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Impact of Food Insecurity on Psychological Distress, Eating Disorder Risk, and Weight Bias Internalization: A Cross-Sectional Study in Chilean Adults

Impacto de la inseguridad alimentaria en el malestar psicológico, el riesgo de trastornos alimentarios y el sesgo de peso internalizado: Un estudio transversal en adultos chilenos

Carla Ugarte-Pérez[1]*
0000-0002-8130-131X
carla.ugarte.p@uai.cl

Claudia Cruzat-Mandich[1]
0000-0003-3477-8737
claudia.cruzat@uai.cl

Andrés Silva[2]
0000-0002-4816-2821
andres.silva@uss.cl

Fernanda Díaz-Castrillon[1]
0000-0003-4517-6803
fernanda.diaz@uai.cl

Camila Oda-Montecinos[3]
0000-0002-4988-9969
camila.oda@uoh.cl

Álvaro Quiñones[4]
0000-0002-6993-0324
aquinones@academicos.uta.cl

[1] Universidad Adolfo Ibáñez. Santiago, CHILE
[2] Universidad San Sebastián. Santiago, CHILE
[3] Universidad de O'Higgins. Rancagua, CHILE
[4] Universidad de Tarapacá. Iquique, CHILE
*Autor de correspondencia

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Abstract

Background: Food insecurity is a global issue associated with negative effects on both physical and mental health. In Chile, it affects a growing number of people, and, despite this, its relationship with psychological distress, internalized weight bias, and eating disorder risk has not been sufficiently studied. **Objective:** This study aims to explore the relationship between levels of food insecurity and psychological outcomes (psychological distress, eating disorder risk, and internalized weight bias) in Chilean adults. **Methods:** A cross-sectional study was conducted with 107 adult participants (83.5% women), using the FIES scale to measure food insecurity, the DASS-21 scale to assess psychological distress, and the EDI-3 and WBIS-M scales to measure eating disorder risk and internalized weight bias. To assess the impact of food insecurity levels on psychological variables, PERMANOVA was used. Comparisons between food insecurity levels on each dependent variable were conducted using Kruskal-Wallis analysis. **Results:** 62.6% of participants experienced moderate or severe food insecurity. The results showed that severe food insecurity was significantly associated with higher levels of psychological distress, body dissatisfaction, and internalized weight bias. Body dissatisfaction emerged as the most relevant factor in the relationship between food insecurity and eating disorder risk. **Conclusions:** This study provides relevant evidence on the relationship between food insecurity and psychological distress (depression, anxiety, stress), the risk of eating disorders, and internalized weight bias. The results underscore the need to address the emotional and psychological impact of food insecurity in interventions aimed at vulnerable populations. Further longitudinal research is needed to better understand the dynamics between these variables and their influence on mental health.

Keywords: food insecurity, emotional distress, internalized weight bias, body dissatisfaction, eating disorders

Resumen:

Antecedentes: La inseguridad alimentaria es un problema global asociado con efectos negativos en la salud física y mental. En Chile, afecta a un número creciente de personas, y, pese a esto, su relación con el malestar psicológico, el sesgo de peso internalizado y el riesgo de trastornos de la conducta alimentaria no ha sido suficientemente estudiada. **Objetivo:** Este estudio busca explorar la relación entre los niveles de inseguridad alimentaria y los resultados psicológicos (malestar psicológico, riesgo de trastornos alimentarios y sesgo de peso internalizado) en adultos chilenos. **Método:** Se realizó un estudio transversal con 107 participantes adultos (83.5% mujeres), utilizando la escala FIES para medir la inseguridad alimentaria, la escala DASS-21 para evaluar el malestar psicológico, y el EDI-3 y WBIS-M para medir el riesgo de trastornos alimentarios y el sesgo de peso internalizado. Para evaluar el impacto de los niveles de inseguridad alimentaria en las variables psicológicas, se utilizó PERMANOVA. Las comparaciones entre los niveles de inseguridad alimentaria en cada variable dependiente se realizaron mediante análisis de Kruskal-Wallis. **Resultados:** El 62.6% de los participantes presentó inseguridad alimentaria moderada o severa. Los resultados mostraron que la inseguridad alimentaria severa se asocia significativamente con mayores niveles de malestar psicológico, insatisfacción corporal y sesgo de peso internalizado. La insatisfacción corporal emergió como el factor más relevante en la relación entre inseguridad alimentaria y riesgo de trastornos alimentarios **Conclusiones:** Este estudio proporciona evidencia relevante sobre la relación entre la inseguridad alimentaria y el malestar psicológico (depresión, ansiedad, estrés), el riesgo de trastornos alimentarios y el sesgo de peso internalizado. Los resultados subrayan la necesidad de abordar el impacto emocional y psicológico de la inseguridad alimentaria en las intervenciones dirigidas a poblaciones vulnerables. Se requiere más investigación longitudinal para comprender mejor las dinámicas entre estas variables y su influencia en la salud mental.

