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Translation, adaptation, and psychometric validation of the Urdu version of the Gaming Disorder Test (GDT-Urdu) among Pakistani adults

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Abstract

Background Gaming Disorder (GD) has been recognized as a diagnosable behavioral addiction; however, no validated Urdu-language scale for assessing GD has been available. This study aimed to translate, adapt, and validate the Gaming Disorder Test (GDT) for use in Urdu-speaking populations and to evaluate its psychometric properties.

Method A cross-sectional survey was conducted with 385 Pakistani adults (46.5% men, 53.5% women; Mean age = 22.43, SD = 3.62), ranging in education from intermediate to master's level (Mean = a bachelor's degree). GDT was translated and validated through established procedures including forward-backward translation, face validity, pilot testing, confirmatory factor analysis, Rasch analysis, and assessment of convergent validity.

Results The GDT-Urdu demonstrated strong internal consistency throughout the three phases of the study (Cronbach's α = 0.902, 0.845, 0.918). CFA supported the unidimensional structure, with satisfactory model fit indices (such as comparative fit index = 0.996, Tucker-Lewis Index = 0.989, root mean square error of approximation = 0.069, standardized root mean square residual = 0.012). Convergent validity was confirmed through significant correlations with GDT-English, depression, anxiety, stress, and aggression. Rasch analysis revealed adequate item fit, proper category ordering, and high person separation reliability, indicating robust item-level performance. Due to the absence of validated clinical cut-offs, tertile categorization was employed for descriptive purposes. The upper tertile (approximately 29% of participants) was identified as a relatively high-risk subgroup exhibiting elevated GD symptom scores within this sample, rather than serving as a diagnostic or prevalence-based estimate of GD. Higher GDT scores were significantly associated with greater psychological distress.

Conclusions The GDT-Urdu is a psychometrically sound instrument suitable for assessing GD among Urdu-speaking populations. It can serve both clinical and research purposes, especially in Urdu speaking regions such as Pakistan and India.

Keywords Mental health, Gaming disorder, Gaming addiction, Behavioral addiction, GDT, Validation, Pakistan

1 Introduction

Online gaming has become a dominant form of digital leisure, offering benefits such as stress relief, social engagement, and cognitive skill development [1, 2]. Particularly among adolescents and young adults, gaming satisfies psychological needs including achievement, competition, escapism, and social connection [3, 4]. Massively multiplayer online role-playing games (MMORPGs) provide immersive virtual environments that allow real-time interaction, creative self-expression, and global social connectivity [5, 6]. Motivations range from curiosity and fantasy to emotional regulation, especially during stress-laden contexts such as the COVID-19 pandemic [7, 8].

The terms Gaming Disorder (GD) and Internet Gaming Disorder (IGD) are often used interchangeably but refer specifically to problematic patterns of digital or video gaming, not to traditional physical games such as football, cricket, or board games. IGD, introduced in the DSM-5 as a condition warranting further study [9], pertains exclusively to online video games, emphasizing behaviors such as preoccupation, withdrawal, and functional impairment in the context of Internet-based gaming platforms. In contrast, GD, formally recognized in the ICD-11 [10], includes both online and offline digital gaming but is still confined to screen-based activities involving computers, consoles, or mobile devices. Importantly, neither term encompasses non-digital recreational activities nor organized sports, which lack the immersive virtual environments and reinforcement mechanisms characteristic of digital games. Thus, the clinical constructs of GD and IGD are designed to capture the unique psychological, behavioral, and neurocognitive risks associated with electronic gaming environments alone.

