

Psychometric properties of the Turkish version of the Eating Pathology Symptoms Inventory (EPSI-T)

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Abstract

The purpose of the current study was to explore the factor structure and psychometric properties of the Turkish version of the Eating Pathology Symptoms Inventory (EPSI), as well as to examine gender differences in eating disorder symptoms. Participants included 417 university students (304 female, 113 male) in Türkiye who completed the Turkish version of the EPSI (EPSI-T), alongside the Modified Weight Bias Internalization Scale (WBIS-M), Addiction-like Eating Behaviour Scale (AEBS), Muscularity-Oriented Eating Test (MOET), Depression Anxiety and Stress Scales (DASS-21). Data was analysed using confirmatory factor analysis (CFA). CFA results supported the eight-factor scale with 45-items [$\chi^2(914) = 1994.57$, $\chi^2/df = 2.18$, CFI = 0.90, RMSEA = 0.05 [0.05, 0.06], SRMR = 0.07]. Women scored significantly higher on most scales, except for Excessive Exercise, Muscle Building, and Negative Attitudes toward Obesity, which were significantly higher in men ($p < 0.005$). The internal consistency (Cronbach's α ranged from 0.72 to 0.90; McDonald's omegas ranged from 0.75 to 0.90) and validity (convergent and discriminant) of this 45-item eight-factor of EPSI-T) was supported. The EPSI-T holds promise for both improved assessment and understanding of eating disorder symptomatology among Turkish speaking people. Furthermore, given that the EPSIT has a similar structure as the original English version, it has the potential to be a valuable tool for cross-cultural research on eating disorders.

Key words: Eating Pathology Symptoms Inventory, psychometrics, validity, Turkish, Eating Disorders

Clinical Implications:

- Eating disorder assessment, intervention, and treatment mainly focus on Western samples, highlighting the need for research in diverse populations.
- Turkish EPSI showed good psychometrics with an 8-factor structure fit.
- Further validation of the EPSI in Turkish clinical samples is warranted to ensure its applicability across diverse clinical settings.

1. Introduction

Eating disorders (EDs) are serious mental health conditions associated with significant psychological distress, including depression and anxiety, and are linked to high rates of mortality (Schmidt et al., 2016). Their prevalence ranges from 0.1% to 4.5% globally, with rates among university populations between 8% and 17% (Hoek, 2016; Tavoracci et al., 2015). Access to validated assessment tools is crucial for identifying at-risk individuals, monitoring treatment progress, and facilitating replicable research (Schaefer et al., 2021). While many self-report measures exist, their psychometric properties vary, and some, like the Eating Attitudes Test (EAT) and Eating Disorder Examination Questionnaire (EDE-Q), suffer from inconsistent factor structures (Forbush et al., 2013; Hill et al., 2010). In contrast, the Eating Pathology Symptoms Inventory (EPSI) reliably maintains its 8-factor structure (Forbush et al., 2013; Sahlan et al., 2022; Tang et al., 2015) with one exception (Coniglio et al., 2018), highlighting its cross-country applicability.

Research on EDs has begun to challenge the stereotype that they predominantly affect thin, White, affluent girls in the West (Halbeisen et al., 2022), yet existing assessment tools often fail to capture symptoms in non-Western cultures because they are often developed using samples of White, affluent girls from Western populations (Berg et al., 2012; Forbush et al., 2013). While symptom patterns are similar across ethnic groups, their manifestations may differ significantly (Eisenberg et al., 2019). While EDs are more prevalent in industrialized societies that idealize thinness (Qian et al., 2022), research has predominantly focused on populations in the Global North, neglecting rising prevalence in non-Western countries (Qian et al., 2022). Culturally sensitive measures are essential for assessing global prevalence and symptom presentations (Melisse et al., 2020), emphasizing the need for culturally adapted assessment tools.

Türkiye, positioned at the intersection of Eastern and Western cultures, displays characteristics of both and is experiencing ongoing Westernization (Tayfur & Evrensel, 2020). Notably, Türkiye's ED prevalence among university students (1-7.9%) reflects Western trends (Altuğ et al., 2000; Uzun et al., 2006), with higher rates in young women compared to men (Peláez Fernández et al., 2007; Sanlier et al., 2008). However, there are significant discrepancies in prevalence rates among studies, both globally and in Türkiye (Alhaj et al., 2022), often due to differences in definitions and measurements of EDs (Fitzsimmons-Craft et al., 2019). This variability complicates accurate identification of ED levels and the

development of effective prevention strategies, indicating the need for robust tools like the EPSI to improve consistency with international findings.

