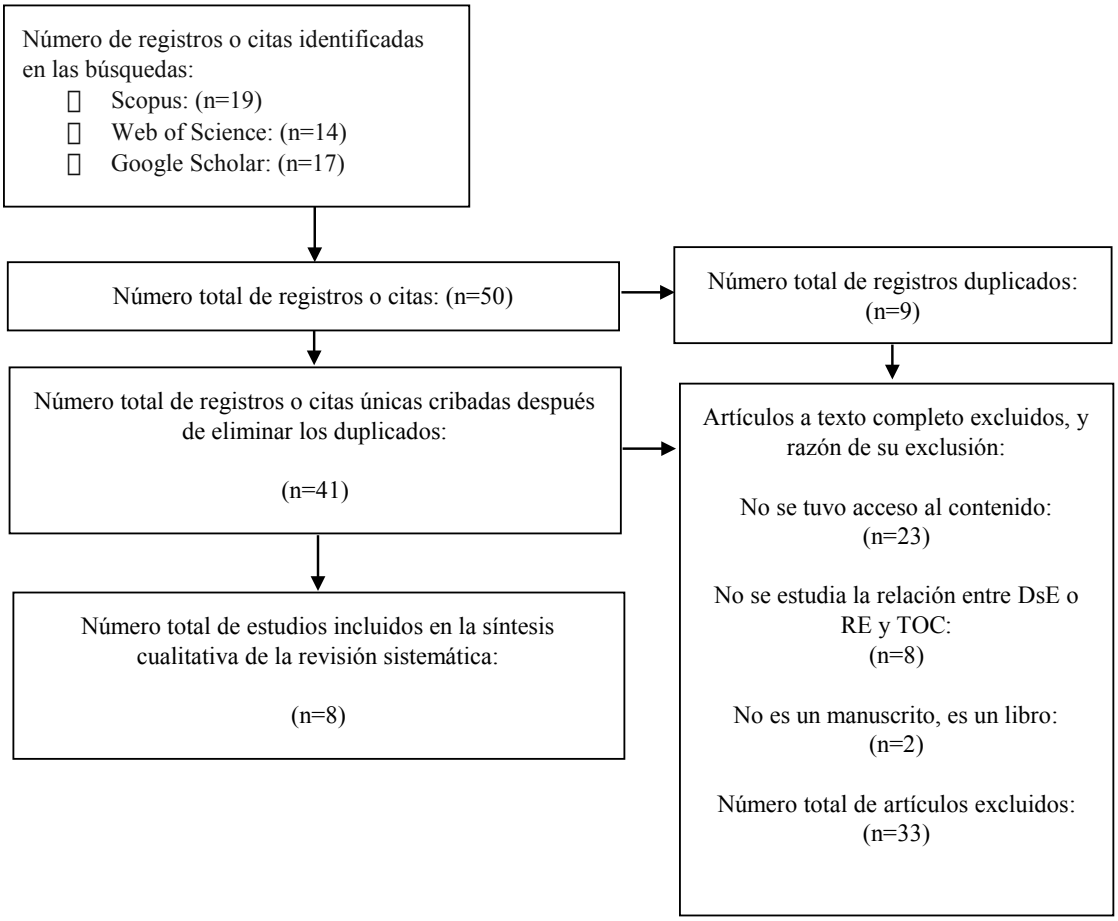

Figure 1. Flowchart of the different phases of the systematic review, based on Urrútia & Bonfill (2010). **Source:** Martínez & Reivan (2025).

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Table 2. Assessment of the quality of the studies based on the STROBE checklist

	STROBE score																				
Articles	Title and summary	Context/Basis	Goals	Study design	Context	Participants	Variables	Data sources/measures	Biases	Sample Size	Quantitative Variables	Statistical Methods	Participants	Descriptive data	Variable data	Main results	Other analyses	Key Results	Limitations	Interpretation	Generality	Financing
(Yap et al., 2018)	+	+	+	+	+	+	+	+	P	+	+	+	+	+	+	+	?	+	+	+	?	?
(Khosravani , et al., 2018)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+	?	?
(Shameli et al., 2019)	+	+	+	+	+	+	P	?	+	+	+	?	+	+	P	+	?	+	?	+	?	+
(McKenzie et al., 2020)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
(McKenzie et al., 2020)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
(Eichholz et al., 2020)	+	+	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+	+	+	?	?
(Ferreira et al., 2021)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
(Naji , et al., 2022)	+	+	+	+	+	+	?	+	?	+	+	+	P	?	+	+	?	+	+	+	?	+

(+) *Green box = Submitted-reported, 1 pt;* (*P*) *Gray box = Partially submitted-reported, 0.5 pt;* (*?*) *White box = Not submitted-reported, 0 pts.*

Note. Source: Martínez & Reivan (2025)

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Table 3. Assessment of the quality of studies based on the CONSORT checklist

CONSORT Score																			
Articles	Qualification	Summary	Introduction 1	Introduction 2	Method 1	Method 2	Method 3	Method 4	Method 5	Method 6	Method 7	Method 8	Results 1	Results 2	Results 3	Discussion 1	Discussion 2	Discussion 3	Other information
(Yap et al., 2018)	?	+	+	+	P	+	?	+	+	?	P	+	+	+	+	+	?	+	?
(Khosravani , et al., 2018)	?	+	+	+	?	+	P	+	+	?	P	+	+	+	+	+	?	+	?
(Shameli et al., 2019)	?	+	+	+	P	+	?	+	+	?	P	?	+	?	+	?	?	+	+
(McKenzie et al., 2020)	?	+	+	+	P	+	P	+	+	?	P	+	+	+	+	+	?	+	?
(McKenzie et al., 2020)	?	+	+	+	P	+	?	+	+	?	P	+	+	+	+	+	?	+	+
(Eichholz et al., 2020)	?	+	+	+	P	+	?	+	+	?	P	+	+	+	+	+	?	+	?
(Ferreira et al., 2021)	?	+	+	+	P	+	?	+	+	?	P	+	+	+	+	+	?	+	+
(Naji , et al., 2022)	?	+	+	+	+	P	?	+	+	?	P	+	+	+	+	+	?	+	+

(+) *Green box = Submitted-reported, 1 pt*; (*P*) *Gray box = Partially submitted-reported, 0.5 pt*; (?) *White box = Not submitted-reported, 0 pts.*

Note. Source: Martínez & Reivan (2025)

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5. Development

Below, in this section, the characteristics, factors analyzed and quality scores of each article reviewed are presented in Table 4:

Table 4. Selected articles, characteristics of the studies and factors analyzed:

No.	Reference	Study Features	Factors Analyzed				STROBE ptj MAX 22 pts	CONSORT ptj MAX 19 pts
			OCD			DsE		
			Obsessions	Compulsions	Complex Factor	Characteristics		
1	"Emotion regulation difficulties in obsessive-compulsive disorder" (Yap et al., 2018)	Australia; N=365; experimental; Difficulties in Emotion Regulation Scale (DERS); Dimensional Obsessive-Compulsive Disorder Scale (DOCS); Yale-Brown Obsessions and Compulsions Scale (Y-BOCS).	Unacceptable thoughts; Responsibility; Symmetry; Pollution	Control rituals; Symmetry; Decontamination rituals	DsE causes an increase in the severity of symptoms .	DsE : Non-acceptance of emotions, inability to achieve goals when distressed, problems controlling impulses, limited access to ER strategies.	18.5	13
2	"Difficulties in emotion regulation and symptom dimensions in patients with obsessive-compulsive disorder" (Khosravani , et al., 2018)	Iran; N=160; quasi-experimental ; DERS; Y-BOCS; Obsessive-Compulsive Inventory-Revised (OCI-R)	Doubt; Washing concern; Obsession; Mental neutralization	Checking; Ordering; Washing and cleaning	DsE was a significant predictor of checking/doubting, obsession, mental neutralization, and ordering symptoms .	Non-acceptance of emotional responses, low emotional awareness, limited access to ER, non-acceptance of emotions	19	12
3	"The Effectiveness of Emotion-Focused Therapy on Emotion Regulation Styles and Severity of Obssesive -Compulsive Symptoms in Women with Obssesive -Compulsive Disorder" (Shameli et al., 2019)	Iran; N=24; quasi-experimental ; Emotion-Focused Therapy (EFT) Protocol	Fear of contamination; Fear of aggression; Need for symmetry; Forbidden thoughts	Washing and cleaning; Checking; Reinforcing compulsions; Memory review; Avoiding triggers	The results showed that there was a significant difference between the test and study groups in terms of concealment style and OCD severity after the intervention.	Decreased emotional awareness Maladaptive behaviors due to poor emotional management.	16	11
4	"Variability in emotion regulation in pediatric obsessive-compulsive disorder: Associations with symptom presentation and response to treatment" (McKenzie et al., 2020)	Australia; N=137; experimental; Child Behavior Checklist (CBCL)	Fear of contamination; Fear of aggression; Need for symmetry; Forbidden thoughts	Washing and cleaning; Checking; Reinforcing compulsions; Memory review; Avoiding triggers	DsE is related to internalizing and externalizing symptoms	Lack of emotional awareness Negative emotional responses	20	13.5

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5	"Examining parent-report of Children's emotion regulation in pediatric OCD: Associations with symptom severity, externalizing behavior and family accommodation" (McKenzie et al., 2020)	Australia; N=76; experimental; CBCL	Fear of contamination; Fear of aggression; Need for symmetry; Forbidden thoughts	Washing and cleaning; Checking; Reinforcing compulsions; Memory review; Avoiding triggers	Lability/Negativity correlates positively and significantly with externalizing symptoms	Lack of emotional awareness Negative emotional responses	21	14
6	"Self-compassion and emotion regulation difficulties in obsessive-compulsive disorder" (Eichholz et al., 2020)	Germany; N=90; quasi-experimental ; DERS; Self-Compassion Scale (SCS)	Fear of contamination; Fear of aggression; Need for symmetry; Forbidden thoughts	Washing and cleaning; Checking; Reinforcing compulsions; Memory review; Avoiding triggers	DsE was positively associated with increased severity of OCD symptoms	Low emotional awareness Emotional avoidance Non-acceptance of emotions Distress caused by emotional responses	19	13
7	"Stress Influences the Effect of Obsessive-Compulsive Symptoms on Emotion Regulation" (Ferreira et al., 2021)	Portugal; N=65; experimental; Emotional Regulation Questionnaire (ERQ)	Fear of contamination; Fear of aggression; Need for symmetry; Forbidden thoughts	Washing and cleaning; Checking; Reinforcing compulsions; Memory review; Avoiding triggers	Stress acts as an influencing factor on DsE , causing an increase in the severity of symptoms.	Emotional suppression	21	14
8	"Mediating Role of Difficulties in Emotion Regulation and Experimental Avoidance in the Relationship Between Attachment Styles and Severity of Relationship Obsessive-Compulsive Disorder Symptoms" (Naji , et al., 2022)	Iran; N=531; experimental; DERS; Relationship Obsessive-Compulsive Inventory (ROCI); Acceptance and Action Questionnaire II (AAQ-II);	Fear of contamination; Fear of aggression; Need for symmetry; Forbidden thoughts	Washing and cleaning; Checking; Reinforcing compulsions; Memory review; Avoiding triggers	DsE had a mediating role in attachment styles and symptom severity	Lack of emotional clarity, poor emotional management	16.5	14

Note. Source: Martínez & Reivan (2025)

In addition, the individual results analysis of each study was also carried out with its respective contribution, specifying the type of DsE or RE associated with the severity of the symptoms:

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3.1. Results of the reviewed studies

3.1.1. Study 1

In this article authored by Yap et al. (2018), *Difficulties in Emotional Regulation in Obsessive-Compulsive Disorder*, whose objective was to examine the difficulties in ER and their implication in the severity of OCD symptoms, so two studies were carried out with different samples, the first with a community sample (n=306), and the second with a clinical sample (n=59). Difficulties in emotion regulation, especially the non-acceptance of emotions, problems of greater inability to achieve goals when distressed, problems controlling impulses and limited access to emotion regulation strategies when experiencing negative emotions, differentially affect the stages of identification, selection, application and supervision of emotion regulation in OCD, so the symptoms of this pathology are aggravated. Due to this, the importance of the role that ER has in predicting the severity of symptoms is recognized.

3.1.2. Study 2

The study by Khosravani et al. (2018) *Difficulties in Emotion Regulation and Symptom Dimensions in Patients with Obsessive-Compulsive Disorder* , counting the control group, the total population was 160 people, to whom Y-BOCS, OCI-R and DERS were applied. The results showed that the non-acceptance of emotional responses, limited access to emotion regulation strategies and difficulties in impulse control were positively related to the six symptomatic dimensions of OCD: washing, checking/doubting, obsessing, mental neutralizing, ordering and hoarding. Difficulties in carrying out goal-directed behaviors showed more significant and positive correlations with washing, obsessing, checking/doubting and ordering concerns. Lack of emotional awareness was positively associated with all six dimensions of OCD symptoms, except for ordering.

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3.1.3. Study 3

Shameli et al. (2019) in their research, *The Effectiveness of Emotion-Focused Therapy on Emotion Regulation Styles and Severity of Obsessive-Compulsive Symptoms in Women with Obsessive-Compulsive Disorder* , aimed to analyze the effects of Emotion-Focused Therapy (EFT) on ER styles and the severity of obsessive-compulsive symptoms in women with OCD. For which, pre and post treatment, the OCI-R, Y-BOCKS and DERS instruments were used to a total population of 24 women, applying group therapy sessions lasting 90 minutes, held twice a week for 5 weeks. EFT develops internal control through its principles, which allowed patients to reduce their high levels of self-criticism and feelings of shame, causing their symptoms to decrease. Specifically, patients considered the use of the hiding style, which refers to people who manage or repress their emotions, as the main means of generating emotion regulation. This was because, thanks to the final direction of the treatment, practical solutions were sought, with the objective of replacing the usual obsessive-compulsive strategies, increasing in turn the levels of awareness and responsibility by reflecting on their own internal relationships.

3.1.4. Study 4

This study by McKenzie et al. (2020), *Variability in Emotion Regulation in Pediatric Obsessive-Compulsive Disorder: Associations with Symptom Presentation and Treatment Response* , explored whether variability in emotion regulation was associated with several clinical correlates of OCD and an attenuated response to treatment. Participants in this study were 137 youth between the ages of 7 and 17 years, with a primary diagnosis of OCD, who administered the ADIS-IV-P, CY-BOCS, BRIEF, CBCL, FAS-SR assessment instruments. A median split of responses to the BRIEF Baseline Emotional Control (EQ) index resulted in two groups of youth: those with relatively higher and those with poorer EQ. The results indicated that the group with a relatively lower EQ, that is, those who were

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not aware of their emotions and therefore relapsed into more negative and intense emotional and behavioral responses, presented internalizing and externalizing symptoms , generating greater severity in terms of OCD symptoms, having a comorbid diagnosis of specific phobia, and more Family Accommodation (FA), which refers to the actions taken by the family nucleus to accommodate the needs of a member suffering from psychological difficulties, altering the usual dynamics. Three months after treatment, there were fewer young people who responded to treatment in the group with lower EQ than in the group with higher EQ; however, there were no significant differences in the remission of symptoms between the groups.

3.1.5. Study 5

The study by McKenzie et al. (2020), *Examining Children's Parent-Report of Emotion Regulation in Pediatric OCD*: *Associations with Symptom Severity,* Externalizing Behavior , and Family Accommodation examined parent-reports of children and adolescents with OCD, who analyzed the ER of 76 participants aged 7 to 17 years, in order to measure the relationships they had with this illness and PA and ER capacities. The Child Behavior Checklist was used for this. The results indicated that the parent-report showed that participants' lability/negativity was significantly and positively correlated with externalizing symptoms and PA, while adaptive ER was significantly and negatively correlated only with externalizing symptoms; furthermore, lability/negativity predicted externalizing symptoms , even when OCD severity was taken into account. Lability/negativity did not predict family adjustment after controlling for OCD severity and externalizing symptoms , however, it was a significant moderator of the relationship between OCD.

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3.1.6. Study 6

The research conducted by Eichholz et al. (2019), *Self-Compassion and Difficulties in Emotional Regulation in Obsessive Compulsive Disorder , studied the relationship of self-compassion, ER difficulties, obsessive beliefs and the severity of OCD symptoms in 90 patients who were administered* self-report questionnaires , which were: DERS, Y-BOCS, OCCWG and SCS. The results of statistical analysis showed that the severity of symptoms and obsessive beliefs were negatively correlated with self-compassion, on the other hand, they were positively associated with DsE , in addition to this self-compassion showed a negative relationship with ER, concluding that specifically the low emotional awareness, avoidance of emotions, distress caused by emotional responses and non- acceptance of emotions, are those that predict the severity of OCD because they directly influence obsessive beliefs.

3.1.7. Study 7

For this article by Ferreira et al. (2021), *Stress Influences the Effect of Obsessive-Compulsive Symptoms on Emotion Regulation* , the effects of stress and obsessive-compulsive symptoms on ER are explored, carried out in a sample of 65 healthy individuals diagnosed with OCD, using self-report psychometric devices to measure stress levels through the Perceived Stress Scale (PSS-10) , obsessive-compulsive symptoms through Y-BOCS and OCI-R, finally ER through reappraisal and emotion suppression skills with the use of the ERQ. Multiple regression and mediation analyses were applied to obtain the results, which indicated that increased reappraisal scores were associated with higher suppression scores; Furthermore, high stress levels predicted increased suppression scores and decreased reappraisal scores. Furthermore, reappraisal abilities resulted from a combination of a direct effect of obsessive-compulsive symptoms and an indirect effect of stress-mediated obsessive-compulsive symptoms. Therefore, it is concluded that the inclusion of stress management in

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treatment models for OCD is important, as it directly affects ER, which consequently increases symptom severity.

3.1.8. Study 8

This article authored by Naji et al. (2022) *Mediating Role of Difficulties in Emotion Regulation and Experimental Avoidance in the Relationship between Attachment Styles and the Severity of Symptoms of Relationship Obsessive-Compulsive Disorder* , aims to determine the mediating role of difficulties in emotion regulation and avoidance of experimentation in the relationship between attachment styles and the severity of Relationship Obsessive-Compulsive Disorder (RCD), so 531 participants were selected for the application of reagents: ECR-R, DERS, AAQ-II, ROCI. The study model fit the data perfectly, and two variables of DsE and experimental avoidance had a mediating role in the relationship between attachment styles and RCD symptoms. Insecure attachment styles are associated with strategies of underregulation (disengagement from close others) and overregulation (exaggerated emotional expressions). These strategies and difficulties in regulating emotions, with a lack of emotional clarity and maladaptive behaviors caused by poor emotional management being key factors, can lead to an increase in compulsive behaviors in different domains of CDD.

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4. Conclusions

There is a notable interest in the research community in the area of psychopathology regarding the relationship between DsE and OCD, highlighting its possible application for treatment and even as a complement when performing exposure therapy. In this work, this information has been analyzed and compiled to arrive at more convincing arguments in this regard, specifically when it comes to communicating the most common specific variables of DsE and ER.

Concluding that the DsE that is frequently evident are: Little emotional clarity, non-acceptance of emotions, behaviors driven by poor management of emotions and emotional avoidance, which constitute the most common specific factors that were found and that infer about the severity of OCD symptoms, mainly because they act on obsessions and compulsions, so it is important that this information be taken into account to reform and integrate new objectives in the different psychotherapeutic interventions.

Likewise, it is recommended that more research be incorporated to demonstrate the effectiveness of enhancing ER in people with OCD within psychotherapeutic processes and that the results be contrasted and validated.

5. Contribution of the authors

FM: Data collection, introduction, analysis of results, discussion, conclusions.
GR: Data collection, analysis of results, discussion, final review of the article.

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Kaposi sarcoma (KS): report of a case

Sarcoma de Kaposi (SK): a propósito de un caso

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Summary

Kaposi's sarcoma (KS) is a malignant tumor that occurs mainly in the skin affecting vascular endothelial spindle cells, however, it can involve organs; it is classified into various clinical forms among which we have iatrogenic, epidemic associated with HIV, endemic in Africa and classic, usually in elderly men affected by the herpes virus type 8 (HHV-8), it is considered an uncommon disease in women, its diagnosis is confirmed by biopsy, the prognosis is reserved because its treatment is a challenge in patients with a low immune system that leads to relapses. The clinical case of a 92-year-old female patient with violaceous macular and nodular lesions that ulcerated and bled easily in the lower extremities is presented. A histopathological and immunohistochemical study was performed, confirming the diagnosis of Kaposi's sarcoma by (HHV- 8), for which treatment was carried out based on radiotherapy with favorable evolution of lesions. At the moment, the patient is stable without recurrence.

Resumen

El sarcoma de Kaposi (KS) es un tumor maligno que se presenta principalmente en la piel afectando las células fusiformes vasculares endoteliales, sin embargo, puede llegar a comprometer órganos; se clasifica en diversas formas clínicas entre ellas tenemos el iatrogénico, el epidémico asociado al VIH, el endémico en África y el clásico por lo general en varones ancianos afectados por el virus del herpes tipo 8 (HHV-8), se considera una enfermedad infrecuente en mujeres, su diagnóstico se confirma por biopsia, el pronóstico es reservado en virtud que es todo un reto su tratamiento en pacientes con sistema inmunitario bajo que lleva a las recidivas. Se presenta el caso clínico de paciente femenina de 92 años con lesiones maculares y nodulares violáceas que se ulceraban y sangraban fácilmente en extremidades inferiores, se realizó estudio histopatológico e inmunohistoquímica a través de los cuales se confirmó el diagnóstico de sarcoma de Kaposi por (HHV-8) por lo cual se realiza tratamiento a base de radioterapia con evolución favorable de lesiones al momento la paciente se encuentra estable sin recidivas.

Palabras clave: sarcoma, Kaposi, Herpes virus tipo 8, reporte de caso.

Introduction

The incidence of KS has decreased worldwide since treatment with antiretrovirals, generally the most frequent is associated with HIV / AIDS, especially in advanced stages or inadequate treatment; coinfection by Herpesvirus and HIV has a high prevalence (1,3,4) . Classic KS is an angioproliferative tumor positive for herpes virus type 8, is indolent, its clinical picture progresses from a mild mucocutaneous lesion to organ involvement; it mainly affects lower extremities with palpable non-pruritic macular, papular , nodular lesions, varying in size from millimeters to centimeters in diameter, with reddish brown or purplish color (2,5,11).

Because classic KS is rare, its diagnosis is challenging. Treatment depends on the extent of the lesion and the patient's immune status, ranging from surgical excision, radiotherapy, chemotherapy with intralesional vinblastine , immunotherapy, among others (6,8,12).

Clinical case

A 92-year-old female, originally from a rural area of Cañar Province, with a history of high blood pressure (HBP) and thrombosis of the left lower limb for one year, with no toxic habits , presents polymorphic dermatosis characterized by violaceous plaques on the left lower limb for 3 years. She has been treated by a private physician as vasculitis with prednisone 20 mg QD, methotrexate 2.5 mg, and azithromycin 500 mg for approximately three months without improvement; the condition worsened 2 months ago, so she came to the clinic at the time of painful violaceous nodules that ulcerate and bleed easily on the left lower limb, on the back and sole of the right foot, smaller violaceous plaques and nodules (**Figure 1);** we requested additional tests and a histopathological study.

Analytical : WBC 5.8 Lym 1.6 HGB 10.8 g/dl, HTC 35.1%, VCM 85fL PCR 10.3

Serology : HIV, VDRL, Hepatitis B and C negative.

With results compatible with classic KS by HHV-8, the patient was referred to an oncology center and after evaluation they decided on treatment based on the patient's age and comorbidities, administering 10 radiotherapy sessions at intervals of the first week (4 continuous days), second week (4 continuous days) and third week (2 continuous days) with improvement.

Photographs of Kaposi's Sarcoma

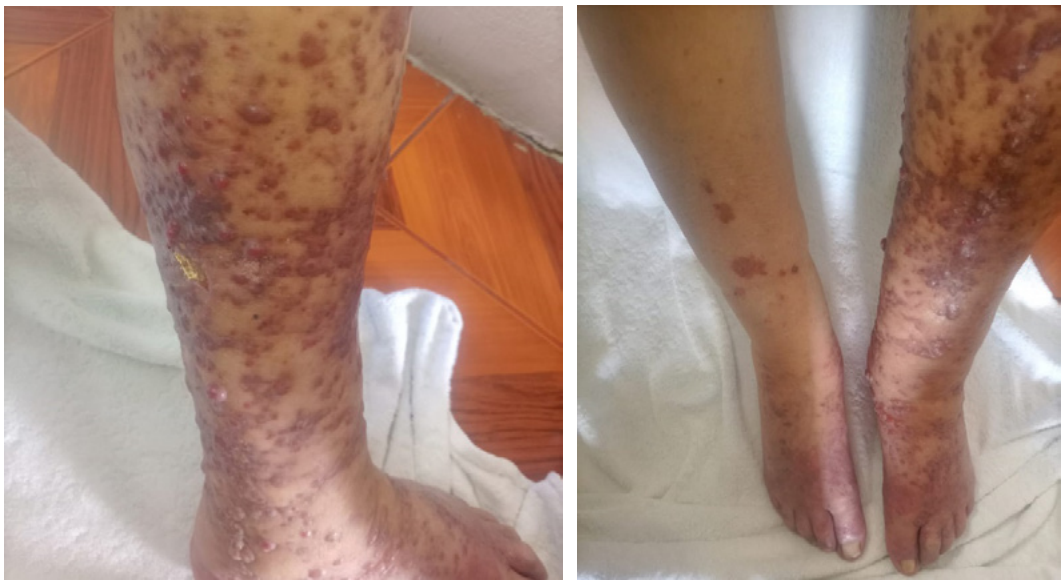

Figure 1. Left leg with presence of ulcerated, violaceous plaques and nodules ; right foot with presence of violaceous plaques . **Source:** Author.

Biopsy and Immunohistochemistry

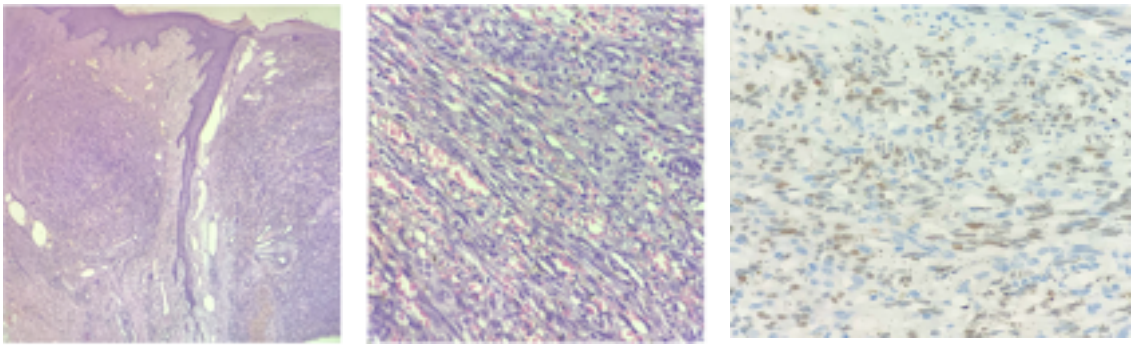

Figure 2. Biopsy : exoendophytic stromal neoplastic aggregates , poorly demarcated nodules with an ulcerated dome-like appearance in the center, covered with serohematic crust, extending into the deep dermis, proliferation of spindle-shaped neoplastic cells with extensive blood capillary formation. **Immunohistochemistry:** HHV-8 positive, granular nuclear labeling with moderate (++/+++) and weak (+/+++) intensity, granular nuclear expression pattern in approximately 70% of the spindle-shaped neoplastic cells.

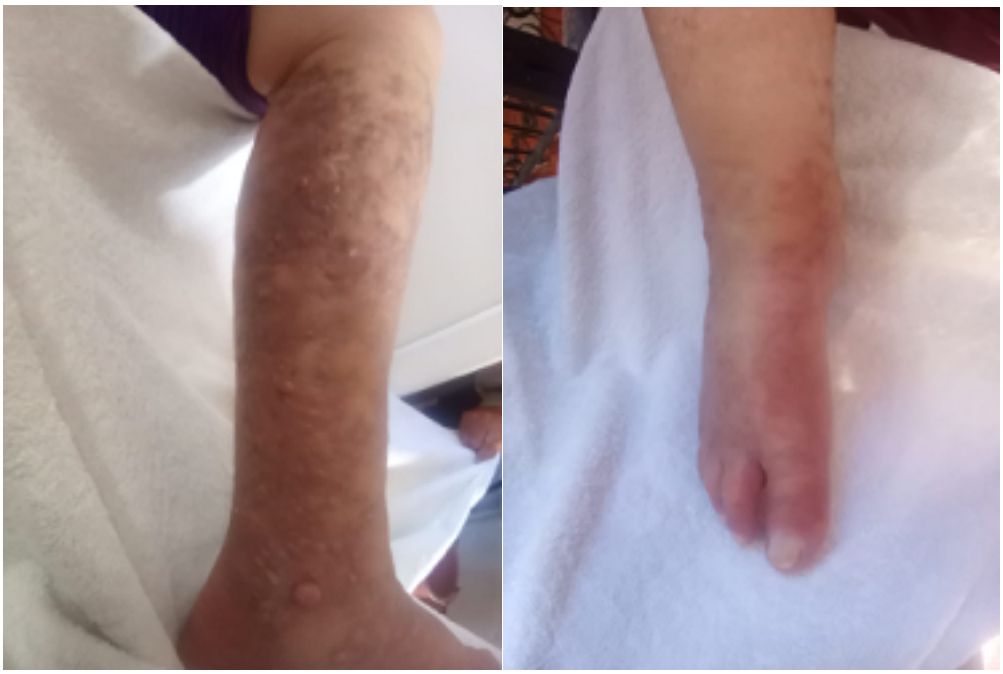

Figure 3. Post-radiotherapy. **Source:** Author.

Discussion

Kaposi's sarcoma was described by Moritz Kapos I, a Hungarian dermatologist in 1872, as a malignant tumor of the vascular endothelium, it is considered to affect angioproliferative spindle cells invaded by the *herpes virus* type 8 (HHV-8) also called *Kaposi's sarcoma virus* (KSHV) belongs to the Herpeseviridae family , *a double-stranded DNA virus* being the causative agent in 95 to 98% of cases, it has a chronic course with a tendency to recur (2,4,5).

Epidemiology categorizes it into KS: *endemic,* present in Africa, highly aggressive in adults and in children with lymphadenopathy ; *iatrogenic,* observed when organ transplants are performed and affects lymph nodes and viscera; *epidemic* or AIDS-associated, is the most common and aggressive; and finally, *classic* or *sporadic,* common in elderly HIV-negative men, is the least aggressive, affecting the lower extremities and, less frequently, the upper extremities, respecting the lymphatic chain and organs (4,5,9).

KS is a rare pathology in females. *Miranda et al.* present a similar case, an 87-year-old female patient with a history of hypertension and ischemic heart disease, who presented with violaceous macules and nodules in the lower limbs, initially treated as vasculitis, later confirmed by biopsy as classic KS; Similarly, *Ruiz et al.* published a case of a 79-year-old woman with a history of diabetes, hypertension and Meniere 's vertigo , who presented violaceous tumor lesions in the lower and upper limbs. Histopathological studies confirmed plaque stage KS with HHV-8 expressivity. Subsequently, the diagnosis was concluded as disseminated KS, which was associated with Castleman 's disease without immunosuppression and active hepatitis (14,16)B.

Clinically it varies from an indolent pathology to extensive visceral involvement; histologically it presents a dermal nodule with epidermal changes, proliferation of endothelial spindle cells, these cells are

monomorphic, there is pleomorphism, pseudovascular clefts , capillaries with extravasation, hemosiderin, the diagnosis is confirmed with HHV-8 immunohistochemistry in injured cells with strong nuclear positivity (16,17,21).

KS has a clinicopathological variation depends on: (I) the location of KS lesions (lymph node, internal or cutaneous), (II) clinical stage (patch, plaque, nodule), (III) epidemiological classification in this includes: classic KS in older men, African or endemic KS in young men and boys in Central Africa and iatrogenic mainly (transplant, chemotherapy and immunosuppressive therapies); the epidemic one which is associated with HIV/AIDS (16,17,21).

There are multiple treatments for Kaposi's Sarcoma, being a challenge in the therapy to be taken due to recurrences or concomitant skin infections, a prospective single-arm study was conducted on the use of cauterization with silver nitrate in SK nodules in elderly patients with favorable results without the treatment being aggressive (14) .

monocentric phase 2 trial demonstrated that Indinavir therapy, being an HIV protease inhibitor, has antitumor and antiangiogenic activity , is safe against patients with early-stage classic KS, the treatment consisted of chemotherapy plus indinavir followed by maintenance with the drug alone, presented no toxicity, improved the immune status and controlled HHV-8 infection (5) ; There are also other topical treatments including tetrinoine and thymidol demonstrating encouraging results in the treatment of classic SK with non-extensive lesions (15,21) .

Finally, KS treatment should be assessed depending on whether the lesions are single or disseminated, whether there is visceral invasion, and the patient's immune status. Therapeutic options range from topical imiquimod , cryotherapy, chemotherapy, radiotherapy, surgery, and immunotherapy. A multicenter phase 2 study of pembrolizumab in classic KS is currently underway, with acceptable safety due to its excellent antitumor activity (18,19).

In this study patients were treated at doses of 200 mg IV every 3 weeks for 6 months and in some until reaching severe toxicity, among the adverse events 2 patients presented acute cardiac decompensation and treatment was discontinued; a grade 3 granulomatous reaction and a grade 2 pancreatitis that required treatment with corticosteroids and methotrexate, however, there were no serious events and much less deaths due to pembrolizumab , at the moment there are no more studies about this drug in KS that support its use (18-20).

Conclusion

Finally, KS should be considered in the differential diagnosis of violaceous and nodular skin lesions, especially in immunocompromised patients. Early identification of the disease through clinical, histopathological, and immunohistochemical studies is essential for initiating appropriate treatment and improving patients' quality of life. In this case, the patient was diagnosed with classic KS associated with HHV-8, highlighting the importance of a thorough evaluation and a multidisciplinary approach for comprehensive management.

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Artisanal production. Establishment of an association of toquilla straw weavers in the Nazón parish

Producción artesanal. Constitución de una asociación de tejedoras de paja toquilla en la parroquia Nazón

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ABSTRACT

This study analyzed the production and marketing of toquilla straw hats in the Nazón parish. The objective was to assess the feasibility of forming an association of toquilla straw weavers in the Nazón parish, evaluating its benefits, challenges, and the applicable legal framework. This activity was identified as one of the main sources of income for at least 25 to 30 families and as a key component of intangible cultural heritage. However, it was evident that most weavers sell their products at low prices (less than $10 per hat) due to the intervention of intermediaries and the lack of access to more profitable markets. Furthermore, 70.6% of the artisans have not received training, which limits their ability to innovate and improve the marketing of their products. The research adopted a qualitative and quantitative approach, conducting surveys with 17 women from a population of 20, who expressed interest in joining an association. Data were collected from primary sources, including the testimony of the president of the Decentralized Autonomous Government of the rural parish of Nazón, and supplemented with secondary information on regulations and previous studies. Among the most relevant findings, a low level of youth participation in this artisanal activity was identified, which puts its generational continuity at risk. Furthermore, 100% of those surveyed expressed their willingness to form a formal association. It is concluded that the formalization of a weavers' organization, accompanied by training processes, access to technology, and digital marketing strategies, represents a viable solution to ensure the economic and cultural sustainability of this artisanal activity.

Keywords: heritage, crafts, toquilla straw, women, association.

RESUMEN

El presente estudio analizó la producción y comercialización de sombreros de paja toquilla en la parroquia Nazón, con el objetivo de

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analizar la viabilidad de la conformación de una asociación de tejedoras de paja toquilla en la parroquia Nazón, evaluando sus beneficios, desafíos y el marco legal aplicable. Se identificó que esta actividad constituye una de las principales fuentes de ingresos para al menos 25 a 30 familias, además de representar un componente clave del patrimonio cultural inmaterial. No obstante, se evidenció que la mayoría de las tejedoras comercializan sus productos a precios bajos (menos de $10 por sombrero), debido a la intervención de intermediarios y la falta de acceso a mercados más rentables. Asimismo, el 70,6 % de las artesanas no ha recibido capacitación, lo que limita sus capacidades para innovar y mejorar la comercialización de sus productos. La investigación adoptó un enfoque cualitativo y cuantitativo, aplicando encuestas a 17 mujeres de una población de 20, quienes manifestaron su interés en formar parte de una asociación. Los datos fueron recolectados a partir de fuentes primarias, incluyendo el testimonio de la presidenta del Gobierno Autónomo Descentralizado parroquial rural de Nazón, y se complementaron con información secundaria sobre normativas y estudios previos. Entre los hallazgos más relevantes, se identificó una baja participación de jóvenes en esta actividad artesanal, lo que pone en riesgo su continuidad generacional. A su vez, el 100 % de las encuestadas expresó su disposición a conformar una asociación formal. Se concluye que la formalización de una organización de tejedoras, acompañada de procesos de capacitación, acceso a tecnología y estrategias de comercialización digital, representa una solución viable para garantizar la sostenibilidad económica y cultural de esta actividad artesanal.

Palabras clave: patrimonio, artesanía, paja toquilla, mujer, asociación.

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1. Introduction

The artisanal production of toquilla straw hats is an ancient tradition in Ecuador, recognized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as Intangible Cultural Heritage of Humanity since 2012. This art, passed down from generation to generation, has been a source of cultural identity and economic development for various communities, especially in the Andean and coastal regions of the country (UNESCO, 2012).

Despite their importance, the weavers of Nazón parish face multiple challenges, such as low selling prices, lack of access to international markets, scarcity of financial and technical support, and the absence of a formal organization to represent them. According to the According to the National Institute of Cultural Heritage (INPC, 2020), the precariousness of artisanal work and the lack of economic recognition threaten the sustainability of this activity. Furthermore, a study by Peña Facundo and Serna Linares (2024)on the productivity of the toquilla straw hat artisanal industry indicates that limited production capacity and dependence on intermediaries hinder market expansion and improved income for artisans.

The formation of a toquilla straw weavers' association emerges as a viable alternative to strengthen their autonomy and improve their working conditions. Formalizing this activity would allow access to financing, training, and more effective marketing strategies (Anchundia-Rodríguez, 2021). Furthermore, it would contribute to the preservation of cultural heritage, ensuring the continuity of the artisanal tradition for future generations.

Previous studies have shown that organizing artisans into associations facilitates access to government incentives and fair trade programs (Sabando Santos, 2022). Similarly, experiences in other communities indicate that the formation of formal organizations has

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been key to improving the competitiveness of the artisan sector, enabling participation in national and international fairs (National Institute of Cultural Heritage [INPC], 2020).

The purpose of this study is to analyze the feasibility of forming a toquilla straw weavers' association in the Nazón parish, assessing its benefits, challenges, and applicable legal framework. Specifically, it seeks to diagnose the current situation of toquilla straw weavers in terms of production, marketing, and working conditions; identify the main obstacles they face in their artisanal activity, including a lack of training and access to new markets; propose a model bylaw for the establishment of a formal weavers' association; and establish organizational strengthening strategies to improve the sector's competitiveness and sustainability.

2. Theoretical framework

Background of the toquilla straw. Intangible Heritage

The topic of the production of the toquilla straw hat has not been addressed exhaustively, the author Regalado (2021) establishes:

> A significant effort is required to review the literature published in previous years, which, in the case of Azuay and Cañar, is particularly extensive. However, this body of literature is understudied and undervalued. This requires a plural perspective, both from the authors' perspectives and from their approaches and points of view (p. 28).

Therefore, a fundamental aspect in the consolidation of the toquilla straw weavers' association in the Nazón parish is a review of the existing literature on artisanal production in the province of Cañar, as it has historically been a key focus of toquilla straw weaving,

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and its documentation reflects the sector's evolution, problems, and opportunities. However, although there are studies and historical records on the toquilla straw weaving tradition, much of this literature has been undervalued or understudied in recent research.

This bibliographic review will not only contribute to revaluing the artisanal tradition, but will also lay documented foundations for the design of policies to support the production and marketing of toquilla straw. By recognizing and critically analyzing the existing bibliography, a bridge can be established between historical knowledge and the current needs of the artisanal sector, thus ensuring its sustainability and evolution over time and providing an incentive for the women of the Nazón parish.

Toquilla straw hat weaving is a traditional craft that dates back to the pre-Hispanic cultures of present-day Ecuador. Civilizations such as the Manteña, Jama-Coaque, and Chorrera already used this natural fiber to make baskets and shelter covers (INPC, 2020). However, the use of toquilla straw for hat making, as it is known today, emerged in the 17th century, when indigenous artisans adapted weaving techniques to European hat models (UNESCO, 2012).

In Ecuador, there are two important moments in time. On the one hand, the 1840s, when the first references to an organization in hat production were identified, and on the other, the 1950s, when initiatives to regulate the trade of these products began to be implemented. In particular, since 1952, with the creation of the Economic Recovery Institute, specific measures were promoted to intervene in hat marketing (Regalado, 2021, p. 10).

In 2012, the United Nations Educational, Scientific and Cultural Organization (UNESCO) declared the traditional weaving of the Ecuadorian toquilla straw hat an Intangible Cultural Heritage of Humanity. This distinction recognizes the historical and cultural value of this craft, as well as the importance of its preservation for future generations (UNESCO, 2012).

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Now, what does intangible heritage mean? Bringing together researchers and stakeholders to discuss heritage has not been difficult; however, ironically, this very ease has generated certain inconveniences, as the term "heritage" has become a broad and almost unlimited concept, as described by Roland Barthes. In its most recent formulation, proposed by UNESCO (2003) with the notion of Intangible Cultural Heritage (ICH), heritage encompasses everything that gives a community or an individual a sense of identity and continuity. In this contemporary approach, heritage is conceived as that which endures, that which is remembered, and to which a special bond is felt. Even a goal, ideal, or project that reflects identity and continuity in a person's life could be considered part of heritage (Nicolás, 2020).

In particular, intangible heritage constitutes the cultural heritage of a social group, transmitted from generation to generation as a collective and spiritual memory. However, the conceptualization of intangible heritage has not created the identity or memory of a people, but rather has classified certain cultural elements within a specific logic, which has not always been understood by the social actors themselves (Andrade Orellana, Cárate Tandalla , & Freire García, 2020).

The Nazón parish

Nazón is one of the four rural parishes that make up the Biblián canton, in the province of Cañar. Its parish seat is located just 3.2 kilometers from the cantonal center, facilitating connections with Biblián and other nearby towns. Its territory covers approximately 9,020.65 hectares, extending between an altitude ranging from 2,640 to 4,320 meters above sea level. Geographically, the parish is located between the coordinates 2º 37'12" and 2º 43'48" south latitude, and 79º 05'40" and 78º 53'59" west longitude, located in a mountainous environment with significant natural and cultural wealth (Gómez Ríos, 2022).

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The Nazón parish shares boundaries with several jurisdictions, strengthening its territorial interconnectedness. To the north, it borders the Cañar canton and the Jerusalem parish; to the south, it borders the Turupamba parish and the Déleg and Cuenca cantons; to the east, is the cantonal capital of Biblián, and to the west, it borders again with the Cuenca and Cañar cantons (Gómez Ríos, 2022). Regarding its parochialization: "(...) together with Turupamba , Official Registry No. 267 of April 23, 1945, was issued. This same registry decreed the elevation to the category of civil parishes of the territorial fractions of the hamlets of the same name (Gómez Ríos, 2022, p. 29). "

One of its potential assets is the population that is knowledgeable about toquilla straw weaving. One of the projects addressed within the Nazón parish's Territorial Planning Plan is a group called "Toquilla Straw Weavers of the San Roque Neighborhood," which consisted of 20 members, including four teenagers, six older adults, and two men (Gómez Ríos, 2022).

The parish has a total population of 2,232 inhabitants, of which 1,262 are women (56.5%) and 970 are men (43.5%). This figure is significant, as it demonstrates a greater female presence in the community, which supports the relevance of implementing policies to support women entrepreneurs, as is the case with the toquilla straw weavers (Instituto Nacional de Estadísticas y Censos [INEC], 2022).

Nazón has an area of 89.86 km², with a population density of approximately 44 inhabitants per km². This value indicates that it is a low-density area, with a population dispersed across its 13 communities (Instituto Nacional de Estadísticas y Censos [INEC], 2022). This geographic characteristic poses challenges in terms of access to infrastructure, basic services, and connectivity, which must be considered when planning projects that strengthen the production and marketing of toquilla straw weaving.

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Comparing data from 2010 (2,569 inhabitants) and 2022 (2,232 inhabitants), a reduction of 337 people is observed in 12 years, representing a negative average annual growth rate of -1.17% (Instituto Nacional de Estadísticas y Censos [INEC], 2022). This population decline could be attributed to migration to cities in search of better economic opportunities, a lack of local employment, or a decline in birth rates.

Population decline is a warning factor, as it jeopardizes the continuity of traditional activities such as toquilla straw weaving if younger generations migrate and there is no succession in learning the craft. In this context, the formalization of the Toquilla Straw Weavers Association is key to generating local economic opportunities, encouraging weavers to remain in their communities, and strengthening the social and cultural fabric.

The production of toquilla straw hats is a craft of great cultural, social, and economic value in Ecuador, recognized by UNESCO as Intangible Cultural Heritage of Humanity. In the Nazón parish, this tradition has been sustained primarily by women weavers, who face challenges such as market access restrictions, informal employment, a lack of financial support, and a lack of legal security in their work.

Given this situation, the Law Department at the Catholic University of Cuenca - Azogues Campus, in response to a request from the Decentralized Autonomous Government (GAD) of the Nazón Rural Parish, has identified the need to develop a legal framework that would allow for the formalization of a toquilla straw weavers' association.

Regulatory analysis

Through Official Gazette No. 136, published on February 26, 1993, the Ministry of Labor and Human Resources approved the Statutes of the "5 de Mayo" Toquilla Straw Weavers Association of the Cañar Canton. This approval was granted after reviewing favorable technical reports contained in memoranda No. 496-SDRH-92 of 1992 and No. 31-AJT-92

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of January 12, 1993 (Ministerio de Trabajo y Recursos Humanos, 26 de febrero de 1993).

The officialization of this trade association set a precedent for the formal organization of toquilla straw hat producers, allowing access to legal benefits, representation before government entities, and strengthening the artisanal economy. Its creation laid the groundwork for the structuring of similar associations in other producing regions, including Nazón, where formalization of the sector remains a key challenge for improving the working and commercial conditions of weavers.

On April 24, 2013, the commemorative postal issue entitled "The Traditional Weaving of the Toquilla Straw Hat - Intangible Cultural Heritage of Humanity" was approved through Official Registry No. 940. This initiative arose in response to Memorandum No. 2013-GFL-120-CDE EP-PIC of March 12, 2013, by which the General Manager of Correos del Ecuador CDE EP instructed the National Legal Directorate to prepare the corresponding Internal Resolution (Gerente General de Correos del Ecuador CDE EP, 24 de abril de 2013).

This official stamp entered circulation on March 18, 2013, in the city of Montecristi, the historic birthplace of the toquilla straw weaving tradition. The postal issue not only commemorates UNESCO's recognition of toquilla straw weaving as Intangible Cultural Heritage of Humanity in 2012, but also represents an effort to promote and preserve this ancient tradition. The Constitution of the Republic of Ecuador (2008), in Article 319, provides:

> Various forms of production organization are recognized in the economy, including community, cooperative, public or private enterprise, associative, family, domestic, autonomous, and mixed. The State will promote forms of production that ensure the well-being of the population and discourage those that violate their rights or those of nature; it will encourage production that satisfies

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> domestic demand and guarantees Ecuador's active participation in the international arena.

Within this legal framework, the State recognizes that the economy can be organized in a variety of ways, including community and cooperative models, as well as public or private, family, and autonomous business structures. Each of these forms plays a role within the productive system and contributes to the country's development. The Supreme Law also provides:

> Participatory, transparent, and efficient management will be encouraged in the various forms of production organization. Production, in all its forms, will be subject to principles and standards of quality, sustainability, systemic productivity, labor valuation, and economic and social efficiency (Constitution of the Republic, 2008, art. 320) .

In the organization of production processes, participatory, transparent, and efficient management will be encouraged, with stakeholders having a voice in decision-making and resource management carried out in a clear and equitable manner. Within the legal framework (ibid.), the right to freedom of association and the protection of cultural heritage are guaranteed, fundamental principles for the formalization of the Nazón Toquilla Straw Weavers' Association. Article 66, paragraph 13, recognizes the right of individuals to freely associate, assemble, and demonstrate, which supports the organization of weavers to defend their interests, improve their working conditions, and strengthen the marketing of their products.

In this context, Article 377 of the Constitution establishes that the National Cultural System has the responsibility to strengthen national identity, protect cultural heritage, and promote the diversity of artistic

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expressions. Given that toquilla straw weaving was declared Intangible Cultural Heritage of Humanity by UNESCO in 2012, the State has the obligation to preserve and promote this ancestral practice, ensuring its transmission to future generations.

On the other hand, the Organic Law of Popular and Solidarity Economy (2011), with respect to the associative sector, provides:

> It is the set of associations formed by natural persons, with productive or service economic activities, similar or complementary, with the purpose of producing, marketing and consuming lawful and socially necessary goods and services, self-supplying raw materials, inputs, tools, technology, equipment and other goods, or marketing their production in a supportive and self-managed manner under the principles of this Law (art. 18).

Regarding the previous quote, this concept refers to a model of solidarity-based economic organization, in which individuals join together in associations for the purpose of jointly developing productive or service activities. These associations can be made up of individuals who share interests in similar or complementary sectors, allowing for more efficient management of resources and greater production and marketing capacity.

In 2023, the Organic Law to promote the Violet Economy will be issued. Article 16 on Public Policies, in section 4, literal a), establishes that the State must develop actions to promote equal opportunities in employment, which is directly aligned with the formalization project of the Toquilla Straw Weavers Association in Nazón, emphasizing the need to broaden the notion of employment for women and strengthen the mechanisms that drive their productive ventures.

In the case of Nazón, where toquilla straw weaving is an essential economic activity for many women, implementation of this public policy

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would formally recognize their artisanal work as a legitimate form of employment, granting them access to labor benefits, social security, and institutional support. Furthermore, strengthening their businesses would involve developing strategies to improve production, optimize marketing, and guarantee fair working conditions.

Furthermore, the General Regulations of the Organic Law to promote the Violet Economy (2023), the article establishes the destination of incentives in the productive sector fits directly with the formalization project of the Toquilla Straw Weavers Association in Nazón, since its focus is on guaranteeing support for women entrepreneurs and facilitating the creation of sustainable businesses.

3. Methodology

This research applied a mixed methodology, combining qualitative and quantitative approaches, to obtain a comprehensive view of the situation of toquilla straw hat weavers in the Nazón parish. The study adopted an exploratory-descriptive design. The qualitative phase involved a semi-structured interview with the president of the Decentralized Autonomous Government of the Nazón rural parish, while the quantitative phase consisted of structured surveys with the artisan producers.