Excessive or compulsive gaming has raised significant concerns, particularly when it functions as a maladaptive coping strategy for individuals with social anxiety [11]. Games with competitive, violent, or microtransaction-heavy designs are linked to increased addictive tendencies due to their reinforcement mechanisms [12]. Symptoms such as time loss, withdrawal, and impaired real-life functioning characterize problematic use [13, 14]. IGD is characterized by preoccupation, tolerance, withdrawal, loss of control, and impairment across personal, social, and academic domains [15]. Craving, salience, and relapse are commonly replicated across cultural samples [16]. Gamers often report digital eye strain, musculoskeletal pain, and other somatic complaints associated with prolonged screen use [17, 18]. IGD is comorbid with depression, anxiety, impulsivity, ADHD, and alexithymia [19–21]. Adolescents often experience low self-esteem, conduct issues, and emotional dysregulation [22]. Permissive parenting, parental depression, emotional neglect, and early exposure to gaming increase vulnerability [23, 24]. Adolescents are especially vulnerable due to their still developing emotional and cognitive regulatory systems [25]. Neuroimaging research has shown that individuals with IGD had dysfunction between, and within, the reward processing and executive control networks, that affect both decision making and impulse control [26, 27]. Cultural factors, such as individualism vs. collectivism, suggest a diversity of manifestation of IGD and although

both genders exhibit some central symptoms, males display far more than females [28, 29]. IGD increased during and after the pandemic due to lockdowns and changed routines and unmet psychological needs, especially for youth [30, 31]. While some investigations are demonstrated with adequate empirical support, there are critiques on the limits of pathologizing all high-frequency gamers [32]. There remains a dispute on the level of diagnostic cut-off and if there is any nosological clarity [33, 34]. There is a growing need for empirical effort and institution acknowledgment of the need for culturally validated diagnostic tools and refined psychometric properties across national borders [35].

The Gaming Disorder Test (GDT) was developed by Pontes and associates [36] as the first brief psychometric tool based on the ICD-11 definition of GD. The GDT is theoretically and clinically sound, and operationally consistent with the World Health Organization's definition of GD [10]. The GDT operationalizes the three core diagnostic features of GD: (i) impaired control over gaming; (ii) increasing priority given to gaming as opposed to other activities and interests; and (iii) continuation or escalation of gaming despite negative consequences. In addition, the GDT also operationalizes the associated criterion of impairment in functioning - at the personal, family, social, educational and occupational level [36]. As gaming has recently increased in its prevalence and associated psychosocial effects, the GDT is an important addition to the area of research on behavioral addiction, as it offers a link between the diagnostic criteria and clinical assessment of GD. Although the GDT is brief, it has demonstrated numerous favorable psychometric properties including high internal consistency, construct validity, and cultural generalization [37]. The GDT was initially validated on large, and diverse multilingual samples, establishing it as a reliable scale for clinical diagnosis and for screening at the population level [36]. Further studies have confirmed the psychometric soundness of the GDT across cultures, as they translated and validated this scale into, Bangla [38], Chinese [39, 40], German [41], Malay [42], Persian [43], Polish [44], Spanish [45], and Turkish [46]. However, the GDT had never been translated or validated into Urdu language, which presents a significant gap in the assessment of GD with this language population. The present study will begin to fill this gap, as it will report on the first translation and psychometric validation of the GDT in Urdu after employing standard cross-cultural adaptation processes. This translation is of considerable importance, as it allows for culturally competent screening and diagnosis of GD in a linguistically under-served group, specifically, within Pakistan, India, and other Urdu-speaking populations. In making the GDT available in Urdu, this study extended the potential of international GD research beyond Western populations, while contributing to evidence-informed clinical assessment and public health surveillance in non-Western settings. The present study aimed to translate, culturally adapt, and psychometrically validate the Urdu version of the GDT for use among Pakistani adults. In doing so, the study sought to examine whether the GDT-Urdu demonstrates a unidimensional factor structure consistent with the theoretical framework of GD, whether it exhibits adequate internal consistency as an indicator of reliability, and whether it establishes convergent validity through meaningful associations with related psychological constructs such as depression, anxiety, stress, and aggression.