Several questionnaires for measuring EDs in Turkish-speaking populations exist, such as the EDE-Q, the EAT-26, and the Dutch Eating Behaviour Questionnaire (DEBQ) (Bozan et al., 2011; Yucel et al., 2011), but they have limitations. For instance, the exploratory factor analysis of the Turkish adaptation of the EAT-26 indicates that while the three-factor structure is preserved, the content is different (Ergüney-okumuş & Sertel-berk, 2020). Furthermore, the binge eating subscale of the EDE-Q shows weaker psychometric properties in a Turkish sample (Yucel et al., 2011).

Considering the limitations of current ED measures in general, and specifically in Türkiye, The EPSI offers strong reliability, making it a valuable assessment tool for EDs (Forbush et al., 2013). This 45-item self-report measure effectively covers a wide range of ED symptoms and has demonstrated strong psychometric properties in diverse cultural contexts. For instance, the EPSI has been successfully adapted for use in Chinese, Iranian, and Swedish samples (Sahlan et al., 2022; Tang et al., 2015) maintaining its 8-factor structure (Sahlan et al., 2022; Tang et al., 2015).

Given the context, the EPSI could be a valuable tool for studying EDs in Turkish-speaking populations. However, to our knowledge, the EPSI has not yet been adapted for this population. This adaptation would provide several key advantages, such as a culturally sensitive tool for more accurately capturing ED symptoms within the local context, facilitating cross-cultural comparisons, and contributing to the global understanding of these issues. Additionally, a validated Turkish EPSI could support clinicians and researchers in Türkiye by providing a standardised measure for assessment, while also facilitating early detection and guiding tailored interventions for individuals experiencing eating-related difficulties.

1.1. The Current Study

In line with the gap in the literature, the aim of this study was to adapt EPSI for research and applied settings in Türkiye. Four hypotheses were formed based on the research aim:

First, we proposed that the 8-factor pattern of the EPSI would be mirrored in the Turkish version (EPSI-T). Second, we expected that the EPSI subscales would demonstrate strong reliability. Third, we hypothesised moderate and positive correlations between the EPSI subscales and other well-known risk factors for EDs (e.g., internalised weight stigma) and ED symptom questionnaires (e.g., addiction-like EDs and muscularity-oriented EDs), such as

Modified Weight Bias Internalization Scale (WBIS) (Romano et al., 2021), Muscularity-Oriented Eating Test (MOET), and Addiction-like Eating Behaviour Scale (AEBS) (Fauconnier et al., 2020) to demonstrate convergent validity. Fourth, given the relationship between EDs symptoms and psychological distress (e.g., anxiety, depression, stress), we expected low-to-moderate correlations between EPSI scales and 21-item Depression, Anxiety, and Stress Scales (DASS-21) to indicate discriminant validity. This is because, while ED symptoms and psychological stress often co-occur, the constructs measured by the EPSI and DASS-21 are distinct. Finally, we aimed to explore differences in the EPSI subscales based on gender. Given that the investigation of gender differences is exploratory in nature, no specific hypotheses were formulated regarding this aim.

2. Methods

2.1. Participants

Data for this study were drawn from a multi-site global project on food insecurity and eating disorders among university students across four universities in Türkiye. We aimed for a sample size of 300 to balance power and feasibility (Tabachnick & Fidell, 2007), ultimately recruiting 494 students online. After excluding 21 students due to diverse gender identities or missing responses, and 56 due to non-multivariate normality, the final sample included 417 students. Most identified as Turkish (95.2%) and as cisgender women (72.9%), with an average score of 5.29 (SD = 1.56) on the MacArthur Scale of Subjective Social Status (MSSSS), suggesting a slightly above-midpoint perceived social status.

2.2. Measures

2.2.1. Demographic Questions

Demographic data were collected through multiple-choice self-report questions on university affiliation, ethnicity, gender, sexual orientation, and native language. The MSSSS was used to assess perceived social standing: participants were shown a 10-rung ladder and asked to select the rung representing their place in society. Scores range from 1 to 10, with higher numbers indicating higher perceived socioeconomic status.

2.2.2. Questionnaires

Eating Pathology Symptoms Inventory (EPSI). The EPSI is a 45-item measure assessing the presence of ED symptoms across dimensions (Forbush et al., 2014; Forbush et al., 2013). Participants are asked to rate each item on a 5-point Likert scale ranging from 0 (Never) to 4

(Very Often), considering the presence of those items in the past four weeks. The items are clustered into eight independent subscales (Body Dissatisfaction, Binge Eating, Cognitive Restraint, Excessive Exercise, Restricting, Purging, Muscle Building, and Negative Attitudes Toward Obesity) instead of a total score. Cronbach's alpha reliability ($\alpha = .84$ to $.89$), internal consistency (mean test-retest reliability $r = 0.73$), and convergent and discriminant validity of the EPSI were excellent (Forbush et al., 2014; Forbush et al., 2013).