Palabras claves: inseguridad alimentaria, malestar psicológico, sesgo internalizado de peso, insatisfacción corporal, trastornos de la conducta alimentaria

SOCIEDAD CHILENA DE PSICOLOGÍA CLÍNICA Y PSICOTERAPIA

Introduction

According to the Food and Agriculture Organization of the United Nations (FAO), food security is a fundamental concept that underscores the well-being of individuals and populations (Coleman-Jensen et al., 2022). It is defined as follows: "Food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 1996). Conversely, food and nutritional insecurity occurs when an individual lacks regular access to adequate, safe, and nutritious food necessary for appropriate growth, development, and healthy living (FAO, 1996). Food and nutritional insecurity can be transitory (when it occurs in times of crisis), seasonal or chronic (when it happens continuously). In recent years, the COVID-19 pandemic, economic crises, political instability in various countries, currency devaluation, and armed conflicts have exacerbated food and nutritional insecurity to varying degrees (Makoukji et al., 2024; FAO, 2021; Van Lancker & Parolin, 2020).

The "*State of Food Security and Nutrition in the World*" report by FAO, the International Fund for Agricultural Development (IFAD), the United Nations Children's Fund (UNICEF), the World Food Programme (WFP) an the World Health Organization (WHO) in 2022, highlights a growing gender disparity in food insecurity, which has been further exacerbated by the COVID-19 pandemic, particularly in Latin America and the Caribbean, and Asia. In Chile, gender disparities are evident in household leadership, as food insecurity tends to be higher when the head of the household is female. In 2017, moderate food insecurity was 11.1% in male-headed households, compared to 16.4% in female-headed households. In 2020, these figures increased to 17.1% and 22.6%, respectively, and in 2022, the values were 16.2% for male-headed households and 21.9% for female-headed households. Regarding severe food insecurity, it is also higher in female-headed households, although the gaps are smaller (Ministerio de Desarrollo Social y Familia, 2024).

Currently, inadequate access to safe, nutritious, and sufficient food is a public health issue affecting more than two billion people worldwide (FAO, IFAD, UNICEF, WFP and WHO, 2022), including children, adolescents, and emerging adults (Tarasuk & Mitchell, 2020). International and national evidence shows that level of education is a determinant of perceived food insecurity (Gallegos et al., 2023; Pinheiro et al., 2022)

In Chile, the 2017 National Socioeconomic Characterization Survey (CASEN) assessed perceived food insecurity. Results indicated that 13.6% of respondents experienced moderate food insecurity, while 3.4% reported severe food insecurity (Ministerio de Desarrollo Social y Familia, 2017). Food insecurity was significantly higher in urban areas (13,3%) compared to rural areas (12.2%), with a statistically significant difference, as well as in the "Norte Grande" and Central Zones, in lower-income households, in single-parent nuclear families, and in households with children and adolescents.

Although Chile performs better than other countries in Latin America and the Caribbean regarding food insecurity and nutrition, the prevalence of moderate or severe food insecurity perceived by individuals increased from 13.6% in 2017 to 19.8% in 2020 (Ministerio de Desarrollo Social y Familia, 2020; Observatorio Social Ministerio de Desarrollo Social y Familia, 2021). Furthermore, the FAO has warned that Chile's internal food supply could face medium-term disruptions due to sudden changes in global food flows. For instance, in 2022, the basic food basket increased by 23% (FAO, IFAD, UNICEF, WFP and WHO, 2022).

Food and nutritional insecurity is associated with inadequate diets lacking essential nutrients, which can affect child growth, shorten life expectancy, and increase the risk of chronic diseases (Elgar et al., 2021; Kirkpatrick & Tarasuk, 2008; Leung et al., 2020; Maynard et al., 2018; Na et al., 2019; Weaver & Fasel, 2018). This nutritional deficit not only increases the risk of malnutrition by deficiency or excess, such as obesity (Dietz, 1995; Myers, 2020; Myers et al., 2020), but also has repercussions on psychological well-being (Myers, 2020). The constant worry about lack of access to food generates chronic stress, negatively impacting mental health and promoting the onset of symptoms of depression, anxiety, and stress (Arenas et al., 2019; Bruening et al., 2017; Davis et al., 2023; Kolovos et al., 2020; Maynard et al., 2018; Men et al., 2020; Men et al., 2021; Pryor et al., 2016). Additionally, food insecurity has been associated with the development of eating disorders (EDs), such as binge eating and dietary restrictions, due to the emotional response to food scarcity (Abene et al., 2023; Becker et al., 2017; Hazzard et al., 2020; Lydecker & Grilo, 2019; Middlemass et al., 2021).

