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Psychometric properties of the Turkish version of the premenstrual dysphoric disorder questionnaire for DSM-5 (CTDP–DSM–5)

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Abstract

Introduction Premenstrual dysphoric disorder (PMDD) is a syndrome marked by severe mood and physical symptoms during the menstrual luteal phase. This study aimed to evaluate the validity and reliability of the Turkish CTDP-DSM-5 (CTDP-TR), developed by Aperribai et al. (2016), in response to the insufficient diagnosis of PMDD in clinical settings, as per the DSM-5 or ICD-11.

Methods Data were collected from women through an electronic questionnaire. A total of 336 participants were included in the analysis. The Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), and Premenstrual Symptoms Screening Tool (PSST) scales were administered alongside the CTDP-TR; the data were analyzed for construct validity, internal consistency, test–retest reliability, convergent validity, and criterion validity.

Results The CTDP-TR is a 25-item screening tool based on DSM-5. Confirmatory factor analysis of the CTDP-TR revealed a two-factor structure with acceptable fit indices (CFI = 0.903; TLI = 0.888; RMSEA = 0.057, SRMR = 0.056, $\chi 2/df = 2.08$, $p < 0.001$). The total score of the scale demonstrated excellent internal consistency ($\alpha = 0.89$), a strong correlation with PSST ($r = 0.715$), and excellent discrimination in ROC analysis (AUC = 0.943). CTDP-TR scores correlated significantly with PHQ-9 ($r = 0.547$) and GAD-7 scores ($r = 0.510$), effectively distinguishing individuals with depression from those without (Cohen's d = 1.171) and individuals with anxiety from those without (Cohen's d = 1.145). The rate of positive screening for PMDD was 43.5%.

Conclusions The CTDP-TR is a straightforward, valid, and reliable screening tool aligned with DSM-5 for PMDD in Turkiye, providing a basis for early identification and referral, rather than a stand-alone diagnosis. The existence of this scale is crucial for public health, as it addresses the absence of a standard, DSM-5-oriented tool for PMDD screening in Turkiye.

Keywords Premenstrual dysphoric disorder, Scale, Validity, Reliability, DSM-5, Screening, CTDP-TR

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Introduction

Premenstrual Dysphoric Disorder (PMDD) is a psychiatric condition with mood, behavioral, and physical symptoms occurring during the luteal phase of the menstrual cycle, one to two weeks post-ovulation, and diminishing with menstruation. Usually appearing in early adulthood to mid-thirties, PMDD affects about 3 to 8 percent of the population. Prevalence rates vary among age groups and demographics [1]. In Turkiye, PMDD prevalence ranges from 15.9% to 48.0% [2, 3]. These varying rates highlight methodological differences in studies and underscore the importance of considering cultural and social factors in evaluating the effects of PMDD. Aspects like healthcare access, social support, and cultural attitudes towards menstruation may affect individuals' experiences and treatment-seeking for PMDD [4]. Additionally, the wide range of rates suggests possible underreporting or misdiagnosis, underscoring the need for further research and increased awareness [5].

Once deemed a controversial clinical entity, PMDD now has substantial scientific evidence supporting its distinction from temporary mood shifts. It is recognized as a recurrent, cyclical psychiatric disorder that impairs functioning. This shift has led to its formal acknowledgment in major diagnostic classifications. Initially described in the DSM-III-R (1987) as late luteal phase dysphoric disorder, it was later included in the "Appendix B: Criteria Sets and Axes Provided for Further Study" section of the DSM-IV (1994). It gained official classification as a psychiatric diagnosis in the DSM-5 (2013) under "Depressive Disorders [6]." Moreover, the ICD-11, effective as of 2022, assigned PMDD a specific diagnostic code (GA34.41), indicating its formal recognition as an independent disorder in the global health classification [7, 8].

In clinical settings, Premenstrual Dysphoric Disorder (PMDD) is often underdiagnosed, with challenges in referral and follow-up [9]. Evaluating the relationship between symptoms and the menstrual cycle is crucial for accurate diagnosis, especially in female patients with psychiatric complaints. A comprehensive, standardized assessment tool can enhance diagnosis for psychiatrists and non-specialist clinicians, objectively documenting symptoms, facilitating monitoring, and ensuring continuity in follow-up care.

To enhance the accuracy of PMDD diagnosis, Aperribai et al. [9] developed the CTDP-DSM-5 (Cuestionario del Trastorno Disfórico Premenstrual – DSM-5), a self-administered tool based on DSM-5 criteria. This scale assesses the presence and severity of PMDD symptoms and includes an auxiliary module that evaluates functional impairment in six life domains, as per Criterion D of the DSM-5 [9]. It also contains a pre-programmed SPSS syntax file aligned with established diagnostic algorithms, providing a standardized framework that serves as an alternative to structured clinical interviews. Note that this instrument offers a pre-diagnostic result, as the DSM-5 emphasizes needing a daily-rating scale over two symptomatic cycles to finalize PMDD diagnosis.