The target population consisted of 20 artisans active in the production of toquilla straw hats in the Nazón parish. A sample of 17 women artisans was selected intentionally using a non-probabilistic approach based on their willingness to participate and their experience in the craft. For the qualitative component, a semi-structured interview was conducted with a local authority, which allowed us to identify the main challenges and institutional perceptions of the craft.

For the quantitative component, a structured questionnaire with closed-ended and multiple-choice questions was developed, validated by

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legal and social experts, and evaluated through a pilot test to ensure its content validity and reliability.

The surveys were administered in person, respecting fundamental ethical criteria. The purpose of the study was explained to each participant, ensuring their anonymity and confidentiality. An informed consent form was used, voluntarily signed by each artisan before beginning the survey, in accordance with the Organic Law on Personal Data Protection (LOPDP).

The quantitative data were processed using descriptive statistics, representing the information through frequency tables, percentages, and graphs. This analysis allowed us to identify patterns in production, marketing, working conditions, access to resources, and willingness to form associations.

The fieldwork was complemented by a legal analysis of Executive Decree No. 193 and other regulations applicable to organizations in the popular and solidarity economy, which served as the basis for the development of a model statute for the future association.

This comprehensive methodology ensured a deep understanding of the weavers' economic, social, and legal context, providing solid evidence to support the proposal to establish a formal association in the Nazón parish.

4. Results

In order to gain a detailed understanding of the current situation of toquilla straw hat artisans in the Nazón parish, surveys were conducted with 17 producers, representing 85% of the total sample of 20 people selected for this study. An interview was also conducted with the president of the Decentralized Autonomous Government of the Nazón rural parish. This data collection aimed to identify the main challenges, needs, working conditions, and their willingness to join a formal association. The results

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shed light on both the socioeconomic situation of these artisans and the opportunities for organizational strengthening, providing fundamental input for the design of the bylaws. The most relevant findings derived from this data collection are presented below, which will serve as the basis for future proposals and actions to benefit the toquilla straw artisan sector.

Technical interview with the president of the Nazón Parish GAD

Interviewee: Dr. Maritza Calle

Date: 09/01/2025

Location: Decentralized Autonomous Government of the Rural Parish of Nazón

Production context

- Question: How many families are dedicated to the production of toquilla straw hats in the parish?
- Answer: Currently, approximately 25 to 30 families depend on this craft activity.
- Question: What is the main source of income for these families?
- Answer: The production of toquilla straw hats is their main economic activity, although many families complement it with agriculture.

Production process

- Question: What is the production process of a toquilla straw hat?
- Answer: Production follows three main phases:
- Purchase of straw.
- Alignment and preparation of the material.
- Weaving and shaping the hat.
- Question: What materials are used and how are they obtained?
- Answer: The main raw material is toquilla straw, which is acquired through intermediaries.

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- Question: What are the main challenges in the production process?
- Answer: The payment to the weavers is not fair and does not compensate for the effort and time invested.

Marketing

- Question: How are hats currently marketed?
- Answer: Mainly in local markets, although the lack of specialized outlets limits their access to better prices.
- Question: What are the main difficulties in selling the products?
- Answer: There are no suitable physical spaces for direct marketing, which forces us to rely on intermediaries.

Training and resources

- Question: Have you received training on production and marketing techniques?
- Answer: Only one training session has been conducted to date, which is insufficient to improve sales techniques and strategies.
- Question: What additional resources are needed to improve production and marketing?
- Answer: The municipality is required to allocate more resources to support production and generate more efficient marketing mechanisms.

Organization and formalization

- Question: How important is the creation of a formal weavers' association?
- Answer: It is extremely important, as it would strengthen the economy of producers and improve their working conditions.
- Question: What would be the main benefits of the partnership?
- Answer: An association would contribute to:

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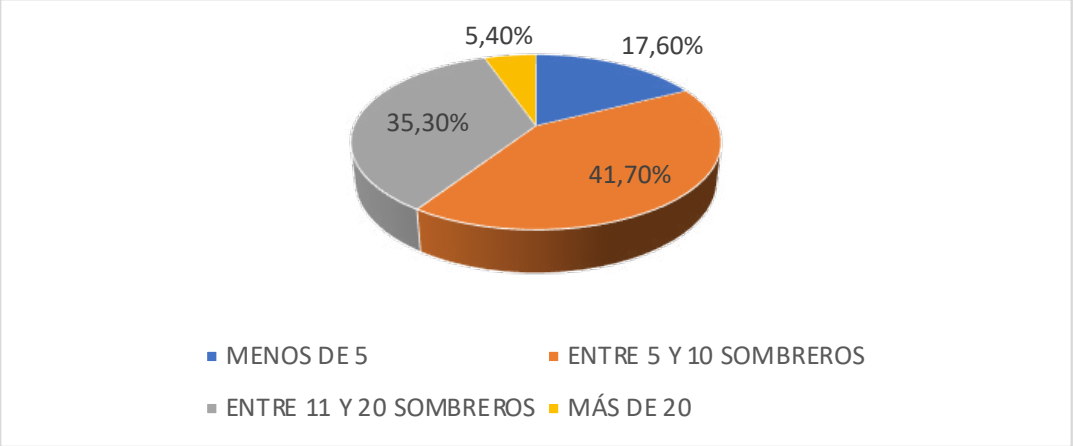
- Improve organization and access financing.
- Establish fairer prices for products.
- Promote marketing in national and international markets.
- Generate greater visibility and recognition of artisanal work.
- Question: Any additional comments on the current production situation?
- Answer: The weavers' pay is neither fair nor sufficient, which affects the sustainability of this artisanal tradition. Surveys were conducted among 17 women artisans who work with toquilla straw in the Nazón parish.

Chart 1

Monthly production of hats



Source: Prepared by the authors.

The majority of weavers (41.7%) have a moderate production of between 5 and 10 hats per month, suggesting that the work is manual and detailed, limiting the quantity they can produce. Only 5.4% produce more than 20 hats per month, indicating limitations in production capacity, either due to lack of time, resources, or demand. Another 17.6% produce

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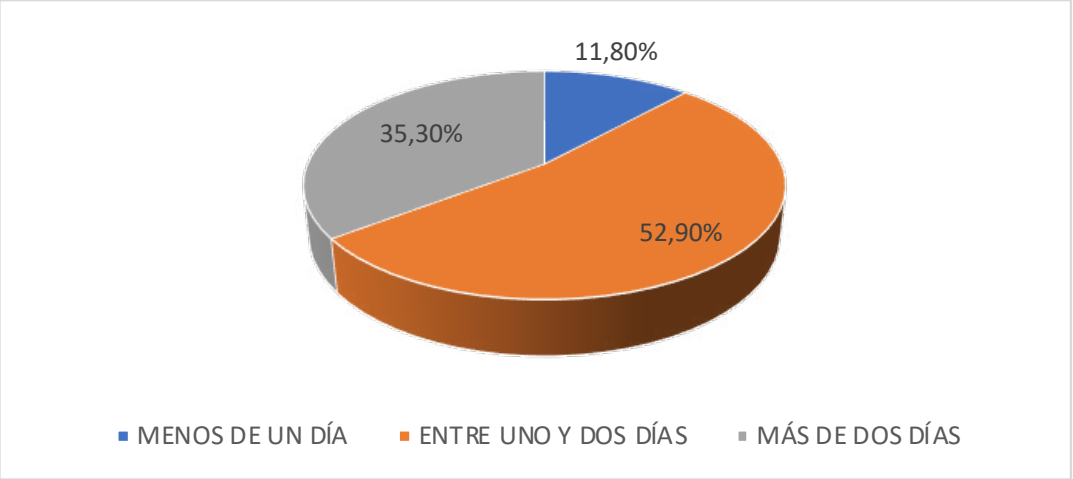
fewer than 5 hats per month, suggesting low productivity in some cases, likely due to factors such as age, lack of inputs, or low profitability.

Chart 2

Production time of a hat



Source: Prepared by the authors.

More than half of the weavers (52.9%) take between one and two days to complete a hat, indicating that production follows a meticulous process. A further 35.3% take more than two days to complete, which may be due to producing higher-quality or more detailed hats. Only 11.8% manage to make a hat in less than one day, suggesting that most weavers cannot significantly speed up the process without compromising quality.

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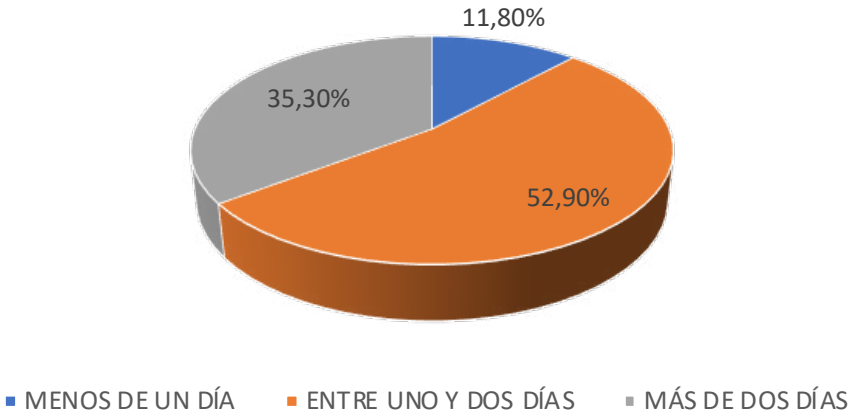
Chart 3

Selling prices of hats



Source: Prepared by the authors.

The vast majority (82.4%) sell their hats for less than $10, reflecting an undervaluation of the artisanal product and a dependence on intermediaries. No weaver earns more than $20 per hat, indicating that they lack access to markets that value artisanal work or allow for fair prices. The 17.6% who sell between $10 and $20 may be accessing better markets or producing higher-quality hats. The low selling price, compared to the production time, suggests that the profitability of the activity is low and that marketing strategies and access to more profitable markets are required.

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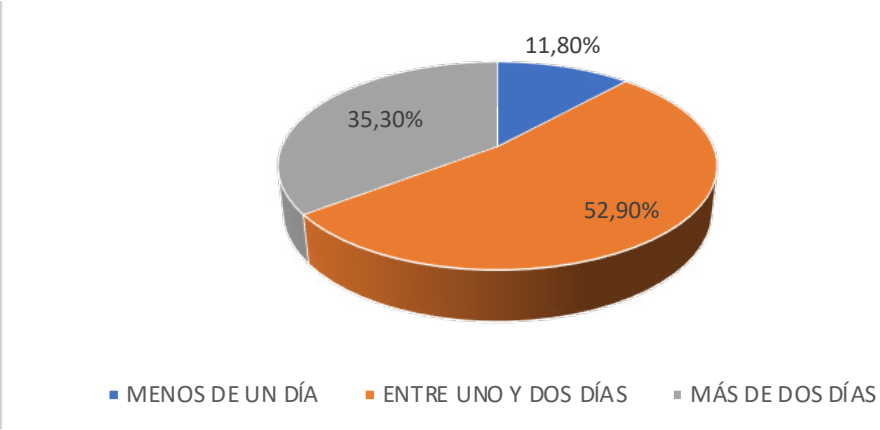
Chart 4

Income satisfaction from the sale of hats

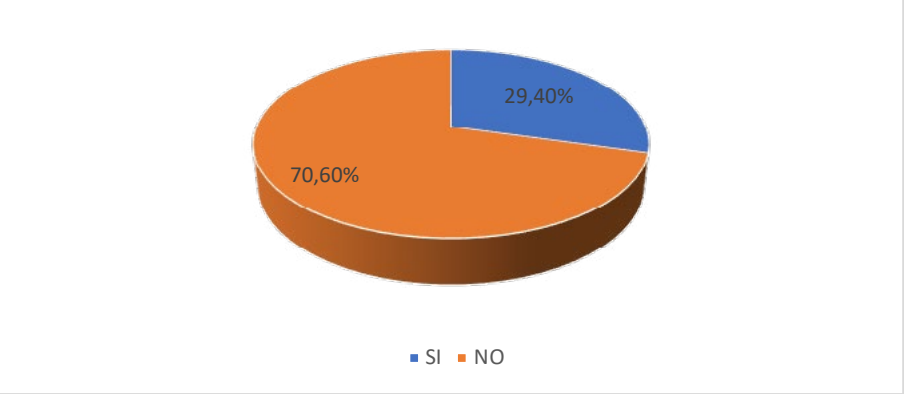


Source: Prepared by the authors.

Nearly half (47.1%) of weavers are dissatisfied, confirming that their current income does not cover their financial needs. Forty-one percent (41.2%) say they are somewhat dissatisfied, meaning that the majority of weavers do not perceive their activity as profitable. Only 11.7% (combining satisfied and very satisfied) are satisfied with their income, highlighting the urgent need to improve sales prices and marketing.

Chart 5

Access to training on production techniques



Source: Prepared by the authors.

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Lack of training affects 70.6% of weavers, limiting their access to better techniques, production time optimization, and marketing strategies. The 29.4% who have received training represent a minority, indicating a lack of institutional support to strengthen their knowledge and skills. Implementing technical and commercial training programs would be key to improving production and increasing profitability.

Chart 6

Formation of an association for women weavers in the Nazón parish

Source: Prepared by the authors.

All women who weave toquilla straw are 100% interested in joining an association.

5. Discussion

The results of this research reflect the complex reality faced by toquilla straw weavers in the Nazón parish, where artisanal production represents not only a means of economic support but also a fundamental element of cultural identity. However, the findings reveal multiple

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structural limitations that affect the profitability of the activity, its sustainability, and the well-being of the artisans.

One of the key problems identified is the low wages per hat, with 82.4% of weavers selling their product for less than $10, despite the fact that more than 88% take at least a day to make. This confirms the existence of inequality in the value chain, where intermediaries obtain greater profits at the expense of the precariousness of artisanal labor (Gaudin & Pérez, 2020). This phenomenon has been documented in previous studies on the popular and solidarity economy, where the lack of direct market access and dependence on external actors limit the growth of small producers (Gaudin & Pérez, 2020).

Another significant finding is the lack of training and technical assistance. 70.6% of weavers have never received training in production or marketing, which restricts their ability to innovate, diversify products, and access more profitable markets. Studies in other toquilla straw-producing communities have shown that training in advanced weaving techniques, time management, and digital marketing can increase income (Aguirre Castro, 2018).

The study also shows unanimity in favor of forming a formal association, with 100% of those surveyed expressing interest in this initiative. The creation of associations has improved negotiating capacity, provided access to credit, and strengthened national and international marketing (Instituto Nacional de Patrimonio Cultural [INPC], 2024).

In contrast to these challenges, the analysis also reveals strategic opportunities for strengthening the activity. Global demand for authentic artisanal products has grown in recent years, especially in luxury and fair trade markets (UNESCO, 2012). If weavers manage to organize and access these markets, they could multiply their income and reduce their dependence on intermediaries. To achieve this, it is essential that local authorities and the State implement policies to incentivize artisanal

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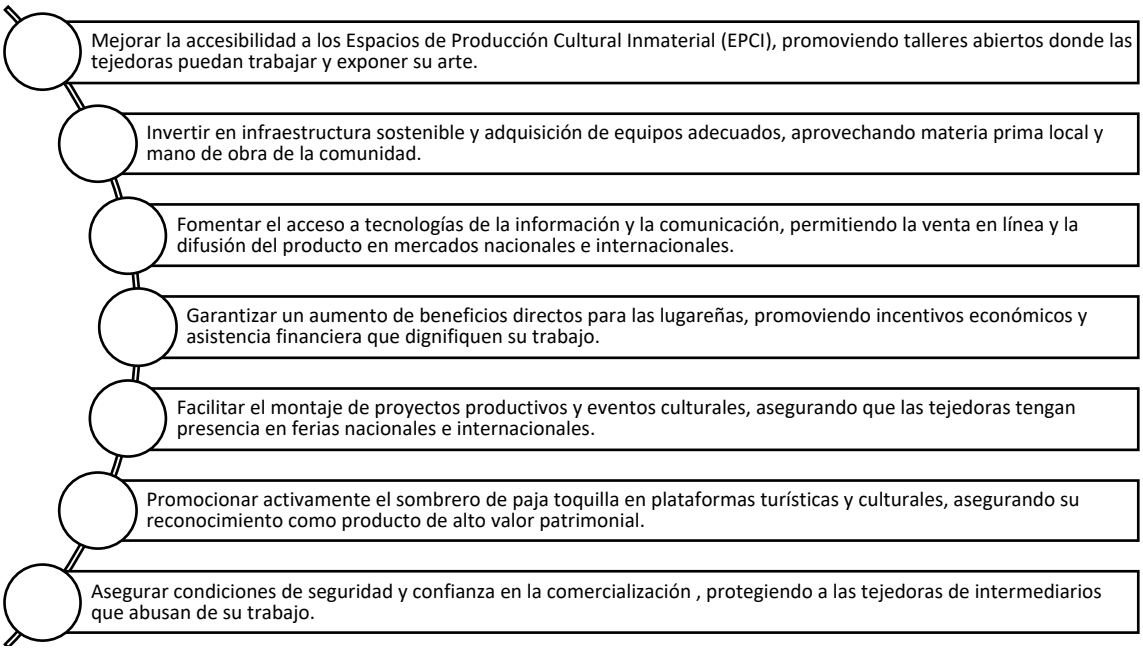
production, such as accessible credit, marketing opportunities, and ongoing training programs (Popular and Solidarity Economy Law, 2011).

Strategies and proposed statutes for strengthening artisanal production in Nazón through the establishment of an association.

In this sense, the production of toquilla straw hats in Nazón faces significant challenges in terms of remuneration, market access, and organizational strengthening. However, the results of this research suggest that, through appropriate training, financing, and direct marketing strategies, it is possible to transform this activity into a model of sustainable and equitable economic development for the weavers, ensuring the preservation of their cultural heritage.

Chart 7

Complementary strategies to strengthen the artisanal economy in Nazón



Source: Prepared from Mejía & Varón Parra (2016)

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As part of its commitment to protecting and promoting the rights of toquilla straw hat weavers, the Law Department at the Catholic University of Cuenca has developed a Statute for the establishment of a formal association. This statute was developed in accordance with Executive Decree 193 (2017), specifically Article 12, with the goal of guaranteeing the artisans' labor rights, facilitating access to state benefits, promoting entrepreneurship, and strengthening the marketing of their products. In this way, the program seeks to establish a legal framework that protects and regulates their activity.

The statute will establish and regulate at least the following aspects:

Table 1.

Contents of the Statute

Aspect	Description
Name, scope of action and address of the organization	Defines the official name of the organization, its purpose, and the location of its headquarters.
Territorial scope of the organization	Determine the geographic extent in which the association will operate.
Aims and objectives of the organization	It establishes the main purposes of the association and will carry out volunteer activities for social action and development.
Organizational structure	It defines the internal composition of the association and its governing bodies.
Rights and obligations of members	Specifies the rights and duties of those who are part of the organization.

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Method of election of dignities and duration of office	Explains the selection process for leaders and their term in office.
Powers and duties of internal bodies	Details the functions of the board of directors, administrators and legal representatives.
Social assets and resource management	Regulates the financial management and assets of the organization.
Form and times of calling general assemblies	Establishes the procedure and frequency with which general meetings will be held.
Quorum for the installation of general assemblies and the decision-making quorum	Defines the minimum number of members required to validate decisions.
Mechanisms for including or excluding members	It establishes criteria for the admission and dismissal of members, guaranteeing the right to due process.
Reform of statutes	Describes the procedure for modifying the organization's bylaws.
Dispute settlement regime	Establishes mechanisms to resolve internal conflicts.
Causes and procedure for dissolution and liquidation of the organization	Defines the reasons and process for terminating the partnership

Source: Prepared from Executive Decree No. 193 (2017)

This statute aims to provide weavers with a solid regulatory framework that allows them to operate in an organized and efficient manner, ensuring respect for their rights and promoting their economic and social development.

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6. Conclusions

Research on the production and marketing of toquilla straw hats in the Nazón parish has identified the main challenges and opportunities for artisanal weavers. The production of toquilla straw hats is a fundamental activity for the economy of at least 25 to 30 families, being one of their main sources of income. At a heritage level, this practice represents an invaluable cultural legacy, linked to the community's identity and internationally recognized by UNESCO. However, the remuneration per hat is low, as 82.4% of weavers sell their products for less than $10 USD, which does not compensate for the effort and time of production. Furthermore, marketing is carried out primarily through intermediaries, reducing the weavers' profits and limiting their access to more profitable markets. Likewise, the lack of adequate physical spaces for direct sales restricts their visibility in the national and international markets.

Another problem identified is limited training and access to technology, as 70.6% of weavers have never received training in advanced weaving techniques or marketing strategies. Furthermore, they lack access to information and communications technologies (ICTs) that enable digital sales and promotion on online platforms. This not only limits their competitiveness but also restricts their reach to new consumers. Another worrying aspect is the lack of generational renewal, as the majority of active weavers are between 31 and 65 years old, while only 17.6% are young people under 30, which jeopardizes the continuity of the craft. To ensure its continued viability, it is urgent to create incentives to interest new generations in learning to weave toquilla straw.

A key element for strengthening the sector is formalization and collective organization. The creation of a formal weavers' association would strengthen their market position, access financing, and improve their productive organization. However, 70.6% of weavers have expressed interest in forming associations. To overcome the problems in this

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area of intangible heritage, it is essential to incorporate technical and commercial training focused on improving product quality, optimizing production time, and facilitating access to international markets. It is also necessary to promote the use of digital tools for promoting and selling hats on e-commerce platforms, in addition to promoting public policies that support craftsmanship by providing infrastructure, financing, and raising the profile of artisanal activity.

Furthermore, it is recommended to create intergenerational training programs, where experienced weavers teach young people, ensuring the continuity of the craft, as well as implementing tourism and cultural promotion strategies, positioning the toquilla straw hat as a craft product of high heritage value. Therefore, toquilla straw weaving in Nazón is an activity that combines economic, social, and cultural value, but it faces multiple challenges that threaten its sustainability. The lack of fair prices, training, market access, and generational renewal puts the continuity of this tradition at risk. The formalization of a weavers' association, along with the support of public policies and commercial innovation strategies, can represent the key to transforming this activity into a sustainable development model, guaranteeing better living conditions. life for artisans and the preservation of their cultural legacy.

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Educational status of a population with multiple disabilities. Lennox-Gastaut Syndrome

Situación educativa de una población con discapacidad múltiple. Síndrome de Lennox-Gastaut

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Abstract

Introduction: Lennox-Gastaut syndrome (LGS) is an epileptic encephalopathy characterized by recurrent seizures, cognitive impairment and electroencephalographic alterations. The education of children with this condition is a challenge, given their functional dependence and the lack of inclusive adaptations in the educational system. **Aim:** To analyze the educational situation of a child with SLG through a functional educational assessment, identifying their needs and possible inclusion strategies. **Methodology:** A qualitative and descriptive approach was used, based on direct observation, structured interviews with therapists and family members, and the application of the Individual Plan of Reasonable Adjustments (PIAR). **Results:** The child presents motor, cognitive and communicative limitations that hinder his school inclusion. Necessary supports were identified, such as a standing frame, multisensory therapy and alternative communication strategies. **Conclusions:** A transdisciplinary approach is recommended for its development, prioritizing autonomy and gradual inclusion with curricular adaptations.

Keywords: Multiple Disability, Lenoxx Gastaut Syndrome, educational assessment, functional, educational status, inclusion.

Resumen

Introducción: El síndrome de Lennox-Gastaut (SLG) es una encefalopatía epiléptica caracterizada por crisis convulsivas recurrentes, deterioro cognitivo y alteraciones electroencefalográficas. La educación de niños con esta condición es un desafío, dada su dependencia funcional y la falta de adaptaciones inclusivas en el sistema educativo. Objetivo: Analizar la situación educativa de un niño con SLG mediante una evaluación educativa funcional, identificando sus necesidades y posibles estrategias de inclusión. Metodología: Se utilizó un enfoque cualitativo y descriptivo, basado en observación directa, entrevistas estructuradas con terapeutas y familiares, y la aplicación del Plan Individual de Ajustes Razonables (PIAR). Resultados: El niño presenta limitaciones motoras, cognitivas y comunicativas que dificultan su inclusión escolar. Se identificaron apoyos necesarios, como un bipedestador, terapia multisensorial y estrategias de comunicación alternativa. Conclusiones: Se recomienda un enfoque transdisciplinario para su desarrollo, priorizando la autonomía y la inclusión gradual con adaptaciones curriculares.

Palabras clave: Discapacidad múltiple, síndrome de Lenoxx Gastaut, evaluación educativa, funcional, situación educativa, inclusión.

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1. Introduction

Lennox-Gastaut Syndrome (LGS) is a catastrophic epileptic encephalopathy characterized by a distinct triad, including the onset of various forms of epileptic seizures, cognitive deficits with regression or stagnation (Camfield, 2011) , and an EEG showing slow wave configurations along with generalized paroxysms of fast activity during nocturnal periods (Belousova et al., 2022; Nizami et al., 2024; Strzelczyk et al., 2023) atypical absences, myoclonic, tonic/atonic drop attacks, generalized tonic-clonic, focal.

The onset of LGS occurs between the first and eighth year of life (Asadi-Pooya and Farazdaghi, 2022), peaking between 3 and 5 years of age, with a higher prevalence in males than in females (Belousova et al., 2022) atypical absences, myoclonic, tonic/atonic drop attacks, generalized tonic-clonic, focal. Furthermore, 30% of individuals diagnosed with West syndrome progress to Lennox-Gastaut syndrome , with a prevalence ranging from 2 to 10 individuals per 10,000,000 people (Kenyon, 2018) . In 75% of cases, the etiology is symptomatic and includes conditions such as hypoxic-ischemic encephalopathy, neurocutaneous syndromes, meningoencephalitis, intracranial hypertension, and neoplasia, while 25% to 30% of cases are cryptogenic, indicating an unknown etiology (Auvin, 2020; Herrera and Burneo, 2018).

However, there is a clear lack of information available on multiple disabilities in the Ecuadorian context (Delgado-Carrillo et al., 2019), particularly with regard to aspects related to the incidence, prevalence and, in particular, the educational circumstances of people with multiple disabilities (Cordeiro and Sebastián-Heredero, 2024; Ramírez et al., 2022), who evidently constitute a significant proportion of the population and frequently lack the necessary adaptations and support for effective inclusion (Martínez - Martínez et al., 2020; Mendoza Carrasco, 2018; Palma et al., 2016) .

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In this particular case, the child's diagnosis has evolved over time due to the unique characteristics and complexity of his condition. It is currently identified as Lennox-Gastaut Syndrome (LGS). He also presents with spastic tetraparesis and a global delay in psychomotor development. He is completely dependent on another individual for mobility, feeding, and the performance of any other daily tasks, which is the reason for his absence from an educational institution. However, he participates in early stimulation, physical therapy, speech therapy, and neurosensory therapy.

Therefore, this manuscript involves conducting a functional educational assessment to determine the child's potential, focusing on all areas of participation. It also provides essential opportunities for the child to develop as independently as possible, with reasonable adaptations and the functional, imperative, and individualized supports identified throughout this research. Therefore, this study aims to analyze the educational situation of an individual with Lennox-Gastaut syndrome from a functional educational assessment perspective.

2. Methodology

The research was conducted using a qualitative and descriptive approach, as it provided insight into the current educational situation of the subject of study. Through field research, data relevant to the selected topic were collected, enabling the development of an Individual Reasonable Adjustment Plan (IAP), interviews, and a Functional Educational Assessment. Direct observation and questioning were also used for therapists and family members.

On the other hand, observation allowed direct contact with the participant and the events being studied (González Morales, 2023) . While the structured interview allowed information to be collected through previously posed questions and with a defined structure. (Añorve Guillén, 1991; Díaz-Bravo et al., 2013; Troncoso-Pantoja and Amaya-Placencia, 2017)

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. Likewise, understanding that the functional educational assessment is intended for children with multiple disabilities, allowed assess he spot of view educational, with he aim of gather data that will help families and educational institutions (Vásquez, 2011).

In this research, the population consists of a four-year-old child with multiple disabilities: Lennox-Gastaut syndrome who attends the Child Development Center of the University of Cuenca (CEDIUC) located in the city of Cuenca.

3. Results

3.1. Individual Reasonable Adjustment Plan (IRAP)

The individual reasonable adjustment plan is an instrument that allows a person to be characterized specifying details for can determine needs educational and plan activities for a pedagogical approach.

This tool is made up of five parts based based on information obtained in all contexts in which the child develops. The child's needs at the time of the assessment have also been considered.

3.1.1. Initial characterization

The data prenatal do reference to a pregnancy to term and without none complication. The mother of the evaluated was thirty-five years old at the time of delivery, with a total of three pregnancies, zero abortions, ten controls doctors during all he process of gestation. He delivery was eutocic . Within the postnatal information it is important to know that there was immediate crying, presented hyperbilirubinemia, receiving the care necessary and he period of lactation was until two months of age, being interrupted by multiple medical interventions.

Currently, the child is fed only with semi-liquids through bottles, spoons, between others utensils that they use the members of his family,

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HE unknown that have any type of allergy to any food or product and He's not yet toilet trained, which is why he wears diapers. Occasionally , his sleep is interrupted several times during the night, but he calms down easily.

The patient being evaluated has a chronological age of four years and ten months and has a diagnosis of Lennox-Gastaut syndrome with recurrent seizures and delayed psychomotor development, which, in this specific case, is global due to the fact that he has spastic tetraparesis. He has no defined language; he only communicates through crying and facial expressions. facials, by it so much, depends totally of a adult that it attend. Go to the Center of development childish of the University of Cuenca, in where receives stimulation early, physical therapy and speech therapy.

The minor has not been enrolled in school due to reasons related to his condition, lives with his parents and two brothers, forming a solid family and United. A notable aspect is the support each member provides, which in turn allows them to move forward as a team, respecting norms and rules of coexistence to maintain optimal interpersonal relationships. and prioritizing always the needs of the member of his family with multiple disabilities.

The child does not have medical insurance, which is why his health care is provided of manner private, attending by choice of their parents to specialists so much in conventional and natural medicine. He holds a disability card issued by the Ministry of Public Health, which only qualifies his physical disability, with a percentage of 84%.

3.1.2. Descriptive report : Body expression and motor skills

In this area of a total of twelve evaluation items the skill is acquired concerning to tolerate different textures and in process the that speaks about of the recognition of loud and soft sounds because it responds with body movements to sounds, but does not discriminate between them.

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3.1.2.1. Logical - mathematical relationship

In this area there are fourteen skills to be evaluated, one of which is in the start indicator and deals with maintaining attention on a task, here we can consider that this trying to carry it out because when observe a element that calls his attention he focuses his gaze and makes repetitive movements with his arms.

3.1.2.2. Oral and written comprehension and expression

The person being evaluated only completes the skill of expressing pleasure and displeasure , as he or she has the ability to express it through crying and calming down. In this area, three skills concerning expressing emotions and needs are also included, with a total of eleven items.

3.1.2.3. Discovery and understanding of the environment

In this scope exist nine skills, one of they is recognize people nearby , which is in the process of being completed. The remaining skills correspond to complex abilities for the child at the moment.

3.1.2.4. Artistic expression

In this field exist fourteen items, of the which one HE finds in he indicator of due start to that has the intention of hold objects, but at the moment No account with the coordination and strength necessary to do it.

3.1.2.5. Identity and autonomy

Of a total of twenty-five questions, two are acquired , since it tolerates accessories and lets someone else comb their hair. On the other hand, two skills are found at the beginning; one concerning to chew properly and other to drink with a cup. The remaining No the performs.

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3.1.2.6. Coexistence

In this scope of ten skills fulfills only with the of tolerate dress up, due that No presents opposition to the carry out this action, the remaining still No are carried out by he minor.

3.1.2.7. Context and life history

The child's development proceeded normally until he was two months old, from that period on he began to go to the neuropediatrician due to the seizures he was having and which were increasing. HE intensified further, by it, the family look for the opinion of several professionals. He The first person they went to gave him medication that, according to the parents' opinion, kept him in a state of sleepiness to the child, this happened until the five months, reason by the which they changed as a doctor, attending to other that of equal manner you gave medication that No was very favorable, In addition to mentioning to the family that the condition the minor has has no cure and that nothing can be done nothing further by his welfare. By this reason, they searched again other opinion and were to the city of Quito from six months to first year, the neuropediatrician provided timely care and of quality decreasing the frequency and intensity of the crisis convulsive, besides of that This professional gave the diagnosis of Lennox-Gastaut syndrome, however, due to the distance and The cost of care meant they had to seek another specialist in their own city, with whom they continue to this day.

It is important to emphasize that the family , since the child was three years old, has also opted to receive natural treatment and states that it has significantly reduced the seizures, but without ceasing to receive monthly check-ups from the neuropediatrician.

In all this process No existed advances in his development psychomotor, to to leave of the four years old the child ha attended to physical therapy, speech therapy and stimulation early in the Child

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Development Center at the University of Cuenca, where she has achieved partial head control, auditory tracking, and partial visual tracking.

3.1.3. Inventory of reasonable accommodations and supports

In how much to supports necessary, is of vital importance he use of a furniture that Allows you to change your constant supine posture to an upright position, which improves your field of vision, object manipulation, respiratory function, among several advantages of changing to this position. This can be achieved through a standing frame with a table for upper limb activities. For dental hygiene, it is suggested to use an electric toothbrush , because the person that it attends has elderly ease of arrive to places bit accessible and carry out Proper cleaning thanks to the automatic movement of the bristles. For feeding purposes , a straw with a non-return system is recommended, allowing the liquid to remain inside the straw even when the suction stops.

3.1.4. Pedagogical assessment

In this instrument, most of the activities are not applicable because the child is not enrolled in school. It is important to note that the dependency is total because the child cannot mobilize of manner autonomous, besides of No possess a guy of communication defined and functional. Therefore, all activities to be carried out should be designed to achieve the greatest possible independence.

3.2. Survey of the educational process from the curricular perspective

The survey was conducted in line to four professionals in the area of therapy of language, early stimulation, physical therapy and the coordination of CEDIUC, obtaining the following results:

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3.2.1. How do students with disabilities access the curriculum?

This ask No was applicable due to that the professionals belong to a institution that provides different types of therapies and are not based on the curriculum. Therefore the responses from respondents in their entirety were that they do not access the curriculum because they do not work based on it .

3.2.2. What team model is being worked on in the institution?

According to all those evaluated, the team is interdisciplinary because the criteria of each professional are taken into account and they share objectives; however, it can be denoted according to the responses that the professionals do not know the meaning of the term transdisciplinary.

3.3.3. Is a parallel curriculum used for the education of students with disabilities?

According to all the professionals evaluated , the answer was no, because different activities are planned based on the needs of each child.

3.3.4. Where do we get the curriculum content used for students with disabilities?

The answer obtained of two of the respondents was that No HE works with base in a curriculum. On the other hand, two professionals also responded that activities are obtained from standardized guides and manuals on childhood development.

3.2.5. How are curricular contents developed for students with disabilities?

Once again, two of the professionals responded that they do not work with curricular content ; however, the remaining two respondents responded that these are designed based on each child's abilities and through an individualized care program.

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3.2.6. Does the student have a person-centered educational program?

Of the total number of respondents, half responded yes and the other half no, because each work area at CEDIUC has the capacity to make decisions in its activities autonomously, but considering the common goal they have as a work team.

3.2.7. What are the components of a person-centered educational program?

In this question the answer of each professional varies, because one responded that the components are the family, the professionals and he child, other answer obtained states that The components are clinical diagnosis, diagnostic assessment of the area, developmental age, developmental areas, objectives, activities, resources and evaluation, a third response ensures that it is not performs this activity and finally other of the respondents considers that only there is a component and It is child development, which is why it is noticeable that there is no clear idea about what a person-centered plan is.

3.3. SOCIEVEN Functional Educational Assessment

This evaluation considered nine areas involving the child and their environment, including their immediate family and therapists.

3.3.1. Functional vision assessment

The child observes everything around him and focuses at less than one meter away . This includes faces of people and objects attractions that be older people to ten cm. In His left eye has a larger visual field, he responds to flashing, brightly colored lights, as they tend to attract his attention, and sometimes if he is offered something of his pleasure, he tries to manipulate it. and hold it, the textures of different guys are of his taste especially when They are accompanied by bright colors, sound and are easily manipulated, objects that stimulate his sensitivity vibratory also

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you attract. Constantly expresses pleasure to through random movements of arms and legs, on rare occasions he also makes small babbles when he is very attracted to something.

HE recommends carry out a assessment of his vision by a professional that sea specialist in this area, specifically an ophthalmologist who performs a visual evoked potential test, based on knowing neurophysiological responses.

3.3.2. Functional hearing assessment

The person being evaluated can hear everything that is happening around him, he communicates through crying discriminatory, shouting and sounds guttural, he can hear sounds environmental,onomatopoeic, and human voice, but if presented with sudden sounds above seventy decibels, they may experience spasms. Furthermore, they have the ability to locate the sound source as long as it is a maximum of fifty centimeters away from them.

It is important that you be assessed through an auditory evoked potential test by a speech therapy professional, and In the event that the results are altered, for a specialist as it is a otolaryngologist, for determine that can hear and to what intensity.

3.3.3. Functional assessment of communication and language

Expressive communication is quite limited, however, he communicates through crying, facial expressions and sometimes guttural sounds. Depending on Va's level of communication Dijk HE finds in he of nutrition and, of agreement to the level of development Rowland's and Campbell's behavior is pre-intentional. Finally, his auditory attention span lasts a maximum of five seconds, as evidenced by the child's body movements and audible responses.

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3.3.4. Functional assessment of cognitive level

And hear, moving his or her fingers when presented with objects with textures and temperatures he or she likes. His or her attention span while engaged in an activity lasts for ten seconds in a sitting position; his or her level of cognitive development is at the sensorimotor stage.

3.3.5. Functional assessment of social and family interaction

Due to his condition and to the emergency health, he evaluated has difficulties for to be able to socialize with others people that No be members of his family, be these adults either children. In regular situations, his interaction is usually limited; he allows and accepts any activity, stimulus, or object that a person offers him, regardless of whether it is someone he knows or not, but his response to what is presented is usually head movements and, sometimes, his breathing accelerates.

3.3.6. Functional assessment related to behavior

He self-stimulates with repetitive hand movements and observes them when he's calm or enjoying an activity. It's difficult to notice characteristic aspects of his behavior due to his motor skills, but he can be considered quite passive and doesn't exhibit disruptive behaviors.

3.3.7. Sensory Functional Assessment

The person being evaluated tolerates physical contact, except when sudden movements are made. They tolerate any type of lotion or substance on their body, but if they are in a cold temperature, do small shocks, you like the massages and No presents opposition. Yeah something is of his pleasure, manifests it through calm facial expressions, movements of his mouth, head and limbs, these responses usually last a maximum of a minute. He suffers from spastic tetraparesis, which is why it is difficult for his muscles to relax and his sensory integration is not the most adequate.

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Therefore, he responds in the same way to different stimuli presented to his sensory systems.

3.3.8. Functional assessment of independence and habits

The minor is completely dependent on another person to carry out activities of daily living. as eat, change from clothes, brush their teeth, wash their hands, etc Use diapers and the family requests that first HE board it essential for that HE can develop alone. With This refers to their motor skills, communication skills, among others.

3.3.9. Functional assessment of orientation, mobility and motor skills

It is necessary to consider that their size and weight correspond to their chronological age, reason by he which HE has to contemplate other shape of displacement by he overexertion muscular exercise performed by their parents. Within this, one can think of a mobile bipedestador or any similar object where the child can be in an upright position , but held by a harness and that it has wheels to facilitate its mobility.

3.4. Person-centered plan

3.4.1. Characteristics

He is a receptive child who is attentive to what is happening around him. He responds to what he likes with movements of his limbs and guttural sounds. He also expresses some of his needs through crying. He has head control with slight oscillations. His auditory monitoring allows him to know that something interests him. He interacts with his family and especially with his mother. An important characteristic is the family support he receives unconditionally.

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3.4.2. Life story

The prenatal check-ups were the necessary ones and There were no complications during the childbirth . The life of the child HE development of manner conventional during the first months. TO From 2 months of age they noticed that the child had seizures, the family went to several professionals for help, the first one they went to gave medication that, according to the parents' opinion, kept the child asleep all the time, this happened until 5 months, which is why they changed professionals, going to another who also gave medication that was not favorable according to the parents' criteria, in addition to telling the family that the child's condition has no cure and that nothing more can be done for his well-being, which is why they changed their medical opinion and went to the city of Quito from 6 months to the first year. The neuropediatrician provided care timely and quality decreasing the frequency and intensity of seizures, in addition to this professional giving the diagnosis of Lennox-Gastaut Syndrome , however, due to the distance and the cost of care they had to look for another professional in their same city with whom they continue to date.

Is important emphasize that the family from the 3 years of the child's life has also opted to receive treatment natural and who claim that it has decreased seizures, leaving traditional medication and using natural medication, but without stopping receiving monthly check-ups of the neuropediatrician. In all This process No existed advances in his development psychomotor. At age 4, the child attended hippotherapy, physical therapy at FISIOSENS, and is currently receiving physical therapy, language therapy, and early stimulation at the Child Development Center of the University of Cuenca (CEDIUC).

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3.4.3. Activities you enjoy

There are several activities that they like, such as those that involve sensory stimuli, especially bright colored lights, vibrating objects, soft and smooth textures. On the other hand, they also like to consume semi-liquid foods and foods with characteristic textures. as he cereal processed. Also is important know that you pleases move his hands near his eyes and swinging his limbs randomly. His preferred body position is lying on his back.

3.4.4. Activities you don't like

That that No you pleases includes food citrus fruits, changes of position as positions sitting, prone position or any other position that is abrupt and sudden loud sounds are not to their liking either.

3.4.5. Family expectations

His family expects the child to be independent, also to have a way of communicating with others and interact optimally with other people. Furthermore, his family hopes that the child's health will become increasingly stable.

3.4.6. Links

The child commonly bonds with his or her mother, father, siblings, therapists, and health professionals.

3.4.7. Skills, strengths and aspects to strengthen

3.4.7.1. Skills

- Follow-up auditory.
- Control cephalic partial.
- Movements of limbs.
- Perception and reception of information.

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- Notice people and objects.

3.4.7.2. Strengths

- Material didactic elaborated and acquired by his family.
- Tools therapeutic in home.
- Support total of his family.
- Predisposition positive of his family for improve the condition of the child.
- Creativity and love of his family.

3.4.8. Aspects to strengthen

- Follow-up visual.
- Control cephalic.
- Motor skills fine: hold objects.
- Tolerate new postures.
- Babbling.
- Experimentation gradual of new textures (feeding).

3.4.9. Suggested activities

3.4.9.1. Sensory stimulation

Goal. - Assimilate and organize the sensations that HE receive of the around, toasting answers that adapt to each situation.

3.4.9.2Proprioceptive system

Objective: To understand each part of the body and its function through different sensations provided by the environment.

- Smell a lotion or cream with a pleasant aroma, feel its texture and then participate in massages that start from the fingers of

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the feet, legs, trunk, arms, hands, fingers and at the end on the face.

- Tap several objects as brushes, feathers, cotton, between others. Later each one of these items will travel several parts of the body of manner cephalocaudal and proximal - distal.

3.4.9.3. Vestibular system

Aim: Coordinate and balance his body in different moments and circumstances.

- Swing in different items as roller, ball, bobath, kunga, rocking chair, hammock or any other that allows for gentle, repetitive movements. At first, these movements will be light and then increase in intensity.

3.4.9.4. Touch system

Aim: Explore he world to through of their textures and temperatures, complementing it always with sounds, images and smells that each element of the environment possesses.

- Feel different textures in the palm of your hand, starting with smooth textures and then touching rough objects and experiencing various contrasts such as soft and hard, liquid and sticky, and much more.
- Appreciate in everything he body elements such as gelatin, noodles, foam, rice or any other, while I am lying in a bathtub.
- Hold with the hands bottles with different temperatures and feel he contrast.

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3.4.9.5. Visual system

Aim: Notice all it what's happening around and discriminate his function.

- Observe lights through a projector and listen to the verbalization of everything that is being observed.
- Follow a luminous object with your eyes and make different movements like top to bottom or left to right and vice versa.
- Notice my body and my face through from a mirror.

3.4.9.6. Auditory system

Objective: Assimilate sounds and associate them with different activities.

- Listen to familiar sounds through any device and verbalizations that explain the device's sounds.
- Notice and tap images of animals with textures and sounds own of each animal which is found in the graph.
- Feel the vibrations that occur in another person's neck area with your hand while they are speaking, as well as observe their facial movements.
- Listen to the sounds of various musical instruments and observe how they are played, then try to reproduce the movements that must be performed to hear the sounds again.
- Hear sonatas of Mozart while HE they perform others activities.

3.4.9.7. Olfactory system

Aim: Relate smells with places, people, food or objects.

- Sniff different aromas as essences either humidifiers with aromas floral and fruit trees.
- Distinguish he smell of different places to the that HE frequents commonly.

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- Manipulate, savor and smell fruit, besides of hear the verbalizations with he name of the fruit.

3.4.9.8. Gustatory system

Objective: To know the taste of different foods, in addition to associating them with their name, smell, and image.

- Prove different flavors and textures of fruit, gelatin either any food that HE arrange, contrasting flavors.
- Feel in the lips, cotton swabs, feathers, brushes either any another element.
- Hear verbalizations of the that is this eating.

All systems must be addressed to ensure proper sensory integration. They can be worked on together or separately, in sessions that the child can tolerate. Activities must be carried out beforehand, meaning the child must be explained what will be done.

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Suggestion for future curriculum alignment

Table 1. Curricular alignment

Teaching:	Degree/Course: Initial 1		Parallel:		Day:		
Unit didactics: Exploring he world.			Time: Two weeks				
Aim general: Interact with he around through of the exploration and stimulation of their senses.							
Needs	Area	Contents	Activities	Operational objective	Reasonable adjustments/ supports	Resources	Evaluation indicators
Communication: Expressing desires and emotions through gestures and facial expressions. Accompanying activities with verbalizations. Socialization: Interacting with other people in their environment.	EMOTIONAL AND SOCIAL BONDING Recognize characteristics of their own identity and how to react when hearing their name. Interact with an adult through simple games with actions and objects that catch their attention . NATURAL AND CULTURAL DISCOVERY Follow objects with their eyes that have strong colors, lights, and shine. React to contact with rough and smooth textures; and to pleasant and unpleasant flavors. Manipulate and explore objects (toys) according to their functionality. SUPPLEMENTARY CONTENT Sensory Integration Receive, process, and respond to sensory stimuli received from the environment. In a coordinated manner through different places. SUPPLEMENTARY CONTENT Orientation and mobility Allow mobility in a safe manner and in an adequate posture.	Distinguishes his/her name Interacts with another person Visual tracking Experiences textures and flavors Explores objects Coordinated movement	to your name while performing everyday activities accompanied by verbalizations. Observe another person for 30 seconds while they make different facial expressions or sounds that attract attention. Look at a luminous object and follow its path. Feel textures with your hands and feet. Contrast the differences between some textures. Try different food flavors. Hold objects with sticky textures that make them easier to grip. Visit a nearby park and experience the textures and aromas of the place.	Upon hearing their name, the child will react with gestures, movements , or sounds. When faced with visual and auditory stimuli , the child will interact with others. When faced with a luminous object , the child will follow it visually. When sensing textures, they will react with gestures, movements, or sounds. When faced with several textures , the child will sense the difference between two of them. When sensing several flavors , the child will react with gestures, movements, and/or sounds. When faced with objects with a sticky texture , the child will try to grab them. When going to the park , the child will sense textures and react with gestures, movements, or sounds.	Standing frame with non-slip floor	HUMAN RESOURCES Teacher Support teacher SUBJECT RESOURCES Pointer Light projector Texture notebook Texture mat Flavors Slime Speakers Music Story Puppets	Reacts with gestures, movements, or sounds when called. Observes another person for 30 seconds. Visually follows an object. Reacts with gestures, movements, or sounds when sensing textures. Feels the contrast of two different textures. Reacts with gestures, movements, or sounds when sensing different flavors. Tries to hold objects. Reacts with gestures, movements, or sounds when sensing textures. found in the park.

Source: Own elaboration

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4. Discussion

Based on the first specific objective, it is mentioned that the description of the educational, personal and family conditions, with the help of the instruments for collecting information and in coincidence with the problem of this research, it can be established that the child has the diagnosis of a rare pathology from which limited and varied information is obtained. According to Gutiérrez-Zúñiga et al. (2018) and Irazoque-Palazuelos and Barragán-Navarro (2009) the prevalence of this pathology is 2 to 10 per 10,000 people, in addition to the fact that the ethology is cryptogenic because the causes in this specific case are unknown.

Furthermore, according to the data collected, it can be noted that the child is currently not enrolled in school because he or she is completely dependent on another person to assist him or her with hygiene, feeding, and mobility activities. It is also vitally important that the child's hearing and vision be assessed by a specialist.

Likewise, when trying to identify reasonable supports and adjustments, these may be supports that allow changing posture, but without doing so in an abrasive way that causes pain and facilitating the assistance provided by other people (FINSTERBUSCH ROMERO, 2016; López García et al., 2022; Tello-Blanc and Paredes-Floril, 2022)

According to the teacher survey , it can be emphasized that there is no transdisciplinary teamwork, however, they do share common objectives and goals. Furthermore, the authors Arellano Torres and Peralta López (2015) el foco de la planificación de los apoyos en el ámbito de la discapacidad intelectual es la persona, poniendo un especial énfasis en la toma de decisiones de los usuarios de los diferentes servicios y, por tanto, en la necesidad de consultarles. En ese sentido, la Planificación Centrada en la Persona (PCPmention that the person-centered plan is based on the talents, abilities and desires of the person with a disability and designed to enrich a possible future, it allows us to notice the lack of

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knowledge of therapists, its use and application, which is why it needs to be implemented considering the child, his family and the comprehensive development center he attends.

5. Conclusions

Based on the accumulated data and considering the milestones achieved in his psychomotor development, the child is not incorporated into the educational system. Currently, his formal education is not advocated due to circumstances related to his autonomy, as this would require an integration process rather than optimal and effective inclusion. However, as he acquires specific skills, his incorporation into the academic environment must be reevaluated. In anticipation of this progression, a curriculum alignment framework has been developed to serve as a reference point for future educational adaptation.

Regarding social participation, there is limited exposure to diverse environments, as their social sphere is limited to family members, therapists, and health professionals. In this context, it is imperative to foster opportunities for interaction with peers and adults, which will enhance the development of their socioemotional skills and broaden their communicative experiences.

Regarding reasonable accommodations, the use of a standing frame is recommended, as it facilitates postural variation and vertical body alignment, thus benefiting respiratory, digestive, and circulatory functions. Furthermore, its use will help strengthen muscular tolerance and endurance, as well as improve the visual field. It is also recommended to use straws equipped with a non-return mechanism, which minimizes excessive air intake and retains fluid after sucking, making swallowing easier. For oral hygiene, the use of an electric toothbrush is suggested, as it allows more precise access to hard-to-reach areas and reduces the

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risk of unintentional occlusal bites, thus optimizing the duration and effectiveness of tooth brushing.