Lastly, food insecurity has also been linked to internalized weight bias (IWS), which occurs when individuals adopt and apply negative social stigmas related to overweight to themselves (Puhl et al., 2018; Schvey & White, 2015). Individuals experiencing food insecurity, especially those with severe levels of food insecurity, have shown higher levels of IWS (Becker et al., 2017; Becker et al., 2021; Goode et al., 2023).

Food and nutritional insecurity, along with its effects on mental health, have become increasingly important areas of research, especially in the aftermath of the COVID-19 pandemic and ongoing armed conflicts. Although much of the research in this area has focused on the U.S. population, the relationship between food insecurity and mental health remains underexplored in other contexts, particularly in Chile. Given the increasing prevalence of food insecurity in the country and the known associations with mental health issues such as depression, anxiety, and stress, as well as the development of eating disorders and internalized weight bias, this study seeks to contribute to filling this gap in the Chilean context. This research specifically aims to explore the relationships between food insecurity levels and psychological outcomes (depression, anxiety, stress, eating disorders, and internalized weight bias) in a sample of Chilean adults. The study also examines sociodemographic factors such as age, educational level, and employment status to better understand how these factors interact with food insecurity and its impact on the mental health of participants.

Method

A cross-sectional study was conducted targeting adults aged 18 to 70 years residing in Chile. Subjects under 18 years old are minors, which may be less conscient of food insecurity related issues. Moreover, subjects over 70 years tend to be retired and with higher age-related pathologies, therefore, higher food insecurity. We consider that a sample of adults aged 18 to 70 years are more comparable that adding underage or elder subjects. The sample was selected using a non-probabilistic convenience sampling method based on participant accessibility. Some previous examples using convenience examples can be found in the work done by Nikolaus et al. (2020) and Niles et al. (2021).

Procedures

Data collection was carried out through two main channels: first, by contacting participants from a database associated with a food waste project, who had previously consented to be approached for future research; and second, via the social networks of researchers (e.g., Instagram and Facebook). Participants who agreed to take part completed the survey using Qualtrics®, accessible on computers and mobile devices, between September 2023 and March 2024. As an incentive, participants who completed the survey were entered into a draw to win one of 30 gift cards valued at $50,000 CLP each (50 USD).

Instruments

All participants were provided with a link to an online survey. Upon accessing the survey, participants were first presented with an informed consent form. Access to the survey questions was granted only after consent was confirmed. The survey included the following instruments: Food Insecurity Experience Scale (FIES); Depression, Anxiety, and Stress Scales (DASS-21); Risk Subscales of the Eating Disorder Inventory-3 (EDI-3); Modified Weight Bias Internalization Scale (WBIS-M); and a Sociodemographic Questionnaire developed specifically for this study, this section collected demographic information, including age, sex, educational level, and employment status.

FIES

The Food Insecurity Experience Scale (FIES) is an internationally recognized tool used to assess the extent to which individuals experience food insecurity. This eight-item questionnaire is endorsed by the FAO and has been employed in numerous academic publications (Helmi et al., 2020; Rezende Machado de Sousa et al., 2019). In this study, participants were classified into three levels of food insecurity: marginal, moderate, and severe, following the thresholds proposed by the FAO. To carry out this classification, the Rasch methodology and the RM.weights program (official R software for the FAO's 'Voices of the Hungry' project) were used, allowing for the estimation of food insecurity prevalence. The Rasch model showed adequate reliability, with a Cronbach's alpha of .88 (95% CI: .84–.92) for standardized scores, reflecting moderate reliability.

DASS-21

The Depression, Anxiety, and Stress Scales-21 (DASS-21) is a self-report scale designed to assess symptoms of depression, anxiety, and stress (Lovibond & Lovibond, 1995),and has been validated in Chilean university students (Antúnez & Vinet, 2012; Vinet et al., 2008). It has 21 items with four Likert-style response options ranging from 0 ("does not describe anything that happened to me or that I felt during the week") to 3 ("Yes, this happened to me a lot, or almost always"). It has three subscales that include seven items each. It is brief, easy to administer, and straightforward to interpret. In the validation study, the DASS-21 showed an overall alpha of .91, with depression, stress, and anxiety scales having alphas of .85, .83, and .73, respectively. In this study, the DASS-21 showed excellent internal consistency, with a global Cronbach's alpha of .95. The subscales for depression, anxiety, and stress yielded alpha coefficients of .91, .87, and .86, respectively.