The CTDP-DSM-5 enables a nuanced evaluation of PMDD symptom severity and its impact on daily life. Preliminary psychometric analyses indicate high internal consistency, with ordinal alpha coefficients of 0.88 for Dysphoria and 0.84 for Apathy, demonstrating reliability. These features position the CTDP-DSM-5 as a psychometrically robust and practical screening tool for clinical and epidemiological settings. However, its psychometric properties have not been examined in a Turkish female population. Thus, this study aims to evaluate the scale's validity and reliability within this cultural context, to assess its appropriateness for Turkish women. Although the Premenstrual Symptoms Screening Tool (PSST) is a widely used screener for PMDD, it was developed based on DSM-IV criteria. In this study, we used the CTDP-DSM-5 (Turkish version, CTDP-TR) because it aligns directly with DSM-5 diagnostic criteria and has demonstrated strong psychometric properties in initial validations (e.g., high internal consistency and validity). Using both PSST and CTDP-TR allowed us to compare the new scale's performance with an established instrument. This research will provide insights into the effectiveness of the CTDP-DSM-5 in identifying and assessing PMDD in Turkish women. Evaluating its psychometric characteristics in this demographic will deepen our understanding of the scale's relevance across cultural environments. Ultimately, the findings will inform therapeutic approaches in Turkey and similar cultural contexts, expanding the scope of mental health research.

Materials and methods

Participants and procedure

Data were collected from March 27 to May 9, 2025, using an electronic survey on Google Forms. Participants were invited via a QR code on recruitment posters displayed at Çanakkale Onsekiz Mart University Hospitals and shared through social media, WhatsApp groups, and email. Participants were recruited from three community subgroups: university students, healthcare professionals, and their relatives. The study included all women aged 18 and older, with specific exclusion criteria: individuals without a regular menstrual cycle in the past year, users of hormone regulators or psychotropic medications, those with a history of pregnancy within the last year, and individuals with alcohol or substance abuse issues. All criteria were detailed on the survey poster and in the information note, and they were incorporated as questions within the survey. Initially, informed consent was obtained by providing research information and asking participants if they wished to proceed. Only those selecting 'yes' were

directed to the questionnaire page and could exit the study at any time. Following consent, questions regarding age, education level, marital status, occupation, smoking, alcohol and substance use, medical conditions, and psychiatric treatments were asked. Participants also provided sociodemographic and clinical information and completed the CTDP-DSM-5 scale, along with other scales. Over 600 people participated, with 419 completing the survey. However, 83 participants were excluded due to the exclusion criteria, resulting in final analyses with 336 participants. Data were collected with forced completion for all items; therefore, there were no item-level missing data. All analyses used complete cases ($N = 336$). Participants received invitations to retake the CTDP-TR about 4 weeks after the initial test. This period roughly matched the next complete menstrual cycle for most women.

Turkish versions of the CTDP-DSM-5 scale were created through direct and reverse translation from the Spanish version. First, permission was obtained from the original author (L. Aperribai) via email. A linguist fluent in Turkish and a native Spanish speaker independently translated the document. Two psychiatrists reviewed the translation, made corrections for meaning, cultural relevance, and grammar, and combined them. The translation was back-translated into Spanish by an expert unfamiliar with the scales. A Spanish expert evaluated both forms for linguistic equivalence. Ten psychiatrists reviewed the draft Turkish items for relevance and clarity. The item-level content validity index (I-CVI) was 1.0 for most items (with a minimum of 0.8), and the scale-level content validity index (S-CVI/Ave) was 0.95, indicating excellent content validity. The adaptation process adhered to established guidelines for cross-cultural instruments (e.g., COSMIN recommendations) to ensure conceptual equivalence with the original scale [10]. The final translation and back-translation were emailed to the original author for approval. After approval, the finalized Turkish version of the CTDP-DSM-5 was prepared for the study and attached as an appendix. All participants completed the survey in 15–25 min. The research adhered to the Declaration of Helsinki and received approval from the Ethics Committee of Çanakkale Onsekiz Mart University Faculty of Medicine.

Sample characteristics

The study's final sample included 336 participants. The mean age of participants was 30.83 ± 9.41 years (min: 18; max: 57). Most participants were single ($n = 198$, 58.9%), university or doctorate graduates ($n = 265$, 78.8%), students ($n = 199$, 59.2%), non-smokers ($n = 259$, 77.1%), and had no medical conditions ($n = 270$, 80.4%).

Measures

In this survey, the CTDP-TR and the Turkish versions of the Patient Health Questionnaire-9 (PHQ-9), the Generalized Anxiety Disorder-7 (GAD-7), and the Premenstrual Symptoms Screening Tool (PSST) were administered in that order.