2 Method

2.1 Translation procedure

The English version of the GDT was translated into Urdu using internationally recognized steps for cross-cultural scale adaptation, which ensured linguistic and conceptual equivalence [47, 48]. The process began with the forward translation. Two bilingual experts independently translated the original English language version of the GDT into Urdu. A third bilingual expert synthesized the two translations into a single reconciled forward translation through consensus. The reconciled forward translation was then back-translated into English by two different bilingual professionals who were blinded to the original scale. This ensured the Urdu version of the GDT preserved the same meaning of the items as the original English version of the scale. An expert committee of six individuals including psychologists, language experts, and psychometricians reviewed all versions for semantic, idiomatic, experiential, and conceptual equivalence. Some linguistic adjustments were made to align with participants' culture and understanding. A small pilot test (n = 25) of Urdu speaking participants was completed to test the clarity and reading level of the items. Feedback from the pilot was that there were no major issues in understanding, it supports the face validity and cultural appropriateness of the GDT Urdu version. Cronbach's alpha was used to evaluate the reliability of the GDT-Urdu in the pilot study and found a high level of internal consistency with a coefficient of $\alpha = 0.896$. Participants in the pilot study did not participate in the main study to protect against bias or overlap. This careful translation procedure has resulted in the GDT-Urdu being linguistically accurate and fit for further psychometric testing for Urdu-speaking groups.

2.2 Participants

The research was undertaken in three sequential phases, with each of the individual phases directed towards something different regarding the translation and psychometric validation of the Urdu version of the Gaming Disorder Test (GDT-Urdu). Each of the three phases of the study had the following eligibility criteria: (1) participants had to be 18 years of age or older, and (2) participants must currently engage in online gaming activities. The final sample consisted of 385 participants, 179 male (46.5%), and 206 female (53.5%) participants. Most participants were unmarried (n = 334, 86.8%) and 51 (13.2%) were married. Participants ranged from 18 to 40 years of age (M = 22.43, SD = 3.62), educational qualifications ranging from intermediate through to master's level, with educational level on the whole being at a bachelor's level.

Phase 1 aimed to evaluate the factorial structure of the GDT-Urdu through confirmatory factor analysis (CFA) and assess its correlation with the original English version. A total of 170 participants (men = 98, 57.6%; women = 72, 42.4%) were included. Participants ranged in age from 18 to 34 years (M = 22.52, SD = 3.21). In terms of marital status, the majority were unmarried (n = 152, 89.4%), while married participants constituted 10.6% (n = 18). Educational backgrounds ranged from intermediate education to master's level, with an average education level equivalent to a bachelor's degree. Phase 2 examined the convergent validity of the GDT-Urdu by correlating it with depression, anxiety, and stress. The sample consisted of 116 participants (men = 30, 25.9%; women = 86, 74.1%), aged 18 to 26 years (M = 20.88, SD = 1.44). Most participants were unmarried (n = 107, 92.2%), and their education ranged from intermediate to master's level, with

a mean education level of a bachelor's degree. Phase 3 also assessed convergent validity, this time by examining correlations between GDT-Urdu scores and aggression levels. This phase included 99 participants (men = 51, 51.1%; women = 48, 48.5%) aged 18 to 40 years (M = 24.08, SD = 5.07). Most were unmarried (n = 75, 75.8%), while 24.2% (n = 24) were married. Participants' education levels ranged from intermediate to master's, with an average of a bachelor's degree. Across all three phases, the diverse sample composition in terms of gender, age, and education enhances the generalizability of the GDT-Urdu and supports its use among various subgroups within the Urdu-speaking population.

The sample size for this research was determined based on established psychometric and statistical guidelines appropriate for each analytical phase.