Risk Subscales of EDI-3

The Eating Disorder Inventory-3 (EDI-3) risk subscales (Garner, 2004; Lizana-Calderón et al., 2022) assess the risk of developing eating disorders through 25 items grouped into three primary subscales: Drive for Thinness: Measures a strong desire to be thinner or an intense fear of gaining weight (e.g., *I am terrified of gaining weight*); Bulimia: Evaluates tendencies towards binge eating or having uncontrollable episodes of overeating (e.g., *I eat or drink in secret*) ; Body Dissatisfaction: Assesses dissatisfaction with overall body shape or specific areas, such as the stomach, hips, thighs, or buttocks, which are often of concern in individuals with eating disorders (e.g., *I think my stomach is too big*). In the Chilean validation study (Lizana-Calderon et al., 2022), the three subscales showed Cronbach's alphas and McDonald's omega greater than .70, drive for thinness (α = .89, ω = .905), bulimia (α = .759, ω = .742) and body dissatisfaction (α = .820, ω = .807). In this study, the three EDI-3 subscales demonstrated good internal consistency, with Cronbach's alphas of 0.85 for drive for thinness, .88 for bulimia, and .87 for body dissatisfaction.

WBIS-M

The Modified Weight Bias Internalization Scale (WBIS-M) evaluates the extent to which individuals internalize negative stereotypes about people with overweight or obesity (Pearl & Puhl, 2014). WBIS-M comprises 11 items adapted from the original scale (Durso & Latner, 2008), rated on a seven-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). The scale has demonstrated strong psychometric properties, with reliability coefficients ranging from .90 to .94 and presented a one-factor structure. In this study, the WBIS-M showed good internal consistency, with a Cronbach's alpha of .89.

Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki and was reviewed and approved by the Ethics Committee of Universidad Adolfo Ibáñez.

Data Analysis

Data analysis was performed using R software version 4.4.2. Descriptive and inferential statistical analyses were conducted to explore relationships between demographic variables, levels of food insecurity, and their impact on psychological variables. The assumptions of normality and homogeneity of variance were verified before proceeding with the analyses.

Means, standard deviations, and frequencies were calculated to describe the demographic characteristics of the sample and the main study variables, stratified by levels of food insecurity. Chi-square analyses were used to examine relationships between categorical demographic variables (sex, neighborhood type, educational level, and employment status) and levels of food insecurity. Differences in age across food insecurity levels were assessed using one-way analysis of variance (ANOVA), with post hoc tests to identify specific group differences. Additionally, multiple linear regression models were employed to evaluate the combined impact of demographic variables, such as age, neighborhood type, and sex, as predictors of food insecurity levels treated as a continuous variable.

To assess the impact of food insecurity levels on psychological variables (psychological distress, risk of eating disorders, and internalized weight bias), a multivariate analysis of variance (PERMANOVA) was performed. This method was chosen due to its ability to handle non-normal data distributions and unequal variances. In cases where a marginal or significant multivariate effect was observed, univariate Kruskal-Wallis tests were conducted to evaluate the specific contributions of each dependent variable to the overall effect, given the violation of normality assumptions. Post hoc Dunn tests were applied to examine the specific differences between food insecurity levels.

Finally, multiple linear regression models were developed to explore the relationships between food insecurity (treated as a continuous variable using FIES scores) and psychological variables, while controlling for potential covariates such as age and sex. Regression coefficients were used to assess the strength of associations between variables.

Results

A total of 107 adult volunteers completed the instruments via digital platforms. The majority of the sample were women (83.5%), with a mean age of 41.21 years (SD = 11.48). According to the FIES scale, 62.6% of participants experienced food insecurity at moderate or severe levels, distributed between moderate food insecurity (n = 38) and severe food insecurity (n = 29). The demographic characteristics of each group are detailed in Table 1.

The Chi-square analyses did not find significant associations between food insecurity levels and the categorical variables of sex, neighborhood type, educational level, employment activity, and household head's employment activity; $p > .05$.

To assess whether age differed across groups according to food insecurity levels, a one-way analysis of variance (ANOVA) was conducted. The results showed significant differences between food insecurity levels ($F(2,104) = 6.026$, $p = .00334$, $\eta^2 = .104$). Post hoc analyses revealed that participants with severe food insecurity ($M = 35.17$, $SD = 10.30$) were significantly younger than those with marginal food insecurity ($M = 43.50$, $SD = 11.56$) and those with moderate food insecurity ($M = 43.42$, $SD = 8.06$).