Cuestionario del Trastorno Disfórico Premenstrual– DSM-5/ premenstrual dysphoric disorder questionnaire for DSM-5 (CTDP-DSM-5)

The CTDP-DSM-5, developed by Aperribai et al. [9], is a self-report screening tool aligned with DSM-5 PMDD criteria that produces a pre-diagnostic algorithmic classification. It is a self-rating scale that assesses PMDD based on 25 symptoms experienced as “very intense” during the week before menstruation and the first two days of menstruation, considering the majority of menstrual cycles over the past year. The scale consists of two dimensions: 13 items assess “dysphoria” and 12 assess "apathy." Each item is dichotomous (yes or no) and receives a score of 1 for "yes" and 0 for "no". A ‘yes’ answer is given only if the criteria are met, meaning that the symptoms occur during most menstrual cycles in the past year and cause significant distress and impact daily life. In addition to the 25 items in the questionnaire, another table indicates six different situations of disability or impairment in daily life, which should relate to the symptoms or items marked as positive. These six conditions are required to fulfill the DSM-5 D criteria. A preliminary diagnosis is then offered based on algorithms that align with the DSM-5 criteria for diagnosing PMDD. The research authors developed the SPSS Syntax file to facilitate this initial diagnosis. They also created an algorithm for predicting PMDD scores using the CTDP-DSM-5, with a total score range of 0 to 25. The CTDP-TR scores of the participants in this study were also calculated using this algorithm, along with an accompanying SPSS Syntax file for scoring. Table 1 links CTDP-DSM-5 items to DSM-5 criteria; the complete Turkish version of the CTDP-DSM-5 is included in the Supplement. The instrument has demonstrated high internal consistency, as evidenced by a reported ordinal alpha of 0.88 for Dysphoria and 0.84 for Apathy.

Patient Health Questionnaire- 9 (PHQ-9)

The PHQ-9 is a self-administered tool for diagnosing depression and evaluating symptom severity in medical and mental health settings [11]. Its validity, reliability, and brevity make it essential for clinical practice and research. The tool assigns a severity score ranging from 0 to 27 by evaluating the 9 DSM criteria for Major Depressive Disorder (MDD) on a scale of 0 (never) to 3 (nearly every day). A higher score indicates lower functional status and greater symptom severity. Scores from 0 to 4 indicate no depression, while scores of 5 or higher suggest depressive

Table 1 Presence of similarities between CTDP-DSM-5 items and DSM-5 PMDD criteria

CTDP-DSM-5* [9]	DSM-5 PMDD Symptoms [6]
1. Very sad or depressed mood 2. Intense feelings of hopelessness 3. Very intense thoughts of self-disapproval	Criteria B 3. Depressed mood, feelings of hopelessness, or self-deprecating thoughts
4. Marked anxiety 5. Marked tension 6. Sensation of being overloaded or of being close "to the limit"	Criteria B 4. Anxiety, tension, and/or feelings of being keyed up or on edge
7. Sensation of being emotionally much more vulnerable (i.e., attacks of sadness, weeping, or greater sensitivity in the face of rejection)	Criteria B 1. Affective lability
8. Intense and permanent annoyance 9. Intense and permanent irritation 10. Evident increase in intense and frequent conflicts with people	Criteria B 2. Irritability, anger, or increased interpersonal conflicts
11. Evident loss of interest towards daily life activities (work, school/college) 12. Evident loss of interest in hobbies or leisure activities 13. Evident loss of interest in friends (breaks in social relations)	Criteria C 1. Decreased interest in usual activities
14. Considerable difficulty concentrating	Criteria C 2. Subjective difficulty in concentration
15. Acute sleepiness, the much greater sensation of being sleepy during the day 16. Much greater sensation of fatigue 17. Evident lack of energy	Criteria C 3. Lethargy, easy fatigability, or marked lack of energy
18. Very significant changes in appetite; binges or whims regarding specific meals	Criteria C 4. Marked change in appetite, overeating, or specific food cravings
19. Acute hypersomnia, that is to say, sleeping to excess without apparent cause 20. Insomnia, that is to say, finding it difficult to sleep, or waking up very frequently during the night	Criteria C 5. Hypersomnia or insomnia
21. Sensation of being overwhelmed or out of control	Criteria C 6. A sense of being overwhelmed or out of control
22. Evident increase in breast size 23. Discomfort in joints or muscles 24. Strong sensation of bloating 25. Clear gain in weight, with difficulty fitting into clothes, footwear, or wearing rings	Criteria C 7. Physical symptoms

*Translated into English

symptoms. A cut-off score of 10 maximizes sensitivity and specificity [12]. The Turkish version's Cronbach's alpha for reliability was 0.86 [13]. This study used depression scores from the PHQ-9 for comparative analysis with PMDD-related constructs.

General anxiety disorder-7 (GAD-7)

The GAD-7 is a self-report scale used for screening and assessing symptom severity in common anxiety disorders in primary care and mental health settings. Higher scores indicate more severe anxiety and correlate with disability. Each question is rated on a scale of 0 (not at all) to 3 (nearly every day), resulting in a total score ranging from 0 to 21. A score of 10 has significant sensitivity and specificity for diagnosing generalized anxiety disorder [14]. The Cronbach's alpha coefficient for the Turkish GAD-7 was 0.852 [15]. In this study, GAD-7 anxiety scores were compared with PMDD-related constructs.

