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Relationship between psychological distress, eating behaviour and body fatness in university students

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A B S T R A C T

Background: Psychological distress is a constant problem for university students, it can be related to excessive academic work, fear of failure, emotional exhaustion, and social pressures, which could affect eating behaviour and body composition. The objective was to relate psychological distress with eating behaviour and body composition in health occupations students. *Methods:* Cross-sectional correlational study in 92 subjects' undergraduate health careers. The instruments applied were Kessler's psychological distress scale (K10) and the Three Factor Eating Questionnaire (TFEQ), body composition was determined by multi-frequency bioimpedance measurement. Spearman's rho was used to determine the correlations. *Results:* 57% of the sample presented high or very high psychological distress, psychological distress was significantly correlated with the percentage of fat (Rho=0.269: p=0.009), and with the three TFEQ factors: cognitive restriction (Rho=0.296: p=0.004), uncontrolled eating (Rho=0.289: p=0.005) and emotional eating (Rho=0.398: p<0.001). *Conclusions:* Psychological distress during the university stage should be considered a possible factor of overweight and eating disorders.

Relación entre el malestar psicológico, la conducta alimentaria y la grasa corporal en estudiantes universitarios

Palabras clave:
Malestar psicológico
Conducta alimentaria
Composición corporal
Estudiantes universitarios
Chile

R E S U M E N

Antecedentes: El malestar psicológico es un problema constante para los estudiantes universitarios, puede estar relacionado con el exceso de trabajo académico, el miedo al fracaso, el agotamiento emocional y las presiones sociales, lo que podría afectar la conducta alimentaria y la composición corporal. El objetivo fue relacionar el malestar psicológico con la conducta alimentaria y la composición corporal en estudiantes del área de salud. *Métodos:* Estudio transversal correlacional en 92 sujetos de las carreras de salud de pregrado. Los instrumentos aplicados fueron la escala de malestar psicológico de Kessler (K10) y el Cuestionario alimentario de tres factores (TFEQ), la composición corporal se determinó mediante bioimpedanciometría multifrecuencia. Se utilizó la Rho de Spearman para determinar las correlaciones. *Resultados:* El 57% de la muestra presentó malestar psicológico alto o muy alto, el malestar psicológico se correlacionó significativamente con el porcentaje de grasa (Rho=0.269: p=0.009), y con los tres factores del TFEQ: restricción cognitiva (Rho=0.296: p=0.004), alimentación descontrolada (Rho=0.289: p=0.005) y alimentación emocional (Rho=0.398: p<0.001). *Conclusiones:* El malestar psicológico durante la etapa universitaria debe ser considerado un posible factor de sobrepeso y trastornos alimentarios.

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Introduction

University health occupations students are usually subjected to many factors that can alter their psychological stability during their university stay (Jerez-Mendoza & Oyarzo-Barría, 2015), for example; excessive academic load, fear of failure, emotional exhaustion and social pressures (Liu & Lu, 2012) could develop some degree of psychological distress in students, understood as experiencing emotional suffering that can manifest as feelings of stress, anxiety, depressed mood and exhaustion (Dendle et al., 2018), psychological alterations that can affect 30, 40 and 27% of university students for depression, anxiety and stress respectively (Patten & Vaterlaus, 2021), these conditions are inversely related to academic satisfaction and motivation (Chraif, 2015), and could, in the long term, be a trigger for chronic stress (Pozos-Radillo et al., 2014) causing clinical symptoms such as increased heart rate and high blood pressure (Conley & Lehman, 2012). Psychological Distress can increase from the beginning of university life (J.-M. March-Amengual et al., 2022). In Chile, there is evidence that 98% of higher education students have some altered or psychological distress (Jerez-Mendoza & Oyarzo-Barría, 2015). This condition could affect the choice of food, in fact, a tendency to develop and maintain eating pathologies in university students, especially those oriented towards food addiction, has been described (Gonçalves et al., 2022) in addition, other studies indicate that anxiety in university students is significantly correlated with total fat and saturated fat intake (G. Díaz et al., 2023). It has been described that psychological alterations can produce a defect in self-control during the choice of food, especially for foods with a high energy density, which can lead students to be overweight or obese (Maier et al., 2015) in fact, it has been described that daily stress activates brain regions involved in the evaluation of food and decreases the activity of prefrontal regions related to self-control, which can lead students to overeat (Neseliler et al., 2017), contributing to the development of overweight and obesity.