Table 1. Sociodemographic data by food insecurity level

	Total Sample (n=107)	Marginal Food Insecurity (n=40)	Moderate Food Insecurity (n=38)	Severe Food Insecurity (n=29)
Sex (Female)	90 (84.1%)	35 (32.7%)	30 (28.0%)	25 (23.4%)
Nationality				
Chilean	93 (86.9%)	36 (33.6%)	34 (31.8%)	23 (21.5%)
Peruvian	3 (2.8%)	-	1 (.9%)	2 (1.9%)
Venezuelan	8 (7.5%)	2 (1.9%)	2 (1.9%)	4 (3.7%)
Colombian	1 (.9%)	-	1 (.9%)	-
Other	2 (1.9%)	2 (1.9%)	-	-
Marital Status				
Single	57 (53.3%)	15 (14.0%)	12 (20.6%)	20 (18.7%)
Married / PUC	39 (36.4%)	20 (18.7%)	12 (11.2%)	7 (6.5%)
Divorced	10 (9.3%)	4 (3.7%)	4 (3.7%)	2 (1.9%)
Widowed	1 (.9%)	1 (.9%)	-	-
Educational Level				
Primary School	3 (2.8%)	-	3 (2.8%)	-
High School	39 (36.4%)	17 (15.9%)	12 (11.2%)	10 (9.3%)
Technical/University	52 (48.7%)	17 (15.9%)	19 (17.8%)	16 (14.9%)
Postgraduate	13 (12.1%)	6 (5.6%)	4 (3.7%)	3 (2.3%)
Neighbourhood Type				
Highly Favoured	10 (9.3%)	6 (5.6%)	2 (1.9%)	-
Middle Class	71 (66.4%)	28 (26.2%)	27 (25.2%)	13 (12.1%)
Highly Disadvantaged	26 (24.3%)	6 (5.6%)	9 (8.4%)	11 (10.3%)
Employment Status				
Unpaid Worker	19 (17.8%)	5 (4.7%)	10 (9.3%)	4 (3.7%)
Self-Employed	24 (22.4%)	15 (14.0%)	5 (4.7%)	4 (3.7%)
Salaried Worker	49 (45.8%)	16 (14.9%)	18 (16.8%)	15 (14.0%)
Retired	4 (3.7%)	2 (1.9%)	1 (.9%)	1 (.9%)
Unemployed	11 (10.3%)	2 (1.9%)	4 (3.7%)	5 (4.7%)

PUC = Civil Union Pact, which is a form of marriage in Chile

Descriptive statistics for the instruments used in the study, including measures of psychological distress, risk of eating disorders, and internalized weight bias, are presented for the total sample and stratified by levels of food insecurity in Table 2.

Table 2. Descriptive statistics of the instruments by food insecurity levels.

Scale	Total Sample (n=107) M (SD)	Marginal Food Insecurity(n=40) M (SD)	Moderate Food Insecurity (n=38) M (SD)	Severe Food Insecurity (n=29) M (SD)
Psychological distress	29.17 (26.2)	25.35 (28.4)	24.36 (21.1)	40.75 (26.6)
Depression	8.78 (9.5)	8.45 (11.0)	6.42 (6.2)	12.34 (10.1)
Anxiety	8.05 (9.2)	6.50 (9.6)	6.36 (8.0)	12.41 (9.2)
Stress	12.33 (9.5)	10.40 (9.2)	11.57 (9,4)	16.0 (9.5)
Eating disorder risk	50.06 (25.24)	42.80 (23.6)	50.84 (24.5)	59.03 (26.0)
Drive for thinness	16.57 (8.43)	14.37 (8.9)	17.05 (7.8)	18.96 (7.9)
Bulimia	10.06 (8.08)	8.13 (6.5)	9.50 (6.8)	13.48 (10.4)
Body dissatisfaction	23.42 (11.77)	20.30 (10.9)	24.28 (12.4)	26.58 (11.3)
Internalized weight bias	3.34 (1.47)	2.88 (1.4)	3.2 (1.37)	4.02 (1.40)

For the psychological variables, the results of the Shapiro-Wilk test indicated that the data were not normally distributed for most variables ($p < .05$). Despite Levene's Test confirming homogeneity of variances for most variables ($p > .05$), the violation of normality led to the decision to use non-parametric tests for all subsequent analyses. Therefore, as the first analysis, PERMANOVA was performed to assess the impact of food insecurity levels on multiple psychological variables simultaneously. Following the PERMANOVA, the Kruskal-Wallis test will be used to assess differences across the levels of food insecurity for all psychological variables.

A PERMANOVA was conducted to assess the impact of food insecurity on psychological variables (psychological distress, risk of eating disorders, and internalized weight bias). The results revealed significant differences between the food insecurity levels ($F(2, 104) = 2.973$, $p = .026$). The model explained approximately 66.67% of the variance in the psychological variables ($R^2 = .67$), suggesting that food insecurity levels significantly impact these psychological outcomes.

