

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

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.

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

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, & Wachter, 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

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

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

of materials $\alpha = .78$, monitoring $\alpha = .72$, initiative $\alpha = .77$, and working memory $\alpha = .82$. (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 (

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 R^2 , the standardized coefficients (β), and the semipartial compensation coefficient (sr^2) were determined, which indicates the percentage of variance explained by each predictor variant after controlling the effect of the other variables (Harrell, 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.

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%).

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.

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	—

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.

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.

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.

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.

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.

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

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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