Premenstrual symptoms screening tool (PSST)

The Premenstrual Symptoms Screening Tool (PSST) is a retrospective assessment based on DSM-IV criteria for Premenstrual Dysphoric Disorder (PMDD). It reliably identifies women with mild, moderate, or severe PMDD across adult and adolescent populations [16]. The PSST comprises 19 items; the first 14 assess PMDD symptoms, while the last five evaluate the impact of symptoms on family, work, relationships, and leisure. Each item is scored on a 4-point Likert scale from 0 to 3, indicating 'none' to 'very severe.' Total scores range from 0 to 57, with higher scores indicating more severe symptoms or significant impacts. Cronbach's alpha for the Turkish PSST was 0.928 [17].

Statistical analyses

Data were analyzed using IBM SPSS version 27.0 and Jamovi version 2.5.6.0. Statistical significance was set at $p < 0.05$. A thorough examination identified missing and extreme values before data analysis. Normality for numerical variables was assessed using skewness and kurtosis, which fell within the range of −1.5 to + 1.5. Continuous variables are reported as the mean ± standard deviation, and categorical variables are reported as counts and percentages. The chi-square test and independent samples t-test were used to evaluate clinical characteristics.

The study examined the psychometric properties, including reliability and validity, of the CTDP-DSM-5 (Turkish version; CTDP-TR):

I) To assess construct validity, a confirmatory factor analysis (CFA) was conducted, examining two-factor models for CTDP-TR based on original studies. Structural equation modeling was performed using JAMOVI software with a diagonally weighted least-squares estimation method, suitable for polychoric correlations due to the data's ordinal nature [18]. Model fit was evaluated using the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA),

standardized root mean square residual (SRMR), and relative chi-square (χ2/df) [19]. Adequate CFI and TLI values are 0.90 and above, with a value of 0.95 indicating a very good fit. RMSEA values of 0.08 and below are regarded as adequate, while 0.05 and below reflect a very good fit. For SRMR, an adequate cut-off is 0.08 or lower. Values of χ2/df under 3.0 are good, and those under 2.0 are very good (43). We also conducted multi-group CFA to assess measurement invariance across age groups (≤ 35 vs. > 35) and marital status (single vs. married). Both configural and metric invariance were tested; a ΔCFI < 0.01 served as the criterion for invariance. A priori RMSEA-based power considerations indicated that, with df = 260 and α = 0.05, $N = 336$ affords greater than 90% power to detect a close fit (RMSEA ≈ 0.05), consistent with contemporary SEM guidance [20].

II) The Cronbach's alpha and McDonald's ω coefficients were computed to assess the internal consistency (reliability) of the CTDP-TR.

III) The Pearson correlation coefficient and the linear regression model were applied to demonstrate convergent validity, based on the relationship between CTDP-TR and PSST.

IV) The discriminative power, also known as criterion validity, of the CTDP-TR was evaluated using Receiver Operating Characteristic (ROC) analysis and the Area Under the Curve (AUC). ROC analysis also utilized PSST-based classification (positive = moderate-to-severe PMDD; negative = none-to-mild) as a proxy for ground truth, as no clinician-verified diagnosis or prospective daily ratings were available.

V) The relationship between CTDP-TR and the PHQ-9 (which measures depression) and the GAD-7 (which assesses anxiety) was analyzed using Pearson correlation coefficients and independent samples t-tests.

VI) A MANCOVA was conducted to determine if the total scores of the PHQ-9 and GAD-7 scales could differentiate between individuals with and without PMDD, accounting for age. The CTDP-TR scale score was calculated using the SPSS syntax file provided by the developer. The PMDD screening-positive status rate was found to meet or exceed the threshold criteria of the CTDP-TR.

Moreover, since the PSST scale is one of the most reliable external criteria for PMDD, convergent and criterion validity analyses were also conducted using this scale.

Results

PMDD screening rate

According to the Turkish version of CTDP-DSM-5 (CTDP-TR), 146 of 336 participants were diagnosed with PMDD, resulting in a positive screening rate of 43.5%. The screening-positive rate for PMDD was higher in early adulthood (ages 18–25) and young adulthood (ages 25–35) compared to middle (ages 36–45) and late adulthood (premenopause, 46 + years): 54.62% in early, 53.84% in young, 31.87% in middle, and 21.74% in late adulthood ($p < 0.001$). It was also more common among single women than married women (53.5% vs. 34.8%, $p < 0.001$). However, educational level, occupation, smoking, and medical conditions did not influence the PMDD screening rate (all $p > 0.05$).

