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Index of healthy eating and emotional eating in relation to psychological inflexibility in dance students

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Dance places significant physical and cognitive demands on both students and professionals. These demands increase dancers' susceptibility to a variety of problems. Between them, the prevalence of eating disorders in dancers of various dance genres is significant. In this context, emotional eating is a common problem among people struggling with weight issues. On the other hand, a construct that has been shown to be relevant is Psychological inflexibility. Psychological flexibility refers to the possibility of fully embracing unpleasant private events in the present, without attempting to modify them. The aim of this paper is to determine the different components of emotional eating and the healthy eating index as a function of psychological inflexibility in dance students. This was a cross-sectional study using non-probabilistic sampling. One hundred fourteen dance students enrolled in conservatories or dance schools participated in the study. Evaluations were conducted using the Acceptance and Action Questionnaire, the Healthy Eating Index for the Spanish population, and the Eating and Appraisal Due to Emotions and Stress Questionnaire. Data were collected in person and online format. No differences in psychological inflexibility were observed between men and women. While women showed greater utilization of food to regulate emotions, they did not differ from men in scores on the healthy eating index. Students with high psychological inflexibility reported greater utilization of food as a regulator of emotions. No differences were found in healthy eating according to psychological inflexibility. It is recommended to transform dance conservatories into healthy spaces by promoting habits that facilitate students' well-being. Faculties can help in the pursuit of excellence by aligning performance goals with research findings and improving holistic care.

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Introduction

Dance, as a rigorous performance activity, places significant physical and cognitive demands on both students and professionals. These demands increase the susceptibility of dancers to physical fatigue, pain, psychological distress, injury, and dropout (van Winden et al., 2019). Furthermore, dance is associated with a range of other issues, including injuries (Ojofeitimi and Bronner, 2011), sleep disturbances (Arbinaga, 2018), tobacco use (Arbinaga, 2019), and eating behavior disorders (Doria and Numer, 2022).

The prevalence of eating disorders in female dancers across various dance genres ranges from 12% to 26.5% (Arcelus et al., 2014; Liu et al., 2016). In a recent study by Fostervold-Mathisen et al. (2022) involving professional dance students, 12% reported a history or diagnosis of an eating disorder. Among the latter, 4% had anorexia; 1% had bulimia; 4% experienced fluctuations between anorexia and bulimia, and 3% did not specify a particular eating disorder. Interestingly, no differences were found according to gender, school, or academic year. However, gender differences were observed, with females scoring higher on the food restriction subscale (Fostervold-Mathisen et al., 2022).

Similar results have been reported by Cardoso et al. (2021), who found that 74.1% of dancers scored very highly on a scale that provides an index based on the frequency of compulsive and purgative behaviors. Ribeiro and Veiga (2010) also found that 11.5% of professional classical ballet dancers reported suffering from anorexia nervosa. Similar, but slightly higher estimates (16.4%), have been reported in semi-professional dancers in Spain (Jáuregui-Lobera et al., 2016). Therefore, the risk of eating disorders is present across various dance genres (Cardoso et al., 2017).

An aspect little studied in dance but relevant to eating behavior, and related to compulsive forms of eating, is emotional eating. In this regard, two eating behaviors can be distinguished, one based on emotional (irritability, anxiety, or stress) cues (emotional eating) and the other on external (smell or sight of attractive food) cues (van Strien, 2018). Emotional eating is thus regarded as the tendency to overeat in response to negative emotions, such as anxiety, depression, or irritability (van Strien et al., 2007; Whiteside et al., 2007).

Emotional eating is a common problem among people struggling with weight issues (Frayn and Knäuper, 2018). Emotional eaters are particularly prone to consuming foods high in fat, sugars, and calories in response to negative emotions (Konttinen, 2020). These eating habits, combined with higher body weight, place emotional eaters at increased risk for diabetes and heart disease (Wang et al., 2010). It should also be remembered that emotional eating may be the first step toward developing a binge eating disorder and its extreme subtypes, such as food addiction (Davis, 2013). In addition, emotional eating is manifest differently in men and women. In men, it has been associated with body mass index and uncontrolled eating; however, in women, emotional eating has been linked to uncontrolled eating, anxiety, and poor sleep quality (Amoako et al., 2023).