The Modified Weight Bias Internalization Scale (WBIS-M). The WBIS-M is a self-report measure of internalised societal weight-related stigma (Pearl & Puhl, 2014). This internalised stigma is a known risk factor for EDs and is useful for assessing the convergent validity of EDs (Hunger et al., 2020). The WBIS-M exhibits strong internal consistency and construct validity, correlating well with body image, and EDs. The Turkish version showed a α of $.92$, test-retest reliability of 0.75 ($p < 0.001$), and factor loadings between 0.61 - 0.80 (Apay et al., 2017). In this study, McDonald's omega (ω) and α for the WBIS were 0.96 for the total sample and female students, and 0.95 for male students.

The Addiction-like Eating Behaviour Scale (AEBS). The AEBS measures eating addiction (Ruddock et al., 2017) and includes a total score and two subscales: Appetite Drive and Dietary Control Practices, both of which demonstrate high internal consistency and test-retest reliability. The total score demonstrates predictive, convergent, and divergent validity, with α of $.90$ and $.85$ for the subscales. The Turkish version maintained construct validity, with α and split-half reliabilities above $.70$ (Demir et al., 2021). In this study, the Appetite Drive scale showed good reliability ($\omega = 0.89$, $\alpha = 0.88$) for the total sample, with similar results for female ($\omega = 0.90$, $\alpha = 0.89$) and male students ($\omega = 0.86$, $\alpha = 0.85$). Dietary Control also demonstrated acceptable reliability ($\omega = 0.78$, $\alpha = 0.78$) across both genders.

Muscularity-Oriented Eating Test (MOET). The MOET assesses muscularity-oriented eating behaviours rather than thinness-focused EDs (Murray et al., 2019). It consists of 15 items rated on a 5-point Likert scale. The original study demonstrated a single-factor structure with an internal consistency of around 0.90 , a test-retest correlation of 0.75 , and both convergent and divergent validity. The Turkish version showed a α of 0.88 and a test-retest reliability of 0.84 (Caliskan & Alim, 2021). In this study, ω and α for the MOET were 0.91 , 0.89 , and 0.93 for the total sample, female students, and male students, respectively.

The Depression, Anxiety, and Stress Scales (DASS-21). The DASS-21 is a 21-item self-report measure using a 4-point Likert scale to assess depression, anxiety, and stress experiences

over the past week (Henry & Crawford, 2005). It shows good reliability ($\alpha = 0.82-0.93$) and acceptable convergent and divergent validity. The Turkish adaptation yielded α of .81-.87 and test-retest reliability of .61-.68 (Saricam, 2018). In this study, DASS-21 demonstrated good reliability: total sample ($\omega = 0.91, 0.84, 0.83$; $\alpha = 0.91, 0.84, 0.83$ for depression, anxiety, and stress), female students ($\omega = 0.90, 0.84, 0.82$; $\alpha = 0.91, 0.84, 0.82$), and male students ($\omega = 0.92, 0.81, 0.84$; $\alpha = 0.92, 0.81, 0.84$).

2.3. Translation Procedure

Permission to translate the EPSI into Turkish was obtained from the developer, Dr. Kelsie Forbush. The first two authors independently translated the instrument, ensuring natural phrasing to reflect the original meaning (van Widenfelt et al., 2005). The translation was piloted in a focus group with university students using a think-aloud technique (Charters, 2003), and minor adjustments were made based on feedback. The last author then back-translated it into English, and the team compared this with the original, making final revisions. The completed version was sent to Dr. Forbush, who provided feedback incorporated into the final EPSI-T.

2.4. Data Preparation and Analyses

Statistical analyses were performed using SPSS 25.0 and AMOS 23. Since the EPSI was developed and validated based on a solid theoretical framework and given that the primary aim of this study was to assess whether the original factor structure of the scale was maintained in the Turkish version, Confirmatory Factor Analysis (CFA), rather than Exploratory Factor Analysis (EFA), was deemed appropriate to confirm the fit of the predefined model (Levine, 2005). Thus, the CFA assessed the fit of the English EPSI's factor structure to Turkish data (Forbush et al., 2013), using the most applied criteria of the Comparative fit index ($CFI \geq 0.90$), root-mean-square error of approximation ($RMSEA \leq 0.08$), and standardised root mean square residual ($SRMS \leq 0.08$ $CFI \geq 0.90$, $RMSEA \leq 0.08$, and $SRMR \leq 0.08$ (Stone, 2021). Prior to CFA, multivariate outliers were removed based on Mahalanobis distance ($p < 0.001$), leaving 417 participants—sufficient for the final 45-item factor analysis (5–10 participants per item) (Tinsley & Tinsley, 1987).