Construct validity

Before executing Confirmatory Factor Analysis (CFA), we assessed the data's suitability using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity. The KMO value was 0.888, indicating excellent sampling adequacy. Bartlett's test was statistically significant ($\chi^2 = 3087.74$, df = 300, $p < 0.001$), confirming the appropriateness of the data for factor analysis.

The fit indices from the CFA of the Turkish version of the CTDP-DSM-5 were acceptable (CFI = 0.903, TLI = 0.888, RMSEA = 0.057, SRMR = 0.056, $\chi^2 = 540$, df = 260, $\chi^2/df = 2.08$, $p < 0.001$). The RMSEA and CFI values suggest a good fit. Though the TLI is slightly borderline, the overall construct validity of the scale is deemed appropriate. The CFA revealed a strong positive correlation between the Dysphoria factor (13 items) and the Apathy factor (12 items) ($r = 0.761$, SE = 0.038, 95% CI [0.687–0.836], $p < 0.001$), confirming these subscales are conceptually similar yet distinct (see the supplemental file). Except for item 25 (standardized estimate 0.257, $p < 0.001$), item 11 (0.271), and item 20 (0.346), all factor indicators had acceptable loadings (≥ 0.50) ($p < 0.001$). Thus, the CFA supports the construct validity of the CTDP-TR.

Alternative CFA models were examined. A unidimensional (single-factor) model showed a poorer fit (e.g., CFI < 0.80, RMSEA > 0.08), indicating that a one-factor solution could not adequately represent the data. A bifactor model, which included a general PMDD factor and two specific factors, yielded fit indices similar to those of the two-factor model but did not significantly improve upon it. Therefore, we retained the two-factor correlated model as the most straightforward representation of the CTDP-TR's structure. Furthermore, no significant local dependence was detected; residual correlations between item pairs were all low (≤ 0.20), indicating that the two factors sufficiently explained each item's covariance.

Multi-group CFA indicated that the two-factor structure remained consistent across all subgroups. Specifically, configural invariance was confirmed for both younger participants (≤35 years old) and older participants (>35 years old), as well as for single and married participants. Factor loadings could be constrained to equality (metric invariance) with minimal change in fit (ΔCFI < 0.003), suggesting that the CTDP-TR functions equally across these age and marital status groups.

Reliability

Internal consistency was evaluated using Cronbach's alpha (α) and McDonald's omega (ω) coefficients for the CTDP-TR total score and its dimensions: dysphoria and apathy. The CTDP-TR total score demonstrated excellent internal consistency, with an α of 0.89 and a ω of 0.90. For dysphoria, both α and ω were 0.88, indicating strong reliability. The apathy subscale showed acceptable internal consistency, with α = 0.78 and ω = 0.81. These results suggest that the CTDP-TR and its subscales possess adequate to strong internal reliability in the current sample.

The test–retest reliability of the CTDP-TR total scores was assessed by analyzing Pearson correlations between scores obtained about one month apart for the sample ($N = 45$). The Pearson correlation coefficient for CTDP-TR total scores at Time 1 and Time 2 was 0.683 (95% CI: 0.374–0.894, $p < 0.001$), indicating good test–retest reliability. For the dysphoria subdomain, the correlation at Time 1 and Time 2 was $r = 0.521$ (95% CI: 0.158–0.760, $p = 0.008$), whereas the apathy subdomain showed a correlation of r = 0.799 (95% CI: 0.601–0.911, $p < 0.001$). Additionally, the inter-session ICC coefficient was calculated for the total score and found to be 0.665 (95% CI: 0.431–0.816, $p < 0.001$).

Convergent validity

Pearson correlation analysis of the CTDP-TR and PSST scales showed a strong positive correlation ($r = 0.715$, $p < 0.001$). The dysphoria subscale showed a significant correlation with PSST ($r = 0.664$, $p < 0.001$), while the apathy subscale also demonstrated a substantial relationship ($r = 0.615$, $p < 0.001$), albeit slightly lower than that of dysphoria (Table 2).

To assess convergent validity, a linear regression analysis was conducted between the total scores of CTDP-TR and PSST. The model was significant ($F(1, 334) = 348.85$, $p < 0.001$), explaining 51% of the variance in PSST ($R^2 = 0.511$). The significant regression coefficient ($\beta = 0.715$, $p < 0.001$) indicates that CTDP-TR predicts PSST scores strongly, demonstrating a strong overlap between CTDP-TR and PSST as a valid measure for assessing premenstrual symptoms, thus confirming its convergent validity.

Table 2 Correlation results between CTDP-TR and other scales

CTDP-TR	PSST	PHQ-9	GAD-7
Dysphoria	0.664**	0.582**	0.482**
Apathy	0.615**	0.385**	0.430**
Total	0.715**	0.547**	0.510**

** $p < 0.001$

Criterion validity

The performance of the CTDP-TR in screening for likely PMDD cases was evaluated using receiver operating characteristic (ROC) analysis, with scoring conducted through the algorithm provided in the SPSS Syntax. The AUC against the CTDP algorithm classification was 0.943 (95% CI, 0.917–0.968), indicating excellent discrimination between CTDP algorithm–positive and negative cases (Fig. 1). The threshold for the greatest discriminatory capacity was established by assessing Youden indices from sensitivity and specificity across cutoff points. A cutoff of 5.5 points yielded the highest Youden index (0.785), with sensitivity of 0.851 and specificity of 0.934. A cutoff of ≥6 may serve as a preliminary screening threshold in similar research settings. This cutoff might serve as an initial screening threshold. It should be considered provisional and sample-specific until validated in independent cohorts.