In the field of dance, aside from studying problems related to eating behaviors (Arcelus et al., 2014; Fostervold-Mathisen et al., 2022; Liu et al., 2016), research has also been conducted to determine the energy requirements and sources of energy that are necessary for healthy and good ballet performance (Brown and Wyon, 2014; Challis et al., 2016). However, rather less attention has been paid to exploring food consumption as an indicator of dietary quality and a determinant of nutritional health in dancers. In addition, it should be noted that evidence has been found for an association between consuming certain foods or nutrients with the risks of suffering from diseases (Ballesteros-Arribas et al., 2007) or being protected against them (Hooper et al., 2011).

The literature has reported several methodologies to assess the overall diet quality of individuals. Such instruments include the diet quality index (Granados et al., 2006; Patterson et al., 1994), the diet diversity index (Kant et al., 1995), and the healthy eating index (McCullough, Feskanich, Stampfer, et al., 2000; McCullough, Feskanich, Rimm, et al., 2000). For this purpose, the North American Healthy Eating Index (HEI) (Kennedy et al., 1995) has been adapted to the Spanish population, resulting in the Healthy Eating Index (HEIS in Spanish version) (Norte-Navarro and Ortiz-Moncada, 2011), which classifies an individual's diet as healthy, in need of changes, or unhealthy.

On the other hand, a construct that may help to understand how eating behavior problems develop and are maintained is that of psychological inflexibility. Psychological flexibility refers to the possibility of fully embracing unpleasant private events in the present, without attempting to modify them. Rather, the individual is encouraged to let go of a struggle against discomfort and instead fully feel, engage with, and view these events for what they are as a method of serving one's own values (Hayes et al., 2006, 2014). The psychological flexibility model (fundamental to acceptance and commitment therapy; ACT) promotes adaptive coping through six processes of skills-acceptance, cognitive defusion, awareness of the present moment, ability to see oneself in context, values, and committed action (Cassar et al., 2018; Ferreira et al., 2013; Hayes et al., 2006).

Psychological inflexibility is strongly and positively associated with various psychopathologies, including anxiety, depression, and eating disorders (Rawal et al., 2010), while it is negatively associated with quality of life, perceived health, and positive emotional experiences (Hayes et al., 2006). In addition, evidence in non-clinical samples suggests that psychological inflexibility and experiential avoidance (the unwillingness to stay in touch and consequently avoid internal states such as unpleasant thoughts, feelings, and sensations) play a key role in the relationship between negative emotional states and the onset of emotional eating (Guerrini-Usubini et al., 2022; Litwin et al., 2017; Whiteside et al., 2007).

Psychological inflexibility is associated with increased binge eating among individuals who meet the criteria for overweight/obesity (Finger et al., 2020). Moreover, several studies have indicated that cognitive diffusion techniques (cognitive defusion), as a component of psychological flexibility, reduce cravings and objective eating behaviors (Karekla et al., 2020). Thus, psychological inflexibility appears to produce barriers that make it difficult to change weight- and eating-related conditions (Kauffman et al., 2022).

Given this situation, this research aims to determine differential aspects of emotional eating and the healthy eating index as a function of the psychological inflexibility shown by dance students. These constructs are relevant not only because of their role in eating behavior but also because they are competencies and skills that can feasibly be subject to intervention and modification programs that could transform the health and well-being of dance students. As a first hypothesis, it is proposed that men, compared to women, will obtain higher scores on the emotional eating test; that is, they will show a lower tendency to use food as a regulator of emotions. Our second hypothesis predicts that students categorized as having high psychological inflexibility will make greater use of food as an emotion regulator. Finally, our third hypothesis states that students with high psychological inflexibility will show less healthy eating patterns than those classified as having low or medium psychological inflexibility.

Method

Participants. The sample comprised 114 dance students (87.7% female). The students had a mean age of 23.87 years (SD = 5.47).

According to dance specialty, 7% of the sample were studying classical dance, 43.9% flamenco, 13.2% contemporary dance, 20.2% Spanish dance, 11.4% urban dance, and 4.4% other dances. The study sample was recruited through non-probabilistic sampling to select participants who met the inclusion criteria.

Instruments. Through an ad hoc interview, information was collected on sociodemographic and educational characteristics (gender, year of birth, weight, height, and level of studies), and on dance characteristics. Thus, data were gathered on the number of years dancing under the direction of a teacher, days and hours per week spent dancing-training, place of study (conservatory, academy, or both) stage at which they were studying (elementary, intermediate, higher, or in school), and dance specialty (classical, flamenco, contemporary, Spanish, urban, or other).

The Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011, in its Spanish adaptation by Ruiz et al., 2013) was used to assess Psychological Inflexibility. This instrument provides a general measure of psychological flexibility–inflexibility consisting of a 7-item questionnaire concerned with how the individual relates to their private events (e.g., thoughts, feelings, emotions, and memories) and to what extent they perceive these events as an obstacle to leading the life they wish. Participants respond on a Likert-type scale (1: never, to 7: always) to indicate the extent they believe the statements to be true. Low scores on the questionnaire indicate greater psychological flexibility, while high scores indicate greater inflexibility. The test used in this study has shown high internal consistency (Cronbach's $\alpha = 0.903$). To determine the relationship between the level of flexibility and the rest of the variables, the participants were categorized according to tercile distributions of the total AAQ-II score (Roales-Nieto et al., 2016). Thus, three levels were established: High Inflexibility (≥34 points), Medium Inflexibility (21–33 points), and Low Inflexibility (≤20 points).

The Healthy Eating Index for the Spanish population (HEIS in Spanish version; Norte-Navarro and Ortiz-Moncada, 2011) was used to assess diet quality. This questionnaire is a version of the North American Healthy Eating Index (HEI) (Kennedy et al., 1995), adapted to the Spanish population. First, 12 food categories are established: 1—fresh fruit, 2—meat, 3—eggs, 4—fish, 5—pasta, rice, potatoes, 6—bread and cereals, 7—vegetables, 8—legumes, 9—sausages and cold meats, 10—dairy products, 11—sweets, and 12—soft drinks with sugar. Then, each of these groups is further divided into the following five consumption subcategories: 1—daily consumption, 2—three or more times a week but not daily, 3—once or twice a week, 4—less than once a week, and 5—never or almost never.

To calculate the HEIS, each variable is scored from 0 to 10, where 10 indicates that the recommendations proposed by the Spanish Society of Community Nutrition (Sociedad Española de Nutrición Comunitaria SENC, 2004) are met. The total sore is categorized according to three levels: Healthy (>80 points), Needs change (50–80 points), and Unhealthy (<50 points).

The Eating and Appraisal Due to Emotions and Stress Questionnaire (EADES; Ozier et al., 2007, in its Spanish adaptation by Lazarevich et al., 2015) was used to assess emotional eating. In the Spanish version, this self-applied instrument consists of 40 items, with nine items from the original excluded in the adaptation due to their low factor load. The item responses adopt a Likert format (1—strongly disagree to 5—strongly agree), where a higher score is taken to indicate a weaker relationship between eating and a negative emotional state. Therefore, a total score and three subscales are obtained, which in this study have shown very good reliability: F1—Self-efficacy in Emotion- and Stress-Related Eating (in this study, Cronbach's $\alpha = 0.927$). This subscale refers to the extent to which individuals use food to cope with emotions or stressors related to eating behaviors, along with self-efficacy regarding eating behavior. F2—Self-confidence in emotion- and stress-related eating (Cronbach's $\alpha = 0.876$) refers to the participant's perception, concerning their well-being, of their resources and skills for coping with stress and emotions. Finally, F3—Appraisal of resources and ability to cope (Cronbach's $\alpha = 0.789$) refers to the perception, related to personal well-being, of how an individual is able to cope with external stressors. The Cronbach's alpha reliability coefficient for the total scale in this study was 0.915.

Procedure. The data were collected in paper format by visiting public conservatories and private academies, and online after contacting the management of public conservatories and dance academies nationwide. After agreeing to collaborate, the management disseminated the study through social networks and emails to students. The online and paper questionnaires provided information about the study's objectives, legal terms, and informed consent to participate in the research. The inclusion criteria for participants were: to be of legal age, to have been studying dance for at least 3 years and always with a teacher (thus excluding self-taught dancers), to be enrolled in a conservatory course (elementary, intermediate, or professional level) or dance school-academy, and to sign the informed consent form. Data were collected from October 10, 2022 to January 20, 2023.

Data analysis. An a priori power analysis was conducted using G*Power-3 (Faul et al., 2007) to determine the minimum sample size required to test the study hypothesis. The results indicated that the sample size required to achieve 95% power to detect a mean effect, with a significance criterion of $\alpha = 0.05$, was $N = 117$ for Student's *t*-test for independent groups. Therefore, the obtained sample size of $N = 117$ is adequate to test the study hypothesis.