Phase 1, which was the CFA of the GDT-Urdu, followed the procedure of 10 participants per estimated parameter in the model [49]. The CFA unidimensionality model for the GDT had 4 items loading onto 1 latent factor, thus resulting in 8 parameters to be estimated (4 factor loadings and 4 error variances). Thus, the sample size needed for an adequate sample size was at least 80 participants. This minimum sample size was well-exceeded, as 170 participants were recruited for Phase 1, providing adequate estimation of the model, and sufficient statistical power for validating the factor structure. Phases 2 and 3 sample size estimation for testing convergent validity though bivariate correlations, were based on guidelines for correlational studies. According to Cohen's criteria [50] for detecting medium effect sizes ($r \approx 0.30$) with 80% power at $\alpha = 0.05$, the minimum number of participants would be 84. To ensure statistical credibility and plan for unplanned exclusions, 116 participants were recruited in Phase 2 (where GDT-Urdu is correlated with depression, anxiety, and stress), and 99 participants in Phase 3 (where GDT-Urdu is correlated with aggression). Both sample sizes are well above minimum thresholds and have enough power to measure significant relationships, supporting an examination of convergent validity between different psychological constructs.

2.3 Instruments

2.3.1 Gaming Disorder Test (English)

The GDT (original version in English) [36] is a condensed two-page psychometrically sound measure developed to evaluate GD according to the diagnostic considerations of the ICD-11. It assesses two items assessing each of the three diagnostic components outlined by the World Health Organization regarding GD, or the impairment of control, increased priority of gaming, and continued use despite negative consequences, along with dysfunction across personal, social, academic, and occupational contexts. The GDT consists of four items rated on a 5-point Likert scale ranging from 1 (never) to 5 (very often), yielding a total score between 4 and 20. Higher scores indicate greater severity of GD. Despite its brevity, the GDT demonstrates excellent psychometric properties, including high internal consistency ($\alpha = 0.85–0.91$), strong construct validity, and cross-cultural reliability, having been validated in multiple languages and diverse international samples [37]. It is widely recognized as a time-efficient and theoretically grounded tool suitable for both clinical assessment and population-level screening of GD. In the current study, the GDT English also exhibited good reliability, with Cronbach's alpha = 0.876.

2.3.2 Depression, anxiety, and stress scale

The Depression, Anxiety, and Stress Scale (DASS-42) developed by Lovibond and Lovibond (1995) [51] was employed to assess the convergent validity of the GDT-Urdu with respect to symptoms of depression, anxiety, and stress. The instrument consists of 42 items divided into three subscales: Depression, Anxiety, and Stress, each containing 14 items. Responses are rated using a 4-point Likert scale, which is "Did not apply to me at all" to "Applied to me very much or most of the time." The Depression subscale contained items representative of core symptoms of depression, including dysphoria, hopelessness, devaluation of life, self-deprecation, anhedonia, and inertia. The Anxiety subscale contained items representative of physiological arousal, skeletal muscle tension, situational apprehension, and subjective feelings of fear. The Stress subscale contained items representative of difficulty relaxing, nervous tension, irritability, and emotional over-reactivity. Example items include 'I felt that life was meaningless' and 'I experienced trembling'. The DASS-42 is a popular measure used in clinical and non-clinical research settings, and it has extensive evidence in support of its reliability and validity, including various populations [52, 53]. The Urdu-translated version of DASS-42 [54] was used for this study. The DASS-42 translated questionnaire showed excellent internal consistency: Depression ($\alpha = 0.923$), Anxiety ($\alpha = 0.898$), and Stress ($\alpha = 0.917$).

2.3.3 Buss and perry aggression questionnaire

The Buss and Perry Aggression Questionnaire (BPAQ) [55] is a widely used measure of aggression for both research and clinical purposes [56]. The questionnaire was developed as first an update of the Buss–Durkee Hostility Inventory [57]. The BPAQ has a total of 29 items using a five-point Likert scale, and assesses four different subscales, physical aggression, verbal aggression, anger, and hostility, where higher scores indicate greater aggression. Example items include 'I get into fights more than the average person' and 'I have trouble controlling my temper'. The BPAQ has been a suitable measure of aggression due to its general usefulness and its suitability across various cultures, as the BPAQ has been translated into a number of different languages and tested across multiple groups [56]. The BPAQ indicated excellent internal consistency in the current study (Cronbach's alpha = 0.933).