Ultimately, the person-centered plan has been formulated for implementation both at home and in the therapeutic center, incorporating multisensory stimulation methodologies that promote the proper integration of sensory modalities. As a complementary measure, a curricular alignment framework has been designed to serve as the basis for future academic inclusion, ensuring a structured transition tailored to the specific needs of the child.

6. Authors' contribution

KF: Initial drafting, data collection, analysis of results, discussion, final revision of the article.
DB: Data collection, analysis of results, discussion, final review of the article.
KB: Data collection, analysis of results, discussion, final review of the article.
AG: Data collection, analysis of results, discussion, final revision of the article.

7. Ethics committee approval and consent to participate in the study

The study was authorized by the Child Development Center of the University of Cuenca (CEDIUC) and included written informed consent from the parents of the participating minor.

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Inhibition and depression as predictors of food addiction in the Ecuadorian population

La inhibición y la depresión como predictores de la adicción a la comida en población ecuatoriana

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Summary

Background: Food addiction (FA) has been identified as a growing public health problem, associated with obesity and psychological distress. Factors such as food indigestion and depression have been proposed as possible predictors of this behavior. Objective: The main objective of this study was to evaluate a predictive model of FA in the Ecuadorian population, considering food indigestion, depression, and anxiety as key variables. Methodology: The study had a quantitative approach with a non-experimental, cross-sectional, and causal-correlational design. The Executive Function Assessment Scale (EFECO), the Goldberg Anxiety and Depression Scale (GADS), and the Food Addiction Scale (YFAS) were administered to 236 students from the Catholic University of Cuenca, selected through non-probability convenience sampling. Results: Statistical analyses revealed that food indigestion was a significant predictor of FA, while depression had no direct effect. Anxiety showed a moderate correlation with FA, although its predictive impact was lower compared to food indigestion. Furthermore, 24.2% of participants presented signs of BD, with a higher prevalence in women. Discussion: The results highlighted the role of inhibition in BD, suggesting that deficits in impulse control may increase vulnerability to compulsive eating behaviors. These findings underscore the importance of developing interventions aimed at strengthening self-control as a prevention and treatment strategy.

Keywords: Food addiction, inhibition, depression, emotional regulation, eating behavior.

Resumen

Antecedente: La adicción a la comida (AC) fue identificada como un problema creciente de salud pública, asociada con la obesidad y afectaciones psicológicas. Factores como la inhibición y la depresión fueron propuestos como posibles predictores de esta conducta. Objetivo: El estudio tuvo como objetivo principal evaluar un modelo predictivo de la AC en población ecuatoriana, considerando la inhibición, la depresión y la ansiedad como variables clave. Metodología: El estudio tuvo un enfoque cuantitativo con diseño no experimental, transversal y correlacional-causal. Se aplicaron la Escala de Evaluación de Funciones Ejecutivas (EFECO), la Escala de Ansiedad y Depresión de Goldberg (GADS) y la Escala de Adicción a la Comida (YFAS) a 236 estudiantes de la Universidad Católica de Cuenca, seleccionados mediante muestreo no probabilístico por conveniencia. Resultados: Los análisis estadísticos revelaron que la inhibición fue un predictor

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significativo de la AC, mientras que la depresión no tuvo un efecto directo. La ansiedad mostró una correlación moderada con la AC, aunque su impacto predictivo fue menor en comparación con la inhibición. Además, el 24.2% de los participantes presentaron indicios de AC, con mayor prevalencia en mujeres. Discusión: Los resultados destacaron el papel de la inhibición en la AC, sugiriendo que los déficits en el control de impulsos pudieron aumentar la vulnerabilidad a conductas alimentarias compulsivas. Estos hallazgos subrayaron la importancia de desarrollar intervenciones dirigidas a fortalecer el autocontrol como estrategia de prevención y tratamiento.

Palabras clave: Adicción a la comida, inhibición, depresión, regulación emocional, conducta alimentaria.

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1. Introduction

In recent years, food addiction (FA) has emerged as a growing public health problem, not only due to its close relationship with obesity rates, but also due to the serious physical and psychological repercussions it entails. This phenomenon is characterized by compulsive food consumption, mainly those rich in fats, sugars, and salt, resulting in a significant loss of control over food intake, affecting various areas of individual functioning (Adams, Sedgmond , Mmaized , Chambers, & Lawrence, 2019).

As with other forms of addiction, psychological and behavioral factors play a determining role in the manifestation of CA. In this sense, inhibition and depression have been identified as key elements in the development of this problem, given their close relationship (Ramiro Díaz, Ramos Galindo, & Mendoza Perandrés , 2021).

On the other hand, inhibition, understood as a subject's ability to regulate and suppress unwanted impulses, is one of the key factors in understanding food addiction. However, if a deficit in this inhibitory capacity is present, it has been linked to difficulties with eating self-regulation, which potentially increases vulnerability to compulsive eating patterns (Fletcher & Kenny, 2018).

Similarly, depression, characterized by persistent symptoms of sadness, anhedonia, and eating disorders, has been associated with maladaptive eating behaviors (Barriguete Meléndez, Pérez Bustinzar , De la Vega Morales, Chávez Peón, & Rojo Moreno, 2017). Previous studies have suggested that some people with depressive symptoms use food as an emotional regulation mechanism, thus increasing the risk of developing dependence on certain types of food (Polanco Carrasco et al., 2020; Rojas-Jara et al., 2020; Vindas-Smith et al., 2018).

Despite growing scientific evidence supporting the existence of AD as a clinical phenomenon, its conceptualization remains a subject of debate. Fletcher and Kenny (2018) have pointed out that the use of the

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term “addiction” in the context of food is controversial, given that, unlike substances such as alcohol or drugs, food consumption is a biological necessity. However, these authors argue that many overweight people experience a constant struggle to control their food intake, even when their well-being and health depend on it.

In this sense, AC has similarities with other eating disorders, such as binge eating disorder, but it differs in the compulsive need to consume certain ultra-processed foods, rich in sugars, fats and additives, which can lead to uncontrolled consumption (Lavielle , Rita, Gómez Díaz, & Wacher , 2023).

In addition to emotional and psychological factors, the ease with which these products are available influences the prevalence of OA. In Ecuador, their consumption has increased due to changes in eating habits and urban lifestyles. These foods, designed to be tastier and more appealing, can generate a feeling of lack of control in some people, promoting the development of compulsive eating (Escrivá Martínez T et al., 2023).

On the other hand, the fact that ultra-processed foods are a part of everyday life makes it difficult to recognize AC as a health problem, delaying its identification and treatment. This loss of control not only affects individual quality of life but also has significant implications for public health, as it increases the risk of obesity, metabolic diseases, and psychological disorders, which can, in turn, intensify the inhibition of adaptive responses and reinforce the addictive cycle (Soria Salas, 2021).

In this sense, the difficulty in controlling the consumption of these foods is not only due to physiological factors but also emotional ones. This behavior is linked to negative emotions such as guilt, anxiety, and shame, which causes those affected to consume food in secret (Vindas-Smith et al., 2018). This cycle perpetuates the problem, generating failed attempts to establish a strict dietary regimen that, in many cases, far from reducing weight, increases obesity levels due to the alternation between restriction

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and episodes of overeating (Valdés Miramontes, Enciso Ramírez, Fonseca Bustos, & Pineda Lozada, 2022).

A thorough understanding of the psychological factors that predispose an individual to the development of AC is essential for designing preventive interventions and programs that are not only effective in the short term, but also promote sustainable well-being in the Ecuadorian population (Lucas Vera, Maldonado Mero, & Murillo Zavala, 2023).

The Pan American Health Organization (2021) has emphasized the need to implement public health strategies that include regulations on the advertising and sale of ultra-processed foods, in addition to educational campaigns aimed at promoting healthy eating habits. Strengthening these strategies could contribute to reducing healthcare-related expenses and the social burden derived from AC, significantly improving the quality of life of the population and generating a positive impact at the community level.

The central purpose of this research is to evaluate a predictive model of food addiction in the Ecuadorian population, considering inhibition, depression, and anxiety as predictive variables.

2. Materials And Methods

Study design

The study design is of explanatory correlational scope, non-experimental design, cross-sectional correlational-causal type.

Participants

The sample was obtained through non-probability convenience sampling, selecting participants from the undergraduate program in Psychology at the Catholic University of Cuenca (Ecuador), based on its

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accessibility. The sample size was determined based on the availability of individuals who met the inclusion and exclusion criteria, prioritizing the representativeness of the phenomenon studied. Although a priori statistical power calculation was not performed, the sample was considered adequate for the proposed analyses. A total of 1,456 students were invited, of which 236 met the inclusion and exclusion criteria. The final sample was predominantly composed of women (75.8%, n = 179) and men (24.2%, n = 57), between 17 and 29 years of age (M = 21.3, SD = 3.1) and belonging to the middle sociodemographic class, according to the classification of the National Census Institute of Ecuador (INEC, 2023). Detailed breakdowns are provided in Table 1.

Inclusion criteria required participants to be enrolled during the academic period in which the tests were administered, not to have a previous diagnosis of eating disorders (ED) or psychiatric disorders, to agree to participate in the study, and to sign the informed consent form (or have parental consent for those under 18 years of age). Participants with a history of ED, morbid obesity, use of psychiatric medications, or a diagnosis of serious disorders such as schizophrenia were excluded.

No compensation was provided for participating in the study.

Tools

The following instruments were used for this study:

The Executive Evaluation Scale (EFECO), adapted and validated for the Ecuadorian population by Ramos Galarza et al. (2019), is a psychometric tool that has 67 items or statements that assess different aspects of executive functions. This instrument uses a Likert-type rating scale, with scores ranging from 0 points for never, 1 point for sometimes, 2 points for frequently, and 3 points for very frequently. The instrument has a Cronbach's alpha coefficient for its subscales of inhibition $\alpha = .76$, flexibility $\alpha = .64$, emotional control $\alpha = .83$, planning $\alpha = .73$, organization

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of materials α = .78, monitoring α = .72, initiative α = .77, and working memory α = .82. (Ramos Galarza, Bolaños Pasquel, Martínez, Martínez Suárez, & Jadán Guerrero, 2019). Furthermore, in this adaptation a temporal stability of r = 0.85 (4-week interval) was reported, indicating high reliability.

The Goldberg Anxiety and Depression Scale (GADS), created by Goldberg et al. in (1988), for this study the version adapted and validated for the Ecuadorian population by Reivan Ortiz, Pineda García and León Parias (2019) was implemented. It consists of an 18-question questionnaire divided into two subscales, one is used to assess anxiety and the other to assess depression, and each is structured by 9 binary response questions (YES/NO). The first subscale assesses anxiety, through questions such as : Have you had headaches or neck pain? (Items 1-9), while the second subscale addresses depression in questions such as: Have you lost self-confidence? (items 10-18). The initial questions of each subscale in this instrument (items 1-4 and 10-13, respectively) are conditional; therefore, at least one affirmative response is required for items 10-13 to continue with the depression subscale. This item has a Cronbach's alpha coefficient of 0.75 for the Anxiety subscale and 0.80 for the Depression scale. This adaptation included a test- retest with r = 0.78 after 2 weeks.

The YFAS Scale is an instrument composed of 25 items that make up the seven dependence scales. Likewise, this questionnaire is designed to evaluate the presence of the seven diagnostic criteria of the (DSM-5), related to substance dependence. The instrument uses dichotomous and frequency responses to capture different dimensions of severity in the evaluated behaviors; Therefore, the frequency options are: never, once a month, 2-4 times a week or daily. These responses translate into scores of 0-4 points, and this helps identify behaviors that may be sporadic , even in individuals without addiction disorders. On the other hand, dichotomous responses (yes or no) are applied to items that indicate more pronounced problems in food consumption, with scores of 0 or 1 point respectively (

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Vladés Moreno, Rodríguez Márquez, Cervantes Navarrete, Camarena, & De Gortari, 2016).

In addition, the Sociodemographic Questionnaire was used, which is based on a short, structured, closed-ended survey containing 10 sociodemographic questions describing sex , marital status and age measured in years, education and occupation.

Methods

Statistical analysis was performed using Ro-Statistics for Windows. Descriptive statistics were calculated, including frequencies, means, and standard deviations. Pearson correlations (r) were also performed to assess bivariate associations between variables.

Likewise, a multiple regression analysis was applied to observe the relationship between inhibition, depression and food addiction. To do this, the coefficients of determination of R2, the standardized coefficients (β), and the semipartial compensation coefficient (sr2) were determined, which indicates the percentage of variance explained by each predictor variant after controlling the effect of the other variables (Harrel , 2015).

Procedure

The study was conducted under the guidelines of the latest Declaration of Helsinki for research involving human subjects and was approved by the Human Research Ethics Committee.

Access to the classrooms was granted by the Rector's Office and the Department of Teaching at the Catholic University of Cuenca. Researchers visited each classroom offering the courses, presented the study, and invited students to participate. The objectives of the study, its voluntary nature, and the data collection schedule during school hours were communicated. Only students who agreed and signed the informed consent form were assessed on the predetermined date.

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During the assessment, questionnaires were completed individually in a group setting, supervised by an experienced psychologist. The instruments were not arranged in any specific order. To maintain privacy, participants were spaced sufficiently to avoid potential influence from peer responses. Each session lasted approximately one hour. In accordance with the Declaration of Helsinki, the study received approval from the local Ethics Committee of the Catholic University of Cuenca under code UCACUE-UASB-P-CEISH-2022-096 in Ecuador. All participants were required to sign informed consent.

3. RESULTS

The results in Table 1 show that the majority of participants do not show signs of food addiction, with 75.8% classified in the "absent" category, while 24.2% exhibit this problem.

Table 1 :
Biological sex distribution in relation to food addiction.

Biological saxophone	Food addiction	Frequencies	% of Total	% Accumulated
0	Absent	179	75.8	75.8
1		57	24.2	100.0

Note : "0" represents women and "1" represents men

According to the results presented in Table 2, it is observed that the majority of participants who do not present food addiction are single, representing 93.6%. A smaller percentage corresponds to married (5.9%) and widowed (0.4%).

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Table 2 :

Distribution of marital status in relation to food addiction

Marital status	Food addiction	Frequencies	% of Total	% Accumulated
Single	Absent	221	93.6	93.6
Married		14	5.9	99.6
Widower		1	0.4	100.0

The independent samples t-test, presented in Table 3, showed no significant differences in age by biological sex, with a p-value of 0.427. This suggests that the participants' ages did not vary significantly between biological sex groups.

Regarding food addiction, the screening revealed that 75.8% of participants showed no signs of addiction, while 24.2% did. This demonstrates that, although the majority of the population shows no signs of food addiction, approximately a quarter do suffer from it.

Regarding marital status, the majority of participants without food addiction were single (93.6%), followed by a small percentage of married (5.9%) and widowed (0.4%). The low prevalence of food addiction in the sample, reflected in the high proportion of participants without this condition, together with the low R^2 value (0.0797), suggests that other factors not considered, such as stress, family environment, physical activity and consumption of ultra-processed foods, could influence and should be investigated in future studies.

Finally, the independent samples t-test found no significant differences in age between the sexes (p=0.427), indicating that there is no relevant variation in the age of participants according to biological sex.

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Table 3 :

Independent Samples T-Test: Age Comparison

		Statistical	gl	P
Age	Student 's T	0.795	234	0.427

Regarding the correlations between the variables depression, food addiction (FA), and inhibition, Table 4 shows a moderate positive correlation between depression and FA ($R = 0.221$, $p < 0.001$), indicating that higher levels of depression increase the risk of developing FA. Furthermore, the correlation between inhibition and FA is also positive, suggesting that a deficit in impulse regulation significantly contributes to the emergence of compulsive eating behaviors. Finally, a strong correlation is observed between depression and inhibition ($R = 0.911$, $p < 0.001$), highlighting the interrelationship between both factors.

Table 4:

Correlations between depression, food addiction and inhibition

		Depression	Food addiction	Inhibition
Depression	Pearson's R	—		
	gl	—		
	p-value	—		
Food addiction	Pearson's R	0.221	—	
	gl	234	—	
	p-value	< .001	—	
Inhibition	Pearson's R	0.911	0.274	—
	gl	234	234	—
	p-value	< .001	< .001	—

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The results of the linear regression analysis, presented in Table 5, reveal the differentiated effects of the inhibition and depression variables on food addiction (FA). The coefficient of determination (R^2 = 0.0797) reveals that only 7.97% of the variability in FA is attributable to both variables, suggesting that other factors not considered in the model could significantly influence this addiction. This result is consistent with previous studies that underline the multifactorial nature of addictive behaviors (Gearhard , Schulte , & Potenza, 2018).

Regarding inhibition, the results indicate a positive and significant effect (B = 2.532, p = 0.006). This suggests that a greater deficit in impulse regulation is associated with an increased propensity toward food addiction.

On the other hand, the depression variable did not show a significant effect on food addiction (B = -0.476, p = 0.277). Although there are prior correlations between depression and OA, this result suggests that its direct impact is not significant in the model when other variables are controlled.

In summary, the linear regression results highlight the relevance of inhibition deficits as a significant predictor of food addiction, while depression does not show a direct impact in the model. These findings indicate that interventions focused on improving impulse regulation may be more effective in treating food addiction compared to those focused solely on depression.

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Table 5:
Linear regression model to predict food addiction: Inhibition and Depression as predictive factors

Model	R	R^2
1	0.282	0.0797

Model Coefficients – Food Addiction				
Predictor	Estimator	EE	t	P
Constant	24,482	4.946	4.95	< .001
Inhibition	2.532	0.909	2.79	0.006
Depression	-0.476	0.436	-1.09	0.277

4. Discussion

The results of this study suggest that the majority of participants do not show signs of AC, while a significant proportion do. These findings are consistent with studies such as those by Schule , Jacques Tiura , Gearhardt & Naar (2018), which report a moderate prevalence of food addiction in general populations, associated with the consumption of processed foods rich in sugars and fats. However, they contrast with research such as that by Da Silva Júnior et al. (2022), which found a lower prevalence, possibly due to cultural or methodological differences.

Regarding biological sex, women showed a higher prevalence of food addiction, supported by Granero et al. (2020), who attribute this phenomenon to hormonal factors, emotional regulation, and social roles such as household responsibilities (Espín & Vargas, 2023). However, studies such as that of Linardon et al. (2022) did not find significant differences between sexes, suggesting that this relationship may vary depending on the cultural context.

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Analysis of marital status in relation to food addiction (FA) showed that 93.6% of participants without FA were single. However, this difference was not statistically significant, suggesting that the apparent association could be mediated by sociodemographic factors such as age and typical young adult lifestyles (e.g., irregular schedules, less meal planning). Recent studies support this interpretation: Flores et al. (2020) found that young singles are 30% more likely to consume ultra-processed foods (OR = 1.3, p = 0.02), while Liu et al. (2022) highlighted that the transition to economic independence is associated with chaotic eating patterns ($\beta = 0.24$, $p < 0.01$). However, these findings contrast with Kim et al. (2023), who found no differences in FA according to marital status after controlling for age and socioeconomic status (p = 0.67). Future research should employ longitudinal designs to explore whether singleness acts as a direct risk factor or as a marker of underlying variables (e.g., job instability, psychosocial stress).

Likewise, the results showed no significant differences in age according to biological sex, suggesting that both groups have a similar age distribution. This finding is consistent with research such as that of Lombardo et al. (2021), who also found no relevant age differences between men and women in studies on food addiction. Similarly, Gómez et al. (2020) reported that age is not a determining factor in the distribution of food addiction between sexes, supporting the idea that other factors, such as psychological or social ones, could have a greater impact.

On the other hand, these results contrast with the study by López et al. (2019), who found that women tend to show signs of food addiction at younger ages compared to men. The authors suggest that this could be related to hormonal factors or social pressures that affect each sex differently.

The results also show a moderate positive correlation between depression and food addiction (FA), suggesting that higher levels of depression increase the risk of developing compulsive eating behaviors.

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This finding is consistent with research such as that of Bernadette & Conner (2017), who identified that depression is significantly associated with food addiction, attributing this relationship to emotional dysregulation and the use of food as a coping mechanism. Similarly, Pivarunas & Conner et al. (2019) reported a positive correlation between depression and FA, highlighting that individuals with depressive symptoms are more likely to develop addictive behaviors towards food.

In addition to the above, a positive correlation was observed between inhibition and AC, indicating that a deficit in impulse regulation significantly contributes to the emergence of compulsive eating behaviors. This result is supported by studies such as that of Granero et al. (2022), who found that impulsivity and emotional dysregulation are key predictors of food addiction.

However, these findings contrast with the study by Linardon et al. (2022), who found no significant correlation between depression and OA in a sample of young adults. The authors suggest that other factors, such as stress or anxiety, may play a more relevant role in the development of addictive behaviors toward food.

Regarding the linear regression analysis, the results of this study reveal that inhibition is a significant predictor of food addiction (FA). This finding aligns with recent research, such as that of Smith et al. (2023), who identified that inhibition explains up to 22% of the variance in FA symptoms in general populations ($\beta = 0.34$, $p < 0.001$). Similarly, Granero et al. (2021) demonstrated in a Spanish sample that deficits in impulse regulation are associated with a 24% increase in the severity of FA ($\beta = 0.28$, $p < 0.001$), underscoring the cross-cultural relevance of this mechanism. These results reinforce theoretical models such as the Dual- Systems model. Theory (Hofmann et al., 2022), which postulates that dysregulation between inhibitory and reward brain systems predisposes to addictive behaviors, including AC.

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Depression did not show a significant effect on food addiction (FA) (B = -0.48, p = 0.28), despite prior correlations between both variables. This discrepancy could be due to the collinearity between depression and inhibition (VIF = 8.7), suggesting that they share underlying mechanisms, such as dysregulation (Chen et al., 2021; Kim et al., 2023). Furthermore, the sample size (N = 236) might be insufficient to detect subtle effects, as studies such as Davis et al. (2023) indicate that larger samples (> 500) are required for modest associations. These results are consistent with Linardon et al. (2022), who report that the direct impact of depression is attenuated when controlling for factors such as inhibition, but contrast with Rodríguez-Martín and Meule (2021), where depression was an independent predictor in clinical samples with severe symptoms. Future research should employ longitudinal designs and clinically diverse samples to clarify these interactions, integrating mediation analyses that explore variables such as stress or social support (Hosseini et al., 2024).

The coefficient of determination indicates that the variability in AC can be explained by the inhibition and depression variables, suggesting that other factors not considered in the model, such as stress, anxiety, or environmental factors, could significantly influence this problem. This finding is consistent with previous studies that highlight the multifactorial nature of addictive behaviors (Rojas-Jara et al., 2020).

This study has some limitations that should be taken into account. First, the sample consisted exclusively of Ecuadorian university students, which could limit the generalizability of the findings to other populations. Furthermore, due to its cross-sectional design, it is not possible to establish causal relationships between the variables studied, highlighting the need for future research using longitudinal approaches. Another important aspect is that the information was obtained through self-reports, which may be subject to response bias, limiting the accuracy of the data.

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Despite these limitations, the study provides valuable evidence on the role of inhibition in food addiction, highlighting its influence on the development of compulsive eating behaviors.

A key strength of the study is the use of internationally validated psychometric instruments, ensuring the reliability of the results. Furthermore, the research offers an innovative perspective by exploring the relationship between inhibition and depression in the context of food addiction, providing relevant information for the design of therapeutic and preventive strategies in the fields of mental health and nutrition.

5. Conclusions

These findings highlight the importance of developing intervention strategies focused on strengthening impulse regulation as crucial mechanisms for the prevention and treatment of food addiction. Finally, this study can serve as a basis for future public health policies in Ecuador, promoting education on healthy eating habits and access to psychological resources that contribute to reducing the prevalence of food addiction in the population.

6. Contribution of the authors

VGCH. D. – Analysis of results

GGR .O – Data Collection

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7. Ethics committee approval and consent to participate in the study

The Clinical Research Ethics Committee of the Ministry of Public Health, approved by CEISH:036-2023, MSP Catholic University of Cuenca, Ecuador, will approve the study, and signed informed consent will be obtained from the volunteer participants in the psychiatric outpatient department of the Citizen Care Program "Ecuadorian Mental Health."

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Cognitive Behavioral Therapy in the Treatment of Postpartum Depression: A Systematic Review

Terapia Cognitivo Conductual en el Tratamiento de la Depresión Postparto: Una Revisión Sistemática

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Abstract

Postpartum depression (PPD) is a psychological condition that occurs in women during and after childbirth, characterized by symptoms of sadness, anxiety, and difficulties adequately caring for their baby. Studies suggest that cognitive-behavioral therapy (CBT) is most effective if it focuses on changing one's own thoughts. The following provides an explanation of the effectiveness of CBT in the treatment of postpartum depression through a systematic review. This is the main objective of the article. Searches were conducted in the Web of Science, Scopus, and PubMed databases, considering studies published between 2019 and 2024. The PRISMA and CONSORT methodology was applied to assess the quality of the selected studies. As a result, 17 articles were analyzed, most of which concluded that cognitive-behavioral therapy is effective in reducing the symptoms of postpartum depression. It is concluded that this therapy, in its various modalities, promotes maternal adaptation and improves the mother-child relationship, making it necessary to adapt its application to the context and individual needs of each mother.

Keywords: Cognitive-behavioral therapy, efficacy, postpartum depression, systematic review.

Resumen

La depresión posparto es una afección psicológica que se presenta en las mujeres durante y después del parto, caracterizado por síntomas de tristeza, ansiedad y dificultades para cuidar adecuadamente del bebé. Estudios sugieren que la terapia cognitivo-conductual (TCC) es más efectiva si se centra en cambiar los propios pensamientos. A continuación se proporciona una explicación de la eficacia de la TCC en el tratamiento de la depresión posparto a través de una revisión sistemática. Siendo este el principal objetivo del artículo. Se realizaron búsquedas en las bases de datos Web of Science, Scopus y PubMed, considerando estudios publicados entre 2019 y 2024. Se aplicó la metodología PRISMA y CONSORT para evaluar la calidad de los estudios seleccionados. Como resultado, se analizaron 17 artículos que en su mayoría concluyen que la terapia cognitivo-conductual es efectiva en la reducción de los síntomas de la depresión posparto. Se concluye que esta terapia, en sus diversas modalidades, favorece la adaptación materna y mejora la relación madre-hijo, siendo necesario adaptar su aplicación al contexto y necesidades individuales de cada madre.

Palabras clave: Terapia cognitivo-conductual, eficacia, depresión postparto, revisión sistemática.

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1. Introduction

Postpartum depression (PPD) has been identified as a psychological disorder that affects women after childbirth, characterized by symptoms such as sadness, anxiety, irrational fears, and difficulties in caring for newborns (Molina et al., 2021). This disorder interferes with the mother's emotional well-being and her relationship with her child (Alverenga et al., 2018). Factors such as a history of depression, depressive symptoms during pregnancy, and lack of social support have been identified as main triggers (González et al., 2019). The World Health Organization recognizes it as a public health problem with a prevalence of 10% to 20% in Latin America (Alverenga et al., 2018).

Globally, recent studies have estimated that between 15% and 23% of women experience PPD symptoms, with a higher prevalence among younger women, those with a family history of depression, or those who have experienced violence (Acuña et al., 2021; Villegas et al., 2019). Furthermore, prevalence rates vary according to cultural factors, emphasizing the need for contextually tailored treatment strategies (Van Lieshout et al., 2023).

cognitive behavioral therapy (CBT) has been widely studied as an effective treatment for postpartum depression. This approach, developed by Beck, is based on the development of cognitive theory and the understanding of the connections between thoughts, feelings, and behaviors (Alimoari et al., 2022 ; Li et al., 2022). Recent research has demonstrated its effectiveness in cognitive restructuring, behavioral activation, and problem-solving skills training, which are essential for reducing depression (Milgrom et al., 2021). Similarly, CBT has been shown to be beneficial in improving maternal resilience and promoting mother-child bonding, which is essential for maternal and child health (Monaco, 2019).

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The transition to motherhood is a critical period in which women experience challenges related to their personality, relationships, and psychological and physical changes (Li et al., 2022), and for this reason, it can represent a time of increased risk for women to develop mental health problems (Alimoari et al., 2022) . Postpartum depression (PPD) is the most common psychological disorder after childbirth, with a prevalence of 20% (González et al., 2019; Milgrom et al., 2021). Postpartum depression is defined as an episode of depression that occurs from birth to 12 months (WHO, 2018) and causes negative consequences for the mother, the child, and the mother-child relationship (Bahar et al., 2021; Monaco , 2019).

Psychological interventions are effective in treating postpartum depression (Duffecy et al., 2019) and are among the options for postpartum women. A recent review of systematic reviews and in-depth analyses showed that cognitive behavioral therapy (CBT) is the most effective way to support postpartum depression. According to the type of CBT, awareness is the "key" to a person's feelings and behavior in certain situations (Darcy et al., 2023; Franco et al., 2020). CBT-based interventions for PPD are based on this principle, which also assumes that previous experiences and factors (e.g., biological and psychological) contribute to the development of vulnerability to certain underlying beliefs (Duffecy et al., 2019) .

Wenzel and Kleiman (2015) also hypothesized that these beliefs, which manifest solely through negative thoughts, are activated during periods of stress that lead to change or adaptation and therefore play an important role in the development and maintenance of postpartum depression. Given the complexities of childbirth, CBT treatment in this context must focus on specific beliefs about women and integrate them with society in order to function effectively (Husain et al., 2023), covering aspects such as the need for practical and emotional support and addressing changes in the couple's relationship (Liu and Yang, 2020). Of the many effective treatments, many women do not seek professional help for their postpartum symptoms (Fonseca et al., 2015) due to lack of

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information (e.g., where to find help) and practical barriers (e.g., lack of time and childcare limitations), as well as perceived stigma (Button et al., 2000; Goodman). Recently, efforts have been made to develop new ways to support mental health, such as peer support.

Despite the existence of effective treatments, many women do not seek professional help for their postpartum depressive symptoms (Fonseca et al., 2015) due to lack of knowledge (e.g., where to get help) and practical barriers (e.g., lack of time and childcare limitations), as well as perceived stigma (Button et al., 2017; Goodman, 2009). Recently, efforts have been made to develop new formats of psychological interventions, such as combination interventions.

Blended interventions combine traditional in-person psychotherapy with e-mental health tools, such as web-based programs, that build upon each other in a sequential and integrated protocol (Erbe et al., 2017). In this format, sessions via online programs can replace some in-person sessions with a therapist. It is common to incorporate time-consuming psychotherapy elements, such as psychoeducation and exercises, into web-based programs to provide patients with an opportunity to practice between sessions and integrate strategies into daily routines (Ebert et al., 2018).

Therefore, a combination treatment for PPD could present many advantages for postpartum women, such as reduced costs (fewer sessions with a therapist, reduced travel costs) and greater flexibility, accessibility, and intensity by narrowing the time gap between in-person sessions. Furthermore, a combination treatment also contributes to increasing women's autonomy by allowing them to progress in their own time and at their own pace, access content and exercises between sessions with a psychologist (Titzler et al ., 2018), and reduce the shame and stigma associated with seeking help.

Despite advances in the understanding and use of CBT for postpartum depression, challenges remain, including variability in

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individual response, limited availability of mental health services, and the stigma associated with seeking treatment. A need for further research has been identified to evaluate its long-term efficacy and compare it with other treatment options (Bahar et al., 2021).

In this article, this study aims to describe the effectiveness of CBT in the treatment of PPD through a randomized controlled trial. To do so, studies published between 2019 and 2024 were reviewed, using statistical tools such as CONSORT to assess the quality of evidence. The results obtained will provide a better understanding of the effects of CBT in this vulnerable population, which will contribute to the optimization of treatment strategies and the improvement of interventions and access.

2. Methodology

The systematic review was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart, which ensures transparency and rigor in the selection of included studies. The purpose of this data analysis was to obtain valid and reliable conclusions regarding the effectiveness of Cognitive-Behavioral Therapy in reducing symptoms of Postpartum Depression. By following a rigorous and systematic approach to data analysis, the quality and reliability of the conclusions obtained in the systematic review were guaranteed (Donis, 2013).

Eligibility criteria:

The established criteria were designed to ensure the inclusion of studies that met quality standards and thematic relevance on the efficacy of CBT in the treatment of PPD.

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Inclusion:

- Studies published during the last 5 years.
- Studies in which a psychological intervention with CBT has been carried out for PPD.
- Studies detailing the effectiveness of cognitive behavioral treatments in mothers with PPD.
- Studies are freely accessible and available for download in their full versions.
- Documents in Spanish and English from indexed journals that use the peer-review method.
- Articles with quartile from 1 to 4.
- Include quantitative studies associated with randomized and longitudinal clinical trials in order to have greater resources for analysis.

Exclusion

- Studies containing duplicate records.
- Studies with unclear methodology regarding the synthesis of information on the effectiveness of CBT for PPD.
- Studies that, as part of your treatment, include only pharmacological and non-therapeutic aspects.
- Different sample than adult mothers with PPD or who did not receive treatment.
- Studies that contain another type or approach to psychotherapeutic treatment.

Information sources and search strategies

The information search was conducted on October 31, 2022, and two additional searches were subsequently conducted on May 16, 2023, and July 18, 2024, to obtain more articles that met the information required for

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this work. Databases such as Web of Science, Scopus, and PubMed were reviewed, including terms associated with PPD as well as contemporary psychological treatments (CBT), using Boolean operators that resulted in the following search string: ("Cognitive Behavior Therapy" OR "Cognitive Behavioral Therapy") AND ("Postpartum Depression" OR "Postnatal Depression" OR "Puerperal Depression"). After identifying the articles, each one was evaluated according to the aforementioned inclusion criteria, taking into account the titles, abstracts, and keywords.

Study selection and data extraction processes

In the context of the prior data analysis, which involved collecting and organizing data extracted from studies included in the review using Rayan software, relevant data were compiled from the studies selected for selection. These included study characteristics based on sample, study type, and design, in addition to extracting the results and main clinical findings on the efficacy of CBT for PPD. Additionally, it involved extracting numerical data, such as outcome measures, as well as qualitative data with descriptions of interventions and study contexts.

In this case, duplicates were eliminated and titles and abstracts were screened according to inclusion and exclusion criteria to obtain crucial information . The collected data were then systematically organized using tools such as PRISMA graphs and summary tables to facilitate visualization and understanding. This organization was crucial for identifying patterns of improvement in depressive symptoms, trends in the efficacy of CBT over time, and discrepancies in results between studies that used different intervention methods (face-to-face, online, or blended).

Publication bias assessment

To analyze the methodological quality of the studies, the Consolidated Standards of Reporting Trials (CONSORT) tool was used. It

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was specifically used to assess the methodological quality of randomized clinical trials, using criteria such as randomization, implementation, and results analysis, among others. By standardizing data presentation, the aim is to minimize bias, promote comparability between studies, and reinforce confidence in scientific findings (Schulz, 2010). The CONSORT checklist was applied to individual articles, scoring them according to their methodological rigor: (+) for complete compliance, (P) for partial compliance, and a blank score for non-compliance. This detailed scoring system facilitated a thorough assessment of trial quality, providing a standardized and objective measure of methodological quality.

Synthesis method

Throughout the process, PRISMA was used, which has key stages: initial identification of studies in databases, elimination of duplicates, screening by titles and abstracts according to inclusion criteria, and full-text evaluation of potentially eligible studies.

Another synthesis method was the construction of tables to record the extraction of valid information that justifies the study objective. This approach reinforces the quality and transparency of the selection process, ensuring that the evaluated studies met the methodological standards established for systematic reviews.

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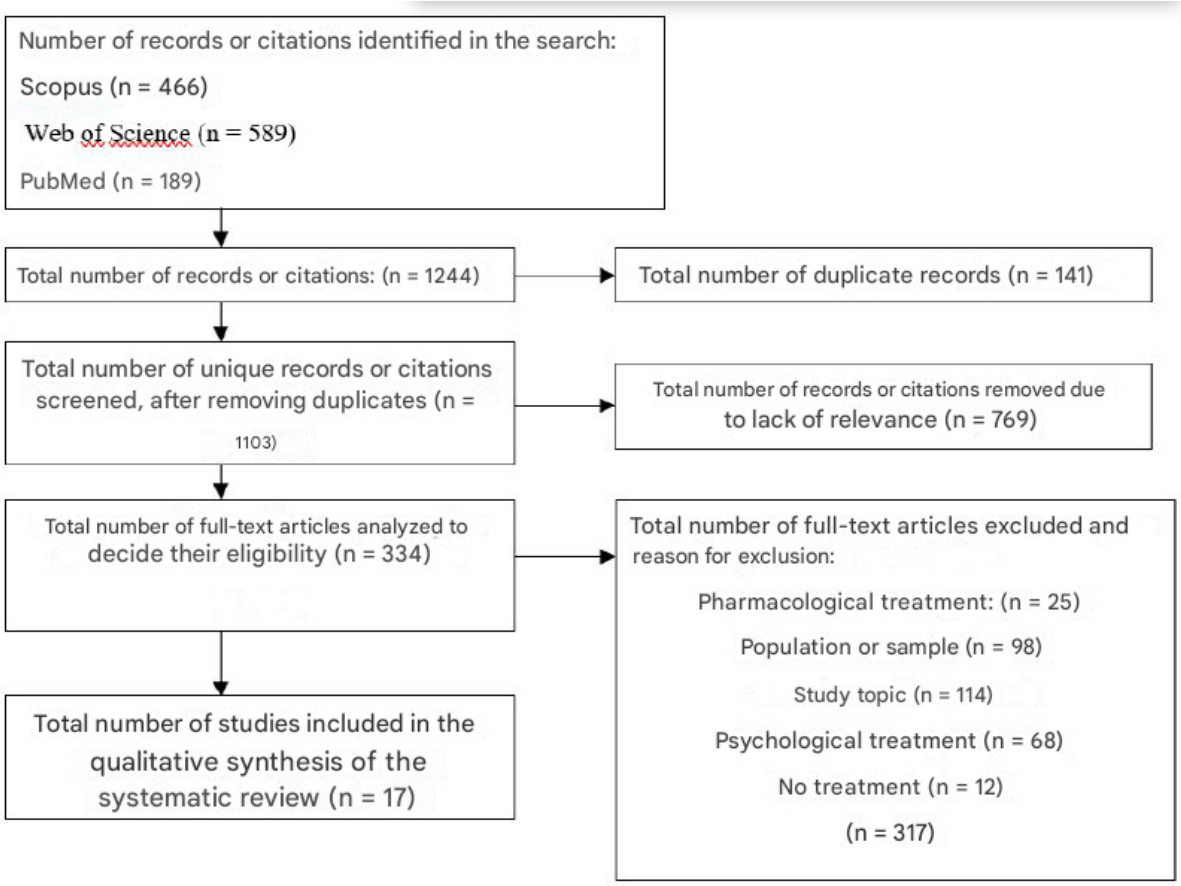

Figure 1. Flowchart of the systematic review process. Source: Arévalo, Gabriela (2025).

As a result of the search in Scopus , Web of Science and PubMed, 1244 articles were identified. After following the exclusion criteria, 141 duplicate articles and 769 additional articles were removed due to lack of relevance. Subsequently, 25 studies that focused on non-psychological treatments, such as medication, or that did not clearly demonstrate the efficacy of cognitive-behavioral therapy (CBT) were discarded. Ninety-eight studies were excluded because their numbers or samples did not meet the selection criteria. Additionally, 114 articles were excluded for addressing irrelevant issues and 68 for focusing on psychological treatments and approaches other than CBT. Finally, 12 studies that did not demonstrate drug use were discarded. Following this selection, 17

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studies that met the criteria were included, primarily those examining CBT approaches for postpartum depression (PPD).

3. Development

Effectiveness of CBT in Postpartum Depression

The Effectiveness of CBT for Postpartum Depression The reviewed studies have shown that cognitive behavioral therapy (CBT), in its various modalities (individual, group, and online), significantly reduces depressive symptoms in women with postpartum depression (PPD). Delivery methods via mobile apps were also effective for women who needed greater flexibility in their medication regimens, suggesting that hybrid and web-based methods are useful for this population.

Individual and group intervention

Liu and Yang (2021) showed that after six weeks of cognitive intervention, women who received this treatment for the first time showed a significant reduction in symptoms of depression and anxiety compared to the control group. Furthermore, it was shown that CBT can prevent the development of PPD and increase satisfaction with the care received. Van Liesout et al., (2022) reported that mothers who participated in groups used CBT methods in the management of their children, achieving relevant changes in depression, childhood anxiety, rejection and anger, with stable results up to six months after treatment.

Van Lieshout et al. (2023) found that one-day face-to-face CBT sessions were effective in treating postpartum depression, with significant improvements in depression, anxiety, and mother-infant bonding. They also had a positive effect on the behavior of infants under 12 months of age, although the same effect was not observed in older children.

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As for Jidong et al. (2024) they showed that culturally adapted CBT for British African or Caribbean women improved treatment satisfaction, retention and engagement, significantly reduced postpartum depression and anxiety and strengthened support networks. Simhi et al. (2021) reviewed the effectiveness of a CBT-based workbook and concluded that both group and individual aspects were effective in reducing anxiety, depression and stress in postpartum women, although the individual aspects showed a fundamental improvement .

Similarly, Duffecy et al. (2022) examined the Sunnyside online intervention to prevent PPD in pregnant women with mild to moderate ED, and found improvement in symptoms over time with no significant differences between groups or means.

Technology-based interventions

Milgrom et al. (2021) found that online CBT was as effective as in-person CBT in relieving depression after 21 weeks, but showed a significant reduction in symptoms over time. At follow-up, symptoms of depression, anxiety, and depression were reduced by 50%. Qin et al. (2022) using a mobile app-based CBT program provided preliminary evidence of reduced depressive symptoms in postpartum mothers, although no relevant improvements in anxiety were observed during a very early four-week period.

Van Lieshout et al. (2021) showed that one-day CBT-based online workshops are effective in reducing symptoms of postpartum depression and anxiety, while also improving mother-infant social support and bonding, as well as positive affectivity in infants regardless of the type of therapist. Darcy et al. (2023) showed that Woebot, a digital therapeutic agent based on CBT principles, is effective in treating postpartum depression, with significant improvements in depression and anxiety scores compared to a control group, while participants reported high

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satisfaction with the device and good acceptance of the digital therapeutic bond comparable to that of human therapists.

In the study Duffecy et al. (2019) analyzed how the internet helped prevent PPD and found that only 5% of at-risk women developed PPD, compared to 17% in the no-intervention group. Furthermore, the intervention reduced depression in many participants and its use was higher than other online programs . Research by Carona et al. (2023) found that the "Web Be a Mom " intervention was highly effective in reducing symptoms of depression and anxiety in postpartum women at high risk for depression, with positive effects being especially notable in those participants with severe symptoms of depression at baseline. Meanwhile, Monteiro et al. (2024) reviewed "Be a Mother " and found that the intervention benefited women with severe symptoms and demonstrated a stable cost-effectiveness ratio, although the final score was lower in the intervention group compared to the control group.

Comparisons and limitations

According to Suchan et al. (2022) compared structured therapy with a therapist-assisted CBT program in new mothers and found that the majority of participants in the intervention group had reduced anxiety, depression, and depression for up to six months. However, after the first month, significant differences were only seen in anxiety. In contrast, Seo et al. (2022) found that in mothers with PPD the CBT-based app had no significant impact on reducing depressive symptoms after eight weeks of use, although there were no substantial improvements in knowledge about depression, maladaptive beliefs, stress coping, social support, or sleep quality, a significant increase was observed in health-promoting behaviors such as daily enjoyable activities.

Finally, Husain et al. (2023) found no differences in depression levels between mothers who received a CBT group intervention and the control group at the three- and six-month follow-ups. However, the retention rate

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was high (76%), and participants reported improvements in their attitude and confidence, with a greater reduction in depressive symptoms in those who attended more sessions.

Table 1
Table of authors analyzed

N	Study	Country	Study Features				Treatment				Results
			Size	Middle Ages	Design	Assessment tools	Diagnoses/ clinical status	Application type	Device	Sessions	Effectiveness
1	Duffecy et al. (2019)	USA	25	30.5 years	ECA	HDRS IDASPHQ	PPD Symptoms	Internet-based CBT	Individual and Group	8 weeks x 10 to 15 minutes	The reduction in depression symptoms was positive, with peer support helpful in maintaining treatment adherence.
2	Liu and Yang (2021)	China	260	26.89 and 27.31 years	ECA	HAMD HAMA EPDS PSQI	DPP	In-person CBT	Individual	Once a week for 6 weeks x 1 hour each session	Reduced the incidence of postpartum depression by alleviating anxiety and depression.
3	Van Lieshout et al. (2021)	Canada	403	31.8 years	ECA	EPDS GAD-7 PBQ	PPD Symptoms	Online workshops based on CBT	Group	Four modules in one day x 7 hours	Significant improvements were reported in postpartum depression, anxiety, social support, positive infant affectivity, and mother-child bonding.
4	Simhi et al. (2021)	Israel	34	30.79 years	Single-group open trial	EPDS GAD DASS	PPD Symptoms	WAWA Protocol based on TCC	Individual by phone and Group	Once a week x four weeks.	Both intervention formats significantly reduced depression, anxiety, and stress.

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5	Milgrom et al. (2021)	Australia	116	30.8 years	ECA	BDI-II PHQ-9 DASS-21	DPP	Online CBT + coaching calls	Individual	One session each week x 6 sessions	Reduced the severity of depression symptoms and perceived stress.
6	Qin et al. (2022)	China	112	31.6 and 32.2 years	ECA	GAD-7 EPDS	PPD Symptoms	App-based CBT CareMom	Individual	28 daily challenges for 4 weeks x 2 to 4 minutes	Depression decreased significantly, which did not occur in the control group.
7	Suchan et al. (2022)	USA	63	30.83 years	Pilot study	EPDS GAD-7 PHQ-9	DPP	Transdiagnostic CBT online	Individual	5 lessons x 8 weeks	There were significant improvements in depression, anxiety and general distress.
8	Van Lieshout et al. (2022)	Canada	234	31.4 and 30.4 years	ECA	EPDS	DPP	TCC	Group	9 weekly sessions x 2 hours	It reduced worry, anxiety, anger, and rejection, and improved the mother-child bond, with stable effects at six months.
9	Duffecy et al. (2022)	USA	208	29.08 years	ECA	PHQ HAMDIDASMINI	PPD Symptoms	Internet-based CBT	Individual and Group	8 weeks x 10 to 15 minutes	The individual and group programs did not have significant differences in the results, and both showed a decrease in anxiety and depression.
10	Seo et al. (2022)	Korea	73	33.54 and 33.36 years	ECA	EPDS	DPP	Mobile app-based TCC	Individual	Free access for eight weeks	There was no difference in the intervention effect on postpartum depression, but there was improvement in maternal health behaviors.

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11	Van Lieshout et al. (2023)	Canada	461	31.6 and 32.3 years	ECA	EPDS GAD-7 PBQ	PPD Symptoms	In-person workshops based on CBT	Group	4 workshops x 7 hours	Decreased depression, anxiety, rejection, anger, and baby-centered anxiety, increased mother-baby bonding, and increased children's effortful control.
12	Husain et al. (2023)	United Kingdom	83	30.4 and 30.1 years	ECA	EPDS PHQ-9	DPP	Culturally adapted CBT	Group	12 sessions of 90 minutes each, once a week, for 3 months.	There was no significant difference in the reduction of depression, but awareness of mental health issues improved.
13	Carona et al. (2023)	Portugal	1053	32.81 and 32.91 years	ECA	EPDS PDPI-R	PPD Symptoms	Internet-based CBT	Individual	5 modules in 8 weeks x 45 minutes	Since the beginning of treatment, depression and anxiety were shown to be reduced.
14	Darcy et al. (2023)	USA	192	Nd	ECA	PHQ-9 GAD-7	PPD Symptoms	Agent-Guided CBT WB001	Individual	Daily use for 8 weeks x 5 to 10 minutes	It was shown to significantly reduce depression and anxiety.
15	Franco et al. (2024)	Chili	65	32.53 years	ECA	PHQ-9 EPDS	PPD Symptoms	Web-based TCC	Individual	6 modules x 8 weeks	It helped to modify negative thoughts and dysfunctional beliefs about parenting and caregiving.

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16	Jidong et al. (2024)	United Kingdom	130	Nd	ECA	PHQ-9	DPP	Culturally adapted CBT LTP+CaCBT	Group	12 sessions of 60 minutes x once a week.	It has been shown to reduce depression, parenting concerns, and increase positive moods.
17	Monteiro et al. (2024)	Portugal	1052	32.91 and 32.81 years	ECA	PDPI-R	DPP	Internet-based TCCi	Individual	For 14 months	It had health effects and lower costs, and could help manage DPP symptoms effectively.

Discussion

Research suggests that the use of cognitive behavioral therapy (CBT) in the treatment of postpartum depression (PPD) is effective and leads to good outcomes (Milgrom et al., 2021; Qin et al., 2022; Darcy et al., 2023; Franco et al., 2024; Monteiro et al., 2024; Daffesi et al., 2022). Overall, interventions using CBT techniques reduce depressive and anxiety symptoms and promote healthy habits and behaviors by developing flexibility and adaptability in patients.

According to the reviewed studies, various CBT-based psychotherapies were demonstrated, with varying durations and types of treatment, ranging from 4 to 6 weeks of interventions to in-person individual therapy. They were effective and long-lasting. The group significantly reduced obsessive thoughts, irrational fears, sadness, and other symptoms, and improved relationships with children, in addition to improving the proper management of emotions (Liu & Yang, 2021; Van Lieshout et al., 2022; Husain et al., 2023) . The authors demonstrated that CBT is an excellent treatment for significantly alleviating the aforementioned symptoms of postpartum depression.

Regarding the intervention modality, Seo et al. (2022) and Duffecy et al. (2019) conducted individual and group interventions in the United

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States and South Korea, respectively, demonstrating the importance of cultural context in different groups. This process makes the treatment efficacy inconclusive, since in South Korea, lasting and evident improvements were achieved through individual therapy, while similar efficacy was achieved in the United States. However, there is no doubt that the tools used are effective in a high percentage of different cultures and lead to symptom relief and significant benefits.

On the other hand, among the various intervention methods currently available, intensive, short-term, and guided interventions have achieved good results because they focus on specific symptoms (Van Lieshout et al., 2021, 2023; Darcy et al., 2023). In addition, there are online intervention methods such as those by Duffecey et al. (2019) and Carona et al. (2023), who highlighted that only about 5% of interventions developed PPD. The prevention effect was 95%, but the efficacy rate was higher in women with severe symptoms, and at the same time, the dropout rate was high. They have been shown to be a useful tool for alleviating symptoms of postpartum depression and increasing patient acceptance and participation due to the low need for skilled workers, short-term intervention, and affordable cost and availability of therapists.