Internal consistencies were assessed using McDonald's omega and Cronbach's alpha. Independent t-tests evaluated mean differences on EPSI-T scales between female and male students. Pearson correlations assessed convergent validity (EPSI-T with WBIS, MOET, and AEBS) and discriminant validity (EPSI-T with DASS-21).

Normality checks showed that Purging (skewness = 3.07, kurtosis = 10.27) and Muscle Building scores (skewness = 2.43, kurtosis = 6.98) deviated significantly from normal distribution (Kim, 2013). A log 10 transformation was applied to these subscales, achieving normality (Purging skewness = 1.56, kurtosis = 1.38; Muscle Building skewness = 0.27, kurtosis = -0.37).

2.5. Procedure

The study received approval from the [blinded for peer review] Committee for Human Research. Between September 2023 and April 2024, university students in Türkiye, aged 18 and over, were recruited online through social media ads (Twitter, Instagram, Facebook) and via participant systems at two universities with course credit awarded for participation. Participants accessed an online Qualtrics survey through a provided link, where they gave informed consent and received a debrief at the end.

3. Results

3.1. Confirmatory Factor Analysis

The initial CFA revealed insufficient model fit to the data [$\chi^2(917) = 2263.23$, $\chi^2/df = 2.47$, CFI = 0.87, RMSEA = 0.06 [0.06, 0.06], SRMR = 0.07)]. Thus, we correlated the error terms for four items within the Body Dissatisfaction scale (Item 23 and Item 24; Item 23 and Item 34) and two items within the Negative Attitudes toward Obesity scale (Item 14 and Item 20) as they belonged to the same factor (Byrne, 2016). As a result, the eight-factor EPSI-T with 45 items demonstrated an acceptable fit to the data [$\chi^2(914) = 1994.57$, $\chi^2/df = 2.18$, CFI = 0.90, RMSEA = 0.05 [0.05, 0.06], SRMR = 0.07)]. The factor loadings of each item on the latent factors are given in Supplementary Table 1.

3.2. Reliability

Cronbach's alpha reliabilities ranged from 0.72 to 0.90 for the EPSI-T subscales (e.g., $\alpha = 0.90$ for Body Dissatisfaction, 0.72 for Cognitive Restraint; see Table 1). The McDonald's omega reliabilities similarly ranged from 0.75 to 0.90 for the EPSI-T subscales ($\omega = 0.90$ for Body Dissatisfaction, 0.90 for Binge Eating, 0.83 for Restricting, 0.75 for Cognitive Restraint, 0.79 for Purging, 0.90 for Negative Attitudes toward Obesity, 0.84 for Muscle Building, and 0.87 for Excessive Exercise).

[INSERT TABLE 1]

3.3. Convergent and Discriminant Validity

Bivariate correlations of the EPSI-T scales with the WBIS, MOET, AEBS and DASS-21 scales of depression, anxiety, and stress are shown in Table 2.

Correlations between weight bias internalization and EPSI-T scales ranged from small to large, with the Restricting subscale showing the smallest association and Body Dissatisfaction the largest. Fisher's z-test indicated that female participants had significantly stronger correlations with Binge Eating ($z = 3.03$, $p = 0.001$) and Purging ($z = 2.92$, $p = 0.002$) than males.

Positive associations were also found between muscularity-oriented eating and EPSI-T scales, with Cognitive Restraint exhibiting the strongest correlations. Among females, the correlation between muscularity-oriented eating and Purging was stronger than among males ($z = 3.00$, $p = .001$). Small-to-large correlations were noted between EPSI-T scales and AEBS Appetite Drive, while small-to-moderate correlations were observed with AEBS Dietary Control (see Table 2 for values).

Gender differences emerged in the correlations between Dietary Control and EPSI-T scales, with females showing a significant positive relationship with Binge Eating and a negative relationship with Excessive Exercise, while males showed a significant positive correlation with Restricting.

Finally, the correlations between the EPSI-T scales and depression, anxiety, and stress tended to be somewhat lower than those between the EPSI-T scales and some—not all—measures of convergent validity, indicating partial evidence for discriminant validity.