2.4 Ethical considerations

This study followed internationally accepted ethical standards, including the Declaration of Helsinki (1964) and subsequent updates, to protect the rights, dignity, and welfare of participants in the study. The study received ethical approval from the Departmental Review Committee of COMSATS University Islamabad (Approval Code: CUI-ISB/HUM/ERC-CPA/2025-12) prior to collecting data. Participants provided their voluntary informed consent after an overview of the study, including the purpose, procedures, and rights in relation to the study. Participants were informed that their responses would not be associated with their individual identities, and they were given freedom to withdraw from the study at any time without consequences. Data collection did not require identifiers, and no identifiable personal information was collected. All the participants were reassured about their confidentiality, and the study protocol had no deception or risk associated. All anonymous responses will be stored securely and used solely for academic purposes and not used in any other capacity. All ethical processes were followed,

and data protection and privacy measures were followed in accordance with established standards.

2.5 Analysis

The gathered data were inputted and analyzed by IBM SPSS Statistics (Version 26). Reliability of the GDT-Urdu was determined by calculating Cronbach's alpha co-efficient to confirm internal consistency of the instrument. Descriptive statistics (means, standard deviations, and percentages) were calculated to summarize the demographic characteristics and responses. Indices including skewness, kurtosis, and range were examined to assess accuracy and normality of data distribution.

The CFA applied the maximum-likelihood extraction solution without rotation. The fit of the model was evaluated by several indices including the chi-square statistic, Comparative fit index (CFI), Tucker-Lewis index (TLI), Bentler-Bonett non-normed fit index (NNFI), Bentler-Bonett normed fit index (NFI), Bollen's relative fit index (RFI), Bollen's incremental fit index (IFI), relative noncentrality index (RNI), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), goodness of fit index (GFI), McDonald fit index (MFI), expected cross-validation index (ECVI), Cronbach's alpha, and McDonald's omega for scales reliability and construct validity. Prior to conducting CFA, preliminary diagnostics including the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity were performed to assess sampling adequacy and the suitability of the correlation matrix for factor analysis. The convergent validity of the GDT-Urdu was evaluated using Pearson's correlation coefficient.

Rasch analysis grounded in Item Response Theory (IRT) was conducted using a polytomous Rating Scale Model (RSM), appropriate for Likert-type response formats with uniform category structures across items. The analysis was performed using R statistical software (R version 4.3.2.). Item fit was evaluated using infit and outfit mean square statistics, with acceptable ranges defined between 0.6 and 1.4. Item difficulty parameters (logits) were examined to assess the distribution of item endorsement along the latent trait continuum. Item discrimination was evaluated using point-biserial correlations. Person separation reliability was calculated to assess the instrument's ability to distinguish between different levels of GD severity. Additionally, the functioning of response categories was examined through threshold ordering to ensure monotonic progression across Likert categories.

3 Results

3.1 Reliability

The GDT-Urdu demonstrated good levels of reliability in all three phases of the study (Table 1; $\alpha = 0.902, 0.845, 0.918$).

3.2 Confirmatory factor analysis

The CFA was conducted on 4 items of the GDT-Urdu to test a unidimensional model. The maximum-likelihood extraction technique was utilized without rotation. The sampling adequacy was notable (Table 2; $n = 170$; KMO = 0.843). The adequacy of correlations between items was highly significant (Table 2; BTS: $\chi^2 = 421.550$, $df = 6$, $p < 0.001$). The factor loadings were statistically significant ($p < 0.001$) and ranged from 0.812 to 0.854 (Table 2), indicating that the items were strongly related to the underlying factor.