The following was carried out descriptive analyses (frequencies, percentages, means, and standard deviation) were conducted to characterize the main research variables. The reliability of the tests was calculated using Cronbach's alpha (α). The comparison of quantitative variables was carried out using the *Student's t-test* for independent groups. The effect size was estimated using Cohen's d ($d < 0.2$—small effect size; $d = 0.2$ to 0.8—medium effect size and $d > 0.8$—large effect size). In the case of quantitative variables with more than two categories, an ANOVA test was conducted, with Snedecor's F statistic and Bonferroni's post hoc tests. The effect size was calculated using eta squared η^2, where the η^2 effect size coefficients were evaluated as follows: $0.01 \leq \eta^2 < 0.06$ = a small effect size, $0.06 \leq \eta^2 < 0.14$ = a medium effect size, and $\eta^2 \geq 0.14$ = a large effect size. In the case of categorical variables, the Chi-square test (χ^2) was used. For categorical variables, *Cramer's V* was used to estimate the effect size (<0.2—small effect size; between 0.2 and 0.6—medium effect size and >0.6—large effect size). Associations between the variables were analyzed by Pearson correlations and Stepwise linear regression analysis was employed to determine the predictors of psychological inflexibility. Analyses were conducted using the SPSS statistical package (IBM version 20.0, SPSS Inc., Armonk, NY, USA).

Results

The participants were 118 students. Of these, three were eliminated for not having been studying dance with a teacher for 3 or more years and one for being under the age of 18. With a final sample of 114 dance students, a mean effect size, a power of 90%,

Table 1 Sociodemographic characteristics of the sample of dance students according to gender.

	Total 114	Men 14 (12.3)	Women 100 (87.7)	$t_{(df.=112)}$	p
Age	23.87 (5.47)	28.29 (8.84)	23.25 (4.56)	2.094	0.055
Weight (kg)	59.45 (9.61)	70.64 (8.83)	57.88 (8.65)	5.157	<0.001
Height (cm)	163.18 (16.56)	175.64 (4.27)	161.43 (16.90)	3.121	0.002
Educational level				$\chi^2_{(2,114)} = 6.667$	0.036
Basic	2 (1.8)	1 (7.1)	1 (1.0)		
Medium	48 (42.1)	9 (64.3)	39 (39.0)		
University	64 (56.1)	4 (28.6)	60 (60.0)		

For quantitative variables *M*(SD) and for categorical variables *n*(%).

Table 2 Training characteristics of the dancers according to gender.

	Total 114	Men 14 (12.3)	Women 100 (87.7)	$t_{(df.=112)}$	p
Years with teacher	12.99 (5.30)	14.64 (8.98)	12.76 (4.59)	0.771	0.454
Days/week dancing	4.72 (1.22)	5.00 (1.11)	4.68 (1.23)	0.992	0.359
Hours/week dancing	20.31 (11.73)	21.57 (13.41)	20.13 (11.53)	0.429	0.669
Place of study				$\chi^2_{(2,114)} = 6.608$	0.037
Conservatory	68 (59.6)	4 (28.6)	64 (64.0)		
Dance school	30 (26.3)	7 (50.0)	23 (23.0)		
Both	16 (14.0)	3 (21.4)	13 (13.0)		
Stage of study				$\chi^2_{(2,114)} = 7.627$	0.022
Elementary-intermediate	53 (46.5)	8 (57.1)	45 (45.0)		
Higher	34 (29.8)	0 (0.0)	34 (34.0)		
School	27 (23.7)	6 (42.9)	21 (21.0)		
Dance specialty				$\chi^2_{(2,114)} = 13.149$	0.022
Classical	8 (7.0)	1 (7.1)	7 (7.0)		
Flamenco	50 (43.9)	7 (50.0)	43 (43.0)		
Contemporary	15 (13.2)	0 (0.0)	15 (15.0)		
Spanish	23 (20.2)	0 (0.0)	23 (23.0)		
Urban	13 (11.4)	4 (28.6)	9 (9.0)		
Another	5 (4.4)	2 (14.3)	3 (3.0)		

For quantitative variables *M*(SD) and for categorical variables *n*(%).

and a significance criterion of $\alpha = 0.05$, it was found to be adequate to test the study hypothesis. No age differences were found according to the gender of the participants (see Table 1). As expected, men were significantly heavier and taller than women. However, significant gender differences were found concerning educational level, that is, more women reported being educated to university level than men (Cramer's $V = 0.242$).

Observing the main characteristics related to dance practice (see Table 2), it can be seen that both groups are equivalent in the number of years they have been practicing dance under the direction of a teacher ($M = 12.99$, SD = 5.30 years), the number of days per week they report dancing ($M = 4.72$, SD = 1.22 years) or the number of hours per week spent in dance rehearsals or training ($M = 20.31$, SD = 11.73 h). Differences were found regarding the place of study (Cramer's $V = 0.241$) since more women were enrolled in conservatories, while men tended to study in dance schools or academies. Similarly, women tend to be training at a higher level than men (Cramer's $V = 0.259$). Statistically significant differences were also found regarding the dance specialty being studied, with women predominantly choosing Spanish dance and men choosing urban dance (Cramer's $V = 0.340$).