Regarding risk factors for the effectiveness of CBT-based therapy, it was observed that situations such as single mothers, first-time mothers, and a lack of healthy behavioral habits before pregnancy were predisposing factors for the development of PPD with acute symptoms. These patients benefited from treatment in different ways. Some patients achieved 100% results for at least six months, while others only noticed significant differences in attitude and confidence. However, it is important to note that there were positive benefits on several levels.

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4. Conclusions

CBT is proven to be effective on electronic devices due to its ease of access, especially for this population whose medical condition makes it difficult to access in-person psychotherapeutic treatment. Regarding the type of device, it is evident that at the individual level, better results were obtained in terms of sustained symptom reduction over the medium term. It is concluded that this is due to the possibility of developing interventions focused on personality characteristics and functional dynamics.

Another relevant finding is that as the symptoms of PPD decreased, they observed an improvement in bonding, especially with children under 12 months old. Meanwhile, among first-time mothers with PPD, the symptomatic reduction occurred more rapidly with the intervention of CBT. The results obtained provide specific data for clinical decision-making when treating PPD.

It is important to mention that, for the symptoms of severe depression, CBT is most effective when it is in-person and individualized, and combined with complementary treatment such as pharmacological treatment, as this modality has demonstrated sustained long-term results, promoting levels of commitment and personal satisfaction, since one of the areas focused on in the treatment is the creation of support networks.

Finally, it is concluded that CBT is a very useful therapeutic tool in any modality, whether individual, group, or digital. Each has its benefits depending on the culture in which they are found, achieving benefits such as symptomatic relief, flexibility, adaptability, improved bonding, among others.

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5. Contribution of the authors

Future research would be advisable to include more representative samples that encompass greater demographic, cultural, and socioeconomic diversity. This would allow for more generalizable findings and a more precise understanding of how different groups respond to therapeutic interventions.

Likewise, it is relevant to explore the effectiveness of combined interventions that integrate different therapeutic approaches. Evaluating these strategies could provide valuable information on more personalized and effective treatments for postpartum depression, thereby optimizing clinical outcomes and tailoring them to the specific needs of each patient.

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Emotional Intelligence and Social Media Use in Adolescents

Inteligencia Emocional y uso de redes sociales
Social Media Use in Adolescents

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Abstract

This quantitative, cross-sectional, analytical study analyzes the relationship between emotional intelligence (EI) and social media use through a documentary analysis of the educational records of 188 adolescents (12-18 years old) from a secondary school in Quito, Ecuador. The records contained results, previously collected by the institution, from the TMMS-24 (24 items, Likert 1-5, $\alpha = 0.86$) to assess EI components such as emotional attention and repair, and from the SMDS Scale (9 items, Likert 1-5, $\alpha = 0.79$) to measure patterns of problematic social media use. The results revealed significant differences in empathy by gender, with higher scores in women ($t(186) = 2.67$, $p < 0.01$). A significant negative correlation was found between emotional repair and problematic social media use ($r=0.41$, $p<0.001$), and daily exposure exceeding 4 hours, along with problematic use, gender, and time-gender interaction, was associated with lower emotional repair ($R^2=0.23$, $p<0.001$). These findings underscore the importance of EI, particularly emotional repair, as a protective factor against problematic social media use in adolescents, guiding potential psychoeducational interventions focused on the development of emotional skills.

Keywords: emotional intelligence, social media, adolescents, emotional repair, empathy.

Resumen

Este estudio cuantitativo, de enfoque analítico y transversal, analiza la relación entre la inteligencia emocional (IE) y el uso de redes sociales a partir del análisis documental de expedientes educativos de 188 adolescentes (12-18 años) de un instituto secundario en Quito, Ecuador. Los expedientes consultados contenían resultados, recopilados previamente por la institución, del TMMS-24 (24 ítems, Likert 1-5, $\alpha = 0.86$) para evaluar componentes de la IE como atención y reparación emocional, y de la Escala SMDS (9 ítems, Likert 1-5, $\alpha = 0.79$) para medir patrones de uso problemático de redes sociales. Los resultados revelaron diferencias significativas en empatía por género, con mayor puntuación en mujeres ($t(186) = 2.67$, $p < 0.01$). Se encontró una correlación negativa significativa entre la reparación emocional y el uso problemático de redes sociales ($r=$'0,41, $p < 0.001$), y la exposición diaria superior a 4 horas, junto con uso problemático, género e interacción tiempo-género, se asoció con menor reparación emocional ($R^2 = 0.23$, $p < 0.001$). Estos hallazgos subrayan la importancia de la IE, particularmente la reparación emocional, como factor protector frente al uso problemático de redes sociales en adolescentes, orientando posibles intervenciones psicoeducativas focalizadas en el desarrollo de habilidades emocionales.

Palabras clave: inteligencia emocional, redes sociales, adolescentes, reparación emocional, empatía.

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1. Introduction

The evolution of technology has made social media an almost indispensable necessity for human interaction, transforming communication and identity construction in adolescents (1). Platforms such as Instagram, TikTok, and Snapchat transcend entertainment and shape a new reality of social connection and personal expression (2). However, their influence on the development of emotional intelligence (EI) raises questions about their benefits and risks, which require in-depth analysis.

It is a reality that nowadays, social networks have become almost indispensable tools for human interaction, and therefore they significantly influence adolescents' experiences in their daily lives and development (2). Social networks satisfy the high demand for entertainment at this stage (3). In addition, they facilitate the creation of support networks and the exploration of personal interests, contributing to the development of an identity with a strong digital component (4).

However, the use of these platforms presents significant challenges in the field of adolescent EI, generally related to factors such as acceptance and comparison in the social context, which results in the emergence of conflicts in virtual environments (5). Although these experiences can be enriching in certain aspects, a high level of emotional competence is required to manage them properly.

In the digital age, social media is now an essential part of adolescents' interpersonal relationships, enabling them to communicate, connect, and build their identity. According to recent data, 95% of young people between the ages of 13 and 17 have access to a smartphone, and almost half (45%) admit to being constantly online on different social media platforms (6). Among the most popular platforms are Instagram, TikTok, Snapchat, and YouTube, each with unique features that capture the attention of this age group.

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Instagram is a popular platform among teenagers, with 72% of users in this age group (6). Its focus on visual content, such as photos and videos, allows young people to express themselves openly, albeit within the network's own defined parameters, in order to connect with their friends and the world. However, this platform is often criticized for promoting social comparison and the search for validation, which can negatively affect the self-esteem and emotional well-being of young people who are in a stage of developing their personality and character (5).

TikTok, a network that emerged as an audiovisual alternative for short messages, has experienced very accelerated growth in recent years. According to a Data Reportal report from 2023, 67% of adolescents between 13- and 17-years old use TikTok, and many spend more than an hour a day on the platform (7). Its algorithm that personalizes tastes and trends makes it a highly addictive network, which has led several groups and organizations related to the education and behavior of adolescents, as well as parents, to have concerns about its impact on concentration and excessive use of electronic devices (7).

Snapchat also has a significant presence among teenagers, with 59% of users in this group (6). Its main feature, ephemeral messages, appeal to young people because of the privacy it offers and the opportunity to share everyday moments without the pressure to remain online. This same feature is linked to risky behaviors, such as sending inappropriate content (8).

And although there are currently countless alternatives to this type of social media, YouTube remains the most established platform, with 85% of adolescents using it regularly (6). Unlike others, this network offers a range of possibilities that encompass multiple topics and purposes that go beyond mere entertainment. However, excessive consumption of its content leads to problems of procrastination and difficulties in managing time effectively (9). In this sense, both the benefits and the problems

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derived from the use of social media, in one way or another, are intrinsically related to the current reality of adolescent emotional intelligence.

Emotional intelligence (EI), defined as the ability to recognize, understand, and manage one's own and others' emotions, including emotional repair, is key to adaptation during adolescence (10). This period, marked by biological, psychological, and social changes, demands skills to regulate emotions in the face of challenges such as forming complex relationships and constructing identity (11). Specifically, EI facilitates conflict resolution, strengthening emotional bonds, appropriate management of stressful situations, and influences informed decision-making (12).

EI has become a key element during adolescence, as it directly influences young people's psychological well-being, interpersonal relationships, and social adaptation (10). During adolescence, this ability becomes very important due to the profound biological, cognitive, and social changes that young people experience (11). However, the development of EI does not occur in isolation; it is conditioned by risk and protective factors that can promote or limit its growth.

One of the risk factors that most affects the development of EI in today's adolescents is the excessive use of social networks (9). A study carried out in Spain in 2022 revealed that adolescents who dedicate time daily to these communities tend to experience high levels of anxiety and have fewer skills in regulating their emotions. It also shows that for adolescent women, having EI is a vulnerability factor in this regard (13). It should be noted that problems such as cyberbullying and online social comparison can aggravate these conditions, which in turn hinders the development of emotional skills, such as empathy and self- healing (5).

On the other hand, there are protective factors that promote the development of EI in adolescents. One of the most important is family support. Studies have shown that young people who grow up in affectionate and communicative family environments tend to develop better emotional

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skills, such as the ability to express their feelings and resolve conflicts assertively (12). In this sense, goal-setting through appropriate strategies focused on developing EI has also been identified as highly effective. A study conducted in Mexico, for example, showed that adolescents who used strategies to develop emotional intelligence significantly improved their ability to set goals and build a life plan (14).

If the appropriate use of social media is also considered, it can be noted that these have become deeply integrated into the lives of adolescents and influence or can positively influence their emotional, social and psychological development. In this context, emotional intelligence (EI), conceived as the ability to effectively perceive and understand emotions, plays a transcendental role in the interaction of young people in these digital spaces (10). Recent research indicates that adolescents with higher levels of EI tend to make healthier and more adaptive use of social media, while those with emotional difficulties tend to be more vulnerable to the risks associated with these platforms (14).

A 2021 study in Peru found that young people with stronger emotional skills experienced fewer instances of cyberbullying victimization on social media and demonstrated a greater ability to support their peers in conflict situations (15). This suggests that EI may act as a protective barrier against the risks of cyberbullying in the digital world.

However, excessive social media use can negatively affect the development of EI. Several studies have indicated that spending too much time on these platforms can generate emotional dependence, reduce self-esteem, and make it difficult to repair negative emotions (16). A study conducted in Mexico found that adolescents who spend more than three hours a day on social media have high anxiety levels and are less skilled at identifying and expressing their emotions (17). This problem is intensified in environments where social comparison is frequent, since adolescents generally tend to feel frustrated when comparing their lives with the idealized images they see online (5).

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Despite these difficulties and evidence of problems, social media can also be a positive tool for the development of EI when used consciously and in a balanced way. Platforms that promote emotional expression and social support, such as interest groups or online communities, can help young people strengthen skills such as empathy and assertive communication (18). Furthermore, educational programs that combine responsible use of social media with the development of EI have shown encouraging results. In Argentina, a suggestive strategy, proposed in the Digital Education Competencies document, focuses on working on these competencies, but considering the youth cultures that are created in these exchange spaces, which translates into a supportive approach by state education for the benefit of students (19).

The available background highlights both the negative and positive aspects of social media. Research such as that of Best , Manktelow and Taylor (20) highlights that these platforms can foster social connection, emotional support and the development of personal identity. Other studies, such as those by Primack et al. (9), warn about the associated risks, including exposure to cyberbullying, negative social comparison and digital addiction. Although little research has delved into how these experiences specifically impact emotional intelligence skills, such as emotion management, empathy and emotional repair, the analysis of the positive aspects, considering that the use of these media is currently widespread and everyday, is a perspective that contributes greatly to this field of adolescent behavior and their own emotional well-being.

The purpose of this article is to examine the connection between social media and emotional intelligence, identify which dimensions of EI are most impacted, and determine how different usage patterns affect these dimensions.

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2. Materials and Methods

A secondary data analysis was conducted on the educational records of 188 adolescents, aged between 12 and 18 years (Mean=15.2, SD=1.8), regular students at a public secondary school in Quito, Ecuador. Of the total, 105 (55.9%) were women and 83 (44.1%) were men. The inclusion criteria for selecting the records were: being students enrolled in the 2024-2025 period, and containing complete records of the TMMS-24 and SMDS instruments, as well as age and gender data, previously collected by the institution. The final selection of the 188 records that met these criteria was based on the availability of complete data within the institutional archive authorized for consultation.

Measuring Instruments

Data were analyzed from the following instruments, the results of which were recorded in the educational records consulted:

Trait Meta- Mood Scale-24 (TMMS-24): Scores were extracted from the Spanish version adapted by Fernández-Berrocal et al. (21). This instrument assesses perceived emotional intelligence through 24 items with a 5-point Likert-type response format (1 = I do not agree at all, 5 = I completely agree). It measures three key components of EI: Emotional Attention (awareness of one's own emotions), Emotional Clarity (understanding of emotions), and Emotional Repair (ability to regulate emotions). The records consulted indicated an internal consistency (Cronbach's alpha) of 0.86 for the original sample on which the instrument was applied.

Social Media Disorder Scale (SMDS): Data were extracted from this scale developed by van den Eijnden et al. (22). It consists of 9 items that assess symptoms of problematic social media use based on the DSM-5 diagnostic criteria for addictive disorders, with a 5-point Likert-type response format (1=Never, 5=Always). A higher score indicates a higher

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level of problematic use. The records consulted indicated a Cronbach's alpha of 0.79 for the original sample.

Procedures

The procedure followed for this documentary research was:

- Institutional Authorization: Formal authorization was requested and obtained from the educational institution's authorities to access, for strictly investigative purposes, the students' academic records containing the required information, under a commitment of confidentiality.
- File Identification and Selection: Institutional files corresponding to the period of interest were reviewed and those files that met the inclusion criteria (availability of complete data on TMMS-24, SMDS, age and gender) were selected.
- Extraction and Anonymization: The variables of interest were systematically extracted from the 188 selected files. The information was recorded in a digital database. To ensure confidentiality and anonymity, a unique numerical code was assigned to each case, separating the data from any personal identifiers of the student.
- Statistical Analysis: The anonymized database was processed and analyzed using SPSS version 26 statistical software. Descriptive analyses (frequencies, means, standard deviations) and inferential analyses (Student t tests for independent samples, Pearson correlation) were performed to address the study objectives. A significance level of $p < 0.05$ was established.

Data Analysis

The data were analyzed using the SPSS statistical package version 27. The following procedures were performed:

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- Descriptive statistics (means, standard deviations).
- Pearson correlations.
- T-tests for gender differences.
- Identification of behavioral and well-being indicators.

Through a detailed analysis including correlations and comparative tests, an exploratory multiple regression was performed to evaluate the effect of time on social networks and gender on emotional repair, controlling for age as a covariate (23). These methods are appropriate for studies seeking to establish associations between psychosocial variables. Assumptions of normality (Kolmogorov-Smirnov) and homogeneity of variances (Levene) were verified.

Ethical Considerations

This research adhered to the ethical principles for scientific research. Formal authorization was obtained from the participating educational institution through an official document issued by the school's administration in Quito, Ecuador, in February 2025. This authorization allowed the consultation and anonymized use of secondary data contained in academic records for purposes exclusively related to the research. This authorization was granted after confirming the review of the research protocol by the institutional authorities, thereby complying with the applicable ethical regulations. These actions guaranteed the confidentiality and anonymity of the data throughout the data extraction and analysis process through numerical coding of the cases and the elimination of personal identifiers. Since the study was based exclusively on the analysis of pre-existing anonymized secondary data, and had institutional authorization for such analysis, no direct informed consent process was conducted with the participants or their legal representatives for this specific phase of documentary research. The principles of the

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Declaration of Helsinki and local regulations applicable to the handling of sensitive educational information were respected.

3. Results

3.1. Sociodemographic Characteristics of the Sample

Table 1

Sociodemographic Characteristics of the Sample (N = 188)

Characteristics	Age Range	Frequency (n)	Percentage (%)
Age	12 or less	10	5.3%
	13-15 years old	85	45.2%
	16-17 years old	70	37.2%
	18 or older	23	12.2%
Gender	Women	89	47.3%
	Man	98	52.1%
	LGBTI	1	0.5%
Academic Degree	8th grade	25	13.3%
	9th grade	30	16.0%
	10th grade	40	21.3%
	1st year of high school	45	23.9%
	2nd year of high school	35	18.6%
	3rd year of high school	13	6.9%
School Schedule	Tomorrow	188	100.0%
	Late	0	0.0%

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The sample included 188 adolescents, with a gender distribution of 47.3% female, 52.1% male, and 0.5% LGBTI. The majority of participants (82.4%) were between 13 and 17 years old, with the 13-15 age group being the largest (45.2%). Regarding academic level, first-year high school students represented the largest percentage (23.9%), followed by tenth-year elementary school students (21.3%). All participants attended classes in the morning.

Table 2

Descriptive Statistics on Social Media Use

Variable	Average	OF	Range
Daily time (hours)*	2.48	1.23	0-4+
Problematic use (1-5)	2.12	0.89	1-5
Frequency**	4.18	0.97	1-5

*Note: 1 = <1 hour, 2 = 1-2 hours, 3 = 3-4 hours, 4 = >4 hours.

**Note: 1 = Almost never, 5 = Several times a day.

The average daily time spent on social media was 2.48 hours (SD = 1.23), [...] while the frequency of use was high (Mean = 4.18, SD = 0.97), close to the value 5 ('several times a day') on the Likert scale, suggesting that adolescents frequently access these platforms.

Table 3

Descriptive Statistics of Emotional Intelligence

Dimension	Average	OF	Range
Emotional recognition	3.42	0.71	1-5
Emotional repair	3.38	0.82	1-5
Empathy*	3.56	0.76	1-5
Relationship Management	3.45	0.79	1-5

*Note: Empathy derived from selected items (e.g. 12, 13).

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Regarding the dimensions of emotional intelligence, adolescents showed moderate levels in emotional recognition (Mean = 3.42, SD = 0.71), emotional repair (Mean = 3.38, SD = 0.82), empathy (Mean = 3.56, SD = 0.76), and relationship management (Mean = 3.45, SD = 0.79). Empathy stood out as the highest-scoring dimension, indicating a well-developed capacity to understand and share the emotions of others in this sample.

Table 4

Pearson Correlations between Daily Time on Social Media and EI Dimensions

Dimension	R	p
Emotional recognition	-0.18	0.014
Emotional repair	-0.41	<0.001
Empathy	-0.12	0.099
Relationship Management	-0.22	0.002

Pearson correlation analysis identified significant negative associations between daily time spent on social media and emotional intelligence dimensions, highlighting a strong inverse relationship with emotional repair ($r = -0.41$, $p < 0.001$) and a moderate inverse relationship with relationship management ($r = -0.22$, $p = 0.002$). This suggests that greater social media use could compromise these emotional competencies. These findings suggest that greater time spent on social media is associated with reduced emotional repair and interpersonal relationship management, according to the analyzed data. Although the correlation with empathy was relatively low ($r = -0.12$, $p = 0.099$), emotional recognition showed a weak but significant negative association ($r = -0.18$, $p = 0.014$).

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Table 5

Comparative Analysis of Emotional Repair by Daily Time and Empathy by Gender

Variable	Cluster	n	Average	OF	F/t	p	d/η^2
Emotional repair (ANOVA)							
	<1 hour	10	3.72	0.68	6.84	<0.001	0.10
	1-2 hours	37	3.51	0.79	-	-	-
	3-4 hours	76	3.29	0.84	-	-	-
	>4 hours	65	3.14	0.87	-	-	-
Empathy (t-test)							
	Women	89	3.68	0.73	2.67	0.008	0.39
	Men	98	3.45	0.77	-	-	-

Notes. ANOVA: $F(3,184) = 6.84$, $p < 0.001$, $\eta^2 = 0.10$. Tukey post-hoc: <1 hour vs. >4 hours, $p < 0.01$. t-test: $t(186) = 2.67$, $p = 0.008$, $d = 0.39$. t-test: $t(186) = 2.67$, $p = 0.008$, $d = 0.39$. One LGBTI participant was excluded from the analysis due to minimal representativeness.

Analysis of variance (ANOVA) confirmed significant differences in emotional repair based on daily time spent on social media ($F(3,184) = 6.84$, $p < 0.001$, $\eta^2 = 0.10$). Adolescents with more than 4 hours per day ($M = 3.14$, $SD = 0.87$) showed less emotional repair than those with less than 1 hour ($M = 3.72$, $SD = 0.68$; $p < 0.01$, Tukey), demonstrating a negative impact of prolonged use. Likewise, the t-test indicated greater empathy in women ($M = 3.68$, $SD = 0.73$) compared to men ($M = 3.45$, $SD = 0.77$; $t(186) = 2.67$, $p = 0.008$, $d = 0.39$), suggesting a female advantage in this dimension. Multiple regression ($R^2 = 0.23$, $F(4,183) = 13.65$, $p < 0.001$) revealed that time ($\beta = -0.36$, $p < 0.001$), problematic use ($\beta = -0.22$, $p < 0.001$), gender ($\beta = 0.14$,

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p = 0.021) and the time x gender interaction (β = 0.09, p = 0.026) predict emotional repair, highlighting their interdependence.

4. Discussion

This study offers a much-needed in-depth look at how social media use interrelates with emotional intelligence (EI) in adolescence, given that it constitutes a crucial stage for personal development. The results reveal the challenges young people face in a digital world and, after analyzing them, allow us to reflect on the opportunities these tools can offer for their emotional development, leading to a balanced life in today's reality of social interaction.

Sociodemographic data show that the sample included 47.3% women, 52.1% men, and 0.5% LGBTI, with 82.4% of participants between 13 and 17 years old. Previous studies, such as García-Jiménez et al. (2), indicate that this age range presents high activity in digital environments (mean daily use: 2.5 hours), which coincides with our mean of 2.48 hours (SD = 1.23). Martínez-Olmo et al. (3) reported similar gender proportions (48% women, 52% men), suggesting uniformity in usage patterns in urban contexts. Espinoza-Garay et al. (5) found that 60% of adolescents perceive social pressure on social networks, which could explain the low levels of emotional repair in the 34.6% of participants with more than 4 hours per day, although this study did not measure vulnerability directly.

The average daily duration of 2.48 hours on social media and an average frequency of use of 4.18 (scale 1-5) demonstrate a relatively high incorporation of these into adolescents' routines. This pattern aligns with previous research that has confirmed the omnipresence of social media. Specifically, Martínez-Ferrer et al. (24) observed an average of 2.5 hours per day among adolescents in Spain, which is associated with an impact on psychosocial adjustment. In Mexico, Pérez-Fuentes et al. (17) determined that adolescents who exceed 3 hours per day present higher

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levels of anxiety, a limit exceeded by 34.6% of our sample, with more than 4 hours. Furthermore, Arrivillaga et al. (13) identified that problematic use (M = 2.12 in our study) is associated with emotional dependence, with a higher incidence in women, which corresponds to the notable presence of dependent behaviors in our sample.

In an international context, Best et al. (20) highlighted that time spent on social media fosters positive social connections, but only when kept within moderate ranges of 1 to 2 hours, a level reached by 19.7% of the participants in this study. These results indicate that, although social media use is a common practice in adolescence, its duration and degree of problematicity differ, generating challenges for emotional health that our study addresses in detail.

The mean values of the EI subdimensions, with 3.42 in emotional recognition, 3.38 in emotional repair, 3.56 in empathy and 3.45 in relationship management, reflect a range of competencies that oscillates between intermediate and high, consistent with previous studies. In Spain, Extremera and Fernández-Berrocal (25) documented similar mean values, between 3.5 and 3.8, in adolescents, which suggests that emotional skills such as empathy tend to be more consolidated at this stage. In Mexico, Silva Gutiérrez et al. (14) observed that emotional recognition (M = 3.4) is related to the ability to define objectives, a characteristic that could be affected by the digital environment in the participants of this study. Meanwhile, Beyens et al. (26) found that emotional repair (M = 3.3) is more compromised in environments with high technological interaction, which is consistent with the data obtained in this study. Extremera and Fernández-Berrocal (25) confirmed that empathy (M = 3.6) is higher among adolescents who have social support networks, an element that could counteract the negative effects of prolonged use of social networks on the participants of this research. These studies indicate that, although EI skills meet international standards, the digital context seems to

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influence their development, with a notable impact on emotional repair, as discussed below.

The inverse relationship between time spent on social media and emotional repair, with a coefficient of r = -0.41 (p < 0.001), is one of the key results of this study, supported by an ANOVA analysis that shows a notable reduction in emotional repair in cases of more than 4 hours per day (F = 6.84, p < 0.001). This result is reflected in previous research. In Spain, Martínez-Ferrer et al. (24) documented an inverse relationship (r = -0.38) between prolonged use of social media and the ability to regulate emotions, explaining it by the incidence of cyberbullying and social comparison. In Peru, Contreras (15) determined that adolescents with low emotional repair are more susceptible to cyberbullying, a risk that intensifies with sustained exposure to digital platforms, in 34.6% of the sample that exceeds 4 hours. Pérez-Fuentes et al. (17) in Mexico also found that more than 3 hours per day are associated with anxiety and a decrease in self-repair (r = -0.45), a pattern that corroborates the data of this study. At the international level, Beyens et al. (26) observed that intensive use of social networks limits the ability to manage negative emotions (r = -0.32), indicating that excessive exposure to digital stimuli affects adaptive emotional processes. These studies agree in highlighting that prolonged consumption of social networks tends to deteriorate emotional repair, a critical aspect in adolescence.

In contrast, higher levels of empathy in women, with a mean of 3.68 versus 3.45 in men (t = 2.67, p = 0.008), evidence well-documented gender differences. Palomera et al. (12) noted that adolescent women exhibit more pronounced emotional sensitivity (M = 3.7), possibly due to more expressive attachment styles. In Spain, Arrivillaga et al. (13) confirmed that women regularly use social media to consolidate emotional bonds, which could enhance their empathy (M = 3.8). In Mexico, Espinoza-Garay et al. (5) observed that adolescent women face greater social pressure online, but also develop empathic skills to navigate these dynamics (M = 3.6).

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Finally, Frison and Eggermont (27) in Belgium found that women report greater perceived social support on social networks (M = 3.7), which could explain their empathy advantage. These findings suggest that gender modulates the interaction between social media and EI, with women showing strength in interpersonal skills, but also greater vulnerability to digital pressures.

5. Conclusions

This study reveals that 34.6% of adolescents who spend more than 4 hours a day on social media show lower emotional repair (M = 3.14, SD = 0.87) compared to 5.3% who spend less than 1 hour (M = 3.72, SD = 0.68), with a significant negative correlation ($r = -0.41$, $p < 0.001$). Furthermore, females (47.3%) exhibit greater empathy (M = 3.68, SD = 0.73) than males (52.1%, M = 3.45, SD = 0.77; $p = 0.008$). These findings suggest that a developed EI encourages a more balanced use of social media, while prolonged exposure increases emotional risks, highlighting the need for regulated digital habits.

On the other hand, the analysis shows that 45.2% of participants (13-15 years old) report an average time of 2.48 hours per day (SD = 1.23), and 82.4% (13-17 years old) show high frequency of use (M = 4.18, SD = 0.97), which underlines how constant access to digital platforms interferes with the management of emotions and relationships. Implementing school programs that limit use to less than 2 hours per day and strengthen emotional repair could mitigate these effects and promote psychological well-being. Thus, promoting strategies that limit time on networks and reinforce emotional intelligence can be essential to protect the well-being of young people in increasingly digital contexts .

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6. Contribution of the authors

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8. Ethics committee approval and consent to participate in the study

Interventional studies involving animals and humans, and other research requiring ethics committee approval, must state the authority/ institution that approved the study and provided the code of ethics.

Attached is a certificate from the “Franz Schubert” Educational Unit authorizing the review of data analysis.

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Impulsivity, disordered eating behavior and its relationship with food addiction in an Ecuadorian to food addiction in an Ecuadorian university population.

Impulsividad, conducta alimentaria desordenada y su relación con la adicción a la comida en población universitaria ecuatoriana

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Abstract

Background: Food addiction (FA) has been identified as a growing public health concern, associated with obesity and psychological distress. Factors such as inhibition and depression have been proposed as potential predictors of this behavior. **Objective:** The main objective of this study was to evaluate a predictive model of FA in the Ecuadorian population, considering inhibition, depression, and anxiety as key variables. **Methodology:** The study followed a quantitative approach with a non-experimental, cross-sectional, and correlational-causal design. The Executive Function Assessment Scale (EFECO), the Goldberg Anxiety and Depression Scale (GADS), and the Yale Food Addiction Scale (YFAS) were administered to 236 students from the Universidad Católica de Cuenca, selected through non-probabilistic convenience sampling. **Results:** Statistical analyzes revealed that inhibition was a significant predictor of AF, whereas depression did not have a direct effect. Anxiety showed a moderate correlation with FA, although its predictive impact was lower compared to inhibition. Additionally, 24.2% of participants exhibited signs of AF, with a higher prevalence in women. **Discussion:** The results highlighted the role of inhibition in FA, suggesting that deficits in impulse control may increase vulnerability to compulsive eating behaviors. These findings underscore the importance of developing interventions aimed at strengthening self-control as a strategy for prevention and treatment.

Keywords: Food addiction, inhibition, depression, emotional regulation, eating behavior.

Resumen

Antecedente: La adicción a la comida es un tema que ha ganado interés en los últimos años, pese a la existencia bibliográfica por investigaciones todavía existen muchos vacíos teóricos. En cuanto a población universitaria ecuatoriana, aún no ha sido un tema de estudio investigado a profundidad. **Objetivo:** El objetivo de este estudio es conocer

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la relación de la impulsividad y la conducta alimentaria desordenada con la adicción a la comida en población universitaria ecuatoriana. **Metodología:** Estudio de enfoque cuantitativo, diseño No experimental transversal, de alcance correlacional y explicativo. Las herramientas de evaluación incluyeron un cuestionario sociodemográfico, Escala de adicción a la comida de Yale YFAS, el Cuestionario de conducta alimentaria desordenada (DEBQ) y la Escala de Conducta Impulsiva UPPS-P. Se utilizó una muestra no probabilística de 278 estudiantes del programa de pregrado de la carrera de Psicología de la Universidad Católica de Cuenca. **Resultados:** Los resultados demuestran que la impulsividad, conducta alimentaria desordenada y adicción a la comida se encuentran en mayor proporción en mujeres solteras y casadas, esto podría deberse a que la composición de la muestra no fue homogénea. Existe una correlación positiva estadísticamente significativa entre conducta alimentaria desordenada con la adicción a la comida, a diferencia de la impulsividad, la cual estadísticamente no es significativa con la adicción a la comida. **Discusión:** La adicción a la comida mantiene una relación con la conducta alimentaria desordenada en mayor proporción que con la impulsividad, sin embargo, valores altos de impulsividad y una conducta alimentaria desordenada, contribuirá a valores altos en la adicción a la comida.

Palabras clave: impulsividad, adicción a la comida, conducta alimentaria desordenada, estudiantes universitarios, alimentos.

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1. Introduction

The university stage is marked by some physical and psychological changes, part of these changes is the extent of autonomy that this population acquires in their eating habits. Disordered eating behavior is a negative eating style that puts human health at risk on a physical and mental level (Cavazos-Flores et al., 2023). The consumption of palatable foods and disordered eating behavior hinders people's health, generating a high probability of food addiction or an eating disorder (Morales-Basto et al., 2021). Consequently, bad eating habits produce psychological profile effects, such as impulsivity, disordered eating behavior, and food addiction, variables that have not yet been thoroughly explored in the Ecuadorian university population (Reivan -Ortiz et al., 2024).

Impulsivity can be defined as hasty actions that occur in the moment, without reflection, and that create a high risk of harm to the individual, reflecting a desire for immediate rewards or the inability to delay gratification (Association, 2014). It can also be defined as the tendency to engage in risky behaviors with negative consequences, which generates the inability to stop a response or thought, with results that prevent the action from being carried out successfully (Flores et al., 2022).

In this sense, research reveals that Ecuadorian students suffer from overweight and obesity because they lack discipline in their eating habits due to the consumption of foods with low nutritional value and high salt, saturated fat, and sugar content. These components, when consumed in high levels, are associated with greater impulsivity in each individual, a psychological profile factor that is part of a personality trait. There are studies that indicate that impulsivity also increases the risk of food addiction (Reivan -Ortiz et al., 2024).

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On the other hand, eating behavior is defined as the behavior related to eating habits, the selection of foods eaten, culinary preparations and the quantities ingested (Osorio et al., 2022). Eating behavior is a variable considered a risk factor, since it can generate inappropriate behaviors in relation to food due to the consumption of unhealthy foods, which harms the physical and psychological health of individuals (Ortiz and Vásquez, 2024). Therefore, disordered eating behavior (DBA) includes patterns of uncontrolled, restrictive or emotional intake, which plays a key role in the manifestation and maintenance of addiction to (Reivan -Ortiz et al., 2024).

Since the university stage involves significant changes in the lives of students on a psychological level, adapting to new environments, gaining greater independence and autonomy, social and academic pressures significantly influence their eating behavior, which in many cases is unhealthy, running the risk of developing eating disorders; which are related at the same time to various factors, such as a sedentary lifestyle and the progressive decline of healthy eating habits (Vargas, 2024).

Food addiction (FA) is defined as a highly palatable eating behavior, which generally has high percentages of sugar, salt, fat and flour in its composition and refers to specific behaviors related to food, characterized by excessive and unregulated consumption of unhealthy foods, it is characterized by the loss of control over food consumption, the inability to reduce consumption despite the desire to do so and continued consumption despite negative consequences (Escrivá et al., 2023). Research indicates that food addiction is regularly compared to substance addiction, since they consist of identical brain functioning mechanisms and psychological factors (for example, impulsivity) (Rojas et al., 2019) . In this sense, AC is associated with the compulsive search and consumption of palatable foods despite their negative consequences, generating physiological changes in individuals, such as the presence of tolerance, withdrawal and activation in the same brain areas as substance addiction (Reivan -Ortiz et al., 2024).

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There is research that mentions that young university students are more likely to show AC than older individuals, and this could be explained by the fact that the university stage involves many physiological and psychological changes that can increase vulnerability to environmental threats such as addictions, inappropriate eating habits or disorders that develop a psychological connection with food and difficulty managing their eating impulses. (Tous-Carrillo et al., 2024).

A study mentions that there are variables that are closely related to food addiction, such as impulsivity and inappropriate eating behavior, which trigger obesity, eating disorders and other mental health problems, due to prolonged exposure to a diet high in palatable foods that generate behaviors similar to those of individuals who suffer from addictions, such as impulsivity and addiction, in this case to food Reivan -Ortiz et al. (2024). In the academic field, there are students who develop inappropriate and impulsive eating behavior, which leads them to develop food addiction (Behar-Astudillo and Pomareda-Echeverría, 2021).

Based on the above, it could be said that food addiction is an increasingly prevalent disorder in today's society and is a real problem in the university context that has not been thoroughly investigated from a psychological perspective in Ecuadorian university students (impulsivity, disordered eating behavior, and food addiction). There is a significant lack of knowledge among Ecuadorian university students regarding the meaning of healthy eating and the physical and psychological consequences that occur when these foods are consumed inappropriately. Therefore, the objective of this study is to understand the relationship between impulsivity and disordered eating behavior with food addiction in the Ecuadorian university population.

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2. Methodology

Study design

This was a research study with a quantitative approach, with a descriptive correlational design, non-experimental, cross-sectional (transversal), with correlational and explanatory scope (Hernández-Sampieri et al., 2014) .

Participants

A non-probability sampling of incidental convenience selection was carried out, a voluntary population of 278 students from the Catholic University of Cuenca with easy access and willing to participate. The group of students from the undergraduate program of middle level (3rd to ^{6th} cycle) of the Psychology career, with an approximate age between 19 and 24 years (mean age 20.1 years) was invited and only those who agreed to participate were evaluated. Of the participants, 221 (79.5%) were female and 57 (20.5%) were male, regarding their marital status it was obtained that, 261 (93.9%) of the participants were single, 16 (5.8%) married and 1 (0.4%) separated / divorced.

Tools

The Yale Food Addiction Scale 2.0 (YFAS 2.0) was used as the instrument. It is a 35-item self-report questionnaire used to measure addictive eating behaviors over the previous 12 months. The original instrument (YFAS) was based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) substance dependence criteria (DSM-4, 2010) and adapted to the context of food consumption. The YFAS 2.0 is based on the DSM-5 (DSM-5, 2013) and assesses 11 symptoms. The score produces two measures: (a) a continuous symptom count score reflecting the number of diagnostic criteria met (ranging from 0 to 11) and (b) an AF

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threshold based on the number of symptoms (at least 2) and self-reported clinically significant impairment or distress . This final measure allows for the binary classification of AF (present vs. absent). Furthermore, according to the revised DSM-5 taxonomy (DSM-5, 2013), it is possible to establish cutoff points for severity: mild (2-3 symptoms), moderate (4-5 symptoms), and severe (6-11 symptoms). AF risk groups were calculated according to a previous study (Munguía et al., 2022) as follows: absent AF, those who do not have any diagnostic criteria in the YFAS 2.0; probable AF, those who meet one diagnostic criterion and those who have two or more criteria, but do not present clinical deterioration; and present AF, those who have two diagnostic criteria and also present clinical deterioration. Thus, the probable AF group will correspond to the clinical concept of high or subthreshold risk , that is, patients who do not strictly meet the diagnostic criteria of the taxonomy, but who present symptoms. Subthreshold psychiatric symptoms do not meet full criteria for a particular disorder in a reference diagnostic taxonomy (such as Axis I disorders within the DSM) but do present significant clinical impairment. In some cases, subthreshold symptoms are more common than their respective Axis I disorders, and empirical research has suggested that these groups are associated with greater disability and many other negative consequences (Rai et al., 2010). The internal consistency of the YFAS 2.0 is $\alpha = 0.85$ in the Ecuadorian population.

For disordered eating behavior, the Dutch Eating Behavior Questionnaire [DEBQ; (Van, 1986)] was used. The English version of the DEBQ (Van et al., 2002) was used. The Dutch Eating Behavior Questionnaire (DEBQ) is a 33-item self-report questionnaire developed by Van Strien et al. (Van, 1986) to assess three distinct eating behaviors in adults: (1) emotional eating, (2) external eating, and (3) restrained eating. DEBQ items are scored from 1 (never) to 5 (very often), with higher scores indicating greater endorsement of the disordered eating behavior. The psychometric

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properties of the DEBQ are sound, showing good internal consistency in samples with an alpha of 0.89 for the Ecuadorian population.

And, for Impulsivity, the UPPS-P Impulsive Behavior Scale (Lynam et al., 2007) was used, a 59-item scale designed to assess impulsivity, determined in five subscales: lack of deliberation, lack of perseverance, negative urgency, positive urgency, and sensation seeking. Items are rated from 1 (strongly agree) to 4 (strongly disagree). Internal consistency reliability estimates indicate that the overall scale and the subscales have an internal consistency >0.80 in the Ecuadorian population.

Procedure

Participants were recruited as volunteers, and all voluntarily signed informed consent. No compensation was provided for participating in the study; participants were required to have no prior eating disorder (ED) and no other medical or psychiatric problems. Students were assessed using a questionnaire adapted from the Structured Clinical Interview for Eating Disorders (SCID-5) of the DSM-5. In accordance with the Declaration of Helsinki, the study was approved by the local Ethics Committee of the Catholic University of Cuenca, with code UCACUE-UASB-P-CEISH-2022-096, under the regulations of the Ministry of Public Health of Ecuador.

Statistical Analysis

An analysis was performed with the measure of mean central tendency ($\bar{x}$) and proportions according to each variable. In addition, descriptive graphs using histograms for the characterization of the scalar variables (impulsivity, disordered eating behavior and food addiction) with the marital status variable and dichotomous variable sex. The Pearson correlation coefficient (r) was evaluated, fulfilling the previous assumptions of normality and statistical power. A prediction model was consolidated using the parametric multiple linear regression test (R^2),

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fulfilling the assumptions of: linearity, independence, homoscedasticity, normality and non-collinearity. Finally, the Kolmogorov-Smirnov (KS) normality test was used due to the criterion >30 observations and the parametric assumption was met ($p>0.05$).

Statistical analysis consisted of group difference, correlation, and regression tests. The hypothesis was tested and the relationship between impulsivity and disordered eating behaviors and food addiction was demonstrated.

3. Results

Analysis of results

Below, for the development of the first objective, the results obtained through the applied instruments are described:

In table N°1, the descriptive data detail that regarding the impulsiveness variable: singles have a higher proportion of women (206). In married people, there is a higher proportion of women (15), however, a higher average in men ($\bar{x}$=28.0) . And in separated/divorced people, they have a high average in men ($\bar{x}$=25.0).

For the variable food addiction it is observed that: singles have a higher proportion of women (206). In married people, there is a higher proportion of women (15), consequently, a lower average in men ($\bar{x}$ = 30.0). And in separated/divorced people, they have a high average in men ($\bar{x}$ = 27.0).

Finally, for the variable disordered eating behavior we have that: singles present a higher proportion of women (206). In married people, there is a higher proportion of women (15), consequently, a lower average in men ($\bar{x}$=60.0) . And in separated/divorced people, they present a high average in men ($\bar{x}$=54.0).

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Table 1. Differences between sociodemographic characteristics and variables: Impulsivity, food addiction and disordered eating behavior.

Biological Sex Frequencies			
Biological sex	Frequencies	% of Total	% Accumulated
0	221	79.5 %	79.5 %
1	57	20.5 %	100.0 %

Descriptivas

	Marital status	Biological sex	N	Lost	Average	Median	DE	Minimum	Maximum
IMPULSIVENESS	1	0	206	0	25.8	27.0	8.01	6	42
		1	55	0	25.2	26	8.96	7	40
	2	0	15	0	17.2	18	8.60	6	34
		1	1	0	28.0	28	NaN	28	28
		0	0	0	NaN	NaN	NaN	NaN	NaN
	1	1	1	0	25.0	25	NaN	25	25
FOOD ADDICTION	1	0	206	0	45.2	47.0	13.54	15	64
		1	55	0	43.0	46	14.17	0	64
	2	0	15	0	36.1	31	14.28	17	58
		1	1	0	30.0	30	NaN	30	30
	4	0	0	0	NaN	NaN	NaN	NaN	NaN
		1	1	0	27.0	27	NaN	27	27

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DISORDERED EATING BEHAVIOR	1	0	206	0	85.6	88.0	28.26	30	128
		1	55	0	83.7	86	29.00	0	128
	2	0	15	0	71.8	62	28.80	34	116
		1	1	0	60.0	60	NaN	60	60
	4	0	0	0	NaN	NaN	NaN	NaN	NaN
		1	1	0	54.0	54	NaN	54	54

Note. N: Number; SD: Standard Deviation; 1: Single; 2: Married; 4: Separated/divorced; 0: Female; 1: Male

Figures

In developing Objective 2, according to Figure 1, the results show that among single women, impulsivity rates are higher compared to married and separated/divorced women. These rates are similar for men.

Continuing with Figure 2, the results show that among single women, food addiction rates are higher compared to married and separated/divorced women. These rates are similar among men.

Finally, Figure 3 shows that among single women, disordered eating behaviors are higher than among married and separated/divorced women. These rates are similar for men.

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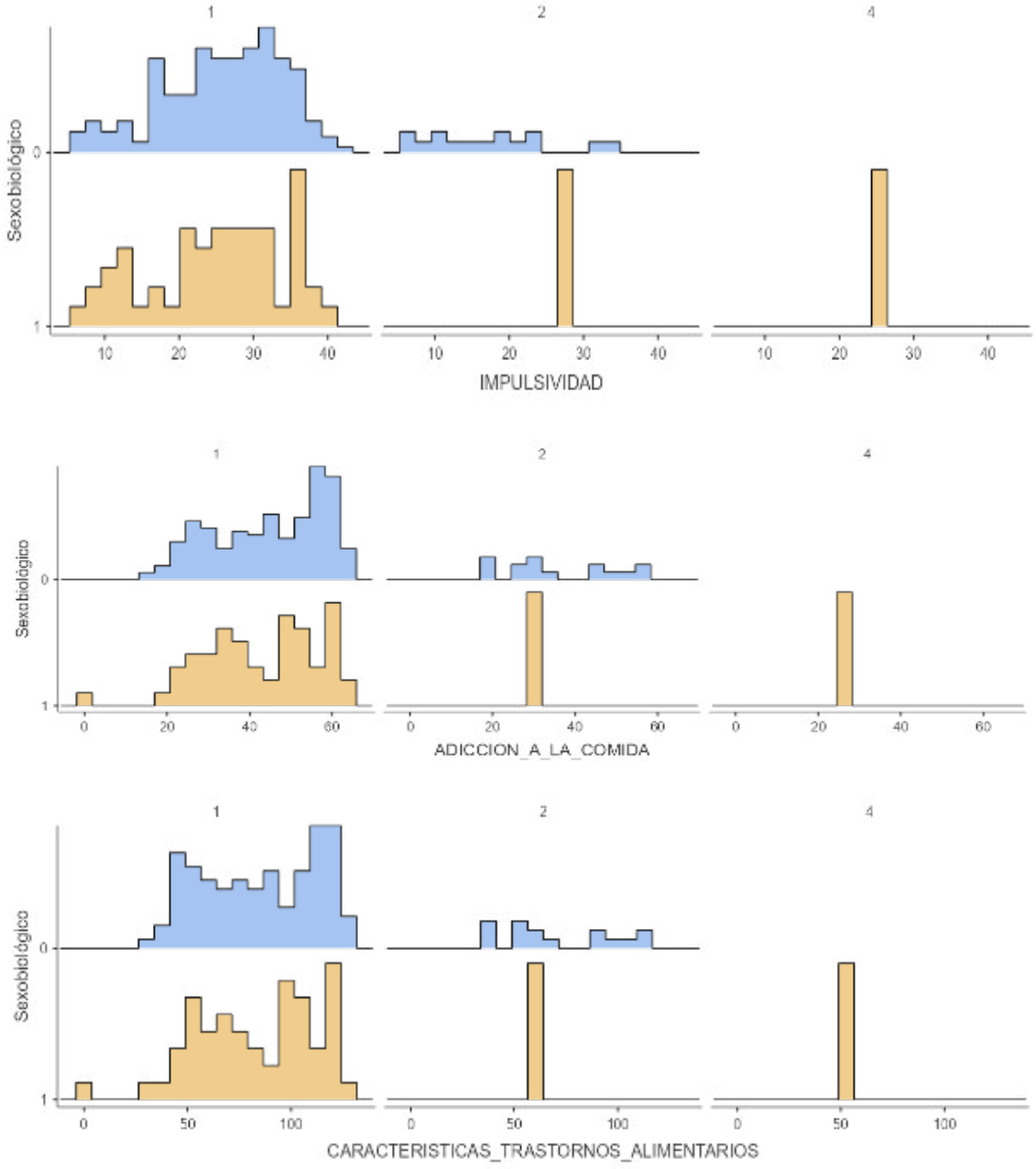
Figure 1.

Characteristicsofpsychologicalvariablesbasedonsociodemographic variables. A: Impulsivity. B: Disordered eating behavior. C: Food addiction.



Note. 1: Single; 2: Married; 4: Separated/divorced

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Table 2, in the development of objective three, analyses indicate statistically non-significant positive correlations between impulsivity and food addiction and disordered eating behavior. And a statistically significant positive correlation between disordered eating behavior and food addiction. These data indicate that high values in impulsivity and disordered eating behavior will contribute to high values in food addiction.

Table 2.

Correlation between Impulsivity, Food Addiction and Disordered Eating Behavior.

		IMPULSIVENESS	FOOD ADDICTION	DISORDERED EATING BEHAVIOR
IMPULSIVENESS	Pearson's R	—		
	gl	—		
	p-value	—		
FOOD ADDICTION	Pearson's R	0.074	—	
	gl	276	—	
	p-value	0.217	—	
DISORDERED EATING BEHAVIOR	Pearson's R	0.086	0.856	—
	gl	276	276	—
	p-value	0.155	< .001	—

Note. gl : degrees of freedom; p: value; Significance level: p < .001

Table 3, in the result of objective four, the regression model indicates an R^2 of 0.733, indicating that the model is explaining a greater proportion of variability in the dependent variable (food addiction). However, in the Beta analysis, only the independent variable of disordered eating behavior is statistically significant in the model. Therefore, it would explain that

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disordered eating behavior must exist for a food addiction to originate, and impulsivity must not be integrated.

Table 3. Level of prediction of impulsivity and disordered eating behavior on food addiction.

Model	R	R^2
1	0.856	0.733

Model Coefficients – FOOD ADDICTION				
Predictor	**Estimator**	**EE**	**t**	**p**
Constant	9.08195	1.7960	5.0568	< .001
IMPULSIVENESS	0.00165	0.0515	0.0321	0.974
DISORDERED EATING BEHAVIOR	0.41568	0.0152	27.3698	< .001

Note. R: Regression; SE: Standard Error; t: Distribution; p: Value

4. Discussion

The general objective of this study was to understand the relationship between impulsivity and disordered eating behavior and food addiction in an Ecuadorian university population. The results indicate a non-significant relationship between impulsivity and food addiction, unlike disordered eating behavior and food addiction, which do maintain a statistically significant relationship. These results regarding impulsivity differ from those of a study conducted with emerging adults between 19 and 23 years of age, which determined that impulsivity is significantly

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related to food addiction (Minhas et al., 2021). Likewise, a study conducted with an adolescent population indicates that food addiction is associated with impulsivity, especially when there are high levels of impulsivity (Kidd & Loxton, 2021).

The results of the first objective indicated that variables based on sex and marital status are related to impulsivity, disordered eating behavior, and food addiction in a greater proportion of single and married women than men. This could be due to the fact that the sample was not homogeneous; it is also important to note that there was a high mean in separated/divorced men. In accordance with a study conducted with male and female students from the city of Nuevo León, Mexico, the results indicate that women present greater disordered eating behavior and greater food addiction than men (Guevara et al., 2020).

The second objective proposed to characterize the psychological variables impulsivity, disordered eating behavior, and food addiction in the Ecuadorian university population, based on marital status and sex. The results obtained in this objective demonstrate that in the variables impulsivity, disordered eating behavior, and food addiction, there are higher values in the group of single women compared to married and separated/divorced women; and that similar values are present in men in these three variables. These results are consistent with a study conducted with university students in Kuwait, which reports that regarding disordered eating behavior there are higher values in single women (Alkazemi et al., 2018).

Few studies have explored the level of relationship between impulsivity, consumption of unhealthy foods with food addiction in a specific population, some of them show that positive associations were found between impulsivity and intake of unhealthy foods with food addiction (Bernard et al., 2019). The severity of food addiction (FA) is directly associated with a worse eating style profile and higher levels of impulsivity (Munguía et al., 2022).

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The results of the third objective demonstrate statistically non-significant positive correlations between impulsivity with food addiction and disordered eating behavior. And, a statistically significant positive correlation of disordered eating behavior and food addiction, understanding that high values in impulsivity and disordered eating behavior will contribute to high values in food addiction. In accordance with the above, another study in university students shows that impulsivity is related to disordered eating behavior, these findings suggest that different facets of impulsivity are related to disordered eating attitudes and behaviors in this population (Lundahl et al., 2015). Contrasting the previous results, another study carried out with Ecuadorian university students shows that there is a low positive correlation between impulsivity and disordered eating behavior (Ortiz and Vásquez, 2024).