The univariate Kruskal-Wallis analyses revealed significant effects on all three dependent variables: psychological distress ($\chi^2(2) = 13.29$, $p = .009$, $\eta^2 = .108$), risk of eating disorders (TCA) ($\chi^2(2) = 7.61$, $p = .02$, $\eta^2 = .054$), and internalized weight bias ($\chi^2(2) = 10.35$, $p = .01$, $\eta^2 = .080$). Post-hoc Dunn tests, summarized in Table 3, highlighted that participants with severe food insecurity reported significantly higher levels of psychological distress ($Z = -3.39$, $p = .0004$, $r = -.328$),risk of eating disorder ($Z = -2.74$, $p = .0031$, $r = -.265$), and internalized weight bias ($Z = -3.21$, $p = .0007$, $r = -.310$) compared to those with marginal food insecurity. Additionally, the

severe food insecurity group also showed significant differences in internalized weight bias (Z = -2.06, p = .0198, r = -.199) compared to participants with moderate food insecurity.

Table 3. Post hoc comparisons across levels of food insecurity

Dependent Variable	Comparison	Est. (Z)	r
Psychological Distress	Severe FI vs. Marginal FI	-3.39	-.328***
	Severe FI vs. Moderate FI	-3.05	-.295***
Eating Disorder Risk	Severe FI vs. Marginal FI	-2.74	-.265***
Internalized Weight Bias	Severe FI vs. Marginal FI	-3.21	-.310***
	Severe FI vs. Moderate FI	-2.06	-.199*

*p<.05; **p<.01; ***p<.001
FI = Food Insecurity

In addition to these findings, univariate analyses were conducted with the subscales of the DASS and the subscales of eating disorder risk (EDI-3) to assess the impact of food insecurity levels. The results indicated significant differences in psychological distress and eating disorder risk subscales among participants based on their level of food insecurity. Regarding psychological distress, Kruskal-Wallis tests revealed significant differences in depression ($\chi^2(2) = 8.86$, p = .01, $r = .27$), anxiety ($\chi^2(2) = 16.30$, $p < .001$, $r = .39$), and stress ($\chi^2(2) = 7.98$, p = .02, $r = .29$). Concerning eating disorder risk, a significant result was found for the body image dissatisfaction subscale ($\chi^2(2) = 6.12$, $p = .046$, $r = .17$) and a marginal result for thinness obsession ($\chi^2(2) = 5.49$, $p = .06$, $r = .16$). On the other hand, the bulimia subscale did not show significant differences between food insecurity groups ($\chi^2(2) = 4.55$, $p = .10$). Table 4 presents the detailed post-hoc comparison results between food insecurity levels.

Table 4. Detailed results from post hoc comparisons across levels of food insecurity for psychological distress and eating disorder risk subscales

Subscale	Comparison	Z-value	r
Depression	Severe FI vs. Moderate FI	-2.72	.261**
	Severe FI vs. Marginal FI	-2.19	.211*
Anxiety	Severe FI vs. Moderate FI	-3.62	.347***
	Severe FI vs. Marginal FI	-3.54	.341***
Stress	Severe FI vs. Moderate FI	-2.60	.252**
	Severe FI vs. Marginal FI	-2.68	.258**
Drive for Thinness	Severe FI vs. Moderate FI	-2.27	.220*
	Severe FI vs. Marginal FI	-0.81	.079
Body Dissatisfaction	Severe FI vs. Moderate FI	-3.21	.311***
	Severe FI vs. Marginal FI	-2.06	.200*

*p<.05; **p<.01; ***p<.001
FI = Food Insecurity

Finally, multiple regression models with stepwise selection were conducted to examine the impact of several predictor variables on three dependent variables: psychological distress, risk of eating disorders (ED), and internalized weight bias.

The predictor variables included age, marital status, food insecurity, economic activity of the head of household, and neighborhood type.

In the psychological distress model, the fit was significant ($F(3,103) = 6.188$, $p = .0007$, adjusted $R^2 = .128$), highlighting that food insecurity and economic activity were significant predictors. The model explained a substantial portion of the variability in psychological distress levels.

For the eating disorder risk model, the fit was also significant ($F(4,102) = 5.649$, $p = .0004$, adjusted $R^2 = .1493$). While age and food insecurity were significant predictors, the relationship with food insecurity was marginally significant, and the model did not confirm the impact of economic activity or neighborhood type.