Table 1
Kessler Psychological Distress Scale (K10)

n	Ítem
1	During the last 30 days, about how often did you feel tired out for no good reason?
2	During the last 30 days, about how often did you feel nervous?
3	During the last 30 days, about how often did you feel so nervous that nothing could calm you down?
4	During the last 30 days, about how often did you feel hopeless?
5	During the last 30 days, about how often did you feel restless or fidgety?
6	During the last 30 days, about how often did you feel so restless you could not sit still?
7	During the last 30 days, about how often did you feel depressed?
8	During the last 30 days, about how often did you feel that everything was an effort?
9	During the last 30 days, about how often did you feel so sad that nothing could cheer you up?
10	During the last 30 days, about how often did you feel worthless?

Psychological distress can be identified by various tools, including the Kessler Psychological Distress Scale (K10) (Table 1). This instrument is increasingly used for clinical and epidemiological purposes and even in some countries, to analyze data from National Health Surveys, without differences from other instruments (Andrews & Slade, 2001; Chirwa et al., 2020; Enticott et al., 2018). It is a scale that has multiple validation studies in different populations and contexts (Hoffman et al., 2022; Milkias et al., 2022; Sampasa-Kanyinga et al., 2018; Uddin et al., 2018), therefore, it is a reliable instrument. Studies have even shown a significant association between K10 scores and body mass index (BMI), total cholesterol, LDL, and triglycerides (Yu et al., 2021) and with eating behaviour (Beaudequin et al., 2021). In university students, it has been determined that the K-10 score is related to sleep quality, but not to academic performance (Alotaibi et al., 2020) although other research has linked the K10 score to academic failure (Jaisoorya et al., 2017). But there are few reports related to the relationship between the K10 scale score with eating behaviour and body composition in university students.

The objective of this research was to relate perceived psychological distress to eating behaviour and body composition in university students in the health area of a regional university in Chile.

Methods

Participants

A non-experimental, descriptive and cross-sectional study was carried out, the population universe was made up of all the students of the faculty of health of a regional university in Chile, with a total enrolment of 1,227 students. A sample size of 86 (7%) students was calculated with 95% confidence, seeking a precision of 5% and assuming an approximate value of 0.5 in the correlation between the psychological distress score and body mass index (BMI). The selection of participants (sampling) was non-probabilistic for convenience, by calling volunteers. Posters were produced with the contact details of the researchers and the study, which were distributed on the university campus, students interested in participating were given a characterisation survey to identify inclusion and exclusion criteria. Those selected were then called to participate, until the sample size was completed.

Undergraduate students, between 18 and 30 years old, assigned to the Faculty of Health were included. Pregnant women, students with children or with some chronic diseases were excluded. The volunteers received a simple but fully explained of the study to later sign an informed consent. The research was safeguarded under international (Declaration of Helsinki) and Chilean ethical standards: Law Nº 20.120, “on scientific research on the human being, its genome, and prohibits human cloning”, 2006 (Government of Chile). The study was approved by the School of Nutrition and Dietetics of the Universidad Santo Tomás.

Instruments

Three tools were then applied: 1) Structured characterization survey (sociodemographic background) 2) Kessler Psychological Distress Scale (K10) (Kessler & Mroczek, 1992); this tool evaluates non-specific psychological distress in the last month. The instrument contains 10 items with a five-point Likert scale (1=never, 2=rarely, 3=sometimes, 4=many times, 5=always) (Table 1), and has various validation studies in various populations (Aranguren, 2010; Pereira et al., 2019). 3) Finally, the Eating Behaviour Test “Three Factor Eating Questionnaire (TFEQ)” was applied (Stunkard & Messick, 1985), this instrument is made up of three subscales or factors; (a) Cognitive Restraint (CR), defined as a conscious restriction of food intake aimed at controlling body weight and/or promoting weight loss; (b) Emotional Eating (EE), which refers to the tendency to eat more than usual due to a loss of control over intake with a subjective feeling of hunger; and (c) Uncontrolled Eating (UE), defined as the inability to resist emotional cues and eat in response to different

negative emotions. These subscales are made up of six, three, and nine items, respectively, with responses on a 4-point Likert scale (1=strongly agree, 2=agree, 3=disagree, and 4=strongly disagree), an instrument that also has multiple reliability studies. (Jáuregui-Lobera et al., 2014; Mostafavi et al., 2017). The time to answer the questionnaire was not limited.