The results of the fourth objective, in the regression model indicate an R^2 of 0.733, which means that 73.3% of the variability in food addiction (dependent variable) can be explained by disordered eating behavior (independent variable), as it is a highly significant predictor (p = 001), indicating that as disordered eating behavior increases, food addiction increases. On the other hand, regarding impulsivity (independent variable), it is observed that it is not a significant predictor (p = 0.974) in food addiction, therefore, it does not influence food addiction within this model. This result, in terms of impulsivity, differs from a study carried out with female university students, which indicates that this variable does maintain a statistically significant positive correlation with disordered eating behavior and food addiction, because impulsivity influences impulsive decision-making (Noel and Van, 2022).

This research presented limiting factors, as the sample composition was not homogeneous in terms of marital status and sex, which could have influenced the results. The sample was predominantly composed of university students and focused solely on a specific age group. Other factors such as time, student availability, or any type of pathology must

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also be taken into account. It is important to emphasize that the sample is a fundamental point in a research study, as it is the population with which the research will be carried out. In addition, there are procedures to obtain the number of sample components. (Chero, 2024).

In the future, it is recommended to work with a broader, homogeneous sample from other universities in all regions of Ecuador to obtain specific results for the university population. It is considered important to address other sociodemographic categories and psychological profiles linked to the proposed study model in future studies. Causal and longitudinal analyses could also be considered so that the results of the variables are as close to reality as possible for the Ecuadorian university population. It is important to emphasize the importance of using assessment scales that have been adequately validated for the general Ecuadorian population, including the university population.

It would be beneficial to examine the interactions between gender and various clinical variables with a larger sample. It would also be useful to collect samples with sufficient power to test for differences between genders and marital status. Furthermore, it would be important to conduct studies with a clinical sample of individuals with eating disorders, as well as with a sample of healthy individuals without problematic eating patterns.

Finally, it is hoped that this research will serve as a reference for future studies along the same lines, since the variables studied are linked to other clinical variables that are correlated with each other. The results of these types of studies should be considered when intervening with programs focused on the promotion and prevention of healthy eating in Ecuadorian university students, a situation that has already become a public health issue and requires support, information, education, and treatment, not only at the university stage but also at an early age, where sufficient elements are also taken into account to act from an integral perspective (García et al., 2024).

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5. Conclusions

In conclusion, according to the results of this study, it is observed that impulsivity, disordered eating behavior, and food addiction are more prevalent in single and married women than in men. Likewise, a statistically significant positive correlation exists between disordered eating behavior and food addiction. Finally, the results also indicate statistically non-significant positive correlations between impulsivity and food addiction in the study population. Regarding the results, it is of great importance to be able to differentiate high-risk and moderate-risk students from those who are low-risk, in order to promote health and prevent physical injuries, psychological effects, and psychopathologies (Ertl et al., 2022).

6. Authors' contribution

SAPP: Introduction, methodology, data collection, results
GGRO: Analysis of results, discussion, conclusions, recommendations, final review of the article.

7. Acknowledgments (optional)

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8. Ethics committee approval and consent to participate in the study

In accordance with the Declaration of Helsinki, the study was approved by the local Ethics Committee of the Catholic University of Cuenca, with code UCACUE-UASB-P-CEISH-2022-096 under the regulations of the Ecuadorian Ministry of Public Health. Participants were recruited as volunteers, and all voluntarily signed informed consent.

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Problem-based learning program for the development of competencies of physiology students of the Faculty of Medicine of the Catholic University of Cuenca, Azogues, 2023

Programa de aprendizaje basado en problemas para el desarrollo de competencias de los estudiantes de Fisiología de la Facultad de Medicina de la Universidad Católica de Cuenca sede Azogues, 2023

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Abstract

Introduction: Higher education has revolutionized over time, currently there are new teaching methodologies. **Objective:** To apply a problem-based learning program for the development of competencies of physiology students of Medicine at the Catholic University of Cuenca, Azogues branch. **Methodology:** action-participatory study with qualitative approach, in second cycle students; a test was used to obtain the data obtained, which were later analyzed. **Results:** evidence-based learning (ABP) has shown to have good results in strengthening and acquiring competencies to new health professionals from problems posed in the classroom. **Conclusions:** It was evidenced that after the application of PBL, the technical, methodological, participatory and personal competencies were strengthened in more than 80% of the students who participated, proving to be a superior method compared to other methods such as the traditional one.

Keywords: higher education; competence; students; learning; evidence

Resumen

Introducción: La educación superior ha revolucionado con el tiempo, actualmente existen nuevas metodologías de enseñanza. **Objetivo:** Aplicar un programa de aprendizaje basado en problemas del desarrollo de competencias de los estudiantes de fisiología de Medicina de la Universidad Católica de Cuenca sede Azogues. **Metodología:** estudio de acción-participativa con enfoque cualitativo, en alumnos de segundo ciclo; se utilizó un test para la obtención de los datos obtenidos, los mismos que fueron analizados posteriormente. **Resultados:** el aprendizaje basado en evidencia (ABP) ha demostrado tener buenos resultados al momento de fortalecer y adquirir competencias a los nuevos profesionales de la salud a partir de problemas planteados en las aulas de educación. **Conclusiones:** Se evidenció que, luego de la aplicación del ABP, las competencias técnicas, metodológicas, participativas y personales se fortalecieron en más del 80% de los estudiantes que participaron, resultando ser un método superior frente a otros métodos como el tradicional.

Palabras clave: educación superior; competencia; estudiantes; aprendizaje; evidencia

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1. Introduction

In response to globalization and the social problems that affect societies, it is essential to train professionals capable of ensuring an adequate quality of life for the general population. Therefore, many institutions have been part of programs such as Erasmus, Tempus, Jean Monnet, of the European Union, XII Five-Year Plan of China; in Latin America, organizations such as CELAC, among others, help the development of societies, allowing the creation of professionals who have the skills and abilities capable of proposing solutions, in addition to developing critical thinking (1).

Therefore, it is of vital importance to plan strategies for the development of higher education, the teaching-learning method has been evolving and has undergone paradoxical changes, from passive methodologies such as the traditional method to current times with active methodologies such as Problem-Based Learning (PBL), which propose the training of professionals with human and ethical quality and are capable of solving the problems of society. Problem-based learning (in its acronym in Spanish: PBL), is a teaching-learning method already applied since the 70s, beginning in the United States and then accepted worldwide (2).

There are several authors who recommend PBL over other teaching methods, such as Trullas et al. 2022 in their systematic review; Effectiveness of problem-based learning methodology in undergraduate medical education: a scoping review, carried out in 2022, after reviewing 124 studies, concluded: Problem-based learning was superior to traditional learning, since there is greater retention of information except for 3 studies where it was indicated that it was greater in simulation learning and conference learning studies, another skill that was found to be superior was communication between students and their self-confidence when posing problems, since they felt more secure in collaborative work and interpersonal relationships (3).

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Important aspect was the positivism that the students presented to the method; however, there was some resistance to it, unclear objectives, poor management and inadequate flowcharts, it is striking where the tutor does not give the method as favorable and feels dissatisfied, in relation to methods such as the traditional one, by lectures (3).

Yanamadala et al. (2018) in the United States studied the topic "A Problem-Based Learning Curriculum in Geriatrics for Medical Students" determined: better development in a degree of interdisciplinary work, optimized resources appropriately, multidisciplinary work was exemplary (4).

Therefore, the problem-based learning method helps to develop 4 competencies or skills to be known according to Gil -Gálvan (2021) and they are: Technical competencies (know/know), Methodological competencies (know how to do), participatory competencies (know how to be) and personal competencies (know how to be) (5).

In Ecuador, many institutions and teachers continue to use traditional methods, where teachers transmit information mechanically, thus eliminating student participation in face-to-face classes. Therefore, it is important to understand and implement new methodologies such as PBL to help students participate in class and develop critical thinking.

2. Materials and methods

This participatory action research work is based on a qualitative approach, because it is responsible for collecting and analyzing information on the object of study. It was carried out at the Catholic University of Cuenca, located in the Azogues canton, Cañar province, in the Republic of Ecuador, it is a private institution, to second cycle parallel students "A", "B", "C", "D", "E" of the medicine career, through the application of the problem-based learning strategy solved with collaborative work, it is made up of 115 students taking the subject of General, Hematopoietic,

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Renal and Reproductive Physiology, however, 104 completed the study. It consisted of several phases such as exploration, observation, method application phase, information collection phase using a validated test that allows data collection according to the skills developed such as technical, personal, participatory and methodological according to a scale of 1. A lot, 2. Enough, 3. Little, 4. Nothing, which are answered by each of the students, subsequently analyzed in Excel and a DS and averages were obtained.

Bioethical aspects have been taken into consideration to ensure this research is conducted responsibly and respectfully. The authors' intellectual property rights are protected by appropriate citation and referencing. The procedures and methodologies developed in this work are the intellectual property of the authors, with respect to their contextualization and application. The autonomy of respondents is preserved through informed consent, which will be obtained prior to the survey, taking into account the confidentiality, voluntariness, and privacy of participants.

3. Results

According to the demographic characteristics and profile of the students at the beginning of the study, there were 115, however, 104 participated, the average age of those involved was 19 years with a range between 18 and 20 years, women represented 65.3% of the total sample, compared to men with 34.6%, with a ratio of 1.9 to 1.

Regarding the technical skills that students acquired through the application of the Problem-Based Learning methodology in teaching Physiology , we observe in Table 1, after the evaluation on scales from 1 (a lot) to 4 (nothing), the following statistical data.

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Table 1. Technical skills acquired through PBL by 101 students of the Physiology course of the medical degree, Azogues 2023

VARIABLES	A lot		Enough		Bit		Nothing	
	No.	%	No.	%	No.	%	No.	%
I see my field of study from a broader perspective	34	32.7	62	59.6	8	7.7	0	0
I develop the capacity for analysis, synthesis and evaluation	29	27.9	58	55.8	16	15.4	1	1
Develop the ability to learn on your own	35	33.7	51	49	17	16.3	1	1
Need to learn	60	57.7	36	34.6	8	7.7	0	0
Facilitates organizing ideas	32	30.8	50	48.1	22	21.2	0	0
Development of creative and intellectual capacity	40	38.5	52	50	12	11.5	0	0

Source: Authors , (2023).

Regarding student opinions after the implementation of PBL, the average score for the six assessed competencies was 1.77 overall. Similarly, there was a high component of the need to learn, with 57.7% of students acquiring competencies after the implementation of PBL. 32.7% of participants viewed the field of physiology from a common perspective, with an average score of 1.75 and a SD of 0.58. However, 88.5% of students felt that they developed a creative and intellectual capacity when studying the subject by applying this method, which was between a lot and enough.

Furthermore, in general terms, we could indicate that more than 90% of the participants, after applying the methodology, achieved a level

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of proficiency and knowledge regarding the skills acquired in the ability to analyze, synthesize, evaluate, self-learn, and organize study ideas. Of the skills analyzed, it was determined that all students were familiar with and had adopted, to some degree, acquired techniques related to the proposed methodology. The method influenced all participants except for 1%, who lacked the ability to learn independently, in addition to having difficulty analyzing, synthesizing, and evaluating the material.

When analyzing the impact on the acquisition of methodological skills that the application of PBL has generated in Physiology students in the 104 students, greater acquisition of the five skills was observed, evaluated with a value 1 = a lot and followed by 2 = enough (scale between 1 and 4), in addition all students considered that the method helps to develop the skills to some degree, since no one indicates the opposite (1. nothing) except for 1.9% who did not develop the ability to solve problems, as shown in table 2.

Table 2. Methodological skills acquired through PBL in 104 students of the General Physiology Chair of the second cycle of the Medicine degree, Azogues 2023

VARIABLES	A lot		Enough		Bit		Nothing	
	No	%	No.	%	No.	%	No.	%
It helps us discover knowledge for ourselves that does not occur in traditional or expository methodology.	37	35.6	49	47.1	18	17.3	0	0
This methodology motivates you to learn more than traditional methodologies.	35	33.7	55	52.9	14	13.5	0	0
Problem-solving skills	28	26.9	60	57.7	14	13.5	0	0

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Motivation for learning	35	33.7	56	53.8	13	12.5	0	0
Facilitates collaborative work	30	28.8	55	52.9	19	18.3	0	0
It facilitates playing an active role in a learning process compared to other traditional-expository methodologies.	32	30.8	57	54.8	15	14.4	0	0

Source: Authors , (2023).

The average of the 6 methodological competencies acquired was 1.83 with a SD of 0.6. These acquired competencies in order of frequency from highest to lowest were the discovery of knowledge by ourselves is sufficient or greater in 80% of respondents in relation to the traditional or expository method, followed by others such as motivation for learning (87.5%), problem solving (84.6%), facilitation of collaborative work (81.7%), and facilitating the performance of an active role in 85.6% of cases compared to other methodologies such as the traditional one.

However, another aspect observed is that 10% to 20% of individuals are unaware or have little knowledge of the methodological skills acquired through PBL.

After the analysis of the learning of participatory skills acquired with PBL, as we see in table 3, it can be observed that students have a predisposition to develop these skills greater than 80% in each of the items presented with an average of 1.8 and a SD: 0.64, from highest to lowest it was observed that feedback in students is necessary in the rectification of deficiencies that they felt existed in 90% of cases, it improved the acquisition of values to real problems and interpersonal communication in 8 9.5 % and 88.5% respectively, therefore, these participatory skills acquired through the application of PBL in general can be characterized by the high degree of impact on learning.

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Table 3. Qualification on the participatory skills acquired through PBL in 101 students of the General Physiology chair of the second cycle of the Medicine degree, Azogues 2023

VARIABLES	A lot		Enough		Bit		Nothing	
	No.	%	No.	%	No.	%	No.	%
Ability to work in an interdisciplinary team	31	29.8	60	57.7	12	11.5	1	1
Dialogue within the team is encouraged	36	34.6	53	51	14	13.5	1	1
Feedback is generated to rectify deficiencies and take advantage of identifying strengths.	41	39.4	55	52.9	8	7	0	0
I acquire values based on real problems	42	40.4	50	48.1	11	11.5	0	0
Interpersonal communication is encouraged	34	32.7	55	52.9	14	13.5	1	1

Source: Authors , (2023).

It is striking that 1% of the students did not acquire a form of interdisciplinary work and therefore know nothing about this skill. Undoubtedly, another controversial factor is the presence of students who did not develop different competencies, such as teamwork, as 18.3% knew little or nothing about these competencies. This was followed by team dialogue, which accounted for 18.3%. It is concluded that teamwork is difficult and did not help strengthen the harmony of these competencies.

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Regarding the last competencies presented, called personal, Table 4 tells us about the students' opinion regarding the value they give to their learning, placing it at a value of 2 as sufficient in most cases.

Table 4. Qualification on personal skills acquired through PBL in 101 students of the Chair of General Physiology of the Second cycle of the Medicine Degree, Azogues 2023

VARIABLES	A lot		Enough		Bit		Nothing	
	No.	%	No	%	No.	%	No.	%
Skills for personal interaction, both intellectual and emotional	32	30.8	59	56.7	12	11.5	1	1
Interpersonal relationship skills	32	30.8	57	54.8	14	13.5	1	1
Tolerance to deal with ambiguous situations	33	31.7	60	57.7	9	8.7	2	1.9
Reflective thinking skills	39	37.5	55	52.9	9	8.7	1	1
Critical thinking skills	37	35.6	57	54.8	10	9.6	0	0

Source: Authors , (2023).

Similarly, the students' opinions regarding the acquisition of skills indicated that 19.6% tolerated facing ambiguous situations, followed by 15.4% regarding interpersonal skills. Meanwhile, the skills acquired after PBL for personal interaction, both intellectual and emotional, and those of reflective thinking and critical thinking were found between 12% and 14.4% who did not develop personal skills in this group of students.

There is a 2.4 to 1 ratio of students' opinions of sufficient over much regarding the ability to tolerate dealing with ambiguous situations, and the same trend was similar to the previous one with a ratio greater than 1.5 (sufficient/much).

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4. Discussion

We can start by stating that problem-based learning has had a great impact on the students participating in the study, since the vast majority of them have acquired and know the technical, personal, participatory and personal skills after incorporating this methodology as a learning system, since most of them indicate that they know this process enough or a lot and it has allowed a development in the field of problem solving compared to the traditional method of education (6, 7, 8).

The students who participated in the study were mostly female with a ratio of 1.9 to 1 towards men, correlated with the study conducted by Won et al. 2022 (8) in the nursing department, who determined in their study that 78% of the participants were women in what refers to men and with an average age of 21.45 years (SD 0.86), while in the present study the average age was 18 years, in the same way the participating students were from the second cycle of physiology of the medical career, in contrast to the study carried out by Ibrahim et al. 2018 (9) in medical students of the same academic cycle and third.

The skills acquired with the process of Problem Based Learning especially in the field of medicine and that has been accepted worldwide, allows perceived advantages such as seeing the method as something broader in the acquisition of knowledge, organizing ideas, developing creative and intellectual capacity allows the student to know much or enough about the process, improving knowledge retention, integration of scientific skills in the basic clinical field, development of communication, the creation and improvement of critical thinking as indicated and being able to create their own knowledge and lifelong learners (7).

It has been determined that problem-based learning allows the acquisition of skills in the development of technical, methodological, participatory and personal competencies as evidenced in this work, which is corroborated by Gil- Galvan (10) who in his study on the use of

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problem-based learning in university teaching determined that there is a positivism and acceptance of this methodology in relation to the acquisition of knowledge, based on real problems (p = 0.08), the need to learn, organize ideas (p = <0.05).

Problem-Based Learning is an instrument that facilitates problem solving and becomes an active methodology, as it allows for the improvement of personal skills such as self-direction in the learning process and critical reflection as indicated (11). Then we can indicate that this methodology allows for sound, deep learning that positively influences the performance of each individual, so much so that in the study presented, these positive skills have allowed it to be a facilitating vehicle and thus subsequently be applied in the professional field.

Motivation, the acquisition of knowledge and resolutions of events in specific situations are technical skills that are acquired during the process of the methodology studied and have allowed the good judgment of the students to be able to find solutions to meet the objectives and become judicious, since the strengthening of these skills in medicine improves the results (8).

A study conducted by Al Ansari et al. (2021) on the acquisition of confidence and knowledge in medical students established that, in 279 final-year medical students, 13% of the students were confident in performing the procedures, 15% had the ability to recognize alarming signs, 20% adequately assessed blood tests, thus the students indicated that the teaching method under consideration allowed an adequate development of skills (6).

Aldayel et al. (2019) in their review of medical student perception of the problem-based learning method in 259 students, had a positive perception, as their knowledge in basic sciences increased (P = 0.03), however, they indicate that the method must be carried out properly, as they felt that the teacher was not prepared to do so and there were limitations in its applicability, only 26.3% considered that there was

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adequate applicability, thus the present study identified that 82.7% of the students indicated that they knew between enough and a lot, to discover the different competencies (12).

PBL allows the development of "beneficial skills such as improved communication, teamwork, presentation skills and critical evaluation, independent learning and improved clinical skills" (15) as it is beneficial for students as demonstrated by the present study, where students indicate that they know enough about collaborative work skills and communication skills and much more than 80% of the cases surveyed after the application of this methodology.

In a systematic review carried out by Ghani et al. (2021) they evaluated affective learning behavior and within them are confidence, intrinsic empowerment and functional skills, in relation to critical empowerment students have several roles such as being a leader, writer, editor or any role that helps improve the performance of collaborative work, in addition they have to be diligent and self-critical with the sole purpose of determining if the objectives set are being met and being able to find solutions when posing problems (14).

The work carried out by Gomez - Millan et al. (2019) (15) identifies that the students improved in the results related to the skills of collaborative work, information synthesis, ability to organize, teamwork has allowed the student to have the ability to create and argue the entire development of the work process.

Ates et al. (2011) (16) described the evolution of engineering students on PBL, as they showed that there was an increase in confidence in the process itself, it improved essential skills in problem solving, it promoted the culture of self-learning over the years, as it taught them to think, understand and deal collaboratively, and above all they developed critical thinking in problem solving.

Feedback to rectify deficiencies is seen as a process known by students, since they indicate their relationship to interpret them as

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sufficient or much (90%), in the systemic review carried out by Ghani et al. (14) they determined that it is an important parameter in the strengths of knowledge, since carrying out an analysis of the results obtained also helps to strengthen the learning process.

Improving knowledge based on the problems posed has allowed for productive discussions and in this way provides the acquisition of knowledge, strengthens dialogue, thinks and thus improves cognitive skills, the present study observes and communicates that they benefited from the method, since more than 90% of the participants mark the process as sufficient and much, data that are corroborated by Shimizu et al. (2019) (17) in their study of 96 participants in the development of PBL concluded that group discussions were significant and acquired knowledge with higher scores and self-directed learning.

Personal skills are presented as a less favorable result, showing that there is a significant group, since they value it as something less than little, in this way it is understood that it is not favorable, despite this circumstance there is a crucial group of students who know enough or a lot about the acquired skills and is subject to the studies carried out by other authors such as Tadesse et al., Gil-Galván and Contreras et al. (7, 10, 18).

Critical thinking, as a quality of human beings , is influenced by learning pedagogy, the individual is able to solve the problems that arise daily, making coherence in each resolved process and not having problems in decision making (19).

5. Conclusions

It was found that after implementing PBL, more than 80% of the participating students' technical, methodological, participatory, and personal skills were strengthened, making it a superior method compared to other methods, such as traditional methods. It contributes to knowledge

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generation, problem-solving, decision-making, fosters critical thinking, and helps solve challenges. In order to create professionals with skills and competencies capable of proposing solutions that guarantee an adequate quality of life for the general population, it is therefore important to plan new strategies for the development of higher education that convey information accurately and with the participation of learners.

6. Contribution of the authors

MVUR: Data collection and analysis of results.
KMPL: Final review of the article.
RMCP: Discussion development.
JRRA: Discussion development.

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Comparative analysis of the clinical performance of Bulk Fill and Fiber-reinforced resins: A systematic review in restorative dentistry

Análisis comparativo del desempeño clínico de las resinas Bulk Fill y reforzadas con Fibra: Una revisión sistemática en odontología restaurativa

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Abstract

Dental restorative materials are organic-mineral materials used in dental procedures. The use of Bulk Fill resins is associated with monobloc techniques, reducing clinical time. On the other hand, fiber -reinforced resins have good mechanical properties such as higher resistance to occlusal forces due to their mechanical properties. Materials and methods: A descriptive research with a quantitative approach was carried out, following the PRISMA statement, resulting in an initial 245 documents, inclusion and exclusion criteria were applied, 13 documents were selected to be included for the study. Results: Examining the success rate, clinical performance and difficulties in application, the results showed that Bulk Fill resin restorations have a success rate of more than 95% between 6 months and 5 years, its complications included lack of adaptation, marginal staining, microleakage, etc. On the other hand, reinforced resins show a high success rate, fatigue resistance of 87%, identifying non-catastrophic fractures as complications. Conclusions: The two resin systems have presented good clinical performance so their use is recommended, limiting the research the lack of literature on fiber-reinforced resins for being a new element in restorative dentistry.

Keywords: Bulk fill resin, fiber -reinforced resin, composite resins, clinical effectiveness, restorative dentistry.

Resumen

Los materiales de restauración dental son de naturaleza orgánico-mineral que se emplean en procedimientos dentales. El empleo de resinas Bulk Fill está asociado a las técnicas de monobloque, reduciendo el tiempo clínico. Por otro lado, las resinas reforzadas con fibra presentan buenas propiedades mecánicas como mayor resistencia a fuerzas oclusales por sus propiedades mecánicas. **Materiales y métodos**: Se llevó a cabo una investigación descriptiva con un enfoque cuantitativo, siguiendo la declaración PRISMA, dando como resultado inicial 245 documentos. Se

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aplicaron los criterios de inclusión y exclusión, y se seleccionaron 13 documentos que se incluirán para el estudio. **Resultados:** Examinando la tasa de éxito, el rendimiento clínico y dificultades en la aplicación, los resultados mostraron que las restauraciones con resina Bulk Fill presentan una tasa de éxito de más del 95% entre 6 meses y 5 años, sus complicaciones incluyeron falta de adaptación, tinciones marginales, microfiltraciones, etc. Por otro lado, las resinas reforzadas muestran una tasa de éxito alta, resistencia a la fatiga del 87%, identificando como complicaciones fracturas no catastróficas. **Conclusiones:** Los dos sistemas resinosos han presentado un buen desempeño clínico, por lo que su uso es recomendado, limitando la investigación la falta de literatura de las resinas reforzadas con fibra por ser un elemento nuevo en la odontología restaurativa.

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1. Introduction

Dental restoration materials are of organic-mineral nature that are used in dental procedures (1). These materials replace several properties of the dental structure, such as color, which improves the functional and aesthetic aspects that have been negatively affected by different microorganisms and other agents that can cause the destruction of the piece and a restorative treatment may be necessary (2,3).

In the current context, the use of Bulk Fill resins is associated with monoblock techniques (2). These techniques involve the application of resinous materials that can reach thicknesses of 4 to 5 mm (4). The advantage of using this type of resins lies in the reduction of clinical time required in the dental office due to the specific application technique used (2,4). The chemical composition of Bulk Fill resins includes polymerization groups and plasticizing monomers (5). In addition, due to the translucency characteristics of these resins, they result in the reduction of the filler content and contribute to a more efficient polymerization process (6,7).

BulK Fill resins are primarily used in posterior restorative procedures, particularly in the treatment of Black class I and II cases, in which the " C " factor is greater and it is possible to control to some extent the shrinkage resulting from polymerization (7). However, it should be noted that these resins have been shown to exhibit higher wear rates and lower hardness compared to conventional composite resins (6,8). Therefore, it is not advisable to use them in situations where the tooth is subjected to high tensile loads (8,9).

In contrast, the field of fiber-reinforced dental resins (posterior everX) is characterized by the development of materials incorporating fibrous fillers or microfibers (10). These materials serve several functions, including transmitting loads and stresses from the affected teeth to the resinous material, thereby conferring increased strength to the tooth structure (10,11). The primary objective of FRCs is to reproduce dentin-

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like properties, thereby improving the effectiveness of the restorative process and preventing future failures (11).

The application of new fiber-reinforced resins may be beneficial in a variety of clinical situations, such as the reinforcement of fractured teeth, where higher restorative strength is required (12). Due to its specific composition, this type of resin promotes durability, as it allows a greater amount of healthy dental tissue to be preserved (11). The success of fiber-reinforced resins directly depends on factors such as the composition, distribution, quantity, and adhesion of the fiberglass particles within the tooth structure (11,12).

The growing diversity of materials and techniques currently available on the market has led to a lack of consensus regarding the optimal choice for each specific clinical case. This lack of clarity poses a significant challenge in the decision-making process for dental professionals, as they must determine the most appropriate material to ensure clinical efficacy. Therefore, the field of modern dentistry has greatly benefited from the advancement and implementation of novel technologies, including a range of dental resins that offer diverse options for restorations. Among these alternatives, bulk-fill resins and fiber-reinforced resins have gained prominence due to their ability to simplify procedures and increase the longevity of restorations. However, choosing between these two technologies remains a difficult task for dentists.

The absence of a comprehensive systematic review analyzing the clinical performance of bulk-fill composites and fiber-reinforced composites has created a knowledge gap. This gap hampers dentists' ability to make decisions based on sound scientific evidence, potentially leading to suboptimal outcomes in terms of stability, longevity, and patient satisfaction with restorations. Clarity is needed for dentists when selecting the appropriate material for each case; this will significantly contribute to improving standards in restorative dentistry practice, thereby promoting the quality of patient care and the effectiveness of dental procedures.

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Therefore, the primary objective of this study is to conduct a comprehensive and comparative systematic review of the clinical performance of bulk-fill composites and fiber-reinforced composites in restorative dentistry, enabling dentists and oral health professionals to have a comprehensive understanding of the clinical benefits and limitations of both technologies.

Materials and methods

This research is descriptive with a quantitative approach, carried out through a Systematic Review of the Literature (RSL), for which the PRISMA statement for RSL was strictly followed (13–16) for example in a matrix converter, the maximum voltage transfer ratio will be limited if one or more input lines is at a reduced voltage. Control techniques to compensate the effect of unbalanced voltage supply for matrix converters allow for a limited output voltage and power capabilities, which depends on the level of unbalance. This paper proposes the utilization of the clamp capacitor, which is normally needed to protect a Direct Power Converter (DPC).

Research question

What is the clinical effectiveness associated with dental restorations using bulk fill resins compared to fiber-reinforced resins in patients requiring restorative dentistry procedures?

PICO Question

- P (Population): Adult patients requiring dental restorations on permanent teeth.
- I (Intervention): Bulk Fill resins used in dental restorations.
- C (Comparison): Fiber- reinforced resins in dental restorations.

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- O (Outcomes): Clinical effectiveness of restorations , measured by success rate, clinical performance and application difficulties.

Inclusion/exclusion criteria

The inclusion and exclusion criteria that documents must meet to be included in the systematic review are set out below.

- Only articles that are controlled studies, prospective studies and randomized clinical trials will be considered, excluding systematic reviews.
- Documents published in the last five years (2018 to 2022) will be included, with the possibility of considering the year 2023 even if it is not a fully completed year.
- Articles that do not deal with composite resins or are not relevant to the subject matter will be excluded.
- Papers that do not address restorative dentistry will be excluded.
- Articles in languages other than Spanish, English, or Portuguese are not considered for the study.
- Articles that are not empirical studies will be excluded.

Search strategies

The research was conducted in scientific databases such as Scopus, Web of Science, PubMed, and Scielo, between October 1 and 4, 2023. Table 1 shows the categorized key terms for the study (dental resin, restorative dentistry, comparison, and clinical efficacy), which will be used for systematic exploration. Table 2 presents the search strings, emphasizing that the keyword combination was carefully chosen to obtain non-zero results.

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Table 1. Search string according to each category

Search terms	"Bulk Fill", " Fibre -reinforced", "Restorative Dentistry", "Dental restorations", "Long-term restorations", "Dental restorative techniques", "Dental restorative materials", "Comparison", "Evaluation", "Comparison", "Differences*", "Vs*", "Clinical effectiveness", "Durability", "Success rate", "Restorative failure", "Failure", "Postoperative complications", "Complications".
Grouping themes	A. Dental resin B. Restorative odontalgia C. Comparison D. Clinical effectiveness
Search strings	A: ("Bulk Fill" OR " Fiber -reinforced *) B: ("Restorative Dentistry" OR "Dental restorations" OR "Long-term restorations" OR "Dental restorative techniques" OR "Dental restorative materials") C: ("Comparison" OR "Evaluation" OR "Differences*" OR "Vs*") D: ("Clinical effectiveness" OR "Durability" OR "Success rate" OR "Restorative failure" OR "Failure" OR "Postoperative complications" OR "Complications")

Table 2. Search equation according to each scientific database

Database	Search equation	Initial search
SCOPUS	SCOPUS = A+B+D TITLE-ABS-KEY("Bulk Fill" OR " Fiber -reinforced") AND TITLE-ABS-KEY("Restorative Dentistry" OR "Dental restorations" OR "Long-term restorations" OR "Dental restorative techniques" OR "Dental restorative materials") AND TITLE-ABS-KEY("Comparison" OR "Evaluation" OR "Differences*" OR "Vs") AND TITLE-ABS-KEY("Clinical effectiveness" OR "Durability" OR "Success rate" OR "Restorative failure" OR "Failure" OR "Postoperative complications" OR "Complications")	180

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WoS	WoS = A+B+C TS=("Bulk Fill" OR " Fiber -reinforced") AND TS=("Restorative Dentistry" OR "Dental restorations" OR "Long-term restorations" OR "Dental restorative techniques" OR "Dental restorative materials") AND TS=("Clinical effectiveness" OR "Durability" OR "Success rate" OR "Restorative failure" OR "Failure" OR "Postoperative complications" OR "Complications")	8
PubMed	PubMed = A+B+C+D ("Bulk Fill" OR " Fibre -reinforced") AND ("Restorative Dentistry" OR "Dental restorations" OR "Long-term restorations" OR "Dental restorative techniques" OR "Dental restorative materials") AND ("Comparison" OR "Evaluation" OR "Differences*" OR "Vs") AND ("Clinical effectiveness" OR "Durability" OR "Success rate" OR "Restorative failure" OR "Failure" OR "Postoperative complications" OR "Complications")	30
Scielo	SCIELO = A+B+C ("Bulk Fill" OR " Fibre -reinforced") AND ("Restorative Dentistry" OR "Dental restorations" OR "Long-term restorations" OR "Dental restorative techniques" OR "Dental restorative materials") and ("Comparison" OR "Evaluation" OR "Differences*" OR "Vs")	27

Source: Own elaboration

Publication selection process

The initial search yielded 245 documents. After eliminating duplicates, inclusion and exclusion criteria were applied, yielding 59. After reviewing the titles, abstracts, and keywords to ensure article relevance, 13 documents were selected for inclusion in the study. The manuscripts were reviewed and discussed with a professor with expertise in the field and in the development of systematic reviews.

Results

Based on the analysis performed at each stage of the methodological exploration, the final count of approved scientific manuscripts was seven. A graphic representation of the study's complexities is shown in Figure 1.

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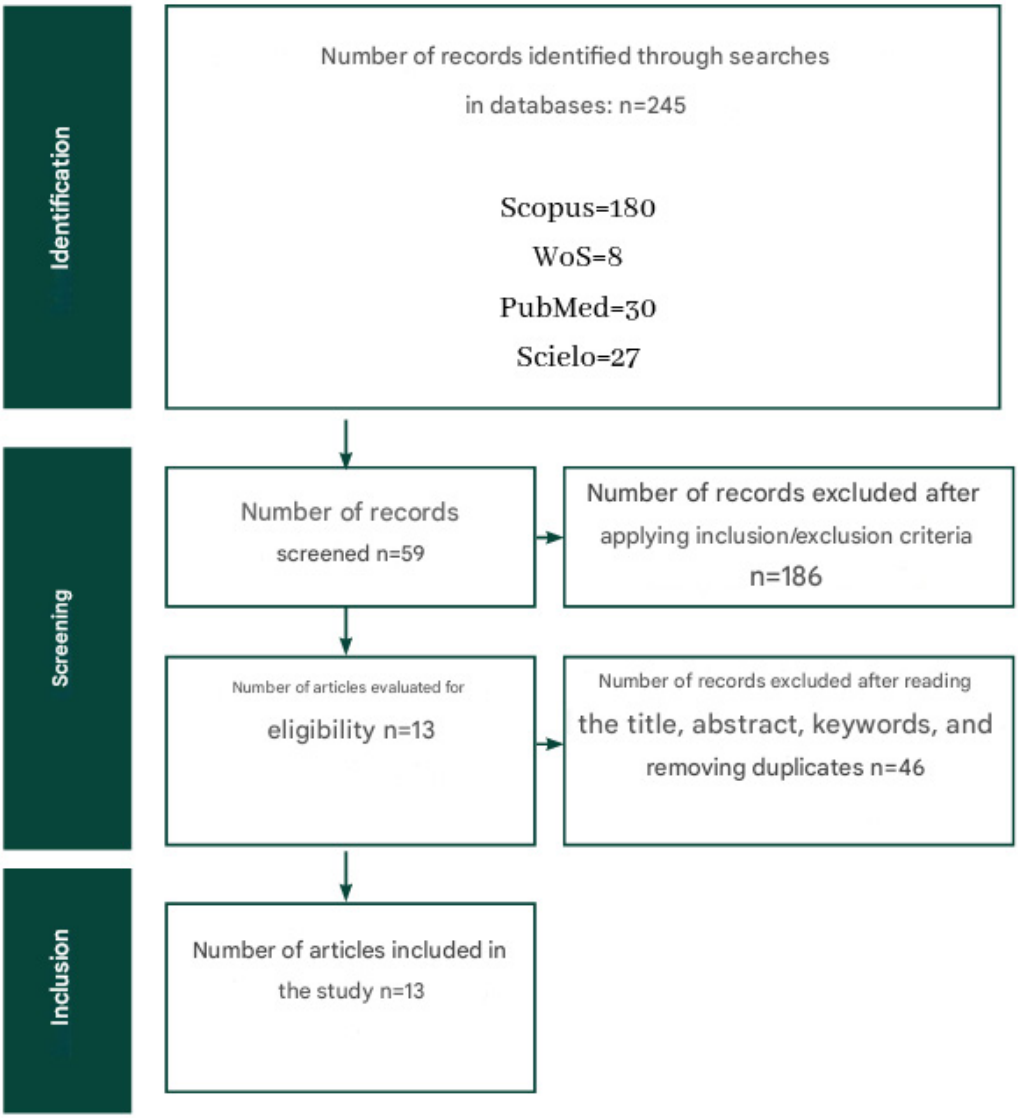

Figure 1. Flowchart according to the PRISMA methodology. **Source:** The authors.

Table 3 shows in detail the summarized information from each article included in the study, distinguishing the success rate, times, clinical performance and difficulties in the application of restorative dentistry

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procedures. Demonstrating that the success rate for Bulk Fill restorations was greater than 95% in all the studies analyzed, which were carried out over the course of 6 months (equivalent to 500 thermocycling cycles), up to 5 years of analysis, among some of the most visible complications shown in the studies were: lack of adaptation due to polymerization contraction, presence of stains at the marginal level, as well as microleaks, deterioration of the surface brightness due to wear and caries recurrence was found after a few months of restoration. On the other hand, in restorations with fiber-reinforced resin, marked complications such as the presence of non-restorable fractures were seen in a high percentage of analyzed pieces; however, in another study, its similarity to dentin property was highlighted, which is why the use of fiber-reinforced resin was preferred in the posterior sector.

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Table 3. Determinants for the application of Bulk Fill and fiber-reinforced resin.

Título	Autores	Año	Periodo de evaluación	Tamaño muestral	tasa de éxito/fracaso	Desempeño clínico	Dificultades de aplicación
Randomized clinical split-mouth study on a novel self-adhesive bulk-fill restorative vs. a conventional bulk-fill composite for restoration of class II cavities – results after three years	Cieplik et al. (17)	2022	36 meses	60 restauraciones	TE=96,6%	Uso clínico recomendado.	Deterioro significativo en la adaptación marginal. Aumentos significativos en la tinción marginal
Thirty-six-month clinical evaluation of posterior high-viscosity bulk-fill resin composite restorations in a high caries incidence population: interim results of a randomized clinical trial	Almeida et al. (18)	2021	36 meses	138 restauraciones	TF=1,26%	No especifica	No presenta

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12-months Clinical Evaluation of Fiber Reinforced Bulk Fill Resin Composite versus Incremental Packing of Nanohybrid Resin Composite in Restoration of Deep Proximal Lesions of Permanent Molars: A Randomized Controlled Trial	Mennatallah et al. (19)	2022	12 meses	36 restauraciones	TE= 95%	No existe riesgo de fracaso	No presenta
A randomized, prospective clinical study evaluating effectiveness of a bulk-fill composite resin, a conventional composite resin and a reinforced glass ionomer in Class II cavities: one-year results	Balkaya et al. (20)	2019	12 meses	109 restauraciones	TE= 100%	Marcada supervivencia de las restauraciones	Cambios de color (2,8%). Decoloración marginal (5.5%). Mala adaptación marginal (5.5%).

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Evaluation of micro-leakage in Class II composite restorations: Bonded base and bulk fill techniques	Feiz et al. (21)2021	6 meses (500 ciclos de termoci-clado)	60 res-taura-ciones	No espe-cifica	Baja contrac-ción de poli-merización.	Alto nivel de micro-filtra-ción al no utili-zar una base cavita-ria.	
Optimiza-tion of large MOD res-torations: Composite resin inlays vs. short fiber-rein-forced direct restorations	Soares et al (22)	2018	No espe-cifica	45 restau-raciones	TE= 87%	Resis-tencia a las pruebas de fati-ga: 87%	Propenso a agrietar-se. Frac-turas no catastrófi-cas.
One-year clinical evaluation of bulk-fill flowable vs. regular nanofilled composite in non-carious cervical lesions	Canali et al. (23)	2019	12 meses	89 restau-raciones	TF= 3,3% para la forma anatómica TF=2,2% para la adapta-ción margi-nal	Desem-peños clínicos acep-tables para la restau-ración de NCCL después de 1 año.	Tinción marginal, sensi-bilidad postope-ratoria y presencia de caries recurren-te

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Clinical evaluation of bulk-fill and universal nanocomposites in class II cavities: Five-year results of a randomized clinical split-mouth trial	Schoilew et al. (24)	2023	5 años	120 restauraciones	Tasa media de fallo anual: 1,6%	Rendimiento clínico y una supervivencia aceptable durante el período de observación de 5 años	Restauraciones mal adaptadas. Recambio de restauraciones por fallas.
Bulk-fill Composites Compared to a Nanohybrid Composite in Class-II Cavities - A Two-year Follow-Up Study	Hoffmann et al. (25)	2021	24 meses	160 restauraciones	TE=92%	Estabilidad clínica.	Caries recurrentes. Fracturas de las restauraciones
Clinical Performance of Bulk-Fill Resin Composite Restorations Using the United States Public Health Service and Federation Dentaire Internationale Criteria: A 12-Month Randomized Clinical Trial	Almeida et al. (26)	2021	12 meses	138 restauraciones	TE=97.2% TF=1%	Rendimiento clínico satisfactorio.	Mala adaptación marginal. Rugosidad superficial. Recambio de restauraciones por fallas.

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Flowable fiber-reinforced versus flowable bulk-fill resin composites: Degree of conversion and microtensile bond strength to dentin in high C-factor cavities	Harp et al. (27)	2022	No presenta	30 restauraciones	No especifica	Preferencia de la resina reforzada con fibra en zonas con alto estrés.	No presenta.
Clinical time and postoperative sensitivity after use of bulk-fill (syringe and capsule) vs. incremental filling composites: A randomized clinical trial	Tardem et al. (28)	2019	No presenta	295 restauraciones	No especifica	Menor tiempo operatorio. Disminuye la sensibilidad posoperatoria con la técnica incremental tradicional.	Sensibilidad posoperatoria (4.6%)

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Short-fiber Reinforced ced MOD Restorations of Molars with Severely Undermined Cusps	Pascal et al. (29)	2023	No presenta	36 restauraciones	TE= 100%	Restauraciones de bajo costo. Resina reforzada con fibra como complemento de incrustaciones CAD/CAM	Grietas por contracción

Note: **TE:** Success rate . **TF:** Failure rate . **Source:** Prepared from the results of a systematic literature search.

The following table shows a comparison of clinical complications of Bulk Fill resin over time, ranging from 6 months (artificial aging) to 5 years of study. It shows that the most prevalent complications are microleaks, color changes, marginal staining, poor marginal adaptation, surface wear, recurrent caries, and surface roughness. It should be noted that there is no literature covering any clinical complications with fiber-reinforced resin because it is a new element and there is a lack of information (Table 4).

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Table 4. Complications in the application of Bulk Fill resins over a period of 6 months to 5 years.

Complicaciones clínicas en la aplicación de resina Bulk Fill		
Título	**Intervalo de tiempo**	**Complicaciones**
Evaluation of microleakage in Class II composite restorations: Bonded base and bulk fill techniques	500 ciclos termociclado 6 meses de envejecimiento artificial	• Presencia de microfiltraciones al no emplear bases cavitarias en cavidades profundas antes de la aplicación de la resina Bulk Fill.
A randomized, prospective clinical study evaluating effectiveness of a bulk-fill composite resin, a conventional composite resin and a reinforced glass ionomer in Class II cavities: one-year results	12 meses	•Se evidenció cambios de color. •Zonas de decoloración marginal. •Mal adaptación marginal.
One-year clinical evaluation of bulk-fill flowable vs. regular nanofilled composite in non-carious cervical lesions	12 meses	•Tinciones marginales •Desgaste superficial de la resina. •Sensibilidad postoperatoria. •Mal adaptación marginal por lo tanto presencia de caries recurrente.

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Clinical Performance of Bulk-Fill Resin Composite Restorations Using the United States Public Health Service and Federation Dentaire Internationale Criteria: A 12-Month Randomized Clinical Trial	12 meses	•Rugosidad superficial por desgaste. • Mal adaptación marginal. • Se tuvieron que hacer recambio de restauraciones por fallas presentes.
Bulk-fill Composites Compared to a Nanohybrid Composite in Class-II Cavities - A Two-year Follow-Up Study	24 meses	• Fracturas de las restauraciones. • Caries recurrentes por microfiltraciones.
Randomized clinical split-mouth study on a novel self-adhesive bulk-fill restorative vs. a conventional bulk-fill composite for restoration of class II cavities – results after three years	36 meses	• Adaptación marginal con deterioro significativo. • Tinción marginal.
Clinical evaluation of bulk-fill and universal nanocomposites in class II cavities: Five-year results of a randomized clinical split-mouth trial	5 años	• Mal adaptaciones en las restauraciones. • Necesidad de recambio de restauraciones por fallas.

Source: Prepared from the results of a systematic literature search.

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Table 5 shows the advantages of using fiber-reinforced resin restorations, both in terms of their applications and disadvantages from a cost point of view.

Table 5. Fiber reinforced resin considerations.

Implications of fiber-reinforced resin	
Advantages	• Reconstruction of class IV cavities • Replacement of amalgam restorations. • Class I and II cavities with previous endodontic treatment. • Cavities where inlays are indicated.
Disadvantages	• High cost of resin. • It is necessary to use a conventional resin for the superficial portion of the restoration. • High cost of restorations.

Source: Prepared from the results of a systematic literature search.

Discussion

The results of this systematic review facilitate the recognition that restorations made with bulk-fill composites demonstrate acceptable clinical efficacy, with success rates exceeding 95% in most studies, reaffirming their suitability for restorative interventions in Class I and II cavities. However, recurrent complications, such as poor marginal adaptation, microleakage, marginal discoloration, surface roughness, and caries recurrence, were evident, especially in long-term evaluations. In contrast, restorations with fiber-reinforced composites, although less frequently analyzed in the academic literature, showed favorable clinical

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performance in terms of mechanical properties and strength, and showed lower susceptibility to aesthetic or bond-related complications, although accompanied by a risk of non-repairable fractures. This divergence may be attributed to the structural similarity of fiber-reinforced resin to dentin, which could improve its functionality in regions subjected to high stress levels.

In this context , the study by Cieplik et al. (17) tooth-colored, self-adhesive bulk-fill restorative (SABF, 3Mindicates that the success rate of Bulk Fill restorations was 96.06% in a period analyzed of 36 months, in terms of biological properties the results were acceptable throughout the study, additionally significant deterioration in the surface brightness of the restorations could be observed, demonstrating a significant marginal staining during the course of the study, which is consistent with the study by Mennatallah et al. (19) in which it was observed that there was no risk of failure with respect to fractures, marginal integrity, color changes, surface texture, postoperative complications and recurrent caries, presenting a success rate of 95%, limiting this study the evaluation time was carried out in 12 months, so possible complications that may occur over time cannot be evaluated. On the other hand , Tardem et al. (28)of posterior restoration that used a universal adhesive, in a self-etch or selective enamel-etching technique, along with incremental or bulk-fill composites (presented in syringes or capsules In his study he evaluated postoperative sensitivity after using Bulk Fill resins, giving a rate of 4.06% of presenting this complication.

In the study by Balkaya et al. (20) a survival rate of restorations based on Bulk Fill resins of 100% was determined after one year of analysis used in class II cavities, the complications that occurred in the study were in terms of marginal adaptation of the restorations (5.5%), color changes (2.8%) and marginal coloration in (5.5%). This shows a relationship with the study by Schoilew et al. (24) , in which they observed failures on the part of the restorations, these had to be replaced and even thus they presented

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poor adaptation in the restorations presenting an average annual failure rate of 1.6% , because this study was carried out over 5 years. Additionally, to these studies in class II cavities, Hoffmann et al. (25) add that, in their study carried out over 24 months, a success rate of 92% was presented, having as complications fractures of the restoration and recurrent caries are added to the clinical defects. Complementing the studies in class II, Feiz et al. (21) in his study used Bulk Fill resins subjected to thermocycling 500 cycles / 6 months of artificial aging, study in which it was possible to affirm that there is a high level of microfiltration when cavity bases are not used prior to restoration with Bulk Fill material.

Almeida et al. (26) In his study carried out over 12 months, he presents an overall success rate of 99.07% in which only a failed relationship of 0.93% based on Bulk Fill resin was detected. Among the difficulties that were observed were poor marginal adaptation and surface roughness, which complements his second study by Almeida et al. (18) Tetric EvoCeram BF (TBF; Ivoclar Vivadentdeveloped over a time interval of 36 months in which a failure rate of 1.26% was obtained, which is mainly related to a poor adaptation of the restoration, which led to a recurrence of caries .

Regarding innovative restorations, Soares et al. (22) in his study determined the fatigue test survival of fiber-reinforced restorations to be 87%. A limitation of this study was the comparison of fiber-reinforced resins placed directly in cavities with inlay-type restorations. In contrast to the study by Harp et al. (27), the great adhesion capacity and its properties similar to dentin were exposed, which is why in this study the use of this reinforced resin is preferred in high stress areas, specifically in the posterior sector where occlusal forces are greater, as a complement to the study by Pascal et al. (29) leaving unsupported buccal and lingual enamel cusps. A short-fiber reinforced composite resin base (SFRC, everX Flow, GCIt is stated that fiber-reinforced resins are a good complement to

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be placed together with CAD/CAM inlays, having a 100% success rate in their restorations.

While the findings underscore the advantageous clinical efficacy of fiber-reinforced composites in dental restorations, scrutiny of this material category is limited due to the limited available evidence, which can be attributed to its recent integration into restorative dentistry. This limitation emphasizes the need for long -term clinical studies that facilitate a more comprehensive evaluation of their performance in relation to variables such as marginal adaptation, fracture resistance, and caries recurrence, with the aim of establishing their efficacy and improving their application in diverse clinical settings.

Conclusions

dentistry today is mainly based on providing long-lasting treatments , therefore, the analysis of new restorative materials that are introduced in the field is essential, among one of the most used are Bulk Fill resins, which in studies have shown that it has a success rate of more than 95% in a study interval of 6 months to 5 years, although according to the analysis, it can show long-term complications, among the most prevalent are marginal maladjustments, superficial wear of the restorations and marginal discolorations; Despite this, its use is still recommended in deep cavities, more specifically in Black I and II cavities, another demonstrated benefit is that it reduces clinical time in the dental office.

Innovation in restorative materials has driven the development of composites that mimic the biomechanical properties of dental tissue, including fiberglass-reinforced resins. These materials have demonstrated a high clinical success rate and fatigue resistance close to 87%, justifying their increasing use in complex restorative procedures. Their ability to adequately distribute functional loads and occlusal stresses from dental structures to the restorative material represents a significant advantage in

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the rehabilitation of Class I and II cavities in endodontically treated teeth, reconstructions with cervical margin elevation, replacement of amalgam restorations, and restorations in teeth with cusp destruction . However, as this is an emerging technology in restorative dentistry, limitations persist due to the limited clinical evidence available. Therefore, longitudinal studies are required to rigorously evaluate their clinical behavior, durability, and potential associated complications.