Table 1 Descriptive statistics, reliability, and data accuracy ($n = 385$)

Variable	Items	α	M	SD	%	Range		Skewness	Kurtosis
						Potential	Actual		
Phase 1									
GDT-English	4	0.876	9.800	3.598	49.00	4–20	4–18	0.381	-0.881
GDT-Urdu	4	0.902	9.577	3.795	47.88	4–20	5–19	0.485	-0.910
Phase 2									
GDT-Urdu	4	0.845	7.732	3.961	38.66	4–20	4–20	1.110	0.506
Depression	14	0.923	33.724	11.450	60.22	14–56	14–56	0.364	-1.005
Anxiety	14	0.898	29.991	10.061	53.55	14–56	14–55	0.440	-0.499
Stress	14	0.917	35.206	10.988	62.86	14–56	14–56	0.021	-0.982
Phase 3									
GDT-Urdu	4	0.918	8.272	3.652	41.36	4–20	4–17	0.660	-0.541
Aggression	29	0.933	76.535	15.021	52.78	29–145	47–115	0.660	-0.276

N Number of participants, *α* Cronbach's Alpha, *M* Mean, *SD* Standard Deviation, *GDT* Gaming Disorder Test

Phase 1: $n = 170$; men = 98, 57.6%; women = 72, 42.4%; unmarried = 152, 89.4%; married = 18, 10.6%; age = 18–34 years, M = 22.52, SD = 3.21; education=intermediate to masters, M=bachelor's

Phase 2: $n = 116$; men = 30, 25.9%; women = 86, 74.1%; unmarried = 107, 92.2%; married = 9, 7.8%; age = 18–26 years, M = 20.88, SD = 1.44; education=intermediate to masters, M= bachelor's

Phase 3: $n = 99$; men = 51, 51.1%; women = 48, 48.5%; unmarried = 75, 75.8%; married = 24, 24.2%; age = 18–40 years, M = 24.08, SD = 5.07; education= intermediate to masters, M=bachelor's

Combined: $n = 385$; men = 179, 46.5%; women = 206, 53.5%; unmarried = 334, 86.8%; married = 51, 13.2%; age = 18–40 years, M = 22.43, SD =F 3.62; education= intermediate to masters, M=bachelor's

Table 2 Confirmatory factor analysis of Gaming Disorder Test Urdu (Phase 1; $n = 170$)

Item No.	Item	Factor loadings				Residual variances			
		Estimate	SE	z	p	Estimate	SE	z	p
GDU1	مجھے اپنی گیمنگ سرگرمی کو کنٹرول کرنے میں مشکلات کا سامنا کرنا پڑا ہے۔	0.812	0.061	12.435	< .001	0.340	0.041	7.205	< .001
GDU2	میں نے زندگی کی دیگر دلچسپیوں اور روزمرہ کی سرگرمیوں پر گیمنگ کو زیادہ ترجیح دی ہے۔	0.841	0.069	13.088	< .001	0.293	0.050	6.684	< .001
GDU3	منفی نتائج کی موجودگی کے باوجود میں نے گیمنگ جاری رکھی ہے۔	0.844	0.072	13.179	< .001	0.288	0.054	6.685	< .001
GDU4	میں نے اپنے گیمنگ رویے کی شدت کی وجہ سے زندگی میں اہم مسائل کا سامنا کیا ہے (مثلاً، ذاتی، خاندانی، سماجی، تعلیم، پیشہ ورانہ)۔	0.854	0.075	13.430	< .001	0.270	0.058	6.420	< .001