Men and women appear to obtain similar scores on psychological inflexibility (see Table 3). However, women showed lower scores on the emotional eating scale, with a medium effect size (Cohen's $d = 0.8$), indicating that they tend to use food more frequently to manage their emotional responses. These differences occur especially in the subscale of Self-efficacy in emotion- and stress-related eating, with a medium effect size (d Cohen = 0.8). Similarly, although not statistically significant, marginal differences were observed for Factor 2, which refers to self-confidence in emotion- and stress-related eating, with a medium effect size (d Cohen = 0.6). On the other hand, no difference was found between men and women in the appraisal of resources and ability to cope (Factor 3 of the emotional eating test).

Finally, no gender differences were observed regarding scores on the healthy eating index. Grouping the results into two categories (needs changes vs. does not need changes in the diet), 72.8% of the sample would need changes, and 27.2% would not.

According to the distribution by gender, concerning the three groupings of the healthy eating index (unhealthy, needs changes, and healthy), 4.4% ($n = 5$) of the sample reported following an unhealthy diet (14.3% of men and 30% of women), 68.4% ($n = 78$) indicated that they needed changes in their diet (71.4% of men and 68% of women) and 27.2% ($n = 31$) reported having a healthy diet (14.3% of men and 29% of women).

When analyzing how psychological inflexibility is related to emotional eating and the healthy eating index, Pearson's correlation tests revealed a negative correlation between psychological inflexibility and the total score on the emotional eating test ($r = -0.504$, $p < 0.001$), along with the subscales self-efficacy in emotion- and stress-related eating ($r = -0.303$, $p = 0.001$), self-confidence in emotion- and stress-related eating ($r = -0.258$,

Table 3 Total scores on the variables of psychological inflexibility, emotional eating, and healthy eating index for the Spanish population according to gender.

	Total 114	Men 14 (12.3)	Women 100 (87.7)	$t_{(df.=112)}$	p
Psychological inflexibility	27.03 (8.50)	26.14 (9.49)	27.15 (8.40)	0.414	0.680
EADES-TOTAL	138.01 (19.25)	151.14 (18.37)	136.17 (18.72)	2.808	0.006
EADES-F1	40.5 (9.92)	47.14 (7.97)	39.62 (9.85)	2.732	0.007
EADES-F2	29.88 (7.05)	33.21 (6.50)	29.41 (7.02)	1.914	0.058
EADES-F3	67.59 (7.54)	70.79 (8.77)	67.14 (7.29)	1.710	0.090
HEIS-TOTAL	70.73 (12.99)	67.79 (13.08)	71.15 (12.99)	0.905	0.367

For quantitative variables *M*(SD) and for categorical variables *n*(%); Psychological inflexibility: Total score in AAQ-II, Acceptance and Action Questionnaire II. EADES-TOTAL: Total score on eating appraisal due to emotions and stress questionnaire. EADES-F1: Score on Factor 1. Self-efficacy in emotion- and stress-related eating. EADES-F2: Score on Factor 2. Self-confidence in emotion- and stress-related eating. EADES-F3: Score on Factor 3. Appraisal of resources and ability to cope. HEIS-TOTAL: Score on the healthy eating index for the Spanish population.

Table 4 Scores on emotional eating and the healthy eating index for the Spanish population according to psychological inflexibility.

	Psychological Inflexibility				
	Low (a) 30 (26.32)	Medium (b) 60 (52.63)	High (c) 24 (21.05)	$F_{(2,113)}$	p
EADES-TOTAL	148.43 (14.98)	139.18 (17.41)	122.04 (18.67)	16.205	<0.001
EADES-F1	43.63 (9.49)	41.10 (9.47)	35.29 (9.91)	5.282	0.006
EADES-F2	31.07 (6.89)	31.12 (7.02)	25.29 (5.44)	7.137	0.001
EADES-F3	73.73 (6.46)	66.97 (5.70)	61.46 (7.31)	26.197	<0.001
HEIS-TOTAL	72.35 (10.16)	70.45 (14.26)	69.42 (13.13)	0.365	0.695

For quantitative variables *M*(SD) and for categorical variables *n*(%); Psychological Inflexibility: Total score on AAQ-II, acceptance and action questionnaire II. EADES-TOTAL: Total score on eating appraisal due to emotions and stress questionnaire. EADES-F1: Score in Factor 1. Self-efficacy in emotion- and stress-related eating. EADES-F2: Score on Factor 2. Self-confidence in emotion- and stress-related eating. EADES-F3: Score on Factor 3. Appraisal of resources and ability to cope. HEIS-TOTAL: Score on the healthy eating index for the Spanish population.