Subsequently, each participant was called to a nutritional evaluation appointment, to determine their body composition.

Procedure

The procedures were determined with the subjects fasting for 8-10 hours, the participants arrived between 8:00-9:00 AM at the nutritional evaluation laboratory, and after the measurements, all received a healthy snack (juice and cereal bar).

Blood pressure (Omron HEM-CR24, Bannockburn, IL, USA), weight, height (SECA 769, Hamburg, Germany) and waist circumference (SECA 201, Hamburg, Germany) were determined using the techniques of the World Health Organization. Health (WHO, 1995). Body composition was determined by Bioimpedancemetry (Rice Lake, D-1000-3, Wisconsin, USA), obtaining; Fat-Free Mass (FFM-Kg) and Fat Mass (FM%) following the manufacturer's instructions.

Data Analysis

The internal consistency was determined with Cronbach's alpha model, and the differences by sex were evaluated with the Mann-Whitney or t-Student test according to the result of the Shapiro-Wilk test. Comparisons of proportions were analyzed with Chi2. Correlation analyses were carried out with Spearman's Rho or Pearson's r. A significance level was 0.05 and used the program IBM-SPSS Statistics 19 for Windows, Spanish version (IBM Corp., Armonk, NY, USA).

Results

92 students were evaluated, 7% more than the calculated sample (n=86). Women represented 75% (n=69). Nursing students were 47% (n=43), followed by nutrition and dietetics (33%, n=30), 14% (n=13) were phonoaudiologists, and the remaining 6% (n=6) were kinesiology students. The mean age was 22.2 years with no differences by sex.

Table 2
Anthropometric and body composition characteristics of health students (n=92)

	Total (n=92)	Women (n=69)	Men (n=23)	
	Mean ± *SD*	Mean ± *SD*	Mean ± *SD*	*p*-value*
Age (years)	22.2 ± 2.57	21.94 ± 2.31	23.1 ± 3.12	0.136
Weight (kg)	65.3 ± 13.1	61.9 ± 11.1	75.1 ± 13.7	0.000
Height (mt)	1.63 ± 0.08	1.59 ± 0.06	1.73 ± 0.06	0.000
BMI (kg/mt²)	24.5 ± 3.97	24.3 ± 3.89	25.0 ± 4.24	0.443
WC (cm)	80.2 ± 10.1	78.6 ± 9.63	84.9 ± 10.4	0.006
FF (%)	28.4 ± 6.49	30.4 ± 5.53	22.5 ± 5.55	0.000
FFM (kg)	46.5 ± 10.8	42.3 ± 6.99	59.2 ± 10.3	0.000
SBP (mmHg)	118 ± 11.5	118 ± 11.9	120 ± 10.3	0.440
DBP (mmHg)	72.8 ± 8.84	73.0 ± 9.45	72.4 ± 6.86	0.914

Note. SD: standard deviation, BMI: body mass index, WC: waist circumference, FF: fat mass, FFM: fat-free mass, SBP: systolic blood pressure, DBP: diastolic blood pressure. * Mann-Whitney U test for independent samples.

The anthropometric and body composition characteristics are shown in Table 2. 62% (n=57) of the sample presented a normal nutritional status, while 38% (n=35) presented overweight (30% BMI >25 and 8% BMI>30), low weight wasn't found (IMC<18.5). Weight (p<0.001), height (p<0.001), waist circumference (p<0.01) and FFM (p<0.001) were higher in men, while the percentage of fat was higher in women (p<0.001) (Table 2).

The Three Factor Eating Questionnaire (TFEQ) was applied to all the subjects, and it was possible to determine an adequate internal consistency with a Cronbach's Alpha of 0.765, by eliminating question 18 the index could increase to 0.810. but, in this work, the confirmatory analysis of TFEQ wasn't doing it. The Cognitive Restriction (CR), Emotional Eating (EE) and Uncontrolled Eating (UE) subscales obtained α values of 0.791, 0.716 and 0.883 respectively, so each subscale or factor has adequate internal consistency, therefore it is necessary to fully apply the instrument. The subjects presented an average of 2.66 ± 0.65 points in the UE subscale, 2.67 ± 0.72 in EE and 3.19 ± 0.73 points in CR. No significant differences were observed between sex (p=0.845, p=0.202 and p=0.148 respectively - Mann-Whitney U test).