The innovation of restorative materials has seen the need to implement a material that resembles the biological characteristics of teeth, therefore , restorations with fiberglass reinforced resins are currently being used, which allow the transmission of loads and tensions from the affected teeth to the resinous material and as a result, the success of restorations in which a margin elevation is necessary, reconstruction of cavities I and II with endodontic treatments, cavities with amalgam replacement, and cavities where a destruction of cusps is seen. Its success rate is relatively high and they also have a fatigue resistance of 87%. However, being a new element in the restorative field , Further clinical studies are still needed to better establish the qualities, clinical performance, and potential complications that fiber-reinforced resins may present.

Contribution of the authors

NH: Idea, introduction, methodology, data collection, analysis of results, discussion, final review of the article.

AG: Idea, introduction, data collection, analysis of results, discussion, final revision of the article.

CUU : Data analysis, results analysis, discussion, final review of the article.

CUE: Data analysis, results analysis, discussion, final review of the article.

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Deteriorated Mental Health, Expressive Suppression, and Stress as Predictors of Eating Disorders

Salud mental deteriorada, supresión expresiva y estrés como predictores de los desórdenes alimenticios

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Summary

This study analyzes the relationship between impaired mental health, expressive suppression, and stress as predictors of eating disorders (EDs), with a particular emphasis on anorexia nervosa (AN) and bulimia nervosa (BN). Eating disorders, characterized by severe disturbances in eating patterns and compensatory behaviors such as binge eating, binge eating, and self-induced vomiting, represent a growing problem in mental and physical health. Previous studies indicate that impaired mental health, expressive suppression, and stress may be highly influential risk factors for the development of these disorders. Using a non-experimental, cross-sectional , correlational design, 116 patients diagnosed with AN and BN from the Ecuadorian Mental Health Citizen Care Program were evaluated. The results revealed a significant positive relationship between impaired mental health and AN, while expressive suppression showed an unexpected negative relationship with this disorder. Stress, on the other hand, did not show a significant association with AN. None of these variables were significant in relation to BN. Furthermore, women had a higher prevalence of eating disorders, especially AN, although the gender difference was not significant in the case of BN.

This study highlights the importance of mental health in the prevention of eating disorders, emphasizing the need to include variables such as body dissatisfaction, social pressure, and traumatic history in future research, as well as longitudinal approaches that allow exploring causal dynamics in the development of these disorders. This study, within the practical approaches, is consolidated as an important theoretical line for the creation of promotion, prevention, and future intervention plans.

Keywords: Mental health, expressive suppression, stress, eating disorders, anorexia nervosa, bulimia nervosa.

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Abstract

This study analyzes the relationship between deteriorated mental health, expressive suppression, and stress as predictors of eating disorders (EDs), with a strong emphasis on anorexia nervosa (AN) and bulimia nervosa (BN). EDs, characterized by severe disruptions in eating patterns and compensatory behaviors such as food restriction, binge eating, and self-induced vomiting, represent a growing concern for both mental and physical health. Previous studies indicate that deteriorated mental health, expressive suppression, and stress may be influential risk factors in the development of these disorders. Using a non-experimental, cross-sectional, and correlational design, 116 patients diagnosed with AN and BN from the Citizen Care Program "Ecuadorian Mental Health" were evaluated. The results revealed a significant positive relationship between deteriorated mental health and AN, while expressive suppression showed an unexpected negative association with this disorder. On the other hand, stress did not present a notable association with AN. None of these variables were significant in relation to BN. Additionally, women showed a higher prevalence of EDs, especially AN, although the sex difference was not significant in the case of BN.

This study highlights the importance of mental health in the prevention of EDs, emphasizing the need to include variables such as body dissatisfaction, social pressure, and traumatic history in future research. Furthermore, longitudinal approaches are recommended to explore causal dynamics in the development of these disorders, within the practical approaches of the same study, it is consolidated as an important theoretical framework for the creation of promotion, prevention, and future intervention plans.

Keywords: Mental health, expressive suppression, stress, eating disorders, anorexia nervosa, bulimia nervosa.

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1. Introduction

Eating disorders (ED) are an increasingly prevalent health problem in society, characterized by serious alterations in eating behavior that can cause problems in both the physical and psychological well-being of the individual (Ortiz, et al., 2017). Eating disorders are a group of negative statements that the individual makes about their own body image, which leads them to adopt restrictive behaviors such as: dietary restrictions, binge eating, excessive exercise, self-induced vomiting , and the use of some kind of laxatives (Arija, et al., 2022).

Knowing the factors that influence the development of eating disorders is of great importance because it could lead to actions related to these factors that reduce them to levels that do not influence people (Ayuzo & Covarrubias, 2019). For this study, the factors considered are: impaired mental health, expressive suppression, and stress.

The relationship between mental health and eating disorders has been documented by various authors. Méndez et al. (2018) were among the first to highlight that people with compromised mental health may be more vulnerable to developing eating disorders. Mebarak et al. (2009) subsequently noted that the main problems associated with deteriorating mental health include alterations in psycho-affective development, sexual and eating habits. Esteban et al. (2012) later highlighted how social and personal factors limit access to optimal mental health. Miranda (2018) and Casañan & Lalucat (2018) reinforced this idea, emphasizing the protective role of optimal mental health at both the social and personal levels. Thus, deteriorating mental health has gone from being seen as a simple coexisting symptom to a possible predictor variable in the development of eating disorders.

Regarding emotions, these are psychophysiological responses to specific situations, whose adaptive function has been widely recognized (Piqueras et al., 2009). Expressive suppression, understood as the conscious

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inhibition of emotional expression, has been linked to psychological discomfort (Pagano & Vizioli, 2021). Sánchez & Reivan (2024) point out that this emotional regulation strategy can hinder adequate emotional expression, interfering with the individual's adaptation. The emotional regulation model proposed by Gross (2003) and highlighted by Arrieta & Moreno (2023), identifies five stages in the regulation process: selection and modification of the situation, attentional orientation, cognitive restructuring, and response modulation.

Gross and John (2003) also developed the Emotion Regulation Questionnaire (ERQ), which primarily assesses two strategies: expressive suppression and cognitive reappraisal (Navarro et al., 2018). Recent literature has found links between expressive suppression and dysfunctional eating behaviors. Palomino (2020) highlights that sustained emotional inhibition could trigger irregular eating behavior patterns.

On the other hand, stress has been considered a prominent risk factor in eating disorders. Leal (2006) defines it as a physical and emotional reaction to stimuli perceived as threatening. Over the years, it has been shown that sustained stress can generate significant physiological and psychological alterations. Herrera et al. (2017) point to a direct correlation between stress and the onset of mental disorders, including eating disorders. Although stress is a frequent variable in the daily environment, its clinical and preventive approach has gained importance due to its ability to trigger disorders when not properly regulated.

In this context, and considering the theoretical and empirical background that links impaired mental health, expressive suppression, and stress with the presence of eating disorders, the objective of this study is to evaluate a predictive model that allows identifying the probability of developing an eating disorder based on these three psychological variables.

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2. Materials and methods

Design

Explanatory correlational scope of non-experimental, transversal correlational-causal design.

Participants

Se incluyó en el estudio una muestra de pacientes con diagnóstico de AN (n = 52) y BN (n = 64) correspondientes al área ambulatoria psiquiátrica del Programa de Atención Ciudadana "Salud Mental Ecuatoriana" del Ministerio de Salud Pública del Ecuador. El diagnóstico de los pacientes fue realizado por los psiquiatras a cargo del programa. Los criterios de inclusión para este estudio fueron una edad de 17 a 40 años, la presencia de diagnóstico de AN y BN según criterios DSM-V, para el diagnóstico de la severidad de la anorexia nerviosa se consideró el bajo peso corporal definido como un IMC ≥17. No se consideraron los subtipos de: anorexia nerviosa (tipo restrictivo y tipo atracones/purgas) y bulimia nerviosa (severidad: leve, moderada, severa y extrema). criteria were substance dependence, major medical or neurological illness , and cognitive impairment. Included patients met the DSM-5 criteria for the diagnosis of eating disorders at least 2 months prior to entering the study. They also did not report being under the influence of any medication or psychotropic drug during the testing. The distribution of participants according to sociodemographic characteristics, medical illnesses, and psychopathology is reported in Table 1.

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Tools

Impaired mental health - GHQ-12 (General Health Questionnaire-12).

The GHQ test developed by Goldberg, 1972, the most used version in the Latin American context is the GHQ-12, which is a reduced version consisting of 12 items. This scale is composed of a factor that assesses depression and another that analyzes social dysfunction, for its qualification a Likert scale is used that goes from 0 to 3. As a result, in the Ecuadorian context it was presented with $\alpha = .83$ (Moreta, et, al 2018).

Expressive Suppression – EQR (Expressive Suppression Scale).

The "Emotion Regulation Questionnaire" test developed by Gross and Jhon in 2003, which evaluates the two types of emotional regulation strategies, which are: cognitive reappraisal and emotional suppression, the questionnaire consists of 10 items, among which 6 respond to the cognitive reappraisal factor and 4 to the suppression factor, which will be evaluated using a Likert scale from 1 to 5. As a result, in the Ecuadorian context, $\alpha = .80$ was presented (Moreta, et, al, 2018).

Stress - DASS-21 (Depression, Anxiety, and Stress Scale - 21 items)

The Depression, Anxiety, and Stress Scale, developed by Lovibond and Lovibond in 1995, is a test that measures depression, anxiety, and stress in a person. This test has 21 items, and a Likert scale of 0 to 3 is used for this assessment. As a result, an average of $\alpha = .89$ was obtained in a Latin American context Contreras, et al. (2021). This sociodemographic questionnaire is a short, structured, closed-ended questionnaire designed to collect sociodemographic information, including variables such as sex, marital status, and age expressed in years (Román, et al, 2018).

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All instruments used in this research have presented criterion and content validity, in addition to all of them complying with the assumption of normality and homostaticity. and collinearity.

Procedure

The study will be conducted in accordance with the latest version of the Declaration of Helsinki. The Clinical Research Ethics Committee of the Ministry of Public Health (project approved by CEISH:036-2023, MSP Catholic University of Cuenca, Ecuador) will approve the study, and signed informed consent will be obtained from the volunteer participants in the psychiatric outpatient department of the "Ecuadorian Mental Health" Citizen Care Program.

Outpatient physicians and psychiatrists Patients will be invited to participate in the study during the consultation process, informing them that their attitudes toward mental health issues were being assessed. Data collection lasted two months. Those who gave their written consent to participate were included in the study. Once this process was completed, patients were scheduled with the patients to complete the tests during their regular consultations and follow-up visits. Data collection was conducted by the on-staff psychologist in conjunction with the attending physician. Patients who completed the measures were thanked for their time.

Data analysis

All data were processed using Ro-Statistics for Windows. First, descriptive statistics were calculated, including frequencies, means, and standard deviations. Pearson's correlations (r) were then applied to analyze bivariate associations between the study variables. Multiple regression analysis was also performed to explore the relationship between inhibition, depression, and food addiction. To do this, the

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coefficients (R^2) and standardized coefficients (β) were determined, along with the semipartial compensation coefficient (sr^2), which indicates the percentage of variance explained by each predictor variable after controlling for the effects of the others (Harrell, 2015).

3. Results

In cases of anorexia, single women represent 26.7% of the total sample, while single men account for 14.7%. No cases of married or cohabiting men with anorexia were observed; however, in the case of bulimia, women represent 28.4% and single men 19.8%. **These data suggest that anorexia and bulimia are present in single individuals, with women being particularly prevalent in that group.**

In terms of gender, a female predominance can be seen, as women represent 67.3% of cases of anorexia and 56.3% of cases of bulimia. However, it should be noted that men are more prevalent in bulimia, at 43.8%, and in anorexia, at 32.7%. However, the predominance of women is still notable.

Descriptive data

Diagnosis	Marital status	Sex	Frequencies	% of Total
Anorexia	Single	Women	31	26.7%
		Man	17	14.7%
	Married	Women	3	2.6%
		Man	0	0.0 %
	Common-Law Union	Women	0	0.0 %
		Man	0	0.0 %
	Separated	Women	0	0.0 %
		Man	0	0.0 %
	Divorced	Women	1	0.9%
		Man	0	0.0 %
Bulimia	Single	Women	33	28.4%
		Man	23	19.8%

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Diagnosis	Marital status	Sex	Frequencies	% of Total
	Married	Women	3	2.6%
		Man	2	1.7%
	Common-Law Union	Women	0	0.0 %
		Man	1	0.9%
	Separated	Women	0	0.0 %
		Man	1	0.9%
	Divorced	Women	0	0.0 %
		Man	1	0.9%

Difference between groups by type of diagnosis and variables (age, stress, expressive suppression, and impaired mental health)

No significant statistical differences could be observed between the diagnostic groups, so these variables do not present notable differences between those suffering from bulimia and anorexia.

Relationship between type of diagnosis and sex

The Chi-square test does not show a significant relationship between the type of diagnosis (AN and BN) and sex, which shows us that despite the difference between sexes in the sample group, it is not so great as to be considered significant.

Correlation between impaired mental health and expressive suppression Pearson's P = 0.246: Positive-moderate correlation between variables. Therefore, as expressive suppression increases, so does mental health deterioration, although not strongly. **P = 0.008 This relationship is significant given that the "p" value is less than 0.05.**

Correlation between impaired mental health and stress Pearson's P = 0.517: Moderate to strong positive correlation between variables. Therefore, as stress increases, so does the deterioration in mental health. **P = < 0.001, this relationship is highly significant, reinforcing a considerable association between variables.**

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Correlation between expressive suppression and stress Pearson's P = 0.343: Moderate positive correlation between variables. Therefore, the greater the emotional suppression, the greater the stress. **P = < 0.001 , this relationship is significant between variables.**

Correlation Matrix

		Deteriorated mental health	Expressive suppression	Stress
Deteriorated Mental Health	Pearson's R	—		
	gl	—		
	p-value	—		
Expressive Suppression	Pearson's R	0.246	—	
	gl	114	—	
	p-value	0.008	—	
Stress	Pearson's R	0.517	0.343	—
	gl	114	114	—
	p-value	< .001	< .001	—

Linear Regression Dependent Variable Bulimia

Analysis for Bulimia:

Model fit measures:

R = 0.111: The correlation between the independent variables and bulimia is very weak.

R^2 = 0.0123: Only 1.23%* of the variability in bulimia is explained by the independent variables, indicating that the model is not useful for predicting this variable.

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Model Coefficients – Bulimia

Model coefficients:

Expressive suppression:

Estimator = 0.0203, p = 0.819: There is no significant relationship with bulimia (high p-value, not significant).

Deteriorated mental health:

Estimator = 0.0514, p = 0.819: It also does not show a significant relationship with bulimia.

Stress:

Estimator = 0.1666, p = 0.454: No significant relationship was observed between stress and bulimia.

Predictor	Estimator	EE	t	p
Constant	13.2743	1.5319	8.666	< .001
Expressive Suppression	0.0203	0.0886	0.230	0.819
Deteriorated Mental Health	0.0514	0.2246	0.229	0.819
Stress	0.1666	0.2215	0.752	0.454

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4. Discussion

The present study aimed to analyze the relationship between poor mental health, expressive suppression, and stress with eating disorders (EDs), focusing on anorexia and bulimia, using linear regression analysis. The results obtained offer interesting results and reveal significant differences in the influence of independent variables on the two types of EDs focused on in this study.

The results obtained indicate that impaired mental health and expressive suppression have a significant relationship with anorexia. Impaired mental health showed a positive and significant relationship with anorexia, which confirms the hypothesis raised by previous studies Irarrázaval, Prieto & Armijo (2016), which indicate that the lack of adequate resources to manage the deterioration of mental health can influence the appearance of TCA, as well as studies by Ruiz, et, al, (2022), David García (2020) and Muñoz, et, al, (2023) which in their research refer to the fact that people with characteristics of impaired mental health are the most vulnerable to suffering from TCA, specifically anorexia, these ideas are reaffirmed by Mendieta et al, (2025), determining that there were factors associated with deteriorated mental health before the emergence of TCA. As the mental health of individuals worsens, the likelihood of developing anorexia increases. This finding underscores the importance of addressing mental health as a key component in the treatment and prevention of eating disorders. Furthermore, this finding reinforces the preventive approach from a clinical perspective, which involves not only intervening when symptoms appear, but also acting early to promote psychological well-being.

Expressive suppression presented a significant negative relationship with anorexia, indicating that the greater the tendency to suppress emotions, the lower the likelihood of manifesting anorexia symptoms. This finding differs from what was expected, given that previous research

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such as that of Palomino (2020) indicated that emotional suppression can trigger disordered eating behaviors. Studies proposed by Díaz & Beltrán (2021), Gómez, et al, (2022) and Nicolás Vizioli (2022) show a mutual agreement that emotional suppression can lead to mental disorders in the future, among which anorexia is mentioned. One possible interpretation is that some individuals with anorexia could resort to emotional regulation strategies other than suppression, such as cognitive avoidance or perfectionism, which could make invisible the direct role of emotional suppression in the development of this pathology. A possible explanation could be that people with anorexia do not necessarily suppress their emotions, but rather channel them differently, which requires further exploration in future research. However, it has also been shown that eating disorders are not specifically linked to issues related to emotions, as stated by Riveros, Garrido & Reyes (2025).

Stress, however, did not show a significant relationship with anorexia, so it can be understood that, despite being a factor that has traditionally been associated with psychological and eating disorders , in this study sample it was not considered a relevant predictor. As García, et al, (2023) points out, stress alone is not a determining factor for anorexia nervosa, however, this associated with other factors can be a great determinant for it. It is possible that other additional factors, such as individual or contextual characteristics, mediate this present relationship, authors such as Acosta, et, al (2023), Elena Gismero (2020), Escandón & Garrido (2020) mention that long-term stress can become a determining factor for the appearance of TCA. This result invites reflection on the role of chronic stressors versus acute stressors, since it may be that only sustained stress without a significant emotional support network has an effect on the development of eating disorders.

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In the case of bulimia nervosa, the results obtained were different from the previous ones. None of the variables taken into account for this study (deteriorated mental health, expressive suppression and stress) showed a significant relationship with this disorder, authors such as Castro, et, al (2023), Diana Pacheco (2021) & Villamar & Baile (2023) mention that in their studies psychological factors that influence the emergence of bulimia nervosa have been determined, however, the variables taken into account in this study are not considered by these authors. These data suggest that bulimia nervosa could be influenced by other factors not contemplated in this study, such as social pressure, body dissatisfaction or a history of emotional trauma, as has been suggested in previous research as referred to by Doncel (2022), as well as the intensity and influence that they had since the person's childhood as mentioned by Orellana & Reivan (2025). Another option to consider is the fact that bulimia, when including behaviors such as binge eating, is more closely related to impulsive emotional dysregulation than to emotional suppression or psychological impairment, which leads us to suggest including other variables such as impulsivity in future studies. Furthermore, the low predictability value indicates that the model is inappropriate for predicting the variability of bulimia with these variables.

It is important to highlight the possible influence of sex on the results, since the data show a higher prevalence of anorexia in women compared to men, which coincides with the literature, which has pointed out the greater vulnerability of women to developing eating disorders, as mentioned in their research by Arija et al (2022), Fernández & Pedrón (2022), Restrepo & Castañeda (2020) and Quiñonez et, al (2022). It should be noted that this pattern could be partly explained by the greater social and media pressure exerted on the female gender related to a social standard of ideal body, as well as by cultural factors that promote unattainable beauty standards for women. However, in the case of bulimia, the sex difference was not significant, as mentioned by authors such as Antonia

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Rodríguez (2024) and Bautista et, al (2020), which suggests that eating disorders can affect both sexes equally. However, when mentioning TCA together, we can conclude that there is a higher prevalence in women than men, as mentioned by Hoyos et al. (2025).

The limitations of this research were related to the limited sample size, which could reduce the ability to generalize results. Variables not considered in this case included body dissatisfaction, personal history, social pressure, among others, which could provide a new database on risk factors for eating disorders. The non-experimental, cross-sectional design chosen for this study prevents causal inferences, limiting it to identifying correlations, not whether one variable can cause changes in another. It should be taken into account that the results obtained may be affected by external events, which do not necessarily reflect the longitudinal dynamics of eating disorders. To address these limitations, it is recommended to increase the sample size to obtain a greater amount of data, in addition to including other psychological factors that may be related to the case, as well as changing the design to a longitudinal one in order to study the development and progression of eating disorders along with their determining factors.

5. Conclusions

Despite its limitations, this study provides a solid theoretical framework for the relationship between poor mental health and anorexia nervosa, highlighting the importance of mental health in preventing future eating disorders. On a practical level , the results obtained may be useful for designing future programs focused on psychological interventions to improve people's mental health and thus prevent the onset of eating disorders. Among the benefits of this research is the understanding of how poor mental health can lead to future eating disorders, which is why addressing this issue through individual or group interventions must be

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a key focus in our practice. Similarly, the impact of poor mental health, expressive suppression, and stress on eating disorders was identified, enabling future research to provide baseline information from which to build new goals.

6. Contribution of the authors

MARG – Analysis of results
GGRO – Data collection

7. Ethics committee approval and consent to participate in the study

The Clinical Research Ethics Committee of the Ministry of Public Health, approved by CEISH:036-2023, MSP Catholic University of Cuenca, Ecuador, will approve the study, and signed informed consent will be obtained from the volunteer participants in the psychiatric outpatient department of the Citizen Care Program "Ecuadorian Mental Health."

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Anatomy of the inferior alveolar nerve and its clinical implications

Anatomía del nervio dentario inferior y sus implicaciones clínicas

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Summary

Introduction: The inferior alveolar nerve is one of the terminal branches that gives off the third branch of the trigeminal nerve. Injury to the inferior alveolar nerve has a prevalence ranging from 0.53 to 8.4%. **Objective:** To analyze the most relevant aspects concerning the anatomy of the inferior alveolar nerve and its main clinical implications . **Methodology** : A narrative review was conducted, in which 19 publications were selected from **the** following databases: SCOPUS, PubMed, Web of Science , Google Scholar and human anatomy textbooks, during July to December 2024. **Results:** The inferior alveolar nerve can be injured in dental procedures such as the placement of dental implants, third molar extractions, lower posterior teeth, retained teeth, endodontic treatments, periradicular surgeries , orthognathic surgeries, distraction osteogenesis and mandibular trauma. **Conclusions:** It is essential to know the typical anatomy of the inferior alveolar nerve and its anatomical variants, to reduce the risk of injury.

Keywords: Dentistry, anatomy, inferior dental nerve.

Resumen

Introducción: El nervio dentario inferior es una de las ramas terminales que emite la tercera rama del nervio trigémino. La lesión del nervio dentario inferior tiene una prevalencia que oscila entre el 0,53 y el 8,4%. **Objetivo:** Analizar los aspectos más relevantes concernientes a la anatomía del nervio dentario inferior y sus principales implicaciones clínicas. **Metodología**: Se efectuó una revisión narrativa, en la que se seleccionaron 19 publicaciones en bases de datos: SCOPUS, PubMed, Web of Science, Google académico y libros de texto de anatomía humana, durante julio a diciembre de 2024. **Resultados:** El nervio dentario inferior puede lesionarse en procedimientos odontológicos como la colocación de implantes dentales, extracciones de terceros molares, piezas dentarias el sector postero inferior, dientes retenidos, tratamientos endodónticos, cirugías perirradiculares, ortognáticas, distracciones osteogénicas y trauma mandibular. **Conclusiones:** Es fundamental conocer la anatomía típica del nervio dentario inferior y sus variantes anatómicas, para disminuir el riesgo de lesiones.

Palabras clave: Odontología, anatomía, nervio dentario inferior.

1. Introduction

The inferior alveolar nerve, together with the lingual nerve, are the terminal branches of the posterior trunk of the mandibular nerve, which constitutes the third branch of the fifth cranial nerve (trigeminal nerve). The inferior alveolar nerve is purely sensory, providing sensitivity through its branches to all lower teeth, adjacent bone tissue, the vestibular gingiva, and soft tissues of the mental area (1,2,3).

Injury to the inferior alveolar nerve has a prevalence ranging from 0.53 to 8.4% (4). Considering the importance of understanding the course and branches of this nerve in preventing injury in various dental and maxillofacial procedures, it is therefore pertinent to conduct this literature review to analyze the most relevant aspects of the anatomy of the inferior alveolar nerve and its main clinical implications.

2. Methodology

A narrative description was made regarding the anatomical considerations of the internal dental nerve and its clinical implications. The search strategy took into account criteria such as: relevance and origin of the data, objective development of the content, and scope of the research. Based on these parameters, 19 publications were selected, including: review articles, original articles, textbooks, and clinical cases related to the subject of study, in English and Spanish. The information was collected from databases, platforms, and/or virtual libraries such as SCOPUS, PubMed, Web of Science, Google Scholar, as well as the human anatomy book, between July 2024 and December 2024.

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3. Development

3.1. Common anatomical presentation of the inferior alveolar nerve

The inferior alveolar nerve begins about 5 millimeters inferior to the foramen ovale in the zygomatic fossa and descends anterior to the dental artery, relating medially to the internal pterygoid muscle and the interpterygoid aponeurosis . It is also related laterally to the ascending branch of the mandible and the external pterygoid muscle as far as the mandibular foramen (2,5,6).

It gives off the mylohyoid nerve before entering the inferior dental canal or mandibular canal. It runs in the inferior dental canal, gives off an internal branch, known as the incisive branch, and an external branch, which emerges through the mental foramen, called the mental nerve (5,6).

In histological studies of the inferior dental nerve, a single trunk has frequently been described that divides at the level of the molars into two extensive nerves that extend in a spiral: the incisive nerve and the mental nerve (7).

The mental nerve supplies branches to the skin and mucosa of the lower lip, as well as the skin of the chin. The incisive nerve, meanwhile, continues anteriorly through the mandibular canal and gives off branches to the incisors, canine, and adjacent gingiva (2,5-7).

Most radiological and cadaveric findings have reported that the inferior alveolar nerve has a plexiform configuration, receiving bony perforating branches from neurovascular bundles that emit adjacent muscular structures. These accessory alveolar nerves are especially visible in a lateral plane of each mandibular third molar and constitute a relatively frequent cause of incomplete inhibition of local pain after the application of anesthesia for inferior alveolar nerve block (2,6,8).

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3.2. Anatomy of the mandibular canal

The mandibular canal, also known as the inferior dental canal or inferior alveolar canal, begins with the mandibular foramen, located on the inner surface of the mandible. The mandibular canal is located anterior to a bony eminence called the lingula. The mandibular canal passes through part of the body of the mandible and ends at each mental foramen (6,9). (See Figure 1)

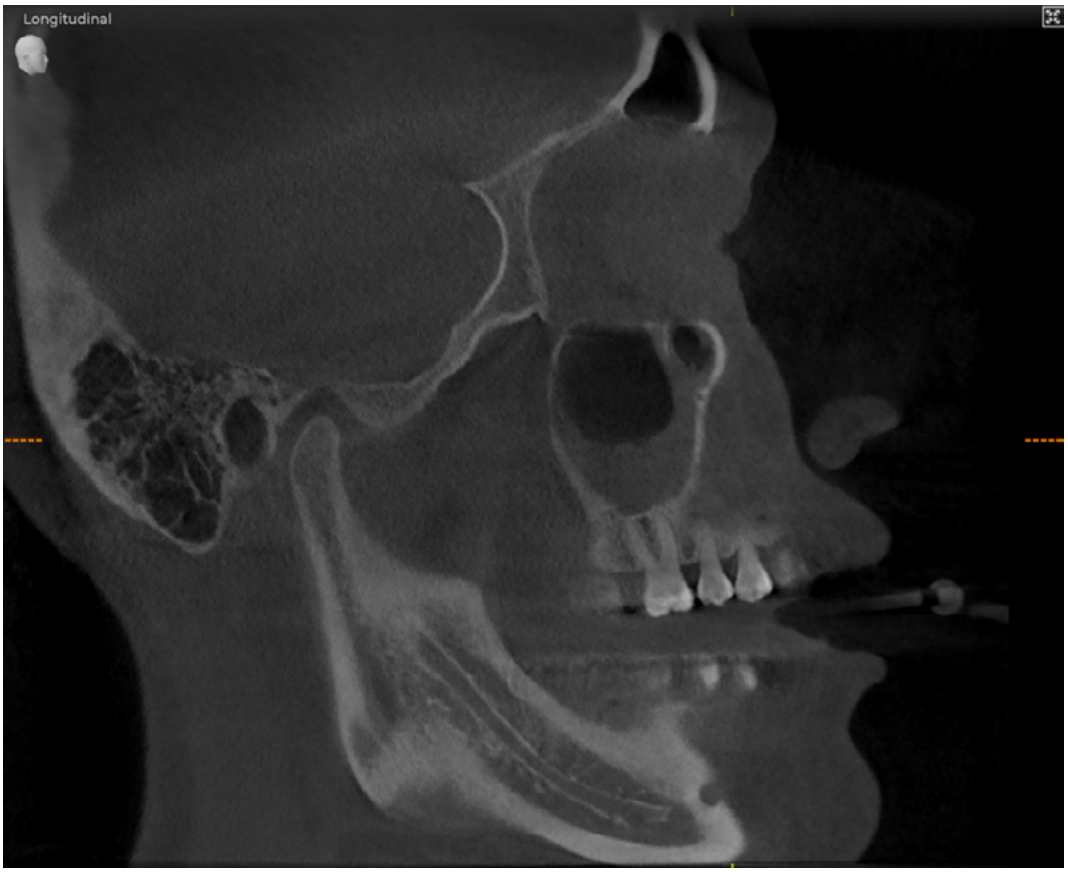

Figure 1. Mandibular canal. The sagittal section shows the course of the mandibular canal, from the mandibular foramen to the mental foramen, between which the inferior alveolar nerve runs. **Source:** Image obtained at the dental clinic of the Salesian Polytechnic University (Guayaquil campus).

3.3. Anatomical variations of the inferior alveolar nerve

The injuries of the alveolar nerve can be of great magnitude according to the scale of the pain to such an extent that they can compromise the quality of life of the patient in such a way that the adequate identification and perception of the anatomy of the inferior dental nerve is essential for any oral surgery intervention in the mandibular region. Therefore, it is important to know the variations in terms of morphology, course and its various relationships with the adjacent structures and the behavior of the nerve in its intraosseous mandibular course in order to make a good diagnosis, as well as to avoid injuries to the nerve in any dental procedure (1-4).

The inferior dental nerve mainly runs, in cadaveric dissections, with three presentations of anatomical variants: a) constituted by a single trunk that is distributed throughout all the apices of the lower teeth; b) fragmented into small branches; c) this type is initially divided into two branches, an upper one responsible for innervating the second and third molars, and a branch located apically that provides innervation to the remaining lower teeth (10,11).

Nortj e & Farman (12) described four anatomical variants in relation to the mandibular canal, according to the findings detected in panoramic radiographs: a) a single bilateral and simple canal; b) a single bilateral canal, but with a radiologically intermittent path; c) several small-caliber canals; d) mandibular canal not visible or with a double shape .

Among the most common variations we can find the double or bifid inferior alveolar nerve, described in the study carried out by the aforementioned authors, who indicate that up to 0.9% of individuals had a bifid nerve displayed in the x-rays taken, of which 20% were bilateral and 13% were unilateral. Therefore, within the contextual study of the mandibular area, these variations in the anatomy that can be detected from the radiological level are considered together and that may be subject to variations in age, taking into account that, the older the patient,

the mandibular canal through which the inferior alveolar nerve runs is usually located in a higher position (12).

3.4. Clinical implications of the inferior alveolar nerve.

In dental practice there are numerous procedures performed on the jaw, to mention a few examples: placement of dental implants, extractions of third molars, teeth in the lower posterior sector, retained teeth, endodontic treatments, peri-radicular surgeries, orthognathic surgeries, osteogenic distractions, mandibular trauma, among others, and despite the fact that the anatomy of the inferior alveolar nerve is known, iatrogenic injuries of the inferior alveolar nerve are well documented (13).

Among the most frequent injuries of the inferior alveolar nerve due to lack of knowledge of its anatomy are: lacerations, neurosensory injuries such as neurapraxia, axonotmesis and neurotmesis that can occur due to compression or stretching. In the first, the nerve is anatomically intact, but is unable to conduct the nerve impulse. This can be caused by any type of external pressure (14) .

The Axonotmesis is a more severe injury because it involves axonal degeneration. The main clinical implication is that it requires a longer recovery period compared to neurapraxia. On the other hand, axonal degeneration requires a longer recovery period. In neurotmesis, there is a complete disruption of the axon and the myelin sheath. Complete deterioration of nerve function is evident, in which case surgical intervention is indicated (14).

Neurosensory lesions can cause chronic pain and complete anesthesia of the areas innervated by the affected nerve. Chemical damage may also occur from components used in endodontic treatments such as formaldehyde, corticosteroids, eugenol, and sodium hypochlorite. Thermal damage may occur due to bone overheating during procedures (15).

The technique for procedures on third molars that are anatomically related to the inferior alveolar nerve consists of anesthesia, incision, osteotomy, odontosection, and extraction. An intentional coronectomy has been proposed to allow mesial migration of the tooth and avoid injury to the inferior alveolar nerve (4).

3.5. Damage to the inferior alveolar nerve

Damage to the inferior alveolar nerve is a significant complication in dentistry and oral surgery. The inferior alveolar nerve is responsible for sensation in the jaw, lower teeth, and lip, so injury to it can result in partial or complete loss of sensation in these areas, as well as neuropathic pain. The most common causes of damage to the inferior alveolar nerve include the extraction of third molars (wisdom teeth), dental implants, orthognathic surgery, endodontic procedures, lateralization of the nerve, and mandibular fractures. Inflammatory diseases, such as osteomyelitis, can also affect this nerve (16).

Symptoms of inferior alveolar nerve damage vary depending on the severity of the injury and include paresthesia (tingling), anesthesia (complete loss of sensation), and neuropathic pain (pain caused by the nerve injury). Diagnosis of inferior alveolar nerve damage is made by a combination of clinical evaluation and imaging tests, such as X-rays and computed tomography (CT). Sensory testing is also useful in assessing the degree of nerve injury (17).

Treatment for damage to the inferior alveolar nerve depends on the severity of the injury. Options include: a) **Conservative treatment:** Pain medication, anti-inflammatory drugs, and regular follow-up to observe the nerve's natural recovery; b) **Surgical interventions:** In severe cases, procedures such as nerve decompression and microsurgery may be considered to repair the nerve; c) **Physical therapies:** Electrical stimulation and low-level laser therapy can aid in nerve regeneration and functional recovery; d) **Prognosis:** The prognosis for recovery from damage to the

inferior alveolar nerve varies widely. Factors such as the patient's age, the extent of the damage, and the promptness of treatment influence the results. Most patients experience some improvement over time, although some may have permanent after-effects (18).

Proper management of inferior alveolar nerve damage is crucial to minimize complications and improve the patient's quality of life. A combination of accurate diagnosis and individualized treatment is essential to optimize nerve recovery outcomes.

3.6. Recovery of the inferior alveolar nerve

The recovery of the inferior alveolar nerve is a topic of great relevance in dentistry due to its involvement in the sensory function of the mandible. Injuries to the inferior alveolar nerve can occur for various reasons, including dental surgical procedures, mandibular fractures and inflammatory diseases. Some therapies have been proposed for the recovery of the nerve, being some minimally invasive alternatives, such as pharmacotherapy and other more invasive ones such as decompression surgical interventions, each of these having its success rate (19).

Pharmacological therapies, including anti-inflammatory and neuroprotective agents, have been shown to be useful in reducing inflammation and promoting nerve regeneration. Surgical interventions, such as nerve decompression and microsurgical repair, are used in cases of severe injuries with varying results. On the other hand, physical therapies, including electrical stimulation and low-level laser therapy, have shown promising results in accelerating nerve recovery. Nerve recovery time can vary, ranging from 6 months to 1 year, or even in cases where the damage is already permanent. To verify the recovery of nerve sensitivity, a mapping of the affected area is chosen (19).

It is concluded that recovery from damage to the inferior alveolar nerve is a complex process dependent on multiple factors, and that a combination of different therapeutic approaches can offer the best results.

An individualized evaluation of each case is recommended to determine the most appropriate treatment.

5. Conclusions

The alveolar nerve is an anatomical structure of special importance in various dental procedures, such as the placement of dental implants, third molar extractions, mandibular posterior teeth, impacted teeth, endodontic treatments, peri-radicular surgery, orthognathic surgery, as well as distraction osteogenesis and mandibular trauma. Therefore, it is essential to understand the typical anatomy of the inferior alveolar nerve and its main anatomical variants.

5. Contribution of the authors

LESP: Bibliographic search, introduction, methodology, development, conclusions.
FSA: Bibliographic search, development and conclusions.
EORC: Bibliographic search and development.
SSV: Bibliographic search and development.

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Micro-curricular planning design in the development of research capabilities

El diseño de planificación microcurricular en el desarrollo de capacidades investigativas

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Summary

Discussing higher education not only involves focusing on its scientific nature, but also on its human and intercultural components. Therefore, its objective is oriented toward preparing individuals for integration into society, developing skills and attitudes that ensure educational quality and adaptation to environmental demands. This study focused on understanding how the structure of microcurricular designs in the research subject fosters the development of skills in final-semester students in the Faculty of Human Health at a public university in the city of Loja.

The approach used was a mixed, non-experimental, cross-sectional, and descriptive design, analyzing ten documents from five undergraduate programs. The technique used was document analysis, based on the Competency-Based Model. The results indicated that specific skills such as report writing, use and application of research tools, and formative assessment strategies were the most frequently used. It was concluded that the microcurricular design of the research course fosters effective learning about social issues.

Keywords: education; capabilities; educational model, curriculum investigation.

Abstract

To talk about higher education is not only to focus on the scientific character, but also on the human and intercultural component, therefore, its objective is oriented to prepare individuals to integrate them into society, developing skills and attitudes that ensure educational quality and adaptation to the demands of the environment. This study focused on how the structure of the course level curriculum designs in the subject of research fosters the development of skills in students of the Faculty of Human Health of the National University of Loja.

The approach used was mixed, non-experimental, with a cross-sectional and descriptive design, analyzing ten documents from five undergraduate courses. The technique used was documentary analysis, based on the Competency-Based Model. The results indicated that specific skills such as report writing, use and application of research tools, and formative strategies of formative evaluation are the most used. It was concluded that the micro-curricular design of the research subject favors effective learning about social problems.

Keywords: Education; capabilities; educational model; curriculum, research.

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Introduction

To talk about higher education is to understand how the processes of formation and transmission of knowledge are generated; its objective is to create capacities and attitudes in individuals that lead them to solve problems in a creative and efficient manner (Barrios and Resendiz, 2012).

For this reason, universities are concerned with taking care of the quality of their management, incorporating value into the experience that students experience, providing environments appropriate to the demands that arise every day, implementing relevant research and promoting teacher updating (Espejo et al., 2020).

In this sense, the purpose of higher education is for students to develop complex skills and achieve high quality standards. To achieve this, it is essential to implement a curricular organization that considers academic redesign, promotes learning for faculty members, and fosters institutional innovation in planning, coordinating, and articulating educational topics (SITEAL, 2019).

Therefore, the curricular organization constitutes a key strategy within the curriculum, it is generic in nature, so it can be applied and administered in various curricular proposals, to promote the training of professionals with technological innovation (Díaz, 2005).

In this sense, the curriculum encompasses aspects that guarantee students meaningful learning, equipping them with the skills necessary to function in everyday life and thus encouraging decision-making, guiding them toward the planning, organization, and integration of curricular components. This is done with the goal of achieving learning outcomes at the macrocurricular, mesocurricular, and microcurricular levels (Melillán and Cravero, 2022).

The microcurriculum is understood as the instrument that regulates and guides teaching work; its structure includes learning content,

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objectives, time for developing the subject, and actions to be implemented in the classroom and in practice (Guerrero, 2021).

This microcurriculum is also subject to assessment processes, so its structure must be dynamic, relevant, and effective. Its components include analytical programs and syllabi, which were originally understood as lists or indexes, but over time became strategic documents for planning and managing learning (Guffante et al., 2016).

Thus, in the context of higher education, the creation of microcurricular guidelines guarantees that educational processes are coherent, effective, and adapted to academic requirements, facilitating the updating of teaching content and methodologies to promote comprehensive, relevant training in line with technological and scientific advances (Grisales, 2024).

In this sense, Vidal (2008), in his study entitled *Evaluation of the curricular design of the Health Information Management profile of the Health Technology career*, points out that:

> Students' satisfaction with their program expectations is high (71.1%); teachers perform well and adequately (91.8%); access to written or electronic bibliography is difficult (43.0%); theory and practice are poorly connected (49.6%); teaching aids are poorly available (60.3%); students have a good level of assimilation in developing skills (88%); practical activity guides are good and adequate (72%); and the assessment system is good and adequate (76%). (p. 7)

The results mentioned in the previous paragraph highlight the importance of microcurricular planning as a key tool for organizing practical activities. Therefore, educational institutions must offer opportunities that make content meaningful to students, while teachers

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must promote tasks and activities that involve reflective assessment and practice (Calderón, 2019).

However, universities face various challenges when implementing innovative practices within the microcurriculum, preventing the effective construction of capacities in the student training process (Herrera, 2024).

Capabilities are defined as the set of activities that integrate theory with practice, generating skills such as learning independently, formulating and solving problems, acting intelligently and with critical thinking (Cabra, 2008).

For Borges (2024), capabilities are understood as knowledge, skills, attitudes, and values; they involve knowing, doing, and being, in the context of academic training. Therefore, they are understood as the set of knowledge, skills, dispositions, and behaviors that a person possesses, for the successful completion of an activity.

To this end, the syllabus is designed to develop skills that allow students to establish a direct connection with the attitudinal aspect, thus fostering a significant impact on their job placement. However, the ambiguity with which these aspects are sometimes presented in the curriculum has given rise to different interpretations, generating controversy in their practical development, because neither the methods, media, nor their possible relationships with the rest of the didactic components have been defined (Barrachina and Blasco, 2012).

In this sense, introducing basic skills in the curriculum requires reorganizing the teaching and learning scenarios, in order to ensure that the student is able to effectively and successfully address communicative situations, has mastery over discursive comprehension, uses reading and documentary research strategies and organizes information (Arnao and Medina, 2014).

Following this analysis, the purpose of this paper is to determine the structure of the microcurricular design in the development of skills acquired in the research course among students in the final semesters

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of undergraduate programs offered at the Faculty of Human Health. To achieve this objective, the following key question is posed: How does the analysis of the research course microcurriculum contribute to identifying the skills developed by students?

Materials and methods

To achieve the objective of this study, a mixed-method, non-experimental, cross-sectional, and descriptive approach was adopted. The sampling was non-probabilistic and convenient. Ten documents were analyzed from the microcurricula (analytical plans and syllabi) of the five undergraduate programs at the Faculty of Human Health: Medicine, Nursing, Dentistry, Clinical Laboratory Science, and Clinical Psychology.

The technique used to gather information was document analysis, based on the Competency-Based Model, which included aspects such as the acquisition of skills to formulate questions, design projects, analyze data, and communicate results. This approach considers both learning outcomes and the integration of practical and theoretical skills (Icarte and Lávate, 2016).

Ecuador's Academic Regulations were also considered. Article 22 establishes that learning is organized through various activities: in contact with the teacher, experimental practice, and independent learning (Higher Education Council, 2022).

The instrument used was the *Strategy for Microcurricular Design by Learning Outcomes in the University Context* developed by Pérez (2018). This scheme is organized into three parts: the first contains the administrative and organizational data of the subject, and the second contains the planning of learning outcomes and assessment mechanisms.

The Atlas.ti tool was used to obtain the results, which facilitated the organization, coding, and graphical analysis of the data. In addition,

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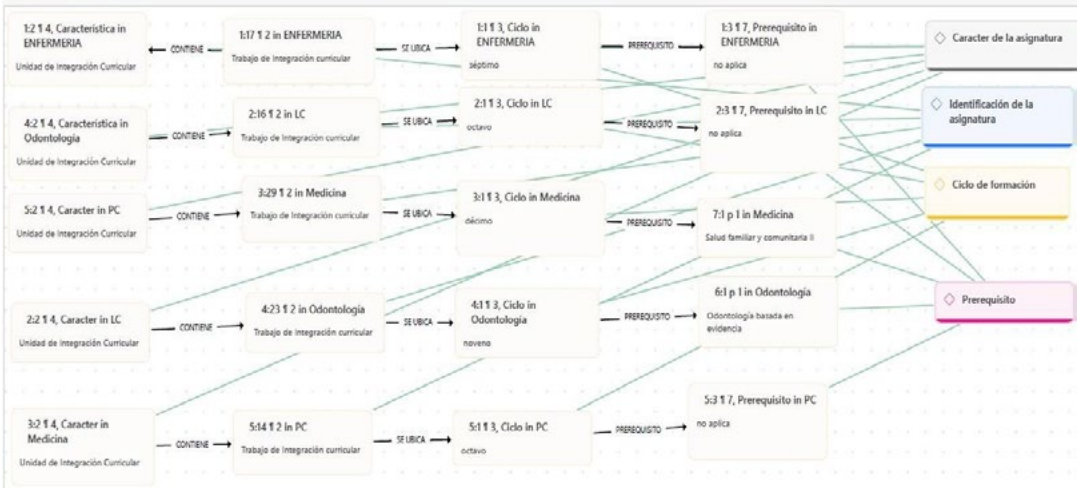
a frequency and percentage analysis was performed, the results of which were presented in Excel tables.

Results

As stated, after reviewing ten documents on the structure of microcurricular designs corresponding to the research subject, the following findings were obtained.

Figure 1. First moment: Administrative - organizational of the subject



Note : Clinical Psychology (CP) and Clinical Laboratory Science (CL).

Within the first stage of analysis of the structure of the microcurricular design, administrative and organizational aspects of the research subject were identified, which includes the name of the subject, training cycle, nature of the subject and prerequisites.

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Table 1. First moment: Administrative - organizational: curricular activities in number of hours of the subject.

Career	Chronological face-to-face hours in the classroom	Practical hours	Hours of independent work	Total hours
Medicine	144	32	184	360
Nursing	144	144	72	360
Dentistry	144	144	72	360
Clinical Laboratory	144	144	72	360
Clinical Psychology	144	32	184	360

The Academic Regulations state that students have 360 hours to complete the research course. Furthermore, each program's hours are allocated to ensure that students have sufficient time to cover research theory in the classroom, develop their practical skills, and prepare their research paper.

Table 2. Second moment: Planning learning outcomes, contribution and hours.

Career	Units	Results learning	Contribution	Number of Weeks	Total hours
	Unit one		High	4	90
	Unit two		High	4	90
Medicine	Unit three	1	High	4	90
	Unit four		High	4	90
	Unit one	1	Average	8	180
Nursing	Unit two	1	Average	8	180
	Unit one	1	High	6	135

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Dentistry	Unit two	1	High	6	135
	Unit three	1	High	6	135
	Unit one	1	High	8	180
Clinical Laboratory	Unit two	1	High	8	180
	Unit one	1	High	8	180
Clinical Psychology	Unit two	1	High	8	180

In the second stage of the microcurriculum structure, it is identified that the subject contents are addressed in two, three, and four units. For each unit, a learning outcome is proposed that demonstrates high and medium contributions to the graduate profile. With this, each program guarantees that students acquire specific knowledge, skills, and competencies in research.

Table 3. Research capabilities proposed in the microcurricular design.

Capabilities investigative	Frequency	%
Specific	4	0.4
Generic	3	0.3
Transversals	3	0.3
Total	10	1

Specific research skills, including report writing, data organization, and use of research methodological tools, are the most frequently applied by majors. These skills contribute to the theoretical and practical work of the subject.

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Table 4. Activities included in the research capabilities proposed in the microcurricular design.

Capabilities	Activity
Specific	Report writing, Organize data research methodologies, develop discussion
	Criticism and scientific foundation, Use and management of research methodological tools, Application of research principles
Generic	Respect, Problem-solving, Skills communicational
Transversals	Ethics, Values, Environmental Bioawareness, Respect
Experiential	Management for health

Specific research skills are characterized by working in the areas of report writing, information organization, and the use and management of research-focused tools.

Table 5. Training strategies identified in the microcurriculum of the research subject.

Strategy	Frequency	%
Formative assessment	5	0.31
Experiential evaluations	3	0.18
Autonomous strategies	2	0.12
Collaborative strategies	1	0.06
Critical reflection	1	0.06
Project-based strategy	1	0.0.6
Active strategies	1	0.06
Technological strategies	1	0.07
Cooperative strategies	1	0.06

Training strategies are an essential part of the structure of microcurricular designs. This study highlights formative, experiential,

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and autonomous assessment strategies as the most commonly used, demonstrating their impact on the teaching-learning process.

Table 6. Activities included in the training strategies identified in the microcurriculum of the research subject.

Strategy	Activity
Project-based strategy	Students work on real projects integrating theoretical and practical knowledge, analysis of clinical cases
Collaborative strategies	Group work
Formative assessment	Tutorials, forums, portfolio, summaries, discussions, concept maps, periodic evaluation, videos
Critical Reflection	Promotes self-assessment and reflection
Experiential evaluations	Workshops, simulations
Active strategies	Dynamic and participatory techniques,
Technological strategies	Use of Internet resources
Autonomous strategies	Freelance work
Cooperative strategies	Promotes small group activities

Training strategies focus on the ongoing collection and analysis of information about student learning, including tutoring, forums, portfolios, summary writing, and periodic assessments within the development of the research subject.

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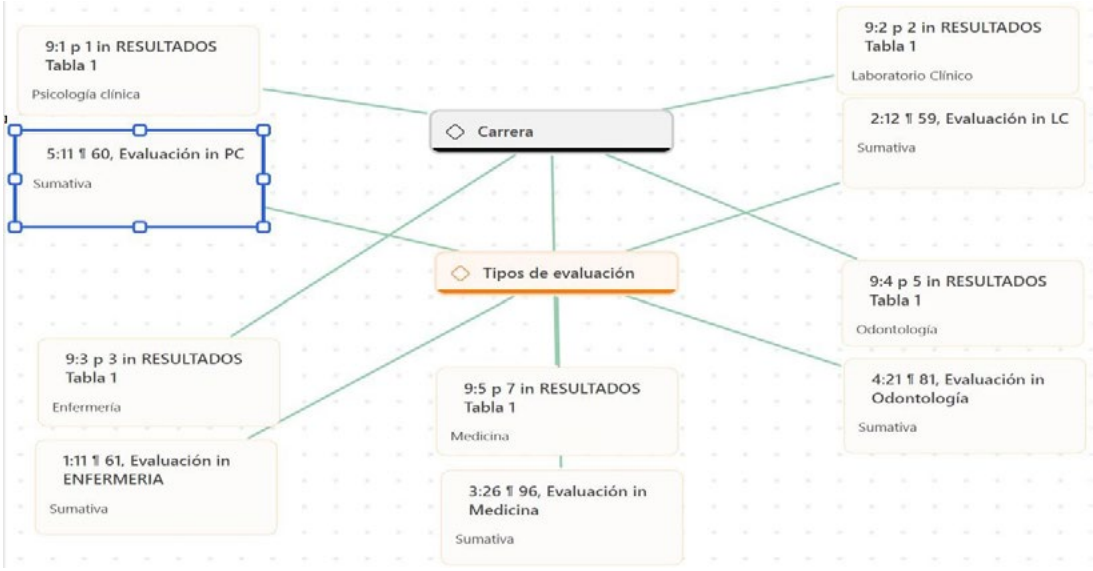
Figure 2. Third moment: evaluation mechanisms



Note : Clinical Psychology (PC) and Clinical Laboratory (LC).