$p = 0.006$), and appraisal of resources and ability to cope ($r = -0.647$, $p < 0.001$). However, no significant correlations were found between psychological inflexibility and scores on the healthy eating index ($r = -0.085$, $p = 0.369$).

When dance students were grouped according to psychological inflexibility scores (see Table 4), significant group differences were found in emotional eating; both in the total score, with a large effect size (Eta squared $\eta^2 = 0.23$) and each of its subscales. In particular, a medium effect size was observed for self-efficacy in emotion- and stress-related eating ($\eta^2 = 0.09$) and for self-confidence in emotion- and stress-related eating ($\eta^2 = 0.12$), while a large effect size was obtained for the appraisal of resources and the ability to cope ($\eta^2 = 0.32$).

For the total scores, marginal differences were observed when comparing the low and medium inflexibility groups, where $a = b$ ($p = 0.051$), but no significant differences were found for the rest of the comparisons, where $a > b$ ($p < 0.001$) and $b > c$ ($p < 0.001$). When considering Factor 1, Group c accounts for these differences, since a = b ($p = 0.717$); $a > c$ ($p = 0.006$), and $b > c$ ($p = 0.040$). This same pattern of results was found for the post hoc comparisons in Factor 2, where the low and medium inflexibility groups obtained similar scores ($a = b$, $p = 1.00$); however, it was observed that $a > c$ ($p = 0.006$) and $b > c$ ($p = 0.001$). Finally, for Factor 3, all three pairwise comparisons were significant, since $a > b$ ($p < 0.001$), $a > c$ ($p < 0.001$), and $b > c$ ($p = 0.001$).

The three inflexibility groups (low, medium, and high) did not differ in healthy eating scores. Regarding the healthy eating index categories, 8.3% of the medium inflexibility group were categorized as having an unhealthy diet, with no low or high inflexibility participants falling under this category. However, 73.3% of the low inflexibility group, 65% of the medium inflexibility group, and 70.8% of the high inflexibility group were categorized as needing dietary changes. Finally, 26.7% of participants in the low inflexibility group, 26.7% of the medium inflexibility group, and 29.3% of the high inflexibility group obtained scores consistent with a healthy diet.

The data indicate that while scores on the healthy eating index are not correlated with psychological inflexibility, emotional eating appears to predict psychological inflexibility in the present sample of dance students. While marked differences in emotional eating are found in those students with high scores in psychological inflexibility, it appears that for those who use food to regulate emotions, emotional eating predicts psychological inflexibility (see Table 5).

It can be observed that the model composed of the three subscales can explain 42.6% of the variance in psychological inflexibility, with Factor 3 having a negative predictive power of $\beta = -0.622$ ($p < 0.001$).

Finally, when considering how psychological inflexibility is related to the various dance variables that have been considered in this study, negative correlations were found with the number of years studying with a teacher ($r = -0.358$, $p < 0.001$), the reported number of days per week ($r = -0.284$, $p = 0.002$) and number of hours per week spent dancing ($r = -0.298$, $p = 0.001$).

Discussion

This research aimed to determine the various aspects of emotional eating and scores on the healthy eating index as a function of the psychological inflexibility shown by dance students.

The first hypothesis proposed that men, compared to women, would obtain higher scores on the emotional eating test. That is, they would show a lower tendency to use food as an emotion regulator. The present data support this hypothesis, both in the total test score and the subscale that assesses self-efficacy in emotion- and stress-related eating. In addition, there was also a

Table 5 Stepwise regression analysis, taking psychological inflexibility as the predicted variable and self-efficacy in emotion- and stress-related eating (F1), self-confidence in emotion- and stress-related eating (F2), and appraisal of resources and ability to cope (F3) as predictor variables.

	β	t	p	R^2	ΔR^2	p	F	p
Model 1				0.066	0.066	0.006	$F_{(1113)} = 7.970$	0.006
F2	− 0.258	− 2.823	0.006					
Model 2				0.105	0.038	0.031	$F_{(2113)} = 6.500$	0.002
F2	− 0.135	−1.270	0.207					
F1	− 0.231	− 2.182	0.031					
Model 3				0.426	0.322	<0.001	$F_{(3113)} = 27.259$	<0.001
F2	0.032	0.361	0.719					
F1	−0.106	−1.220	0.225					
F3	−0.622	−7.853	<0.001					

tendency for men to obtain higher scores on the self-confidence in emotion- and stress-related eating subscale. Thus, women appear to use food to cope with emotions and/or stress factors and have lower self-efficacy concerning eating behavior.