Furthermore, using PSST-based classification as a proxy criterion (positive class: moderate-to-severe PMDD; negative class: none-to-mild), CTDP-TR total scores demonstrated good discrimination ability (AUC = 0.843, 95% CI [0.792, 0.894], $p < 0.001$). Because no clinician-verified diagnosis or prospective daily ratings were available, these results reflect discrimination against a retrospective proxy (a PSST-based proxy ground truth).

Associations with depression and anxiety symptoms

The CTDP-TR total score ($r = 0.510$), along with the dysphoria ($r = 0.482$) and apathy ($r = 0.430$) subscales, showed significant correlations with the GAD-7 total score (all $p < 0.001$). Similarly, the CTDP-TR total score ($r = 0.547$), dysphoria ($r = 0.582$), and apathy ($r = 0.385$) scores were significantly associated with PHQ-9 (all $p < 0.001$) (Table 3).

Participants were classified based on PHQ-9 scores as having no depression (total score < 10) or depression (total score ≥ 10). Those in the depression group scored significantly higher on CTDP-TR than the non-depressed group ($p < 0.001$, Cohen's d = 1.17). Additionally, participants were categorized by GAD-7 scores as having no anxiety (total score < 10) or anxiety (total score ≥ 10); those with anxiety showed a significantly higher CTDP total score ($p < 0.001$, Cohen's d = 1.15). MANCOVA, with age as a covariate, revealed significant differences between PMDD groups in PHQ-9 and GAD-7 scores

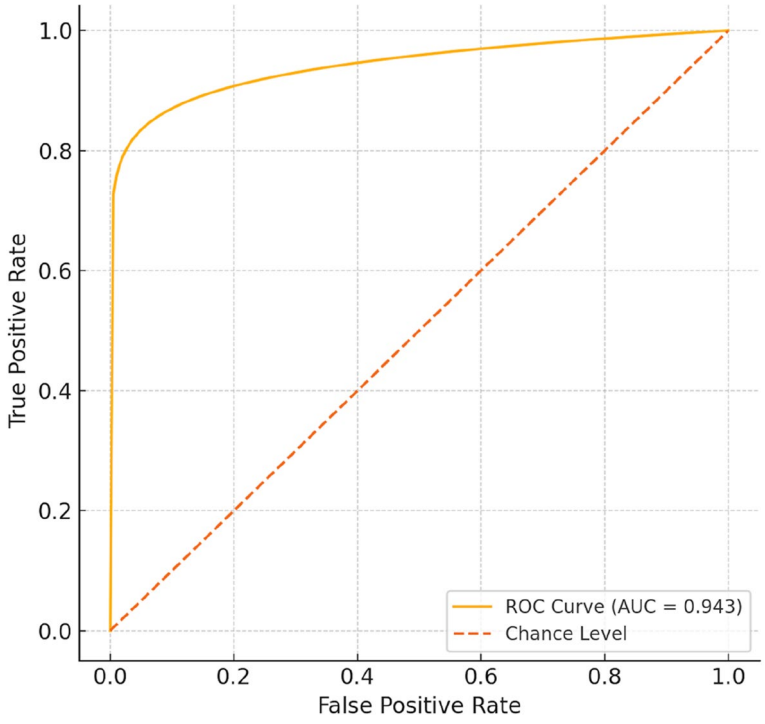

Fig. 1 ROC curve for CTDP-TR in diagnosing PMDD

Table 3 Comparison of CTDP-TR scores between groups with and without depression and anxiety

Scales	Diagnosis yes/no (scores < 10 or ≥ 10)	CTDP-TR score	*t*	*p*	Cohen's *d*
Depression (PHQ-9)	Yes (*N* = 110, 33.8%) No (*N* = 225, 66.2%)	10.52 + 5.81 4.40 + 4.91	9.499	< 0.001	1.171
Anxiety (GAD-7)	Yes (*N* = 69, 21.6%) No (*N* = 249, 78.4%)	11.55 + 6.37 5.39 + 5.08	7.417	< 0.001	1.145

(Pillai's Trace = 0.223, F = 47.254, $p < 0.001$, $\eta p^2 = 0.22$), indicating disparities in mental symptoms.

Additionally, in this sample, the DSM-IV–oriented PSST demonstrated excellent internal consistency ($\alpha = 0.91$; $\omega = 0.91$). PSST total scores showed moderate-to-strong correlations with depressive and anxiety symptoms (PHQ-9: r = 0.563, $p < 0.001$; GAD-7: $r = 0.701$, $p < 0.001$), supporting construct-convergent validity.