Finally, the model for internalized weight bias also presented a significant fit ($F(5,101) = 6.17$, $p < .001$, adjusted $R^2 = .196$). The most relevant variables in this model were age and food insecurity, with economic activity also showing a significant impact. The regression coefficients for all models are summarized in Table 5.

Table 5. Regression Coefficients for Psychological Distress, Risk of Eating Disorders, and Internalized Weight Bias

Dependent Variable	Predictor	β	SE
Psychological Distress	Age	-.181	.11
	Food Insecurity (FIES)	.973	.41*
	Head of Household Economic Activity	2.482	1.08*
Eating Disorder Risk	Age	-.530	.21*
	Food Insecurity (FIES)	1.506	.79^
	Head of Household Economic Activity	3.241	2.05
	Neighborhood type	-6.075	2.05
Internalized Weight Bias	Age	-.047	.01***
	Food Insecurity (FIES)	.117	.044**

^=.06; *p<.05; **p<.01; ***p<.001

Notes Food insecurity was measured using FIES as a continuous variable. β = unstandardized coefficient; SE = standard error.

Discussion

The objective of this study was to explore the relationships between food insecurity levels and psychological outcomes (depression, anxiety, stress, eating disorders, and internalized weight bias) and sociodemographic factors in a sample of Chilean adults. According to the FIES scale, 62.6% of participants experienced food insecurity at moderate or severe levels. This prevalence, while consistent with international studies highlighting the rise of food insecurity in contexts of economic and social crises (FAO, 2021; Makoukji et al., 2024), is higher than that observed in

other studies conducted in Chile, such as the one by Pinheiro et al. (2022), which reports a prevalence of 31.8% of food insecurity in vulnerable urban areas of Santiago.

However, the results from our sample are lower when compared to more vulnerable populations, such as food bank users or institutionalized older adults in Chile, where food insecurity can reach up to 79.3% (Fuente et al., 2023). This discrepancy can be explained by the demographic and socioeconomic characteristics of our sample, which primarily comes from a database associated with a food waste project and recruitment through social media, likely representing groups with lower economic vulnerability compared to highly food bank-dependent populations.

Severe food insecurity was more prevalent among younger individuals, a finding consistent with previous studies (Joseph et al., 2022; Rossi et al., 2017) documenting greater vulnerability to food insecurity in young adults due to unstable income, economic responsibilities, and often, a higher dependence on precarious or part-time jobs. This group also faces a lack of access to stable economic resources, as is the case for those in academic training or in the early years of their professional careers. According to the FAO, IFAD, UNICEF, WFP and WHO (2022) report, food insecurity is particularly prevalent in young populations that do not have sufficient access to well-paying jobs or still depend on family support, which places them in a more vulnerable economic situation.

Our findings revealed a significant relationship between food insecurity and higher levels of psychological distress, including depression, anxiety, and stress, a pattern consistent with previous studies documenting the impact of food insecurity on mental health in contexts of economic vulnerability (Maynard et al., 2018; Nagata et al., 2019; Sundermeir et al., 2021; Zahidi et al., 2022). In our sample, individuals with severe food insecurity showed significantly higher levels of psychological distress, compared to those with marginal and moderate food insecurity, corroborating previous findings in vulnerable communities (Zahidi et al., 2022), and aligning with research suggesting that food insecurity, especially at its most severe levels, acts as a chronic stressor (Maynard et al., 2018; Nagata et al., 2019; Sundermeir et al., 2021; Zahidi et al., 2022). These findings reinforce the urgent need to address food insecurity as a critical determinant of mental health, with interventions that not only mitigate the direct effects of food insecurity, but also provide support for the emotional problems arising from this condition.

Our results highlight a significant relationship between food insecurity and the risk of developing eating disorders (ED), especially in terms of body dissatisfaction. This finding is consistent with previous studies that have documented an association between food insecurity and the risk of eating disorders, such as the one by Hazzard et al. (2022), who reported that severe food insecurity was associated with extreme weight control behaviors and binge eating episodes, possibly in response to fluctuations in food availability. However, in contrast to Hazzard et al. (2022), our results did not show a significant association between food insecurity and bulimia, although we did find a significant relationship between food insecurity and thinness obsession, as well as body dissatisfaction. This pattern also aligns with the findings of Kells et al. (2023), who observed associations between food insecurity, body dissatisfaction, and binge eating behaviors. These results suggest that food insecurity may influence not only extreme control behaviors, such as bulimia, but also cognitions and attitudes related to weight. In our sample, body dissatisfaction emerged as the most relevant factor in the relationship between food insecurity and the risk of ED. One possible explanation is that, as documented in the literature, food insecurity is associated with overnutrition, a prevalent issue in Chile. This phenomenon leads individuals with food insecurity to face a complex dilemma: the need to consume food, often ultraprocessed, due to food insecurity, and the pressure from social messages condemning excess weight, which intensifies body dissatisfaction. These findings emphasize the importance of adopting health approaches that are less stigmatizing, especially for socioeconomically vulnerable populations.