Extraction was performed using the Maximum-likelihood extraction technique with no rotation.
Chi-square test: Baseline model: $\chi^2 = 429.552$, $df = 6$, Factor model: $\chi^2 = 3.611$, $df = 2$, $p > 0.05$
Additional Fit Measures: Comparative Fit Index (CFI): 0.996; Tucker-Lewis Index (TLI): 0.989; Bentler-Bonett Non-normed Fit Index (NNFI): 0.989; Bentler-Bonett Normed Fit Index (NFI): 0.992; Parsimony Normed Fit Index (PNFI): 0.331; Bollen's Relative Fit Index (RFI): 0.975; Bollen's Incremental Fit Index (IFI): 0.996; Relative Noncentrality Index (RNI): 0.996; Root mean square error of approximation (RMSEA): 0.069; RMSEA 90% CI lower bound: 0.000; RMSEA 90% CI upper bound: 0.181; RMSEA p-value: 0.287; Standardized root mean square residual (SRMR): 0.012; Hoelter's critical N (α = .05): 283.088; Hoelter's critical N (α = .01): 434.638; Goodness of fit index (GFI): 0.998; McDonald fit index (MFI): 0.995; Expected cross-validation index (ECVI): 0.162; Kaiser-Meyer-Olkin (KMO) Test: Overall KMO: 0.843; KMO for individual indicators ranged from 0.834 to 0.859; Bartlett's Test of Sphericity: $\chi^2 = 421.550$, $df = 6$, $p < 0.001$; R-Squared: Explained variance (R^2) for the four items ranged from 0.660 to 0.712; Average variance extracted = 70%; Coefficient ω = 0.905; Coefficient α = 0.902.
Response Sheet: کبھی نہیں(scored 1), اکا دکا/ بہت کم (scored 2), کبھی کبھار (scored 3), اکثر (scored 4), ہمیشہ (scored 5)

Table 3 Correlations between GDT and other measures

	Gaming Disorder Test (Urdu)
Gaming Disorder Test (English)	0.956***
Depression	0.208**
Anxiety	0.306***
Stress	0.141
Aggression	0.234**
Age	-0.013
Education	0.032

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 Rasch model analysis for item response theory for GDT-Urdu using entire samples from the three phases ($n = 385$)

Item statistics – RSM							Thresholds delta				
Item	Item mean	Measure	S.E. Measure	Infit	Outfit	Point biserial	1	2	3	4	5
1	2.240	-0.194	0.085	0.857	0.857	0.849	-4.06	-2.47	-0.252	2.84	3.94
2	2.280	-0.294	0.084	0.860	0.847	0.865	-4.06	-2.47	-0.252	2.84	3.94
3	2.170	-0.006	0.086	0.830	0.838	0.873	-4.06	-2.47	-0.252	2.84	3.94
4	2.000	0.494	0.089	0.894	0.856	0.863	-4.06	-2.47	-0.252	2.84	3.94

Model information – RSM: AIC: 2362; BIC: 2446; CAIC: 2468; Log-likelihood: -1159; Parameters: 22; Persons: 32; Person separation reliability using eRm R package: SSD: 3.75; MSE: 0.650; Reliability: 0.827

The average variance extracted was 70%. The reliability of the GDT-Urdu in the CFA was excellent (coefficient $\omega = 0.950$, coefficient $\alpha = 0.902$). The CFA model demonstrated good fit according to several fit indices, such as CFI (0.996), TLI (0.989), NNFI (0.989), NFI (0.992), RFI (0.975), IFI (0.996), RNI (0.996), RMSEA (0.069), SRMR (0.012), GFI (0.998), MFI (0.995), and ECVI (0.162).

3.3 Convergent validity

Regarding the convergent validity of the GDT-Urdu (Table 3), the scale had significant positive correlations with GDT-English ($r = 0.956$; $p < 0.001$), depression ($r = 0.208$; $p < 0.01$), anxiety ($r = 0.306$; $p < 0.001$), stress ($r = 0.141$; $p < 0.001$), and aggression ($r = 0.234$; $p < 0.01$).

3.4 Rasch model analysis for item response theory

To evaluate the psychometric properties of the Urdu version of the Gaming Disorder Test (GDT-Urdu), Rasch Model Analysis grounded in Item Response Theory (IRT) was conducted on the combined dataset from all three phases (n = 385; Table 4). The item mean scores ranged from 2.00 to 2.28, indicating moderate endorsement of the items by respondents. The item difficulty estimates (measures) ranged from – 0.006 to 0.494 logits, suggesting a relatively narrow spread of item difficulty and indicating that the items collectively assess a common and moderately endorsed trait level within the sample. The infit and outfit mean square statistics for all four items were within the recommended range of 0.6 to 1.4 [58–60], demonstrating good fit to the Rasch model and suggesting that none of the items exhibited excessive unpredictability or redundancy. Furthermore, the point-biserial correlations ranged from 0.863 to 0.873, which reflects excellent item discrimination, meaning each item effectively differentiates individuals along the underlying latent trait (i.e., severity of GD). The analysis of rating scale functioning revealed that threshold parameters were monotonically ordered for each item. This indicates that