Discussion

This study evaluated the psychometric properties of the Turkish CTDP-DSM-5 scale. Analyses included: I) examining the factor structure of the CTDP-TR in a Turkish sample; II) assessing CTDP reliability; III) the convergent validity through correlations with PSST; IV) exploring CTDP-TR's ability to differentiate between PMDD individuals; and V) examining the relationship of CTDP-TR with anxiety and depression. This is the first investigation of the psychometric properties of the Turkish CTDP-DSM-5 translation in a normative Turkish population.

This study found a PMDD positive-screening rate of 43.5%, consistent with rates observed in similar populations in Turkey. For example, Turan et al. [3] reported a 48.0% prevalence in Istanbul, while Soyak [21] noted a 31.2% prevalence among those with anxiety. PMDD is notably common among young women, with international studies showing rates ranging from 34.7% to 61.7% [22–24]. Healthcare workers also report higher rates of PMDD [24–26], which may be attributed to occupational stress, shift work, increased medical awareness, and comorbid conditions [27]. High prevalence may relate to sensitive diagnostic criteria like DSM-5, cultural factors, symptom expression, health literacy, and psychosocial stressors. Academic and social stress among young women may exacerbate PMDD [28, 29]. Data indicate that PMDD typically peaks in the early twenties to mid-thirties, before declining due to factors such as reduced ovulatory cycles, receptor changes, higher parity, and improved coping skills with age [30, 31]. Our findings indicate PMDD is a significant public health concern for young women, warranting regular assessments.

CTDP-TR features a 25-item structure that adheres to the DSM-5 criteria for PMDD. Each item allows a 'yes/no' response, enabling comprehensive assessment of DSM-5 requirements, which includes five criteria and functional measures, rather than just symptom tallying

based on cut-off scores. This method enhances diagnostic specificity by identifying cases that meet the criteria, thereby avoiding the pathologization of mild symptoms. The scale reduces false positives (overdiagnosis) by using the DSM-5 algorithm instead of score-based methods. The diagnostic algorithm, developed with SPSS Syntax for PMDD diagnosis, standardizes the process, enhancing comparability across studies and supporting diagnostic validity [32]. These features enable scales like CTDP-TR to be effective not only for diagnosis but also for epidemiological screening and assessing the validity of diagnostic criteria [9, 33].

The reliability of the CTDP-TR is satisfactory, with Cronbach's α coefficients for its two subscales and total score ranging from 0.89 to 0.78. Our findings align with those of Huang et al. [8], who validated the CTDP in Chinese, identifying a two-factor structure with an association between dysphoria and apathy of 0.77 and demonstrating high reliability ($\alpha = 0.80$), thus providing cross-cultural validation of the scale's key features. Furthermore, tools analogous to the CTDP-TR have undergone validation in other cultures—for example, the PSST was validated in Italian [34], showing strong reliability and screening utility. This underscores the international effort to develop culturally adapted PMDD screening measures, helping to position the CTDP-TR among established instruments.

The CTDP-TR has good discriminative ability for PMDD screening, demonstrating excellent agreement and high discriminatory power (AUC = 0.943). Together with moderate-to-strong convergent associations with PSST and high ROC-based discrimination against PSST classifications, the findings support CTDP-TR as a DSM-5-aligned screening aid. The AUC indicated good discrimination against the PSST-based proxy classification, rather than agreement with a clinician-established diagnosis. The CFA supported a two-factor structure (Dysphoria, Apathy) consistent with the original scale's conceptualization. Most items loaded strongly (standardized $\lambda \geq 0.50$) on their intended factors, except for three items (Items 25, 11, and 20) with lower loadings ($\lambda = 0.25–0.35$). These same items also had the lowest item-total correlations (point-biserial $r = 0.32–0.38$), although they remained positively correlated with the total score. Dysphoria aligns with DSM-5 Criterion B, relating to anxiety, interpersonal conflicts, and mood disturbances, while apathy, encompassing the somatic and associated symptoms, aligns with Criterion C [6]. Hormonal changes in the luteal phase trigger psychological reactions in PMDD patients, manifesting as dysphoria and apathy [5, 35]. These symptoms significantly impact health-related quality of life, personal interests, social activities, and relationships, increasing the overall burden of the illness [36]. Emphasizing women's experiences of PMDD and understanding the underlying mechanisms are essential to alleviate psychological distress and improve the healthcare experience for women.