Consistently, our results show a significant relationship between food insecurity and internalized weight bias. Severe food insecurity emerged as a relevant factor in our sample, with participants with this level of food insecurity reporting significantly higher levels of internalized weight bias. This finding is consistent with what has been documented in previous studies, such as Becker et al. (2021), who found a significant relationship between severe food insecurity and internalized weight bias, suggesting that individuals with food insecurity may be more vulnerable to internalizing negative messages about their body and weight, especially considering that food insecurity is often linked to higher body weight (Carvajal-Aldaz et al., 2022). These results underscore the importance of considering the emotional and psychological impact of internalized weight bias in interventions, particularly in populations with high socio-economic vulnerability, where food insecurity combines with strong social stigma related to body weight.

Limitations

Among the limitations of this study, we highlight the limited sample size and the predominance of women (83.5%). Additionally, the non-probabilistic sampling strategy used limits the findings to the specific context of our sample. Furthermore, the cross-sectional nature of this study limits our ability to infer causal relationships between food insecurity and psychological outcomes. While our findings indicate a significant relationship between food insecurity and psychological distress, it is also plausible that pre-existing psychological distress exacerbated the experience of food insecurity. This cross-sectional design prevents us from determining whether food insecurity causes psychological distress, or if psychological distress contributes to food insecurity. Therefore, future studies on this topic should use larger sample sizes, preferably with probabilistic sampling methods and longitudinal designs, to unravel these bidirectional dynamics, providing a clearer understanding of the interaction between these variables over time and their implications for mental health and well-being.

Furthermore, given the discrepancy observed between the international literature and the findings of the CASEN 2017 survey, future research in Chile could benefit from examining the factors influencing food insecurity in both rural and urban areas (FAO, 2023). Internationally, food insecurity tends to be more prevalent in rural areas, yet in Chile, the data from CASEN 2017 indicate a different trend, with slightly higher food insecurity in urban areas. Investigating how sociodemographic factors, such as income level, family structure, and the presence of dependents, contribute to these patterns would offer valuable insights. Exploring these aspects could help design more tailored and effective interventions for different populations.

Strengths

One of the main strengths of this study is its contribution to an area of research that remains underexplored. Although there are studies addressing food insecurity and its relationship with mental health, the connection between food insecurity and internalized weight bias remains a limited line of investigation, particularly in the Chilean context. This study provides valuable evidence on the association between severe food insecurity and internalized weight bias, positioning it as one of the few works that directly explore this relationship in vulnerable populations.

Despite limitations related to the sample size and the predominance of women in the sample, the results obtained are consistent within the context of the studied population. This study contributes to the understanding of the effects of food

insecurity on mental health, the risk of eating disorders, and internalized weight bias, highlighting the need to consider these factors in future health approaches.

Moreover, studies exploring the relationship between food insecurity and internalized weight bias remain limited, making this study a relevant contribution to the field. Although the sample size is small, the findings provide a foundation for future research in this area. The effect sizes obtained in the comparisons reinforce the practical significance of the results. Additionally, regression models complemented the categorical analyses by considering food insecurity as a continuous variable, which allowed for a better understanding of its impact on psychological outcomes.

Conclusions

This study contributes to the understanding of the impact of food insecurity (FI) on mental health, eating disorder (ED) risk, and internalized weight bias (IWS), providing evidence of the significant relationship between these factors. While the study does not claim robust evidence, it offers valuable insights into the association between severe food insecurity and IWS, as well as its influence on body dissatisfaction and thinness obsession. The findings highlight the importance of considering the psychosocial impact of food insecurity in interventions, particularly in socioeconomically vulnerable populations.

Although the sample size is limited and there is a predominance of women, the results are consistent within the context of the studied population. This study adds to the growing body of literature on the psychological effects of food insecurity, focusing on the underexplored relationship between food insecurity and internalized weight bias. The effect sizes observed across the comparisons underscore the practical relevance of these findings.

Future research should prioritize longitudinal designs to better understand the bidirectional dynamics between food insecurity and psychological outcomes over time. Additionally, interventions aimed at addressing the emotional determinants of eating disorder risk, especially body dissatisfaction, should be tailored to vulnerable populations, considering the interplay of demographic factors such as age and gender. Expanding research to diverse cultural and socioeconomic contexts will help develop more effective strategies for addressing the mental consequences of food insecurity.

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Karina Franco-Paredes, Universidad de Guadalajara, México.