These results are consistent with other reports in the literature within the field of dance showing how eating behavior disorders particularly affect women (Amoako et al., 2023; Doria and Numer, 2022). Similarly, women tend to present greater problems with emotional eating in response to negative emotions, such as anxiety, anger, frustration, and depression (Davis et al., 2012; Thompson and Romeo, 2015).

In order to explain these results, it should be noted that, beyond the impact of chronic stress, emotional eating is predicted by increased cortisol reactivity but not by subjective stress reactivity. Neither chronic nor subjective or objective stress reactivity has been shown to predict objective emotional eating after stress induction (Sato et al., 2023). In this regard, cortisol hyperreactivity has been considered a marker of stress in most cases of women who develop depression (Cerda-Molina et al., 2017). Other possible reasons why women may experience emotional eating include mood alterations associated with hormonal fluctuations resulting from the menstrual cycle (Eddy et al., 2007; World Health Organization, 2003); or emotional changes related to an increased cortisol response.

As a second hypothesis, it was expected that students categorized as having high psychological inflexibility would make greater use of food to regulate emotions. This idea is supported by our results, with the high inflexibility group accounting for the differences in total scores for Factor 1 and Factor 2. However, for Appraisal of Resources and Ability to Cope subscale, differences were found among the three groups to indicate that the higher the psychological inflexibility, the greater the severity of the problems encountered.

These results support data from the literature reporting that psychological inflexibility is positively associated with eating disorders (Rawal et al., 2010) and negatively associated with positive emotional experiences (Hayes et al., 2006). Evidence has indicated that psychological inflexibility and experiential avoidance play an important role in the relationships between negative emotional states and the onset of emotional eating (Guerrini-Usubini et al., 2022; Litwin et al., 2017; Whiteside et al., 2007). Similarly, psychological inflexibility interventions have been shown to reduce eating problems (Karekla et al., 2020).

One perspective that could help to understand this situation is to consider that people with difficulties in regulating emotions may be unable to control impulses in certain emotional situations and use limited emotional regulation strategies (Cobos-Sánchez et al., 2022). Thus, in these situations, individuals show psychological inflexibility in an attempt to avoid distressing situations, finding it difficult to link a thought to an experience and refusing to undertake positive actions since they have not achieved the desired outcome when faced with a similar situation in the past (Cobos-Sánchez et al., 2022). Put simply, an individual who struggles to manage and regulate their emotions and behavior demonstrates psychological inflexibility (Cobos-Sánchez et al., 2022), which leads to increased symptoms of various forms of psychopathology—mainly anxiety and depression (Aldao et al., 2010; Kashdan and Rottenberg, 2010). Therefore it is thought that emotional dysregulation indirectly affects emotional disorders through psychological inflexibility since emotional dysregulation and psychological inflexibility are factors related to psychopathology (Aldao et al., 2016).

Although the high scores in psychological inflexibility account for the differences in emotional eating, dance students who use food to regulate emotions, this emotional eating predicts psychological inflexibility. The model that incorporates the three subscales explains 42.6% of the variance in psychological inflexibility, with Factor 3 showing a negative predictive power of $\beta = -0.622$ ($p < 0.001$).

Finally, the third hypothesis predicted that students with high psychological inflexibility would report less healthy eating patterns than those with low or medium psychological inflexibility. Our data do not support this hypothesis since we found no differences in diet quality according to psychological inflexibility. However, it was found that as psychological inflexibility increases, HEIS scores decrease, indicating a poorer quality diet.

The data of the present study indicate that 72.8% of dance students need dietary changes. These figures are similar to those found in the general Spanish population by Norte-Navarro and Ortiz-Moncada (2011). The latter study employed the Encuesta-Nacional-Salud-2006 (Ministry of Health and Consumption, 2008) with 29,478 participants, reporting that 72% needed changes to their diet.

As already mentioned, the literature shows that psychological inflexibility is closely related to eating behavior problems (Rawal et al., 2010) and the onset of the use of food to regulate negative emotions (Guerrini-Usubini et al., 2022), while it has been found that eating problems can be reduced by interventions targeting psychological inflexibility (Karekla et al., 2020). However, no previous studies have explored the relationship between psychological inflexibility and diet quality.