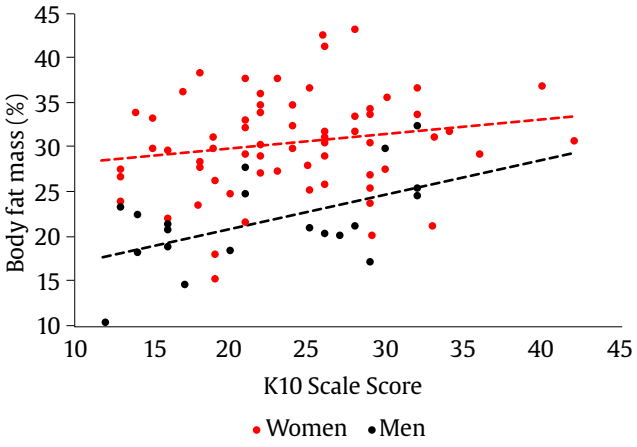

Figure 1. Correlation between Kessler Psychological Distress Scale (K-10) score and fat percentage by sex.

According to the responses provided by the participants, the Kessler Psychological Distress Scale (K-10) showed good internal consistency (Cronbach's alpha = 0.864). An average score of 23.47 ± 6.39 (range 12-42) points were determined without finding differences by sex (p=0.148). According to the instrument's classification, 15% (n=16) present very high psychological distress, 38% (n=41) high, 29% (n=32) moderate, and 10% (n=11) low, without dependence of sex (χ^2 5.455; gl=3: p=0.141).

A significant positive correlation was found between the K-10 score and the percentage of fat, so the higher the perception of psychological distress, the higher the percentage of body fat (Figure 1). When we performed an analysis by gender, the significance was lost, but a trend is observed in males (p=0.061). A significant positive correlation of K-10 with BMI was also identified, but only in men (p=0.041) (Table 3).

We found a positive relationship between K-10 and TFEQ that was significant in all factors, as well as with the total score. When performing the analysis by gender, these positive correlations are maintained in men, but the correlations of the K-10 score with the UE and CR subscales lose significance in women (Table 4).

Table 3
Correlations of the Kessler Psychological Distress Scale (K-10) and body composition and blood pressure variables.

	Total (n=92)	Women (n=69)	Men (n=23)
FF (%)	0.269 (0.009)	0.196 (0.106)	0.396 (0.061)
BMI (kg/mt^2)	0.174 (0.096)	0.131 (0.282)	0.427 (0.042)
FFM (kg)	-0.116 (0.269)	-0.057 (0.644)	0.078 (0.724)
WC (cm)	0.137 (0.193)	0.117 (0.337)	0.373 (0.079)
SBP (mmHg)	0.023 (0.827)	-0.025 (0.839)	0.163 (0.459)
DBP (mmHg)	-0.015 (0.885)	-0.057 (0.642)	0.114 (0.603)

Note. Rho Spearman (p-value), %FF: percentage fat, BMI: body mass index, FFM: fat-free mass, WC: waist circumference, SBP: systolic blood pressure, DBP: diastolic blood pressure. p-value: bilateral significance.

Table 4
Correlations of Kessler's Psychological Distress Scale (K-10) and Three Factor Eating Questionnaire (TFEQ)

	Total sample (n=92)	Women (n=69)	Men (n=23)
Total TFEQ	0.435 (<0.001)	0.279 (0.020)	0.719 (<0.001)
UE	0.289 (0.005)	0.171 (0.159)	0.534 (0.009)
CR	0.296 (0.004)	0.201 (0.098)	0.453 (0.030)
EE	0.398 (<0.001)	0.256 (0.034)	0.699 (<0.001)

Note. Spearman's Rho (p-value), Uncontrolled Eating (UE), Cognitive Restraint (CR), Emotional Eating (EE).