The high correlation between CTDP-TR and PSST scores ($r = 0.715$) suggests both scales assess similar psychological constructs. Significant correlations were observed in dysphoria ($r = 0.664$) and apathy ($r = 0.615$), highlighting consistency at the subscale level. Regression analysis shows a strong relationship; the CTDP-TR score accounts for 51% of the variance in PSST scores. These results support the structural and convergent validity of CTDP-TR with PSST. The CTDP-TR effectively distinguishes individuals with depressive and anxiety disorders. PMDD is defined as a severe mood disorder with depressive and anxiety symptoms (Mishra et al., 2020). It is categorized as a mood disorder in DSM-5, reflecting its high comorbidity with major depressive disorder [37]. Studies show high comorbidity rates between PMDD, major depression, and anxiety disorders [38, 39]. This combination can worsen symptom severity; women with PMDD and GAD have heightened anxiety and depression symptoms during the luteal phase [39, 40]. Co-occurring PMDD with depression and anxiety can impair psychosocial functioning and delay treatment [41]. SSRIs are widely used for treating these disorders, effectively addressing PMDD and depressive/anxious symptoms [42]. Cyclic SSRI administration alleviates PMDD symptoms [33]. Additionally, neuroinflammation may contribute to these disorders, with GABA-A receptor dysregulation affecting PMDD symptoms [37]. Recent research has also begun to explore related factors, such as chronotype. For instance, Riccobono et al. [43] found that evening chronotype and night eating habits were associated with depressive symptoms in female university students, suggesting that circadian factors may influence mood regulation in this population. Although not directly about PMDD, these findings could inform future research on how circadian rhythms might impact premenstrual symptom severity.

This study has limitations. First, the sample of university students, healthcare professionals, and their relatives restricts the generalizability of our findings to individuals with mental disorders. Future research should examine PMDD in those diagnosed with mental disorders, using larger multicenter cohorts to determine PMDD prevalence in Turkish society per DSM-5 criteria. Additionally, since participation was voluntary, those with PMS/PMDD symptoms were more likely to join, resulting in a high participation rate among symptomatic individuals and poor representation of asymptomatic individuals. This may mean the prevalence of PMDD is overestimated compared to the actual rate in the general population due to volunteer bias. Another limitation is the lack of a prospective clinical diagnosis of PMDD. The study did

not include confirmatory prospective daily ratings or a clinician-administered diagnostic interview for PMDD; instead, classification was based on self-report screening tools. As a result, our identification of 'PMDD cases' was not verified by the DSM-5 gold-standard diagnostic procedure, which may affect the precision of our findings. Moreover, CTDP-TR is a retrospective self-report tool; prospective daily ratings made throughout the symptomatic cycle remain the gold standard for diagnosis, and retrospective screening may inflate case estimates. Additionally, criterion validity depended on a proxy ground truth (PSST) rather than prospective daily ratings or clinician-verified diagnoses, which limits the inferences about criterion validity. While forced completion eliminated item-level missingness, it also precluded assessment of non-response patterns at the item level. It is important to note that our test–retest interval of approximately one month did not account for the menstrual cycle phase. In other words, some participants might have taken the retest during a different phase of their cycle (follicular vs. luteal) than the initial test. Finally, factors like nutritional deficiencies, physical activity, sleep quality, stress levels, personality traits, and trauma history should be considered to assess their impact on PMDD [44–46].

The Turkish CTDP-DSM-5 is now a valid tool for assessing PMDD symptoms based on DSM-5 criteria. It should not be overlooked that the CTDP-TR is to be evaluated not as a standalone diagnostic tool but as a screening aid aligned with DSM-5. The Turkish CTDP-DSM-5 is a valid and straightforward screening tool for PMDD, facilitating the early identification of likely cases. No scale (neither CTDP-TR nor PSST) can confirm a diagnosis of PMDD on its own without prospective data; therefore, these women must undergo daily prospective assessments for confirmation later. PMDD affects performance in various areas, including work, education, home, and social life, making an accurate diagnosis essential. Identifying PMDD yields benefits for personal well-being and public health by acknowledging symptoms, enabling interventions, activating support, and raising awareness of women's health. Using the CTDP-DSM-5 with culturally validated adaptations may clarify biological mechanisms, inform customized treatment strategies, and establish a database to enhance future research. In summary, diagnosing and managing PMDD can significantly improve women's mental health and deepen their understanding of their health issues.

Supplementary Information

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Supplementary Material 1.

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Authors' contributions
CRediT authorship contribution statement Şükrü Alperen Korkmaz: Conceptualization, Methodology, Formal Analysis, Investigation, Writing—Original Draft Preparation; Writing—Review & Editing Preparation Hülya Ertekin: Conceptualization, Methodology, Writing—Original Draft Preparation; Writing—Review & Editing Preparation Senem Yapar: Investigation, Original Draft Preparation, Methodology, Conceptualization Leire Aperribai: Supervision, Writing—Original Draft Preparation; Writing—Review & Editing Preparation.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
Informed consent was obtained from all participants included in this study. All methods in this study were performed in accordance with the guidelines of the Declaration of Helsinki. The Ethics Committee of Çanakkale Onsekiz Mart University Medical Sciences has approved it (IRNo. 2025-YÖNP-0020, 26.03.2025).

Competing interests
The authors declare no competing interests.

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