[INSERT TABLE 2]

3.4. Gender Differences in Scale Scores

Female participants exhibited significantly higher EPSI-T scores than male participants in Body Dissatisfaction, Binge Eating, Restricting, and Purging; whereas male participants demonstrated significantly higher scores than female participants in Negative Attitudes toward Obesity, Muscle Building, and Excessive Exercise (*see* Table 1). However, there was no significant difference on Cognitive Restraint between female and male participants (*see* Table 1).

4. Discussion

To our knowledge, this is the first study to examine the factor structure and psychometric properties of the EPSI in Turkish students. The EPSI-T confirmed that the original 8-factor structure of the 45-item EPSI fit the Turkish sample well. It demonstrated robust psychometric properties, including satisfactory reliability and both convergent and discriminant validity, thereby supporting our hypothesis.

In line with the previous studies in the USA (Coniglio et al., 2018; Forbush et al., 2014), China (Tang et al., 2015), and Iran (Sahlan et al., 2022) results support the eight-factor structure of the EPSI-T with high internal consistencies throughout its subscales. The EPSI-T appears to have adequate psychometric properties and is therefore an appropriate self-report measure for monitoring EDs in Turkish research, promising for clinical use.

Consistent with previous research in the USA, male students in Türkiye showed higher scores in Negative Attitudes toward Obesity, Muscle Building, and Excessive Exercise. However, Farsi and Chinese-speaking men demonstrated higher scores only in Excessive Exercise and Muscle Building than women. Similar to gender norms in the USA (Forbush et al., 2013), Turkish female students also exhibited higher scores in Body Dissatisfaction, Binge Eating, Restricting, and Purging, except for Cognitive Restraint, showed no significant differences. In line with this, a recent study with university students in Türkiye suggested that there were no differences in restrictive eating between male and female students (Akdevelioğlu & Yörüşün, 2019). Overall, the results regarding gender differences in the Turkish version are more similar to those in the USA than in the Chinese (Tang et al., 2015) or Farsi (Sahlan et al., 2022) versions. These unique findings suggest a convergence towards Western norms in eating attitudes and behaviours, with the Turkish sample resembling the USA sample. Although both China and Iran are exposed to Western appearance ideals (Suleymani, 2020), the process of internalising these ideals may be more relevant and immediate to Türkiye due to its proximity to Western countries. However, such differences may also stem from specific methodological aspects in this study (e.g., sample, the type of analysis used). To investigate potential cultural variations between the mentioned countries regarding how Western appearance ideals and pressures are perceived and internalised, comparable samples from each country should be used to measure the same variables.

The results of this study supported the convergent validity of the EPSI-T, as it was found to be positively correlated with WOET and AEBS. Similarly, consistently with previous

research, weight bias internalisation was found to be associated with EPSI-T scales, with Muscle Building showing the smallest association and Body Dissatisfaction showing the largest (Romano et al., 2021). Our results support previous studies suggesting that weight bias internalisation exhibits robust positive associations with body dissatisfaction (Pearl & Puhl, 2014). In terms of muscularity-oriented eating and EPSI-T scales, consistent with previous research among university students in Australia, cognitive restraint exhibited the strongest correlation, while restriction showed the smallest correlation with muscularity-oriented eating (Cunningham et al., 2022). In addition, significant positive correlations were found between the EPSI-T scales and AEBS measures (e.g., appetite drive). In line with the previous research, discriminant validity was demonstrated through a significant correlation between the EPSI-T scale and anxiety and depression, providing further support for the validity of the EPSI-T (Gilmartin et al., 2023).

This is the first study to validate the EPSI for the Turkish-speaking population. Our sample, drawn from four large universities in Türkiye, primarily included students from these cities, limiting the generalizability of our psychometric findings to other populations, such as adolescents, clinical samples, or students in smaller cities. However, these universities are large in their capacities and have students coming from a variety of places in Türkiye. Additionally, some gender groups had insufficient participants to evaluate measurement invariance of the EPSI-T, and research suggests that small samples may lead to over-rejection of correct models (Putnick & Bornstein, 2016). An administrative error resulted in the exclusion of participants' ages, preventing assessment of age effects on the results; future studies should address this.

5. Conclusion

Overall, the EPSI-T may contribute to improved assessment and understanding of EDs in Turkish populations. Since the EPSI-T's structure mirrors the original English version, we believe that the EPSI-T could be a valuable tool for studying EDs across different cultures. Given that the literature on EDs is predominantly based on Western cultures, we believe this paper enhances sample diversity by including data from non-Western cultures, thereby providing a more nuanced global understanding of EDs.

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