The third aspect of assessment mechanisms: It is evident that the undergraduate programs at the Faculty of Human Health use summative assessment to measure student outcomes.

Discussion

Microcurricular planning is an essential tool in higher education, as it facilitates the adaptation of educational practices to the demands of today's education. This work highlights the role of teachers in generating meaningful learning, considering that they are responsible for daily classroom planning, creatively designing activities, implementing teaching strategies tailored to students' needs, and promoting educational practices that integrate technological resources and foster cooperative learning. Finally, it is evident that the type of assessment used in these programs is summative.

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In this research work, the administrative-organizational structure of the research subject was initially identified, which consisted of: name and nature of the subject, as well as the identification of prerequisites.

Pérez (2018) mentions that all higher education institutions must provide models for planning, since this information allows the educational proposals generated by the teacher to be specified.

On the other hand, Parcerisa (2008) mentions that every subject must contain organizational characteristics that collect data such as: name, credits, course, code, teaching, since this allows the teacher to coordinate activities within the classroom.

Regarding the planned learning outcomes for the research subject for each of the undergraduate programs at the Faculty of Human Health, it was found that there is one for each learning content unit.

Studies proposed by Ballesteros (2020) show that learning outcomes are considered essential in self-assessment processes, since they are responsible for describing the knowledge or skills that students must acquire at the end of a subject.

Another study indicates that by planning learning outcomes, students are expected to assimilate and integrate knowledge to apply in their professional life and thus solve social problems (Ruiz and Moya, 2020).

As a second stage of this research, it was identified that specific skills (report writing, data organization, critical reasoning, and use of research tools) were the skills proposed in the microcurricular design of the research subject.

For Barón (2020), in his study on the knowledge and skills that teachers possess to teach the research subject, he found that: 47.4% have precarious research skills; in terms of attitudinal skills 35.41%, cognitive research skills were 19.75%, while deficiencies in research knowledge were 5.3%.

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In postgraduate studies, it has been shown that research competencies, in addition to guiding the development of a research design, strengthen student confidence. Meanwhile, competencies associated with research design considered the participation of the student, the professor, and the institution (Tapia et al., 2018).

The study on the evaluation of research competencies programmed in the microcurriculum revealed that students generated greater achievement in: construction of the theoretical framework, processing information and using citations and bibliographic references (37%); research problem (35%), while the use of the APA System for bibliographic references represents 13% and in the detection of type and design of research were the lowest (7%) (Goñi, 2010).

The training strategies applied in the microcurricular designs of this research highlight that formative, experiential, and autonomous assessment strategies are the most commonly used.

While for Barrachina and Blasco (2012), the strategies used within the microcurricular design are related to the organizational and motivational aspects of teaching.

Mayorga and Madrid (2010) point out that the alternative didactic model and the adapted methodological strategies are those that best respond to educational demands, including: work by competencies, collaborative learning, classroom and group activities.

Another study highlights the existence of a weakness in knowledge generation, which suggests that teachers may not be using adequate strategies to promote effective productivity among participants in this educational institution (Freites and Quintero, 2010).

While Villanueva et al. (2022) state that collaborative work and decision-making stand out among the most commonly used training skills and strategies. However, communication skills, related to students' effectiveness in expressing their ideas, show average to low performance, while critical thinking skills reflect a significant result.

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Finally, in the third phase, called evaluation, this work showed that the undergraduate programs of the Faculty of Human Health use summative assessment to improve educational processes.

In contrast to what was previously mentioned, García and Sempere (2021) express that the application of rubrics is a tool for objective and consistent evaluation, promotes reflections on a topic of study and may include student participation.

Other research, such as that of Barcia et al. (2023), explains that formative assessment is of greatest interest to teachers since it can provide information on students' progress, measure their strengths and problems in certain content.

Conclusions

The microcurriculum design for the research course integrates various research skills. Specific skills encompass skills such as report writing, methodological data organization, development and use of methodological tools, and application of research principles. Generic skills include respect, problem-solving, and communication skills.

Complementing these capabilities are the training strategies themselves, which play a key role in microcurricular design, recognizing formative, collaborative, experiential, and autonomous assessment strategies.

It was determined that the microcurricular design structure of the undergraduate research course allows students to generate learning processes that enable them to address various social issues, since the course ensures the responsible application of research principles and with ethical and respectful conduct.

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Contribution of the authors

KCFF: Introduction, data collection, data processing, conclusions.

KDCC: Materials and methods, data tabulation, discussion, general review of the work.

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Regenerative medicine as a therapeutic alternative for chronic diseases and serious injuries: Advances, challenges and clinical applications

La medicina regenerativa como alternativa terapéutica para enfermedades crónicas y lesiones graves: Avances, desafíos y aplicaciones clínicas

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Summary

In recent years, regenerative medicine has experienced remarkable progress and the emergence of new applications, as well as significant challenges. This review article aims to analyze the advances, clinical applications, and challenges in regenerative medicine to drive further development and research in this field. The research adopted a qualitative approach and followed the systematic review protocol based on the PRISMA 2020 guidelines. Key advances include 3D bioprinting and cellular reprogramming, which have enabled the creation of functional tissues and organs in the laboratory, as well as the development of therapies to regenerate musculoskeletal tissue and vital organs from stem cells. Although many experimental studies on cell regeneration face challenges such as immunological compatibility and validation in aspects of safety and efficacy, these studies show great potential for more effective and less invasive treatments. According to the Regenerative Medicine 2030 Report, conducted in 2023, the regenerative medicine therapy market was valued at USD 30.43 billion worldwide; and an annual growth of 16.79% is expected from 2024 to 2030. In addition, a deeper understanding of the cellular and molecular mechanisms involved in organ and tissue regeneration has been achieved. The results demonstrate significant advances in regenerative medicine through the use of stem cells, platelet-rich plasma, organoids, and 3D printing, highlighting their application in the regeneration of bone, cartilage, neuronal, skin, and ocular tissue. Ethical and technical regulatory challenges are identified, such as the need for standardization, regulatory approval, and the development of safe and effective protocols for their clinical implementation. While regenerative medicine therapies are emerging as promising therapeutic alternatives for chronic diseases and serious injuries, continued interdisciplinary research is essential to advance their development and consolidate a future in which these conditions can be treated more efficiently and with less invasive methods, thus transforming medical practice.

Keywords: 3D bioprinting, stem cells, regenerative medicine, cell therapy, cell reprogramming.

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Abstract

In recent years, regenerative medicine has seen remarkable progress and the emergence of new applications, as well as significant challenges. This review article aims to analyze the advances, clinical applications, and challenges in regenerative medicine to drive further development and research in this field. The research adopted a qualitative approach and followed the systematic review protocol based on the PRISMA 2020 guidelines. Key advances include 3D bioprinting and cellular reprogramming, which have enabled the creation of functional tissues and organs in the laboratory, as well as the development of therapies to regenerate musculoskeletal tissues and vital organs from stem cells. Although many experimental studies on cell regeneration face challenges such as immunological compatibility and validation in terms of safety and efficacy, these studies show great potential for more effective and less invasive treatments. According to the Regenerative Medicine 2030 Report, conducted worldwide in 2023, the regenerative medicine therapy market was valued at USD 30.43 billion; and an annual growth of 16.79% is expected from 2024 to 2030. In addition, a deeper understanding of the cellular and molecular mechanisms involved in organ and tissue regeneration has been achieved. The results demonstrate significant advances in regenerative medicine through the use of stem cells, platelet-rich plasma, organoids, and 3D printing, highlighting their application in the regeneration of bone, cartilage, neuronal, skin, and ocular tissue. Ethical and technical regulatory challenges are identified, such as the need for standardization, regulatory approval, and the development of safe and effective protocols for their clinical implementation. While regenerative medicine therapies are emerging as promising therapeutic alternatives for chronic diseases and serious injuries, continued interdisciplinary research is essential to advance their development and consolidate a future in which these conditions can be treated more efficiently and with less invasive methods, thus transforming medical practice

Key words: 3D bioprinting, stem cells, regenerative medicine, cell therapy, cell reprogramming.

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1. Introduction

Regenerative medicine has emerged as a promising therapeutic alternative within the field of medical sciences, as a response to the constant search to improve the quality of life of people suffering from chronic diseases and serious injuries (1). This innovative field of medicine not only offers hope, but also tangible solutions for patients with degenerative diseases, organ transplants and trauma who previously seemed incurable or were affected by limited treatments (2).

In fact, the rapid advances in regenerative medicine have completely transformed the approach to various conditions ranging from spinal cord injuries to diseases such as Parkinson's, Alzheimer's and Diabetes Mellitus. These conditions continue to be investigated for treatment through stem cell tissue regeneration (2). This branch of medical science has sparked renewed interest among the scientific community, healthcare professionals and, above all, among patients and their families.

Regenerative medicine is defined as an emerging multidisciplinary field that seeks to repair or replace injured tissues or organs through tissue engineering (3). It is divided into three main approaches: stem cells, growth factors, and extracellular matrix or scaffolding (3). Each approach has the therapeutic potential to regenerate tissues to restore their normal function, rather than simply alleviate the symptoms of diseases.

Regenerative medicine offers a number of significant benefits for patients, healthcare professionals, and society at large. These include the possibility of personalized treatment, reduced long-term dependence on medications, improved quality of life, and the potential reduction in costs associated with long-term medical care (4) .

There are several regenerative medicine techniques, such as cell therapy, tissue engineering, and genomic medicine, that have become major advances in the field of medicine. Researchers in regenerative

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medicine are exploring new ways to harness the body's regenerative potential to treat a wide range of conditions.

of pathologies. This regeneration-focused approach represents a paradigm shift in the treatment of chronic diseases and serious injuries (5).

The increasing incidence of chronic diseases and serious injuries in contemporary society demonstrates an urgent need for new therapeutic strategies. In this context, regenerative medicine, by focusing on tissue repair and regeneration, offers more lasting and less invasive solutions than conventional treatments. This represents a genuine expectation for patients facing debilitating or potentially fatal medical conditions (6).

Thus, the main objective of this study is to analyze the latest advances, challenges, and clinical applications of regenerative medicine in the treatment of chronic diseases and serious injuries. Through a comprehensive review of the scientific and clinical literature, we aim to identify current trends, clinical and ethical implications, and future opportunities in this promising and dynamic field.

Methodology

The current research was carried out from a qualitative approach, following the systematic review protocol based on the PRISMA 2020 guidelines Preferred Reporting Items for Systematic Reviews and Meta-Analyses), which led the search, selection and analysis of relevant studies (Appendix A). The research variables were advances, challenges and clinical applications in regenerative medicine.

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Search Strategy:

A systematic search was conducted in databases such as Scopus, Google Scholar, PubMed, Uptodate, Dialnet Plus, Science Direct. The use of keywords and Boolean operators allowed the publications to be specified, as follows: ("Medicine" AND "Regenerative"; "Chronic Diseases" AND NOT "Acute Diseases"; "Stem Cells" OR "Tissue Regeneration" OR "Cell Therapy" OR "Tissue Engineering").

To narrow down the search results, the following filters were applied: time limit (2017-2024), subject area (Medicine; biochemistry, genetics and molecular biology, Engineering), document types (articles, reviews, editorials, conference papers, books), keywords (regenerative medicine, stem cells, tissue regeneration, cell therapy), language (Spanish and English), and documents that are available online and do not require payment for access were included.

Eligibility Criteria:

The selected publications meet the following inclusion criteria: (1) Study types such as: scientific articles, review articles, clinical trials, books, theses, observational studies, meta-analyses; (2) Interventions related to regenerative medicine treatment, such as cell therapy, gene therapy, tissue engineering, 3D bioprinting, etc. (3) Studies published from January 2017 to February 2024; (4) Studies published in English and Spanish.

The exclusion criteria applied in the literature search are listed below: (1) Duplicate studies or those with a high risk of methodological or quality bias; (2) Studies evaluating regenerative therapies for acute or superficial diseases that are not considered within the scope of the topic;(3) Publications outside the time range of January 2017 to February 2024; (4) Studies published in languages other than English and Spanish.

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Study Selection and Data Extraction:

The researcher was responsible for filtering out publications that did not meet the inclusion criteria. Studies were selected based on keywords and a reading of their abstracts, methodology, and conclusions. A narrative synthesis of the findings of the included studies was also conducted, highlighting the advances, challenges, and clinical applications of regenerative medicine in the treatment of chronic diseases and serious injuries.

Figure 1. PRISMA diagram

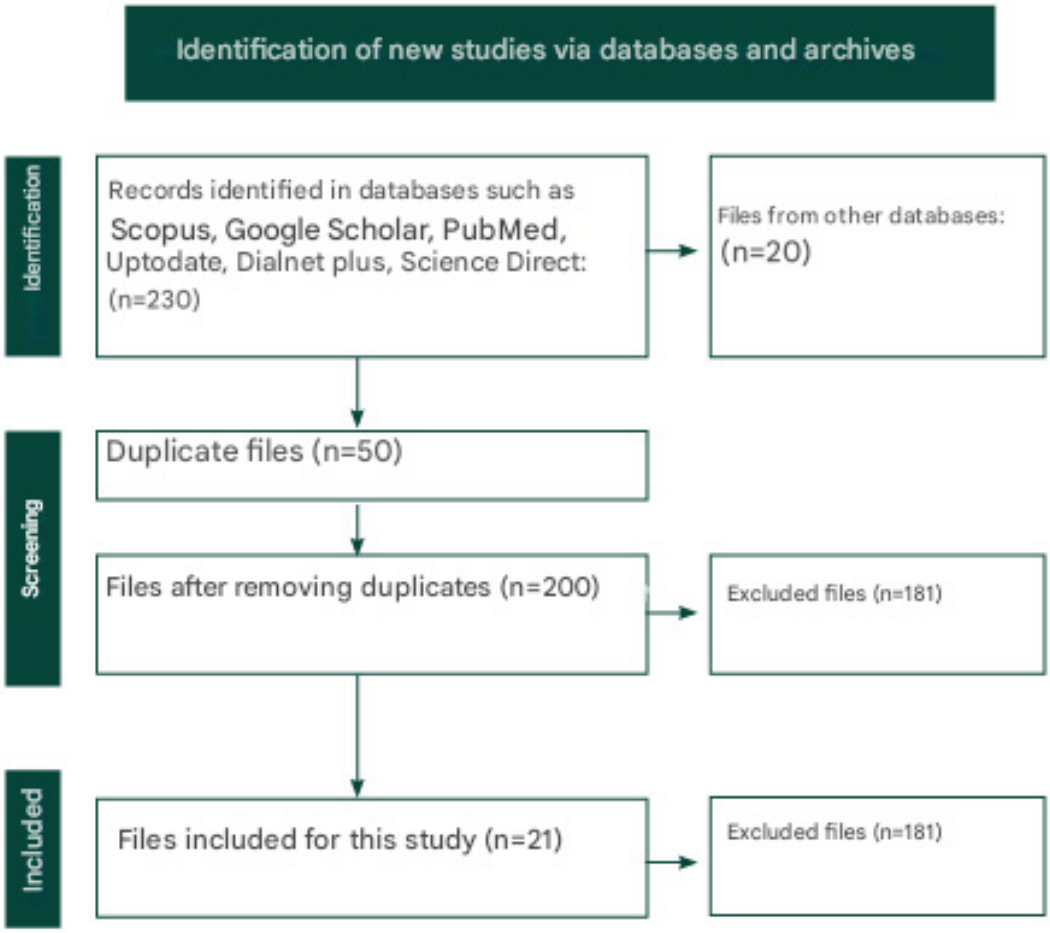

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Table 1. Results

Qualification	Authors	Year	Type of Study	Aim	Results
INTESTINAL ORGANOIDS: Present and future of biomedical research	Díaz, C.	2023	Review article	To provide an updated, literature-based overview of the applications of intestinal organoids in biomedicine and their future potential.	Intestinal organoids have proven useful in regenerative and precision medicine, as they have demonstrated the ability to model intestinal physiology and diseases, as well as epithelial damage caused by various agents. These models have allowed for in-depth studies of the molecular biology of various pathologies and the search for specific treatments. (7).
New approaches to developing safer strategies in regenerative medicine	Alkhraisat, M., Troy, M., Zalduendo, M., Anitua, E.	2019	Scientific article	Explore the advances, challenges, and clinical implications of regenerative medicine, emphasizing the use of autologous biological materials such as PRGF-Endoret for personalized tissue repair and regeneration.	PRGF-Endoret is a system that offers autologous biomaterial enriched with proteins and growth factors, capable of recreating three-dimensional matrices, providing a physical and bioactive environment for the regeneration and replication process. PRGF-Endoret has been shown to enhance the hemostatic effect, reduce the intensity of inflammation, and accelerate the proliferative and remodeling phases of bone tissue. The results also demonstrate that PRGF-Endoret is an alternative for the isolation, culture and ex vivo conservation of stem cells from different origins, without the risk of pathogen transmission or immune rejection, maintaining their phenotype and multilineage differentiation potential (4) .
Regenerative medicine: fundamentals and applications	Isaza, C., Henao, J., Aranzazu, J.	2018	Review Article	To systematically review and organize the latest information on the principles and applications of regenerative medicine.	Stem cells are special cells that can transform into other types of cells to aid tissue regeneration. Research indicates that when combined with demineralized bone and platelet-rich plasma, fracture healing is accelerated. They are also effective in the treatment of osteoarthritis, as they promote cartilage regeneration (4). In the field of eye diseases, the first commercial drug based on stem cells has already been approved for the treatment of corneal burns. Furthermore, it has been proven that the intradermal application of stem cells can prevent the formation of excessive surgical scars, preserving the normal structure and function of the skin (4) .

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Ethics in the field of Regenerative Medicine Research	Quesada, L., Barrios, C., Díaz, Z.	2021	Review Article	To examine the ethical aspects involved in research, fostering critical reflection, both cognitive and ethical, on scientific development in the field of regenerative medicine.	Regenerative medicine carries great ethical importance both in assessing the treatment of various diseases and in making responsible decisions. This includes respecting the limits of the patient's informed consent. Maintaining an appropriate ethical stance in regenerative medicine allows us to measure the impact of treatment with a responsible and humane attitude.
Ethics in regenerative medicine and platelet-rich plasma treatment	Quesada, L., León, C., Quintana, E.	2021	Review article	Analyzing regenerative medicine and platelet-rich plasma treatment from an ethical perspective	The ethical perspective linked to the use of platelet-rich plasma within regenerative medicine facilitated the analysis of scientific and technological advances, ensuring comprehensive, timely and structured medical care, supported by trained professionals and at an affordable and sustainable cost. (2) .
Background of the application of cell therapy as a health technology in medical and dental diseases.	Julia, R., Aurora, N., León, K., Riccis, S., Yolaidays, I., Naughty, N.	2023	Review article	To characterize the background of the use of cell therapy as a healthcare technology in the treatment of medical and dental diseases.	The historical study of the application of cell therapy in the treatment of medical and dental diseases has provided insight into its origin, evolution, and current status. In this context, cell therapy represents an innovative and promising option compared to conventional treatments for tissue regeneration (1) .
Neurodegenerative diseases and Cellular reprogramming: therapeutic potential and promise of rejuvenation	Lehmann, M., Mallat, M., Chiavellini, P., Brown, O., Goya, R.	2019	Book chapter	To describe emerging evidence indicating that aging is a reversible epigenetic process, along with novel reprogramming methods that would avoid the risks associated with conventional techniques requiring the generation of induced pluripotent stem cells (iPSCs).	Research into the production of neural cells, both in vitro and, to a lesser extent, in vivo, is constantly advancing. This line of research seeks to develop safe and effective protocols for obtaining patient-derived cells that can be applied in the treatment of neurological diseases such as Parkinson's, Alzheimer's, and other similar neurological pathologies. (8).

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The business of regenerative medicine and stem cells: confusion with legal implications	Cuende, N., Álvarez-Márquez, A., Díaz-Aunión, C., Castro, P., Huet, J., Pérez-Villares, J.	2021	Review article	To outline the fundamental requirements for the use of autologous biological products, with the aim of offering practical guidance for both the professionals who prescribe them and those who supervise the centers where they are administered.	The use of autologous biological products such as platelet-rich plasma (PRP) requires compliance with specific regulations, including advanced therapy manufacturing labeling, manufacturing in authorized laboratories, and compliance with regulations from the Spanish Agency for Medicines and Medical Devices (AEMPS). For experimental therapies involving cells and tissues, ethical approval and regional authorization are required. Furthermore, advanced therapy medicinal products must comply with transplant regulations regarding aspects such as donation, donor evaluation, and traceability. The Spanish National Transplant Organization (Spanish National Transplant Organization) has also issued regulations regarding medical devices used to obtain autologous cells and the classification of the resulting product as an advanced therapy medicinal product. In the case of cell and tissue transplants that are considered experimental therapies, the sponsor, in addition to submitting the study for evaluation to the corresponding research ethics committee, must request authorization from the competent authority of his autonomous community (the Autonomous Transplant Coordination) (9)

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III Congress on Tissue Engineering and Regenerative Medicine	Weinstein-Oppenheimer, C., Acevedo, C.	2023	Scientific article	To promote the exchange of ideas and cooperation within the scientific community in areas such as tissue engineering, biomaterials, regenerative medicine, and global scientific and technological advances that will influence future therapies, with the goal of contributing to the well-being and quality of life of society.	Significant progress has been made in research on Additive Biomanufacturing and its challenges in tissue replacement within Regenerative Medicine. The application of two biomanufacturing methodologies enabled the implementation of a high-resolution 3D bioprinting system capable of utilizing multiple materials and cells. Furthermore, the fabrication and validation of cellular tissues in animal models was achieved, as well as the development of a novel system for arthroscopic remarking of cartilage lesions. (7) .
Regenerative medicine, its applications and foundations	Pacios, J., Barrosos, M.	2023	Review article	To systematically compile and organize the most current information on the principles and potential uses of regenerative medicine.	The safety of regenerative medicine is supported by various investigations whose results are optimistic about the benefits of this new therapeutic strategy, and it is also assured that new treatment regimens based on regenerative medicine will continue to emerge in the coming years (10) .
Stem cells as an alternative to transvenous pacemakers	Martínez de Hoyo, K., Ortega Enciso, A., Mendoza Beltrán, F., Reynolds Pombo, J.	2020	Review article	To analyze the current development of biological pacemakers and explore future prospects for creating cardiac tissue with pacemaker function using advanced genetic technologies and tissue engineering.	Biological pacemakers, although in a preclinical stage of development, constitute an alternative to electronic devices for patients with selected cardiac diseases in the future. The main challenges faced are the difficulty in ensuring long-term engraftment and the potential risk of proarrhythmias (11) con avances en el dise˜no del cable, el tama˜no del generador, la longevidad de la batería y los algoritmos de software que se han traducido en dispositivos más peque˜nos con funcionalidad mejorada. En la actualidad existen muchos sistemas implantables de cardioestimulación capaces de reemplazar la función de los marcapasos fisiológicos (seno y nódulos aurículo-ventriculares.

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How will skin care change with research advances?	Rodriguez, P.	2018	Editorial	To analyze the efficacy of biomaterials such as umbilical cord fibrin scaffolds in the regeneration of deep wounds and their contribution to regenerative medicine.	The use of biomaterials through tissue engineering techniques allows for new treatment approaches for traditional skin wounds. A successful example is the application of fibrin scaffolds obtained from the umbilical cord for the treatment of deep wounds, which achieved homogeneous, scar-free regenerated skin. This allows us to conclude that research advances in regenerative medicine will serve as a support to current treatments to contribute to and improve tissue reconstruction (12) .
Influence of advances in tissue engineering and regenerative medicine on the progress and evolution of health	Madan Patel, G., Borah, N., Kumar, G.	2023	Review article	Examine how regenerative medicine, tissue engineering, and 3D bioprinting work together, while emphasizing advances in bioprinting technology for transplantable organs and tissues.	Tissue engineering and regenerative medicine work together to create new tissues and organs to offer an alternative to patients with deteriorating organs or debilitating diseases. Studies show that 3D bioprinting has the potential to manufacture or mimic patient-specific natural tissues from scaffolds and stem cells, where the healing and regeneration process is carefully controlled through the release of growth factors. However, improvements are needed to bring this technology to clinical application, but it remains an innovative technology for the future of medicine (5) .

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Advances in the development of organoids as study models in regenerative medicine	Aguilar, P.	2018	Thesis	To conduct a literature review to analyze current knowledge on the development of organoids as study models in the field of regenerative medicine, with a particular focus on intestinal organoids.	The study of organoids, mini organs grown in the laboratory, is booming due to their potential in regenerative medicine. The goal is to improve their development so that they better mimic real organs and optimize their transplantation to replace damaged organs. This opens the door to personalized treatment options for intestinal diseases and personalized medicine (13) se pueden crear unidades funcionales de diferentes órganos, denominados organoides, que se autoorganizan in vitro formando una estructura 3D, capaces de reproducir tanto la función como la estructura del órgano equivalente in vivo. Aunque tienen muchas más aplicaciones, son muy importantes en medicina regenerativa ya que pueden ser útiles para el tratamiento de un gran número de enfermedades donde el órgano no funciona como es debido, ya sea por un defecto genético, por un traumatismo o por otras causas. En este estudio se recogen los últimos avances en el desarrollo, así como en las diferentes formas de maduración de los organoides para su posterior trasplante en el huésped, centrándonos en los organoides intestinales y en las diferentes enfermedades que afectan a este órgano. (13.
3D printers, their innovation in the field of medicine	Alejandro, L., Rodríguez, D.	2020	Review article	Analyze the evolution of 3D printing, from its beginnings to the moment it became established as a method of innovation in medicine.	3D printing in medicine is a great innovation that guarantees more personalized and affordable care, which brings great benefits and good results to patients (7) .
Regenerative medicine for the treatment of neurodegenerative diseases	López-léón, M., Lehmann, M., Goya, R.	2017	Book section	Explore the potential of cellular reprogramming as a therapeutic strategy to restore impaired brain function, focusing on its applications in the treatment of neurodegenerative diseases such as Alzheimer's and Parkinson's.	Mature cellular reprogramming technology will provide, in the not too distant future, effective means to functionally restore the aged brain. Two approaches have been identified: lineage reprogramming and direct reprogramming using pluripotency factors, both aimed at investigating therapeutic alternatives for degenerative diseases such as Alzheimer's and Parkinson's (6) .

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Comparative analysis of bioprinters using additive manufacturing technologies with biomaterials, with the aim of evaluating their efficiency in generating organs and tissues for the biomedical field.	Viera Valencia, L., García Giraldo, D.	2019	Thesis	To conduct a comparative study of bioprinters that use additive processes with biomaterials, with the aim of determining their effectiveness in creating organs and tissues.	Additive process technology with bioinks and biomaterials offers the possibility of manufacturing personalized models and medical supplies adapted to the specific needs of each patient (14) .
Narrative review on the use of platelet-rich plasma as an autologous therapy in regenerative medicine.	Aguilar, R., Cáceres, A.	2020	Review article	To present the theoretical foundations that support the potential use of platelet-rich plasma (PRP) and its growth factors in regenerative therapies through autologous biostimulation, especially in diseases that still lack a specific treatment.	Platelet-rich plasma (PRP) is an autologous treatment used to enhance cell regeneration and tissue healing. Although there is no standardized procedure for its use, PRP has been shown to improve vascular permeability, cell regeneration, tissue healing, and immune response. Further studies are needed to better understand its mechanism of action, but PRP could be useful in degenerative and viral diseases such as COVID-19. In this context, it could be used as a complement during asymptomatic phases, in order to modulate the immune system, promote the regeneration of damaged organs and tissues, and control the progression of multisystem biodegradation (15).

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Standardization of a 3D bioprinting protocol for creating scaffolds with potential applications in tissue engineering.	Castellanos Garzón, J., Correa Quiceno, M., Peñaranda Armbrecht, J., Holguín Ruiz, J., King Piedrahíta, A.	2023	Scientific report	To standardize a 3D bioprinting protocol for creating scaffolds with potential applications in tissue engineering. Materials such as polycaprolactone (PCL), polylactic acid (PLA) filament, flexible filament, and various bioinks were used.	Key parameters such as bed temperature, PLA filament temperature and extrusion speed were adjusted in the REGEMAT 3D bioprinter, achieving the manufacture of three scaffolds with different geometries, potentially useful in areas such as otorhinolaryngology and orthopedics (16) la medicina está siendo complementada y fortalecida con los avances en desarrollo de biomateriales y técnicas como la bioimpresión 3D para la producción de andamios y estructuras orientadas a la reparación, la regeneración o reemplazo de tejidos dañados, afectados por alguna patología o trauma, como también en la prueba de fármacos y la entrega controlada de sustancias utilizadas en el tratamiento de enfermedades, dando paso a la investigación en ingeniería de tejidos, que se define como la ciencia del diseño y fabricación de nuevos tejidos, siendo un campo multidisciplinar que requiere de los aportes de la biología para el cultivo celular, de la ingeniería de materiales y la química para el desarrollo de estructuras 3D denominadas andamios y de profesionales de la salud para su implementación en medicina regenerativa. En este sentido, la Unidad Central del Valle del Cauca incentivando la vocación científica de los estudiantes del programa de ingeniería biomédica, adquirió el equipo de bioimpresión 3D REGEMAT3D R4L que cuenta con una tecnología que ha sido optimizada para imprimir distintos tipos de tejidos como cartílago, piel, hueso y para trabajar con distintos tipos de biomateriales, colágenos, nanocelulosas, termoplásticos. Para potencializar el uso del equipo, la Universidad Central del Valle (UCEVA.

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What are the advances, challenges, and clinical applications of regenerative medicine as a therapeutic alternative for chronic diseases and serious injuries?	Hosseini S, Taghiyar L, Safari F, Baghaban Eslaminejad M.	2018	Scientific article	To explore the opportunities for using mesenchymal stem cells (MSCs), their desirable therapeutic properties in regenerative medicine, and their potential implications for clinical practice.	Regenerative medicine and tissue engineering represent the most promising therapeutic biological strategies utilizing mesenchymal stem cells (MSCs). Mesenchymal stem cells have a high capacity for self-renewal through immunomodulatory properties, making them eligible for clinical applications (21).
Applications of stem cells in regenerative medicine and disease treatment.	Mahla R.	2016	Review article	It examines a framework for the most recent advances in embryonic stem cell (ESC) transplantation and tissue engineering technologies, and the tissue-in-tissue role of hematopoietic stem cells (ESCs). It also discusses stem cells as tools for regenerative use in wildlife conservation.	Stem cells have diverse applications in tissue regeneration and disease treatments. Embryonic stem cells (ESCs) come from the inner mass of the blastocyst and are used in the treatment of neurodegenerative diseases such as spinal cord injuries and macular degeneration. Mesenchymal stem cells (MSCs) are present in bone marrow, adipose tissue, and the umbilical cord and are effective for peritoneal fibrosis and tissue regeneration. Likewise, these umbilical cord-derived cells are used to treat type 1 and 2 diabetes, improving beta cell function. Induced pluripotent stem cells (iPSCs) are adult cells reprogrammed to enhance their pluripotent characteristics. These have applications in the regeneration of damaged tissues and the restoration of neuronal functions. The aforementioned therapies are under development and require research to standardize their use and monitor results on a large scale, since they can be very useful in organ transplantation and the treatment of immunological disorders (17) . Research is focused on improving the efficacy and tolerance of stem cell transplants (17).

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Discussion

In the last two decades, regenerative medicine has made great strides in diverse fields such as molecular biology, biomedical engineering, biochemistry, physics, and ethics. One of these advances is 3D bioprinting, which would allow the generation of functional organs and tissues in the laboratory. 3D bioprinting consists of the technique of manufacturing three-dimensional tissues and organs, using living cells as raw material (18). This advance includes the design and manufacture of biological structures with biocompatible materials, based on scaffolds and stem cells, which are controlled by a computer to create complex three-dimensional models (6). This process resembles conventional 3D printing, replacing ink with biomaterials and cells.

After bioprinting, the tissue or organ is subjected to an incubation bioprocess to promote cell maturation, the use of growth factors to induce cell differentiation, as well as the implementation of perfusion techniques to promote the formation of blood vessels in organs. However, tissue vascularization and the development of new biomaterials continues to be a challenge for 3D bioprinting (14). In this regard, Castellanos-Garzón (16), in his studies, has included a bioprinting technological material, manufacturing three structures with different geometries designed for possible applications in otorhinolaryngology and orthopedics. Likewise, Aguilar (16) in his research work points out that this method of regenerative medicine is very promising to improve organ transplantation and personalized medicine.

Another significant advance found in the review articles regarding regenerative medicine is cellular reprogramming, which consists of the development of therapies based on induced stem cells for the regeneration of damaged tissues and damaged or diseased organs (8). Stem cells are the so-called stem cells that have the characteristic of self-renewing and dividing to produce new or specialized stem cells. In addition, they can

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release molecules that help repair damage caused by injury or disease and aging (10).

Stem cells serve as treatments in musculoskeletal tissues, regeneration of the heart, liver and central nervous system. Hence (8) Lehmann et al., (2018) He points out that stem cell treatments are becoming an alternative treatment for diseases such as Parkinson's and Alzheimer's, as well as therapeutic applications for injuries and grafts.

Thus, the main applications of regenerative medicine are found in tissue reproduction, to treat traumatic, degenerative or congenital injuries of the musculoskeletal system such as bone fractures, cartilage and tendon injuries, and diseases such as osteoarthritis (18). By using stem cells, biomaterials and growth factors, therapies can be developed to promote the regeneration of musculoskeletal tissues, restoring their structure and function effectively.

Another key application of regenerative medicine is the regeneration of vital organs and tissues. This area of research seeks to address chronic and degenerative diseases, as well as the shortage of organs for transplants. These regenerative therapies offer new hope for patients with terminal illnesses, providing the possibility of more effective and less invasive treatments in the future. Aguilar (15) in his experimental study demonstrated that the transplantation of epithelial organoids developed from stem cells is effective for the treatment of diseases that negatively affect the intestinal epithelium, as he experimented with mice suffering from acute colitis, achieving successful treatment. This application is quite prospective for the regenerative treatment of several human diseases.

Despite its promising applications, regenerative medicine faces several challenges that limit its full application. These include the need to overcome immunological barriers and ensure the compatibility of regenerated tissues with the recipient's immune system, especially in the case of tissue and organ transplants (18). Furthermore, the identification of suitable biomaterials and the optimization of cell culture techniques

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are essential to ensure the vascularization and functionality of tissues biofabricated through 3D printing (14).

Other challenges include generating adequate amounts of stem cells in vitro, while avoiding exposing the sample to hazards such as contamination or malignant transformation (19). Finally, according to Quesada Leyva et al. (20), the ethical, regulatory, risk and safety aspects of regenerative treatments for human application need to be considered. Ongoing research and interdisciplinary collaboration are essential to address these challenges and fully harness the potential of regenerative medicine for the benefit of human health.

Conclusions

Recent advances in regenerative medicine, such as 3D bioprinting, have shown great potential for the manufacture of anatomically functional tissues and organs in laboratories. This technique allows for the creation of complex biological structures using living cells and biomaterials, which could revolutionize medical fields such as otorhinolaryngology and orthopedics.

Cell reprogramming, another important advance in regenerative medicine, offers new hope for the treatment of a variety of diseases, as well as injuries. This strategy, which involves the development of induced stem cell-based therapies, could be key in the treatment of diverse conditions, from musculoskeletal injuries to neurodegenerative disorders such as Parkinson's and Alzheimer's.

The primary applications of regenerative medicine focus on the regeneration of musculoskeletal tissues and vital organs, such as the heart, liver, and central nervous system. These advances represent a paradigm shift in the treatment of chronic and degenerative diseases, offering new hope for patients with serious medical conditions. However, despite its promising applications, regenerative medicine faces significant

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challenges that must be addressed. These include the need to ensure the immunological compatibility of regenerated tissues, as well as ethical and willingness-based donations, regulations, and safety considerations that require rigorous attention.

The topic of regenerative medicine is exciting, as it opens the door to a future where chronic diseases and serious injuries could be treated more effectively and less invasively. However, achieving this goal requires continued research and closer interdisciplinary collaboration. More in-depth experimental research is needed to better understand the cellular and molecular mechanisms involved in tissue and organ regeneration, as well as to develop new technologies and therapeutic approaches. Furthermore, more clinical studies and trials are needed to evaluate the safety and efficacy of regenerative therapies in humans. The ethical considerations involved in this medicine must also be taken into account, which could be the subject of further research.

In conclusion, regenerative medicine represents an evolution in the approach to chronic diseases and serious injuries, offering innovative therapeutic alternatives based on the use of stem cells, biomaterials, and emerging technologies such as 3D bioprinting and organoids. While scientific advances have demonstrated high potential for tissue regeneration and personalized treatments, ethical, technical, and regulatory challenges remain that require attention to ensure safety, efficacy, and accessibility. The consolidation of this field will depend on strengthening interdisciplinary research, standardizing procedures, and establishing clear regulations that allow for its proper integration into clinical practice.

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Structural analysis of the personality of incarcerated women and their dominant traits

Análisis estructural de la personalidad de mujeres privadas de la libertad y sus rasgos dominantes

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Summary

Introduction: Structural analysis of the personality of women deprived of liberty is essential to understand their psychological characteristics and behavior in confinement settings. This study seeks to identify and understand the dominant traits in these women to improve intervention and rehabilitation programs. **Objective:** The main objective of the study is to identify the predominant personality traits in women deprived of liberty, in order to provide a solid basis for the development of rehabilitation and psychosocial support strategies. **Method:** A structural analysis of personality was performed using the Minnesota Multiphasic Personality Inventory (MMPI) to a sample of women deprived of liberty ($n = 40$). The analysis included statistical techniques to identify the dominant traits and their relationship with behavior and adaptation in the prison environment. **Results** : The results revealed that the dominant traits in the women studied include high levels of neuroticism and low levels of openness to new experiences. These traits are associated with greater difficulty in adapting to the prison environment and a higher incidence of internal and social conflicts. **Conclusion:** Understanding the predominant personality traits in women deprived of liberty is crucial for designing effective interventions. The identified characteristics suggest the need for personalized approaches in rehabilitation programs, focused on stress management and promoting coping skills.

Keywords: Women, Personality, kindness, conscience.

Resumen

Introducción: El análisis estructural de la personalidad de mujeres privadas de la libertad es fundamental para entender sus características psicológicas y su comportamiento en contextos de reclusión. Este estudio busca identificar y comprender los rasgos dominantes en estas mujeres para mejorar los programas de intervención y rehabilitación. **Objetivo:** El objetivo principal del estudio es identificar los rasgos de personalidad predominantes en mujeres en situación de privación de libertad, con el fin

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de ofrecer una base sólida para el desarrollo de estrategias de rehabilitación y apoyo psicosocial. Método: Se realizó un análisis estructural de la personalidad utilizando el Minnesota Multiphasic Personality Inventory (MMPI) a una muestra de mujeres privadas de libertad (n = 40). El análisis incluyó técnicas estadísticas para identificar los rasgos dominantes y su relación con el comportamiento y la adaptación en el entorno penitenciario. **Resultados:** Los resultados revelaron que los rasgos dominantes en las mujeres estudiadas incluyen altos niveles de neuroticismo y bajos niveles de apertura a nuevas experiencias. Estos rasgos están asociados con una mayor dificultad en la adaptación al entorno penitenciario y una mayor incidencia de conflictos internos y sociales. **Conclusión:** Comprender los rasgos de personalidad predominantes en mujeres privadas de libertad es crucial para diseñar intervenciones efectivas. Las características identificadas sugieren la necesidad de enfoques personalizados en los programas de rehabilitación, enfocados en la gestión del estrés y la promoción de habilidades de adaptación.

Palabras clave: Mujeres, Personalidad, amabilidad, conciencia.

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1. Introduction

The study of personality has been a field of significant interest in psychology due to its influence on human behavior and social interactions (Roberts et al., 2022). Understanding personality traits and dimensions is essential for addressing various problems in specific contexts, such as the prison system (Blake & Gangestad, 2020) . In particular, the analysis of the personality of incarcerated women offers valuable insight for developing rehabilitation (Coppola & Martufi , 2024) and social reintegration (Clubb et al., 2024) programs.

Authors such as Eysenck (1984) and Cattell (as cited in Comrey & Duffy, 1968) are pioneers in personality research, developing theories and tools that facilitated the measurement and analysis of personality traits. Eysenck, with his three-factor theory (neuroticism, extraversion, and psychoticism), and Cattell, with her 16-factor model of personality, provided robust theoretical frameworks for the study of personality in diverse contexts.

According to Balarezo (2015), identifying the prevalent personality traits in a human being would facilitate the development of strategies for an adequate approach and intervention, in this case, during and after the period of deprivation of liberty; the existence of the following traits can be mentioned: paranoid, bipolar (cognitive approach), borderline , antisocial (behavioral approach), schizoid, avoidant, dependent (distant approach), schizotypal, histrionic and narcissistic.

In the context of Women Deprived of Liberty (WDL), these theoretical models can be applied to explore how personality traits influence behavior and experiences within the prison system (Moreira et al., 2022). Furthermore, research in this area can reveal risk and protective factors that are critical for intervention and psychosocial support (Anderson et al., 2020).

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Even more so when it is known that approximately 23% of MPL during their stay in prison require outpatient health services for personality disorders, hence the need to evaluate the percentage of women with psychopathology and the prevalence of certain personality traits, in order to provide adequate follow-up and intervention (Molina et al., 2022).

Following Molina et al. (2022), MPLs tend to present high scores in schizoid and depressive personality traits, with a higher prevalence of clinical personality patterns at a younger age, and antisocial, compulsive, schizotypal and borderline personality traits with shorter prison terms and a higher number of admissions to prisons. In fact, Kalsoom & Gul (2020) indicate that borderline, antisocial, histrionic and narcissistic personality traits are associated with the commission of assaults, sexual abuse, murders, arsons and theft in MLPs.

Molina et al. (2023) point out that antisocial personality traits are prevalent in women deprived of liberty who are held in maximum security wards, and that they are characterized by the presence of a lack of remorse, emotional insensitivity, and manipulation. Furthermore, this trait would be associated with the likelihood of recidivism in MPL (Shahid & Mujeeba, 2022).

While borderline personality traits would be associated with risk behaviors for the spread of the Human Immunodeficiency Virus (Adams et al., 2016), with substance use, mainly cocaine, in women before, during and up to 12 months after going through a period of deprivation of liberty (Loya et al., 2022), more frequently when these personality traits are accompanied by dysfunctionality in family dynamics (Malik & Majeed , 2023).

In recent years, research on personality in prison settings has gained significant relevance due to the growing need to develop more effective and humane rehabilitation programs (Smith et al., 2022). Recent studies have shown that women inmates present unique personality profiles that differ markedly from their male counterparts, underscoring the need for

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gender-specific approaches to psychosocial intervention and support (Anderson & Pitner , 2021). Furthermore, the prevalence of personality disorders in this population remains high, with direct implications for the management of their mental health and the reduction of criminal recidivism (Jones et al., 2023).

A crucial aspect identified in recent literature is the relationship between prior trauma and personality traits in incarcerated women. Longitudinal studies have found that experiences of abuse and violence in childhood are strongly correlated with the development of dysfunctional personality traits in adulthood (Cohen & Brown, 2020). These connections suggest that interventions should address not only current behaviors but also traumatic history that may have contributed to criminality (Robinson et al., 2023).

In addition, the assessment of personality traits using tools such as the Minnesota Multiphasic Personality The MMPI has allowed researchers to identify specific patterns that can predict risky behaviors and adjustment difficulties in prison settings (Miller et al., 2022). For example, high levels of neuroticism and low levels of agreeableness have been consistently associated with a higher incidence of conflict and mental health problems in women prisoners (Sullivan et al., 2021).

Therefore, this analysis not only contributes to the academic understanding of personality but also has practical implications for the management of penitentiary institutions and the design of public policies aimed at the rehabilitation and reintegration of women into society. By delving deeper into the personality of this specific population, more effective and humane strategies can be developed to promote their well-being and resocialization.

The main objective was to determine the structure and manifestations of personality in women deprived of liberty, through a comprehensive analysis that allows identifying patterns. For this study, 177 female deprived of liberty individuals held at the Azuay N1 Deprivation

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of Liberty Center were evaluated. Of these, 40 required personality studies from 2019 to 2022 due to the severity and connotations associated with the commission of crimes. The results obtained reveal characteristics related to personality development, such as self-esteem, self-image, self-knowledge, coping skills, temperament and character, and the degree of psychological maturity achieved.

In contemporary prison systems, the study of incarcerated individuals' personalities is crucial for understanding the internal dynamics of these environments and for informing effective rehabilitation and social reintegration strategies. Among the vulnerable groups within these populations, women in prison represent a particularly relevant segment, characterized by complex life experiences that frequently include histories of abuse, trauma, and socioeconomic disadvantage.

Personality, understood as the set of stable psychological characteristics that shape how individuals perceive and respond to the world, plays a fundamental role in how people adapt to their environment, including how they cope with incarceration and rehabilitation opportunities. However, specific research on personality in incarcerated women is limited, with studies predominantly focusing on male samples or generalizations based on mixed populations.

This article focuses on filling this research gap by providing a structural analysis of the personality of women in prison, identifying and understanding their dominant traits. Using a rigorous empirical and theoretical approach, this study aims to expand academic knowledge on the psychology of women in prison, offer practical recommendations to improve their quality of life, and promote the successful reintegration of these women into society after serving their sentences.

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2. Methodology

Type of Research

A non-experimental quantitative descriptive, correlational, retrospective and cross-sectional study was carried out.

Participants

The participants were 40 women deprived of liberty (secondary data from 2021 in a detention center), using non-probability convenience sampling. Demographic data reveal significant diversity in the marital status of the women deprived of liberty analyzed. The majority identify as single, representing 45 % of the sample, followed by those in common-law unions, who constitute 30 %. Additionally, a considerable proportion of widowed, married, and divorced women are observed, each representing 10% and 7.5% respectively. This variability in marital status suggests a range of experiences and family contexts among the study participants. Regarding educational level, a diverse distribution is observed in the sample. Incomplete secondary education is the most common category, accounting for 30% of the women, closely followed by incomplete primary education, which represents 25%. On the other hand, those with completed higher education and those with completed primary education are less prevalent, at 17.5% and 7.5%, respectively. These figures reflect a variety of educational levels within the study population, which may influence their life trajectories and employment opportunities (Table 1).

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Table 1.

Descriptive analysis of sociodemographic variables

	n (%)
Marital status	
Married	3 (7.5%)
Divorcee	3 (7.5%)
Single woman	18 (45%)
Widow	4 (10%)
Free union	12 (30%)
Level of education	
Complete upper level	7 (18%)
Incomplete primary education	10 (25%)
Complete secondary education	8 (20%)
Incomplete secondary education	12 (30%)
Complete primary education	3 (7.5%)

Inclusion and exclusion criteria

The inclusion criteria for this study considered women deprived of liberty, whose data were secondary. Significant diversity was observed in the marital status and educational level of the participants, reflecting a wide range of family and educational experiences. Exclusion criteria included women under the age of 18, those unable to provide informed consent or experiencing emotional crisis, as well as those participating in other concurrent studies that could influence the results.

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Tools

Ad-hoc survey of the following sociodemographic variables: marital status, education and crime of entry.

The *Minnesota Multiphasic Personality Inventory* (*MMPI*) is one of the most widely used and recognized psychological assessment instruments in the field of clinical and forensic psychology. Designed to measure personality and psychopathology, the MMPI consists of an extensive series of questions or statements about various aspects of behavior, thought, and emotion. Developed in the 1940s, it has been revised and updated several times since. The MMPI assesses a wide range of personality characteristics and psychopathology, including depression, anxiety, paranoia, schizophrenia, and hypomania. Its scales include both specific symptoms and underlying behavioral patterns, allowing clinicians to gain an in-depth understanding of the personality and mental state of the individuals being assessed. The MMPI is used in a variety of clinical and forensic contexts, such as the evaluation of mental disorders, the selection of candidates for sensitive employment positions, and the evaluation of persons involved in legal proceedings.

Procedure

The research was conducted using secondary data obtained from incarcerated women. Initially, existing datasets containing responses previously collected using the *Minnesota Multiphasic* were accessed. *Personality Inventory* (*MMPI*). Information was obtained from institutional databases, previous research archives, or clinical records. After accessing secondary data, data cleaning and preparation were performed , followed by statistical analysis to explore patterns and relationships with the incarcerated women's personalities. Measures were taken to ensure the confidentiality and privacy of the information, as well as to comply with all applicable data protection regulations and policies. Furthermore, the necessary ethical approvals were obtained before using secondary data in

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the research. The results obtained were interpreted based on the research objectives, allowing for a deeper understanding of personality in this specific group of women.

Statistical analysis

descriptive statistical analysis was performed. Univariate and bivariate analyses. First, univariate descriptive analysis was used to explore the distribution of responses on each of the MMPI scales, allowing for the identification of central tendencies, dispersion, and potential outliers in the women in prison's personality scores. Subsequently, bivariate descriptive analysis was performed to investigate the relationships between the different MMPI dimensions and other variables of interest, such as marital status and education level. This analysis identified potential associations between personality and other factors relevant to the context of women in prison. Furthermore, median difference tests were performed to examine whether there were significant differences in personality scores between different groups of participants, based on variables such as marital status and education level. These statistical techniques provided a deeper understanding of the women in prison's personality and allowed for the identification of significant patterns and relationships for further research.

Additionally, this advanced technique was used to examine the complex relationships between latent and observed variables in a previously established theoretical model. The SEM model specified the hypothesized relationships between different aspects of the incarcerated women's personality and their potential determinants or consequences. Structural equations were used to represent these relationships, along with measurement equations that described how the latent variables were related to the observed variables.

To conduct the SEM analysis, maximum likelihood estimation was used to fit the model to the observed data and assess its adequacy. Model

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fit statistics, such as the Wald chi-square, comparative fit indices (e.g., CFI, TLI), and robust standard errors, were calculated to determine whether the model fit the collected empirical data well.