The absence of relationships between diet quality and psychological inflexibility could indicate that the latter is more strongly related to the use of food and eating than the type of food eaten. Although this lack of a relationship should be further investigated since (as observed) stress affects the type and amount of food people choose (Ulrich-Lai et al., 2015). In particular, it is commonly reported that individuals tend to increase their energy intake and make changes to their food choices in response to stress. Specifically, people often consume a greater proportion of

foods that are high in fat, sugar, and calories, as well as highly palatable foods (Ulrich-Lai et al., 2015). In this regard—and as observed in the case of emotional eating—cortisol plays a prominent role in stress responses.

While the present research provides novel information about eating behavior in dance students, certain limitations are worth noting and should be addressed in future studies. The design used here does not allow for establishing causal relationships that determine the directionality between the variables analyzed. Likewise, it could be worthwhile to use a larger sample and control more rigorously the variables related to dance (e.g., to gather information on the expectations and future ambitions of the students). In this sense, it would be interesting to analyze whether the index of healthy eating and emotional eating is related in a different way to psychological inflexibility according to the specialty of dance. Moreover, it is well documented that weight can become a risk factor for eating disorders in individuals who practice certain high-performance activities. Based on this premise, it would be interesting to analyze the impact of psychological inflexibility across a range of specialties, considering the importance of weight in each dance discipline. Finally, dance education can only be understood from a perspective that considers the dancer–teacher dyad. Hence, there is a need to examine the potential impact of teachers on the development of their students' psychological inflexibility patterns, as well as their ability to adapt to students' individual needs.

Implications for research and practice

Dance, as a high-performance activity, presents numerous challenges that can impede a dancer's professional, artistic, and personal development. Consequently, it is crucial to promote the cultivation of effective coping mechanisms. In particular, the objective is to navigate adversities adaptively, and in this regard, conservatories and academies emerge as key spaces for fostering this proactive approach.

Constructs such as psychological inflexibility and emotional eating, as well as the behaviors shown in the healthy eating index, are important because these are skills and behaviors that can feasibly be modified by intervention and training approaches. In this regard, it is critical to understand how conservatories—as educational spaces—must adopt a holistic and comprehensive view of the education and training of dance students. In this regard, they must focus on both the technical aspects of motor performance and factors that significantly impact this performance when executing a choreographed piece. Thus, invisible training understood as the adoption of basic lifestyle practices that favor performance (e.g., proper diet, nutrition, and healthy habits), will, along with mental and physical training, determine the success of professional dancers.

Given this situation, conservatories should become healthy spaces that promote habits and behaviors to facilitate the well-being of students (e.g., elimination of snack machines or introduction of healthy canteens). In this sense, faculties can help students in their pursuit of excellence by aligning their performance goals with the results of research by applying existing knowledge of factors, such as motivation, goal setting, and healthy habits. In short, academic institutions should pay special attention to all behaviors, variables, and constructs that are known to be involved in the training and development of future dance professionals.

Conclusions

Problems associated with eating behavior are very frequent among dancers. It is important to analyze the variables that influence the development of such problems. This research has shown that students with high psychological inflexibility reported greater use of food as an emotion regulator. No differences were found in healthy eating as a function of psychological inflexibility. In this context, conservatoires should become spaces for integral training, taking care of dance students' health and well-being). Considering that psychological inflexibility, as a tendency to respond to situations by facilitating the achievement of goals, is shaped by the contingencies that adults establish with the behavior of the child. In this context, dance teachers can become actors with the capacity to change or persist in functional behavioral categories when doing so serves important purposes. Similarly, they can focus on specific contexts in which being flexible is crucial for healthy functioning; otherwise, they would disrupt a functional adjustment to the context. Dance conservatories are a potentially suitable space for developing changes in the behaviors that characterize psychological inflexibility.

Data availability

The datasets analyzed during the current study are available in the Dataverse repository: FA; anonymous, Anonymous (2024). Index of healthy eating and emotional eating in relation to psychological inflexibility in dance students, https://data.mendeley.com/datasets/kgrngmzxcj/1.

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Author contributions
All authors have contributed to the process of design, data collection, data analysis, and final drafting of the paper.

Competing interests
The authors declare no competing interests.

Ethical approval
All procedures were conducted in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and the Declaration of Helsinki of 1975, revised in 2013. The study was approved by the Andalusian Ethics Committee of Biomedical Research (Evaluation Committee of Huelva. Internal Code: 2159-N-21. Date of approval: 14/12/2021; Act: 11/21).

Informed consent
Informed consent was obtained from all individual participants included in the study.

Additional information
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