Discussion

Currently, there is great concern about the eating behaviour of higher education students, since it is an age range in tension due to their changes in habits that end up increasing cardiovascular risk factors, as we have previously mentioned (C. Díaz et al., 2019). This new lifestyle brings with it, in most cases, an inadequate diet and academic concerns that could develop psychological distress, which can be understood as a stressful factor even on a moral level that can generate dysfunction in the organism. (Mosqueda-Díaz et al., 2016), it has been described that in challenging academic situations, psychological distress may be related to eating disorders (Antúnez & Vinet, 2013), which can further affect the health of students.

In our study, psychological distress was present in 90% of the students surveyed, a lower percentage than those described by other authors in Chile (98%) (Jerez-Mendoza & Oyarzo-Barría, 2015). On the other hand, the average score of the K-10 instrument (23.5 points) was higher than that reported in the general population (14.9) (Slade et al., 2011) and in Mexican university students (19.3) (Torralba et al., 2018), also higher than reported in adolescents with inflammatory bowel diseases (21.6). (Halloran et al., 2020) and even higher than the average score of people with a history of body burns (19.5). (Wasiak et al., 2013). This situation is quite worrying since the maintenance of this condition could develop chronic stress in students (Pozos-Radillo et al., 2014) and promote the development of other diseases.

It is well known that there is a relationship between emotional states and eating behaviours (Macht, 2008). Some authors have described that stress is not related to the hormones associated with the sensation of hunger (Kiessl & Laessle, 2017), other researchers propose the existence of a vicious circle from stress to obesity that is related to physiological changes in the hypothalamic-pituitary-adrenal axis and stimulation of hormone production (leptin, ghrelin and neuropeptide Y) (Tomiyama, 2019), which progressively develops a positive energy balance, favouring the accumulation of energy reserves in the form of fat, a situation that can lead to the development of obesity and thus increase the risk of non-communicable diseases such as type 2 diabetes, hypertension, cardiovascular diseases, dyslipidemia, non-alcoholic fatty liver disease, among others (Schetz et al., 2019).

In our study, the K-10 score was positively correlated with body fat percentage and BMI especially in men, while other researchers have found associations of K-10 with BMI in women. (Gu et al., 2013). Studies using other scales have shown that perceived stress is negatively associated with BMI, especially in men, but not in women (Suglia et al., 2017), so this relationship between stress and body weight could be influenced by the type of instrument used.

In our research, psychological distress was positively associated with an increase in the factor "emotional eating" (EA) in males and females, which could contribute to an increase in food intake increasing body fat mass. It has been reported that adolescents with higher EA scores have a higher intake of snack foods (de Lauzon et al., 2004) with a genetic association for a taste for sweet and fatty foods (Keskitalo et al., 2008).

Recent research in the Chilean population has shown that the dimensions of the Three Factor Eating Questionnaire (TFEQ) instrument are significantly related to body composition variables. Pacheco et al. described in young adults (18-25 years) the relationship between the factors of the instrument with body composition and obesity variables. (Pacheco et al., 2021) as well as other researchers (Löffler et al., 2015; Martins et al., 2021). In our research, we also found significant associations, especially between AE with BMI, waist circumference and fat percentage (data not shown), findings that validate the use of the instrument.

It is important to highlight that the reliability values of both instruments (TFEQ and K-10) were similar to others previously reported. (Aranguren, 2010; Kavazidou et al., 2012; Mostafavi et al., 2017; Vargas Terrez et al., 2011).

Social pressures are increasingly high in a vertical and competitive type of society.

The study had some limitations such as the disparity of subjects according to gender, the male sample was only 33% of the female sample, so the results should be interpreted with caution. The sample size is representative only for the university where the research was conducted, and extrapolation of results should be done considering this information. The design of this study was cross-sectional; therefore, the results did not include the pre-university psychological health status of the participants. Prospective studies will be needed to follow up students in higher education and to develop and evaluate interventions to reduce the effect of psychological distress.

We can conclude, therefore, that it is not only the status, role and set of roles that are relevant, but that these pressures constrain individuals in such a way that they end up modifying their social practices (Giddens & Sutton, 2014), Thus, psychological distress ends up modifying the behaviour and eating habits of university students.

This should be a warning signal for Chilean higher education institutions and a reminder to consider psychological distress during the academic period as a factor that modifies eating behaviours and thus nutritional aspects, which can lead to pathological alterations.

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