Results

Regarding crimes committed, a wide range of illegal activities is observed among women deprived of liberty. Drug trafficking is the most common crime, accounting for 25% of cases, followed by robbery, which constitutes 12.5%. In addition, less frequent but equally significant cases are identified, such as human trafficking, murder, fraud, and others. This diversity of crimes highlights the complexity of these women's individual circumstances and suggests the need for multidimensional approaches to intervention and rehabilitation.

Exploring Personality: An analysis of women deprived of liberty revealed an average age of 34.8 years, with a wide variability ranging from 18 to 62 years (m = 34.8 ± 11.9 years). This suggests a significant diversity in life experience and personal development among the population studied.

Regarding personality traits, relatively high mean scores were observed in some domains. For example, the tendency toward paranoia was notable, with a mean score of 3.9 and a standard deviation of 1.6 (m = 3.9 ± 1.6). This indicates a significant tendency toward mistrust and suspicion in this group of women deprived of liberty.

A tendency toward schizoid and histrionic-schizotypal traits was also noted, with mean scores of 4.2 and 4.2, respectively (schizoid: 4.2 ± 1.4; histrionic-schizotypal: 4.2 ± 2). These results demonstrate the presence of characteristics related to social withdrawal, as well as exaggerated and theatrical emotional expression, in the study population.

In contrast, lower mean scores were observed for antisocial and narcissistic traits, with mean values of 2.7 and 3.5, respectively (antisocial: 2.7 ± 1.4; narcissistic: 3.5 ± 2). These findings may indicate a lower prevalence

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of antisocial behaviors and less exaggerated self-perceptions in this group of women.

However, it is worth noting the presence of a relatively high level of avoidance traits, with a mean score of 4.7 (avoidance: 4.7 ± 2.0). This indicates a tendency to avoid challenging social or emotional situations, which could influence their ability to adapt and function in diverse environments (Table 2).

Table 2. Descriptive analysis of Personality in women deprived of liberty.

						Shapiro-Wilk		Percentiles	
	Average	**Median**	**OF**	**Minimum**	**Maximum**	**W**	**p**	**25th**	**75th**
Age	34.77	32.00	11.90	18	62	0.944	0.046	25.00	43.00
Paranoid	3.92	4.00	1.59	1	7	0.946	0.057	3.00	5.00
Schizoid	4.25	4.00	1.39	1	6	0.909	0.004	3.00	5.25
Histrionic Schizotypal	4.22	3.50	2.01	1	8	0.918	0.007	3.00	6.00
Antisocial	2.74	3	1.45	0	6	0.949	0.075	2.00	4.00
Narcissistic	3.52	3.50	2.03	0	8	0.948	0.063	2.00	5.00
Limit	3.85	4.00	1.97	0	7	0.932	0.019	3.00	5.00
Obsessive-Compulsive	3.58	4.00	1.50	0	7	0.947	0.061	3.00	4.00
Dependence	2.40	2.00	1.77	0	7	0.916	0.006	1.00	4.00
Avoidance	4.72	5.00	1.99	0	8	0.957	0.127	3.00	6.00

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Table 3. Female personality based on marital status.

	Married	Divorcee	Single woman	Widow	Free union	Statistical Test
	(N=3)	(N=3)	(N=18)	(N=4)	(N=12)	
Schizoid	4.0 **4.0** 4.8	3.2 **4.0** 4.8	3.0 **4.5** 6.0	3.2 **5.5** 6.0	3.0 **3.5** 5.0	$F_{4.35}$ = 0.60, P = 0.66 [1]
Histrionic Schizotypal	1.3 **3.0** 4.7	2.0 **2.0** 4.5	3.0 **5.5** 7.0	2.4 **3.5** 5.2	3.0 **3.5** 5.6	$F_{4.35}$ = 0.96, P = 0.44 [1]
Narcissistic	2.3 **4.0** 6.5	2.2 **3.0** 3.0	2.0 **4.0** 6.0	2.7 **5.5** 6.0	1.4 **2.5** 4.0	$F_{4.35}$ =1.27, P=0.30 [1]
Limit	1.2 **2.0** 4.5	1.5 **4.0** 4.8	3.0 **4.0** 5.1	2.2 **4.5** 6.2	1.8 **4.0** 5.0	$F_{4.35}$ = 0.50, P = 0.74 [1]
Dependence	1.2 **2.0** 4.5	0.2 **1.0** 2.7	1.0 **2.5** 4.0	0.0 **0.5** 2.2	1.0 **2.0** 3.6	$F_{4.35}$ =1.66, P=0.18 [1]
Avoidance	3.2 **4.0** 4.8	3.0 **3.0** 5.5	4.0 **6.0** 7.0	2.8 **4.5** 6.8	2.4 **4.0** 6.0	$F_{4.35}$ = 0.97, P = 0.44 [1]

Note: 1 Kruskal-Wallis. 2 Pearson. 3 Wilcoxon.

The results presented come from an adjustment analysis of a female personality model, where two models are compared: the *User Model* and *Baseline Model*. First of all, the *Overall Tests* indicate that there is no significant difference between the user model and the base model, since the *chi-square value* (X^2) is 13.5 with 14 degrees of freedom and a p-value of 0.487.

Regarding the adjustment indices, the *SRMR* (Root Mean Square Residual) and the *RMSEA* (Root Mean Square Error of Approximation) indicate a good model fit, with values of 0.067 and 0.000 respectively. Furthermore, the 95% confidence intervals for the *RMSEA* are within an acceptable range (0.000 to 0.150).

When comparing the *User Model* with the *Baseline Model* , fit indices such as *CFI* (Comparative Fit Index), *TLI* (Tucker-Lewis Index), *NNFI* (Bentler-Bonett Non- normed Fit Index), RNI (Relative Noncentrality Index) and *IFI* (Bollen's Incremental Fit Index) show values close to 1. In

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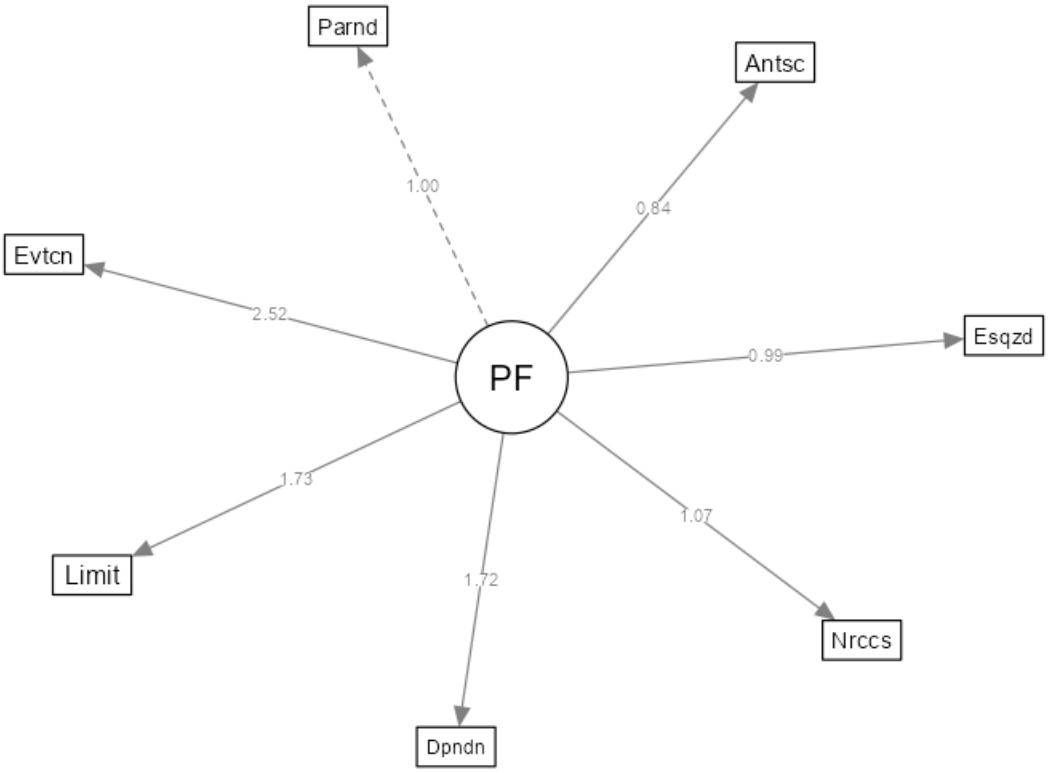
summary, the results suggest that the female personality model proposed by the user fits well to the observed data, but could benefit from a revision to improve parsimony and avoid overfitting.

Figure 1. SEM model of female personality.



Note: Parnd = Paranoid, Antsc = Antisocial, Esqzd = Schizoid, Nrccs = Narcissistic, Dpndn = Dependent, Limit = Borderline, Evtcn = Avoidant.

Figure 1 presents a structural equation model (SEM) that examines the structure of female personality, considering several specific traits. At the center of the model is the latent construct of female personality (FP), from which several arrows emerge toward different personality traits, each with a coefficient indicating the strength of the relationship.

The paranoid trait (Parnd) shows a perfect association with feminine personality, with a coefficient of 1.00, represented by a dashed line. This

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indicates that the paranoid trait is completely explained by the latent construct in this model. Antisocial personality (Antsc) has a coefficient of 0.84, suggesting a strong and positive, although not perfect, relationship with feminine personality. The schizoid trait (Esqzd) is almost perfectly related to feminine personality, with a coefficient of 0.99.

Narcissism (Nrccs) has a coefficient of 1.07, suggesting a significant positive relationship between this trait and female personality. Dependency (Dpndn) shows a strong association with a coefficient of 1.72, indicating that this trait has a considerable influence on female personality according to this model. The borderline trait (Limit) also shows a significant positive relationship, with a coefficient of 1.73, similar to that of Dependency.

Finally, the avoidance trait (Evtcn) has the highest coefficient of 2.52, indicating that it is the trait most strongly related to female personality in this model. This demonstrates that avoidance is a dominant component of female personality structure according to this analysis.

In summary, the SEM model provides a detailed view of how various personality traits relate to the latent construct of female personality. Avoidant personality emerges as the most strongly associated trait, followed by borderline, dependent, narcissistic, schizoid, antisocial, and finally paranoid traits. These findings may be fundamental to better understanding the dynamics of female personality and developing effective interventions in clinical and rehabilitation settings.

Discussion

Among the reasons for arrest in the MPL is illicit trafficking of controlled substances, which is related to socioeconomic circumstances such as poverty. In interviews, most agree that the alibi worked for those who forced them to join this organized crime network related to drug trafficking.

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In Latin America, the main crime in which women are involved is trafficking in psychotropic substances (Center for Legal and Social Studies, 2011), the so-called mules would tend to introverted behavior, a characteristic dimension in people in whom avoidant and dependent traits prevail, which were positively associated with the personality of the MPL in the present research.

Contrary to what was stated in the previous paragraph, Pieters et al. (2018) state that women with a high level of openness to experience are more vulnerable to becoming involved in criminal activities due to their search for new experiences and adventures. These results coincide with those reported by Kalsoom & Gul (2020), who found that borderline, histrionic, and narcissistic personality traits are associated with the commission of assaults, sexual abuse, murders, arsons, and theft.

On the other hand, Molina et al. (2022) agree with the results reported in this research on the high scores on paranoid, schizoid, and schizotypal personality traits in MPL, which are related to distrust, suspicion, and social withdrawal; they also establish the schizotypal trait as a risk factor for reoffending after a period of deprivation of liberty in women.

Likewise, the borderline trait, on which a strong association with the feminine personality was found in the MPL who were part of the study, is prevalent and is associated with risk behaviors for the contagion of the Human Immunodeficiency Virus (Adams et al., 2016), family dysfunction (Malik & Majeed, 2023) and substance use before, during and after the period of deprivation of liberty in this population (Loyola et al., 2022).

Regarding the antisocial personality trait, whose average was low in this research, Molina et al. (2023) indicate that the MPL who participated in their study presented high scores in it, especially those who belonged to maximum security wards and who presented behaviors characterized by lack of remorse, emotional insensitivity, and manipulation; in addition, Shahid & Mujeeba (2022) report that this trait is associated with the probability of reoffending.

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A study by Day et al. (2017) indicated that women with low agreeableness are more likely to participate in criminal activities due to their lower empathy and greater willingness to act selfishly, which allows quick attention to be drawn to this type of conduct and behaviors that are related to the ease with which they carry out acts that go against what is socially accepted.

BPD is characterized by emotional instability, impulsivity, and chaotic interpersonal relationships. Women with this disorder may have a greater tendency to commit crimes due to their impulsiveness and difficulty managing stress. This type of misconduct, in female inmates, usually presents several situations that deteriorate behavior, such as repeated escapes from their homes or domiciles. Borderline personality disorder or emotional instability is related. The questionnaire on antisocial and criminal behaviors already mentions some events that may be related to borderline personality traits. This is also mentioned in the study by Black et al. (2007), which indicates that Borderline Personality Disorder is prevalent among women in prisons and is associated with impulsive and self-destructive behaviors, which can lead to criminal activities. Avoidant people also have some particularities such as repressions in terms of thought, desire, among other characteristics, which can trigger patterns of behavior or paranoid personality traits, according to Coid et al. (2009), Paranoid Personality Disorder is relatively common among women in prisons, and is associated with defensive and aggressive behaviors. A study by Warren and South (2009) suggests that women with Dependent Personality Disorder in prisons can be easily exploited by other inmates or criminal networks, participating in crimes due to their need for approval and fear of abandonment. Finally, when referring to narcissistic personality disorder, it is the most predominant one in women deprived of liberty, presenting behaviors related to manipulation, coercion, etc. As cited by Dolan and Blackburn (2006), Narcissistic Personality Disorder is less common than APD and BPD in women deprived of liberty, but

when present, it is associated with crimes motivated by exploitation and manipulation.

The assessment of personality profiles in incarcerated women has shown that therapeutic intervention must consider individual characteristics to be effective (Hare et al., 2022). A recent study shows that rehabilitation programs that include cognitive-behavioral therapy and social skills training can significantly reduce antisocial behaviors and improve social reintegration (Linehan et al., 2023). Furthermore, social support and group therapy have been found to play a crucial role in reducing recidivism and improving the psychological well-being of incarcerated women (Yoon et al., 2023).

Conclusion

Structural analysis of the personality of women deprived of liberty reveals that avoidance is the dominant trait, with a significant influence on their behavior and attitudes. This trait suggests a tendency to avoid stressful situations or confrontations, which could be related to previous experiences of trauma or stress.

Furthermore, dependency and borderline traits also show considerable influence. Dependency indicates a high need for external support and validation, while borderline traits reflect unstable emotional regulation and difficulties in interpersonal relationships. These traits can be exacerbated by the incarceration environment, affecting adaptation and behavior in the prison context.

Narcissistic and schizoid traits are less prevalent, but still relevant. The former may be related to an inflated self-image and the pursuit of admiration, while the schizoid trait may reflect a tendency toward introspection and isolation. Although less prominent, these traits contribute to the complexity of the personality profile.

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Finally , antisocial and paranoid personality traits also play a role in the personality structure of these women, with the paranoid trait showing a strong association with the latent construct. This suggests that mistrust and suspicion are key elements in their psychological profile.

In conclusion, avoidance, dependency, and borderline personality traits are the most prevalent in incarcerated women. These findings are crucial for the development of interventions and support programs, as they provide a detailed understanding of the psychological characteristics that influence their behavior and adaptation in the prison environment.

Future research on the personality of women in prison could focus on deepening our understanding of the dominant traits identified in this study. A promising line of research would be to explore how the avoidance trait develops and manifests in the prison context, assessing its causes and effects on these women's behavior and well-being. Investigating the experiences of trauma and stress prior to incarceration could provide a clearer view of how these factors contribute to the prevalence of avoidance.

Another area of interest could be the study of the influence of dependency and borderline traits on relationship dynamics within penitentiary institutions. Analyzing how dependency affects the formation of interpersonal relationships and access to resources and support within the prison environment could help develop more effective strategies for managing these needs. Similarly, investigating how borderline trait characteristics impact adaptation and social interaction in prison can offer valuable information for designing interventions that foster better emotional regulation and more stable relationships.

Furthermore, it would be beneficial to investigate the relationship between narcissistic and schizoid traits and behavior and adjustment in the prison environment. Evaluating how these traits influence self-image and the ability to form meaningful connections could contribute to a more complete understanding of the challenges these women face.

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Finally, future research could explore the influence of antisocial and paranoid traits on group dynamics and security within correctional institutions. Understanding how mistrust and antisocial behaviors affect coexistence and risk management could provide a basis for developing strategies to improve safety and well-being in prison settings.

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Pneumonia complicated by influenza type A in a pediatric patient: a case report

Neumonía complicada por Influenza tipo A en paciente pediátrico: un reporte de caso

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1.1. Summary

Community-acquired pneumonia is a common cause of hospitalization in children and can be aggravated by viral infections such as influenza A. We present the case of a four-year-old female patient with no relevant medical history who was admitted with persistent fever, productive cough, and progressive respiratory distress. Imaging studies showed a collapsed left lung and loculated pleural effusion; influenza A was confirmed by nasopharyngeal swab. Due to the lack of clinical response to conventional medical treatment, a thoracotomy with left lower lobectomy was performed. The surgical finding revealed pulmonary necrosis and abundant fibrin. The postoperative course was favorable, with resolution of the respiratory symptoms and successful removal of the chest drain. This case highlights the importance of considering timely surgical intervention in pediatric patients with pneumonia complicated by influenza who do not respond to initial medical management.

Keywords: Pneumonia; Influenza type A; Pediatrics; Lobectomy; Pleural effusion.

1.2. Abstract

Community-acquired pneumonia is a common cause of hospitalization in children and can worsen due to viral infections such as influenza A. We report the case of a four-year-old female patient with no relevant medical history who presented with persistent fever , productive cough , and progressive respiratory distress . Imaging studies revealed left lung collapse and a loculated pleural effusion ; nasopharyngeal swab confirmed influenza A infection . Due to poor clinical response to medical treatment , a thoracotomy with left lower lobectomy was performed . Intraoperative findings revealed pulmonary necrosis and abundant fibrin . Postoperative recovery was favorable, with improvement of respiratory status and successful removal of the chest drain . This case highlights the importance of early surgical intervention in pediatric patients with complicated pneumonia due to influenza who fail to improve with conventional medical management .

Keywords : Pneumonia ; Influenza A; Pediatrics Lobectomy ; Pleural effusion.

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1. Introduction

Community-acquired pneumonia (CAP) remains one of the leading causes of hospitalization and mortality in children worldwide, accounting for approximately 15% of all deaths in children under five years of age, especially in low- and middle-income countries (1). This condition can be aggravated by viral infections, with influenza A virus being one of the main agents involved in severe respiratory conditions in children (2).

Influenza A causes an acute respiratory illness that can progress to complications such as necrotizing pneumonia, pleural effusion, lung abscess, and acute respiratory distress syndrome (ARDS) (3,4). Although most cases are self-limited, a subgroup of patients develops severe pneumonia, requiring prolonged hospitalization, advanced ventilatory support, and, in exceptional situations, thoracic surgery (5).

Current evidence describes that bacterial coinfection, dysregulated inflammatory response and destruction of the pulmonary parenchyma can lead to pulmonary necrosis, a situation that compromises the efficacy of conventional medical treatment (6). In these cases, lobectomy can be a safe and effective therapeutic alternative, especially when there is a poor clinical response or the presence of pneumatoceles and abscesses (7). Recent studies highlight that severe respiratory infections due to influenza have increased their incidence in post-pandemic contexts , and that their management requires a multidisciplinary approach to improve patient prognosis(8).

In Latin America, case reports documenting the clinical course of pediatric patients with pneumonia complicated by *influenza A* are scarce, and those describing surgical interventions such as lobectomy are even more limited. This underscores the importance of presenting clinical experiences that can enhance therapeutic approaches in similar contexts. (9).

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In this context, this article aims to describe the clinical case of a four-year-old pediatric patient with community-acquired pneumonia complicated by influenza A, which progressed to pulmonary necrosis and required a left lower lobectomy. This article aims to contribute to the available clinical evidence and highlight the importance of early diagnosis and timely intervention in these cases.

2. Clinical case

A 4-year-old female pediatric patient with a complete vaccination schedule presented to the pediatric emergency department with persistent fever of 13 days' duration. The initial symptom was unspecified fever associated with a dry cough that progressed to a productive cough, mild headache, and episodes of diarrhea two to four times a day, with no mucus or blood present. Two to three episodes of vomiting were also reported in a 24-hour period. In the 72 hours prior to admission, the patient experienced increasing respiratory distress, prompting the mother to seek hospital consultation.

On admission, vital signs showed: temperature of 39.5°C, respiratory rate of 52 rpm, heart rate of 170 bpm , oxygen saturation of 98% with evident respiratory distress. A Woods Downes score of 6 was obtained. Physical examination revealed semi-moist mucous membranes, subcostal to supraclavicular retractions, and decreased breath sounds with the presence of transmitted rhonchi. Immediate management was initiated with oxygen through corrugated hose, peripheral cannulation, and intravenous paracetamol administration at 15 mg/kg/dose as required.

Initial laboratory tests included a chest x-ray that revealed complete opacity of the left lung field with right mediastinal shift. Thoracic ultrasound showed a loculated left pleural effusion with an estimated volume of 181 cc. Chest computed tomography (CT) confirmed left lung collapse with pneumatoceles, pleural effusion, and signs of bilateral

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interstitial infiltrate. Laboratory studies showed leukocytosis (28,790/mm³), neutrophilia, elevated C-reactive protein (CRP), and a positive detection of *influenza A virus* by nasopharyngeal swab. Tuberculosis was ruled out by PPD, pleural fluid cultures, and gastric aspirate.

The patient was diagnosed with pneumonia complicated by *influenza type A*, associated with loculated pleural effusion and collapsed left lung. Treatment was initiated with high-flow oxygen therapy, initially at 15 L/min with an FiO2 of 50%, progressively adjusted according to saturation. Ceftriaxone was administered at 100 mg/kg/day divided into two doses and clindamycin at 30 mg/kg/day every 8 hours intravenously. Antipyretic support was maintained with paracetamol every 6 to 8 hours if the temperature was greater than 38.5 °C. Additionally, moderate fluid restriction, strict monitoring of urine output, and electrolyte control were indicated.

Due to the persistence of fever, the deterioration of respiratory status and the imaging findings compatible with left lung collapse, loculated pleural effusion and presence of pneumatocele, surgical intervention was decided on the third day of hospitalization. Left thoracotomy with resection of the lower lobe (lobectomy) and placement of a chest tube for drainage, during the procedure extensive pulmonary necrosis and abundant fibrin were observed.

The patient was transferred to the Pediatric Intensive Care Unit (PICU) for close postoperative monitoring, where she received a red blood cell transfusion for postoperative anemia and high-flow oxygen therapy. The intravenous antibiotic regimen was continued for a total of 21 days. Postoperative management included monitoring of vital signs, pleural drainage monitoring, multimodal analgesia with dipyrone and paracetamol, fluid balance monitoring, periodic evaluation with imaging and laboratory studies, and pain control with intercostal block in the operating room. During her stay, she showed progressive improvement in

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respiratory and inflammatory parameters, allowing for the removal of the drainage tube on the fifth postoperative day.

Her evolution during the 21 days of hospitalization was favorable. Before discharge, the patient was hemodynamically stable, neurologically alert, with preserved mobility, oriented, with no signs of respiratory distress. The right lung field was well ventilated and the left was slightly hypoventilated. The chest tube wound was healing, and she performed Triflow (incentive spirometer) breathing exercises every 4 hours, with good oral tolerance and no abdominal warning signs. Control laboratory tests showed leukocytes: 6.78 x10^3/mm^3, neutrophils: 41%, lymphocytes: 39%, hemoglobin: 11.7 g/ dL , hematocrit: 33.8%, platelets: 447 x10^3/mm^3 and CRP: 3.69 mg/L. The biopsy revealed a fibrin -leukocyte exudate with no stroma, granulomas, or pathogens. The follow-up echocardiogram was normal, with no pericardial effusion. The patient did not experience any further fever spikes and maintained good respiratory progress. She was discharged from the hospital with follow-up care by specialists and outpatient pediatricians, pulmonology, infectious disease, and pediatric surgery. She was also instructed to perform home breathing exercises and antireflux treatment. The mother was instructed regarding warning signs and home care.

2.1. Figures, Tables and Diagrams

Table 1.
Auxiliary examinations performed on the patient

LABORATORY TESTS	*ADMISSION RESULT*	*REFERENCE VALUE*
LEUKOCYTES (/UL)	22,800/ uL	4,000 - 10,000/ uL
NEUTROPHILS (%)	76.1%	40 - 75%
LYMPHOCYTES (%)	12.3%	20 - 45%

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HEMOGLOBIN (G/DL)	8.4 G/DL	11.5 - 15.5 G/DL
HEMATOCRIT (%)	24.2%	34 - 44%
PLATELETS (/MM³)	750,000 MM³	150,000 - 450,000 MM³
C-REACTIVE PROTEIN - CRP (MG/DL)	268 MG/DL	< 5 MG/DL
PROCALCITONIN - PCT (MG/DL)	1.13 MG/DL	< 0.5 MG/DL
BLOOD CULTURE CULTURE	No growth	-
URINE CULTURE	No growth	-
TUBERCULOSIS (PPD, PCR, CULTURE)	Non-reactive	-
INFLUENZA TYPE A SWAB	Positive	-
RSV / COVID-19 SWAB	Negative	-
ECHOCARDIOGRAM	-	-
CATHETER CULTURE	No growth	-
CATHETER GRAM	No growth	-
BIOPSY	-	-
Laboratory Test Control	***Result***	***Reference Value***
Leukocytes (/ uL)	6,780	4,000 - 10,000 / uL
Neutrophils (%)	41%	40 - 75%
Lymphocytes (%)	39%	20 - 45%
Hemoglobin (g/ dL)	11.7 g/ dL	11.5 - 15.5 g/ dL
Hematocrit (%)	33.8%	34 - 44%
Platelets (/mm³)	447,000 mm³	150,000 - 450,000 /mm³
C-reactive protein (CRP, mg/ dL)	3.69 MG/DL	< 5 mg/ dL MG/DL
Echocardiogram	Normal	Without pericardial effusion
Biopsy	fibrin exudate , without granulomas or pathogenic microorganisms	-

Source: prepared by the author (2024)

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Figure 1. Posteroanterior (PA) chest radiograph showing a homogeneous consolidation in the left hemithorax, with rightward displacement of the trachea and mediastinum. Blurring of the left costodiaphragmatic angle, cardiac area within normal limits, and free right costophrenic sinuses are observed. These findings are consistent with moderate to severe left pleural effusion.

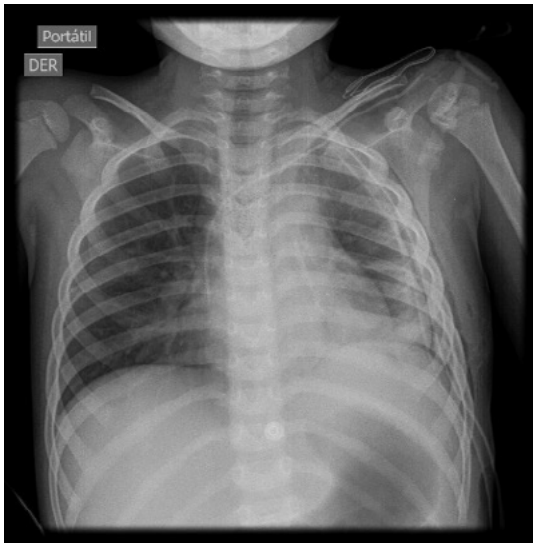

Figure 2. Pleural ultrasound revealed a moderate-volume left pleural effusion, estimated at 181 cc, with multiple partitions and septa within the pleural cavity. No debris or free fluid was observed in the right pleural cavity. These findings were consistent with a left loculated pleural effusion.

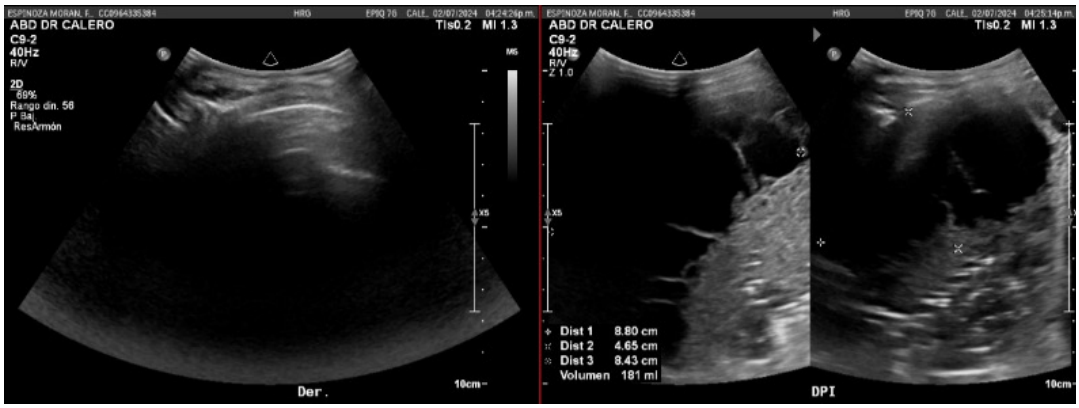

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Figure 3A. Coronal reconstruction of the chest computed tomography (CT) (Figure 3A) . Collapse of the left lower lobe is confirmed, with shift of the mediastinum and trachea to the right. Bilateral interstitial and reticular infiltrates are identified, predominantly on the left side. No anomalous lymph nodes or cavitations are observed. Axial section of the chest computed tomography (CT) (Figure 3B). Collapse of the left lower lobe is evident, with dense consolidation and loss of lung volume. Pneumatoceles and areas of necrosis are observed in the affected parenchyma. The moderate-volume left pleural effusion displaces the adjacent lung parenchyma. The right lung field shows interstitial infiltrates without evidence of pleural effusion.

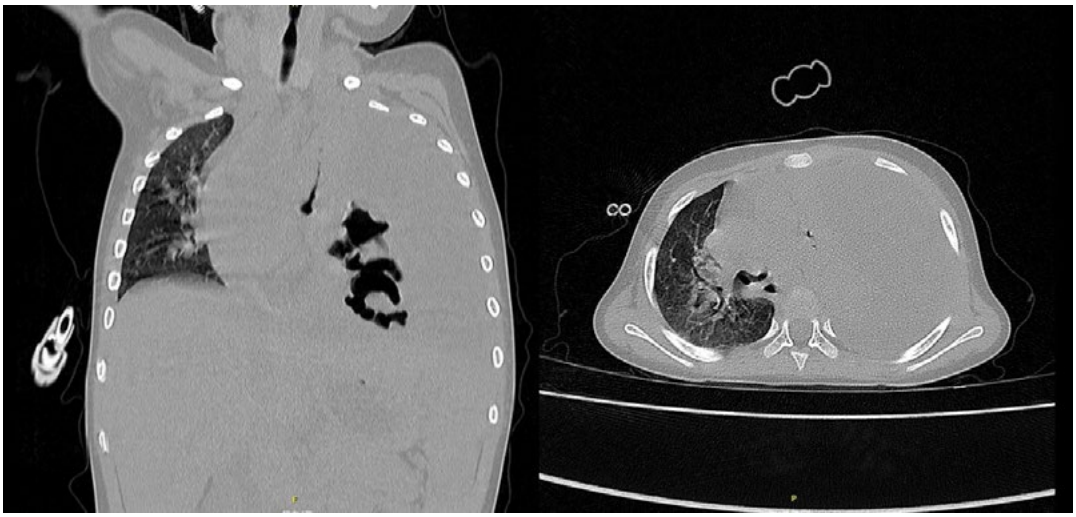

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Figure 4. Portable chest radiograph in anteroposterior (AP) projection shows a cardiac area within normal limits, free costophrenic sinuses, and adequate height of both hemidiaphragms. Accentuation of the pulmonary interstitium is observed with the presence of bilateral perihilar infiltrates , with no evidence of pleural effusion or mediastinal shift. A correctly positioned left pleural drainage tube is identified.

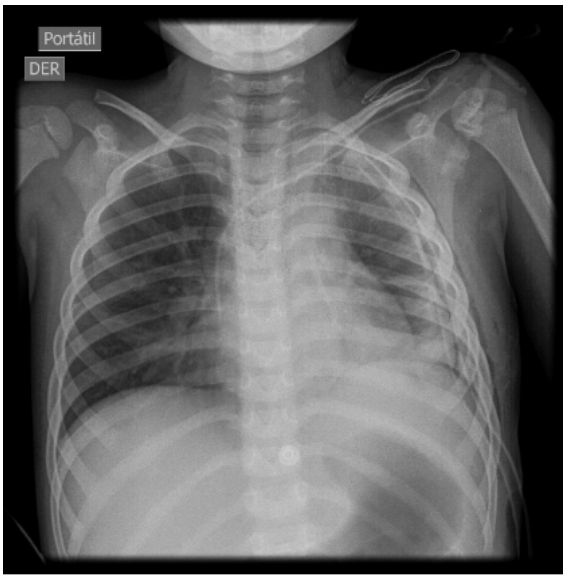
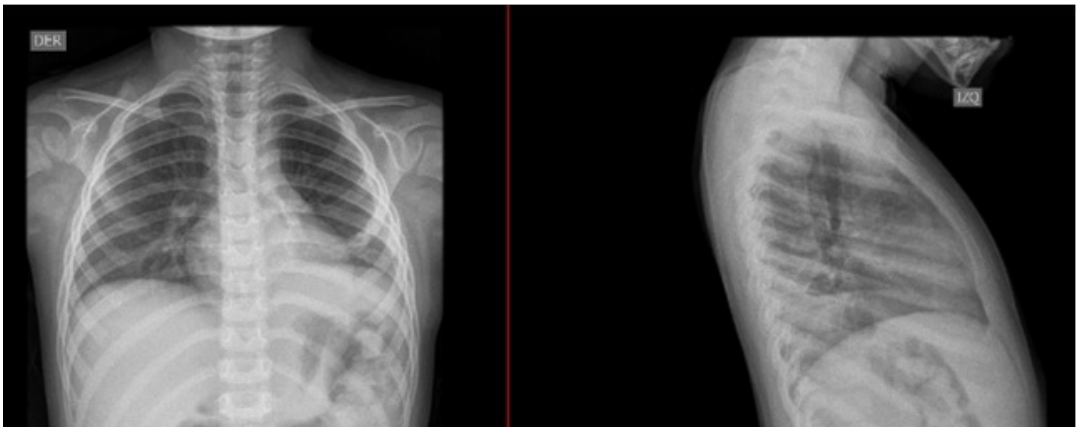


Figure 5. Pre-discharge posteroanterior (AP) (Figure 5A) and lateral chest radiographs (Figure 5B) showing an image of consolidation in the left hemithorax, with dense alveolar infiltrate, effacement of the costodiaphragmatic and left angle, and elevation of the ipsilateral hemidiaphragm.



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3. Discussion

Community-acquired pneumonia remains a leading cause of hospitalization and childhood morbidity and mortality, with potentially serious complications such as pleural effusion, pulmonary necrosis, and pneumatocele formation (1). *Influenza type A* infection , recognized for its high dissemination capacity and respiratory tract involvement, is associated with an increased risk of bacterial superinfection and progression to severe conditions (10).

In the case presented, the patient developed pneumonia complicated by loculated pleural effusion and pulmonary necrosis, which required medical and surgical management. These manifestations are consistent with those described in recent studies, where coinfection with *influenza A* and bacterial agents such as *Staphylococcus aureus* (*Staphylococcus aureus*) *is suspected*. *aureus* or *Streptococcus pneumoniae* increases the severity of the clinical picture (11). The persistence of fever, lack of response to empirical antibiotic therapy and radiological findings of lung collapse and pneumatoceles justified the indication for lobectomy, following recommendations in the literature for refractory cases (12).

Although most complicated pneumonias in pediatrics resolve with medical treatment, a subgroup requires surgical intervention. A multicenter study reported that up to 5% of pediatric patients with necrotizing pneumonia progress to procedures such as lobectomy, especially in the presence of persistent sepsis, extensive lung destruction, or organizing empyema (13). The decision for surgical intervention in this case was based on radiological progression and clinical deterioration, which is consistent with these recommendations.

However, diagnostic limitations include the lack of specific microbiological isolation in pleural fluid, a common occurrence in patients who have previously received antibiotic therapy. Furthermore, delayed surgical indication is a factor associated with increased morbidity,

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highlighting the need for institutional protocols to guide timely decision-making (14).

From a therapeutic point of view, the combination of high-flow oxygen therapy, broad-spectrum antibiotic therapy and surgical management allowed a favorable recovery in this patient, agreeing with current evidence that highlights the importance of a multidisciplinary approach (15). Therapeutic alternatives such as video-assisted thoracoscopy (VATS) are considered in some centers, however, the choice of open thoracotomy remains valid in contexts where the disease is extensive and specialized equipment is limited (16).

This case highlights the need to consider early surgical intervention in pneumonia complicated by *influenza A* with poor clinical outcome, as well as the importance of a comprehensive approach to reducing complications and improving the prognosis in pediatric patients.

4. Conclusions

Pneumonia complicated by influenza type A in the pediatric population represents a diagnostic and therapeutic challenge, especially in cases that progress to severe forms such as pulmonary necrosis. This clinical case illustrates the importance of a comprehensive approach, in which early identification of complications and the timely decision to intervene surgically can be decisive in reducing morbidity and improving prognosis.

The combination of intensive medical treatment, advanced ventilatory support, and surgical management led to a favorable outcome for the patient, reaffirming the usefulness of lobectomy as a therapeutic option in cases refractory to conventional treatment. Evidence shows that clinical and radiological outcomes must be carefully monitored to avoid delays in decision-making.

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This report emphasizes the need to develop specific management guidelines for influenza-associated necrotizing pneumonia in pediatrics, tailored to the resources available at each institution. It also highlights the importance of conducting more multicenter studies analyzing predictors of poor outcomes to optimize interventions for these patients.

The dissemination of clinical experiences such as the one described here contributes to enriching knowledge about the management of complicated pneumonias and highlights the importance of multidisciplinary work in addressing these highly complex pathologies.

5. Abbreviations

NAC: Community-acquired pneumonia
ARDS: Acute Respiratory Distress Syndrome
UCIP: Pediatric Intensive Care Unit
CT: Computed Axial Tomography
PCR: C-Reactive Protein
RSV: Respiratory Syncytial Virus
PPD: Purified Protein Derivative (Tuberculin Test)
FiO2: Fraction of Inspired Oxygen
VATS: Video-Assisted Thoracoscopic Surgery (Video-assisted Thoracoscopy)
MRSA: Methicillin-Resistant Staphylococcus aureus (Staphylococcus methicillin -resistant aureus)

6. Contribution of the authors

First author initials: Data collection, case description, literature and analysis.

Second author initials: Systematic review and case discussion

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Third author initials: Final case review and updated literature contribution.

7. Ethics committee approval and consent to participate in the study

For the publication of this clinical case, all ethical standards established by the institution and the principles of the Declaration of Helsinki were adhered to. Informed consent for publication of the case was granted by the legal representative, who was duly informed about the nature, objectives, and scope of the presentation. The confidentiality and anonymity of the minor are guaranteed. A copy of the corresponding informed consent is attached.

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Legg- Perthes -Calvé disease or Juvenile Osteochondritis Deformans, a case report

Enfermedad de Legg – Perthes – Calvé u Osteocondritis Deformante Juvenil, a propósito de un caso.

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Summary

Juvenile osteochondritis deformans (also known as Legg -Perthes -Calvé disease) is a disorder that impacts hip development. Its exact cause is unknown, although several associated factors have been identified, including synovitis, coagulation disorders (such as thrombophilia), short stature, delayed bone maturation, repeated trauma, corticosteroid use, and unfavorable socioeconomic conditions, among others.

Within its epidemiology, this pathology affects between 1.0 and 2.5 out of every 1,000 children , with a greater predominance in boys than in girls.

Initial symptoms generally include pain in the hip, groin, thigh, or knee, radiating along the course of the obturator nerve, accompanied by a limp of varying severity. Diagnosis is based on conventional radiographs in anteroposterior and lateral projections in the Lauenstein position , which reveal the initial bone changes characteristic of the disease. Treatment depends on the severity and the disease , ranging from rest to osteotomies.

Keywords: Legg- Perthes -Calvé disease , necrosis, osteotomies.

Resumen

La osteocondritis deformante juvenil (conocida también como enfermedad de Legg-Perthes-Calvé) es un trastorno que impacta el desarrollo de la cadera. Su causa exacta es desconocida, aunque se han señalado diversos factores asociados, entre ellos: sinovitis, alteraciones en la coagulación (como trombofilia), talla baja, retraso en la maduración ósea, traumatismos repetidos, uso de corticoides y condiciones socioeconómicas desfavorables, entre otros

Dentro de su epidemiología esta patología la sufren entre el 1,0 y el 2,5 de cada 10000, niños con mayor predominancia en niños que en niñas.

Las manifestaciones iniciales generalmente consisten en dolor en la cadera, ingle, muslo o rodilla, irradiado a lo largo del trayecto del nervio obturador, acompañado de una cojera de diversa magnitud. El diagnóstico se fundamenta en radiografías convencionales en proyecciones anteroposterior y lateral en posición de Lauenstein, que permiten observar los primeros cambios óseos característicos de la enfermedad. El tratamiento depende de la severidad y la enfermedad, desde reposo hasta osteotomías.

Palabras clave: enfermedad de Legg – Perthes – Calvé, necrosis, osteotomías.

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1. Introduction

Perthers disease is characterized by the development of avascular necrosis of the femoral head (1). This disease may progress to regeneration and formation of a new spherical femoral head, or lead to aspherical deformity of the femoral head (2).

Regarding the clinical presentation, this disease occurs bilaterally in approximately 19% of cases; the most common symptom is limping, which may or may not be associated with pain. For this reason, this disease may go unnoticed or be treated as recurrent synovitis before diagnosis. Other symptoms that may occur include groin pain, knee pain, and decreased muscle mass in the quadriceps ipsilateral to the affected hip (3,4).

The Trendelenburg sign consists of the limitation of abduction and internal rotation of the hip, and this can be associated with limping, so physical examination is essential (5).

Risk factors associated with a less favorable course and prognosis include obesity, age over 8 years, female sex, mobility restrictions, and a long history of disease progression.

Complementary imaging studies include plain X-ray, ultrasound, arthrography , and magnetic resonance imaging.

Regarding treatment, we can classify it as orthopedic or conservative, which aims to contain the intra-acetabular femoral head , while the surgical approach, such as femoral osteotomies (variant or rotational), supra-acetabular, Ganz surgery, or arthrodiastasis, are reserved for phases of necrosis, fragmentation or poor prognosis, with the aim of optimizing joint congruity (6)(7)

The main prognostic factors include the type and degree of head deformity, joint incongruity, age at onset (remodeling is only possible until the end of growth), extent of the lesion according to Catterall , Herring or Thompson, stage at onset and therapeutic modality used (8,9).

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2. Clinical case

A 7-year-old girl with no significant medical history presents with a 15-day history of pain in her right hip following a fall from a bicycle, which subsequently intensifies and is accompanied by pain and functional limitation.

Complementary studies included biometry and blood chemistry, which were found to be within the normal range.

Among its relevant laboratories:

- Calcium: 9.7mg/dl
- Phosphorus : 5.5 mg/dl
- Normal electrolytes.

Additionally, within its studies and images it presents:

Hip ultrasound: A bulging joint capsule containing 2.6 ml of fluid was observed in the right hip , a femoral head with irregular edges and a flattened appearance, and an increase in the acetabular-femoral joint space.

After a clinical evaluation and complementary studies, Legg Calvé-Perthes disease was diagnosed , and absolute rest was indicated until the surgical procedure.

On the fourth day, surgery was scheduled for tendon lengthening and placement of a cast. A diagnosis of Calve- Perthes and hip subluxation was made.

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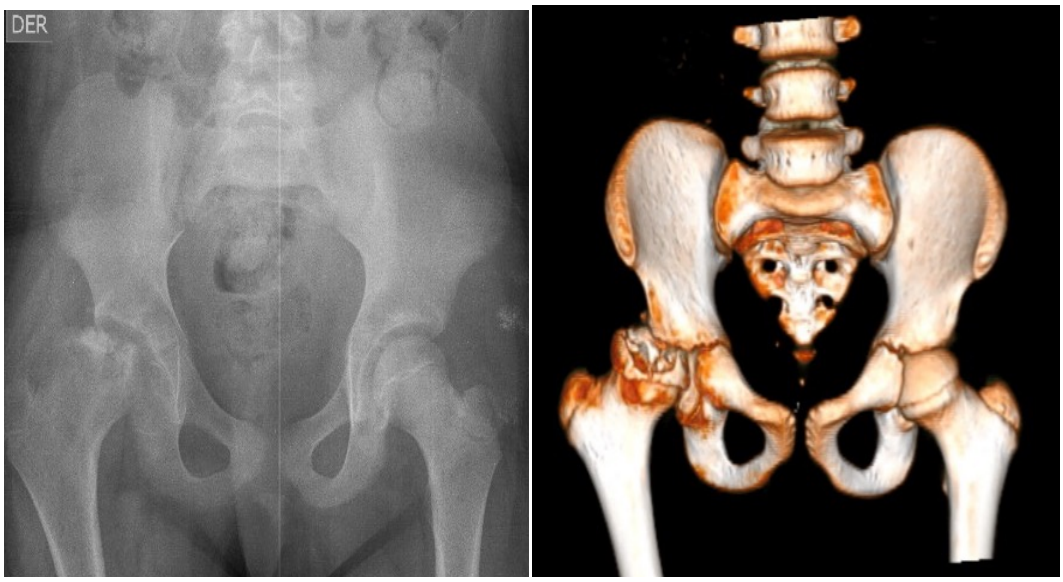
1.1. Images



(a) (b)

Figure 1. Complementary imaging studies **(a)** Comparative AP and axial hip X-ray: Hypoplasia and erosion of the right femoral head with dislocation of the femoroacetabular joint are observed ; (**b)** Computed axial tomography of the hip with 3D reconstruction: Decreased contour of the right femoral head.

3. Discussion

Perthes disease, often simply referred to as Perthes disease , is a complex orthopedic condition that affects the hips of children during crucial stages of growth (11). It is characterized by a process of avascular necrosis affecting the head of the femur, the spherical portion of the thigh bone that articulates with the pelvis (12). This phenomenon is triggered by a temporary interruption in the blood supply to this vital area.

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Although the precise etiology of Perthes disease remains enigmatic, a number of risk factors and potential contributors have been identified. These include certain blood clotting disorders (thrombophilias), corticosteroid use, delayed bone maturation or short stature, and a history of repetitive hip trauma (13).Some studies suggest a possible genetic predisposition, with mutations in certain genes under investigation. The influence of mechanical factors and possible abnormalities in the blood vessels supplying the femoral head in childhood, a period of dynamic vascular change in that area, have also been explored (14). Interestingly, although the literature consistently reports a higher prevalence in boys by a ratio of approximately 4:1, presentation in girls, as in the above-mentioned case, although less frequent, underscores the importance of considering this diagnosis regardless of sex. The typical age of onset, between 4 and 10 years, coincides with a particular developmental phase of the vascularization of the femoral head (15).

The clinical evolution of the disease develops through a well-characterized pathological process. Initially, the interruption of blood flow leads to the death of bone tissue (avascular necrosis) in the femoral epiphysis. This necrotic area weakens and becomes susceptible to deformation under the load of body weight (16). Subsequently, the body initiates a remarkable, although often imperfect, repair process. Revascularization involves the formation of new blood vessels to restore blood supply to the affected area. Simultaneously, a process of bone remodeling occurs, where necrotic tissue is gradually resorbed and replaced by new bone. However, the speed and efficiency of this process can vary considerably between individuals, which may result in incomplete remodeling and the persistence of deformities in the femoral head (17).

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Perthes disease is often insidious. The most common symptom is a limp, which may be intermittent at first and worsen with physical activity. This recurrent limp may initially lead to misdiagnoses, such as transient synovitis of the hip. Children with this condition may also present with pain in the groin or thigh, even reaching the knee (referred pain), which leads to functional limitations of the hip, decreased range of motion, and atrophy of the thigh muscles, particularly the quadriceps.

Clinical evaluation is the cornerstone of diagnosis, which is primarily based on imaging studies. While plain pelvic radiographs are the key initial tool, it is important to know that during the early stages of the disease, changes on radiography may be subtle or even normal (18) Magnetic resonance imaging (MRI) has proven particularly valuable for early diagnosis, allowing ischemic involvement of the femoral head to be visualized before it is evident on radiographs. Other imaging methods, such as bone scintigraphy, can also be useful to assess vascularization and metabolic activity in the femoral head (19).

Perthes disease typically progresses through four distinct phases (20), each with particular radiographic and clinical features:

- **Necrosis (or Ischemia) Phase:** In this initial stage, blood supply is interrupted and bone tissue dies. Clinically, pain and lameness may be present. Radiographically, changes may be minimal at first, but over time, an increase in density (sclerosis) and a decrease in size of the affected femoral epiphysis may be observed, sometimes with an apparent widening of the joint space due to inflammation and cartilage thickening. This phase may last for several months.

- **Fragmentation Phase:** During this phase, the body begins to reabsorb the necrotic bone. Radiographically, the femoral

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head appears fragmented and collapsed to varying degrees. This is the stage in which the femoral head is most vulnerable to deformity. Symptoms, such as limited mobility and pain, are usually most pronounced in this phase, which can last up to one or two years.

- **Reossification Phase:** In this phase, active new bone formation begins as blood flow is progressively restored. Radiographically, new areas of ossification appear within the fragmented femoral head. This phase is the longest, lasting from one to three years. As new bone forms, the femoral head begins to regain some of its shape, although remodeling may not be complete.

- **Remodeling (or Healing) Phase:** This is the final phase, where the newly formed bone consolidates and the femoral head continues its remodeling process until it reaches skeletal maturity. The external configuration of the femoral head will be determined by the extent of the initial damage and the quality of the healing process. Radiographically, the bone pattern becomes more uniform. This phase can last several years until bone growth stops.

Perthes disease , since the therapy and the long-term quality of life and prognosis depend on the age of the patient at onset, the extent of the femoral head that is affected and the final shape that it acquires during healing (21). The central goal of treatment is to preserve the sphericity of the femoral head and ensure that it fits correctly in the acetabulum (the cavity of the pelvis), to minimize the risk of developing osteoarthritis of the hip, affecting the quality of life of the patient in adulthood 22).

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4. Conclusions

Perthes disease is a complex disorder that requires a multidisciplinary approach to ensure good long-term functional outcomes. Early detection and appropriate intervention are key to minimizing sequelae and maintaining the patient's quality of life.

5. Contribution of the authors

EL : Data collection

CV: Discussion

TB: Final review of the article

6. Ethics committee approval and consent to participate in the study

For the publication of this clinical case, all current ethical standards of the institution were respected, as well as the principles established in the Declaration of Helsinki. Informed consent was given by the minor's legal representative, who received clear information about the nature, objectives, and scope of this publication. Patient confidentiality and anonymity are ensured at all times. A copy of the corresponding informed consent is included.

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