the Likert response categories were functioning as intended, with each successive category representing an increasing level of the latent trait. Such ordered thresholds are essential for ensuring the interpretability and integrity of responses in polytomous Rasch models. The person separation reliability index was 0.827, which exceeds the acceptable threshold (typically > 0.80) for group-level assessment and suggests that the scale has adequate sensitivity to distinguish between individuals with different levels of the latent construct [61]. In sum, these findings support the psychometric adequacy of the GDT-Urdu and its suitability for use in both clinical screening and population-based research.

3.5 Gender, marital status, age, and education in GD

An independent sample t-test was conducted on the combined dataset from all three phases of the study ($n = 385$) to examine gender-based differences in GD. Men ($n = 179$, Mean = 9.838, SD = 3.685) scored significantly higher (df = 383; t = 5.634; $p = 0.000$; d = 0.576) on GDT-Urdu as compared to women ($n = 206$, Mean = 7.684, SD = 3.787). No significant differences were found among married and unmarried participants. Age and education were not significantly correlated with GD (Table 3).

3.6 Distribution of GD symptom severity (tertile-based categorization)

The mean score of the Pakistani sample (n = 385) on the GDT-Urdu was 8.69 (Minimum = 4; Maximum = 20), indicating that, on average, participants endorsed approximately 44.3% of the maximum possible GD severity. In the absence of established clinical cut-off scores for the GDT [36], tertile-based categorization was employed to describe the distribution of GD symptom severity within the sample. Participants in the first tertile, representing low GD, scored between 4 and 6 (n = 142; 36.9%). Those in the second tertile, indicating moderate GD, had scores ranging from 7 to 8 (n = 133; 34.5%). Finally, the third tertile, reflecting high GD, included individuals scoring 9 to 20 (n = 110; 28.6%). It is important to note that these categories reflect relative standing within the sample and that the proportion of participants in each tertile (approximately one-third each, by design) is a mathematical consequence of the tertile-based approach rather than an estimate of clinical prevalence or diagnostic status.

4 Discussion

The primary aim of the current study was to translate and validate the GDT into Urdu. The results of this three-phase study provide evidence for the reliability and validity of GDT-Urdu. The scale demonstrated good internal consistency in all phases of the study, indicating the scale is reliable with multiple groups of participants. CFA provided evidence for the unidimensionality of GDT-Urdu; factor loadings were good and fit indices were adequate, suggesting the four items were accurately measuring the underlying concept of GD. In addition, convergent validity was demonstrated by significant correlations between the Urdu versus English versions of the GDT and GDT-Urdu with other psychological constructs related to depression, anxiety, stress and aggression. Rasch Model Analysis showed that the GDT-Urdu had strong psychometric properties, with well-fitting items, strong discrimination ability, and proper functioning response categories, and had adequate reliability, which supported its use to assess GD in Urdu-speaking populations. Consequently, taken together, these results offer support for the GDT-Urdu

as a psychometrically appropriate tool for use in both clinical and research contexts in Urdu-speaking populations.

Within the tertile-based distribution of GD symptom severity, the upper tertile (scoring 9 to 20) comprised approximately 29% of participants; because this proportion reflects sample-relative ranking rather than a clinically derived threshold, it should not be interpreted as a prevalence estimate of GD. Nonetheless, the concentration of higher scores in this subgroup, alongside significant positive correlations between GD, depression, anxiety, stress, and aggression further underscore the potential comorbid psychological burdens associated with excessive gaming behaviors. In align with earlier literature, these associations suggest that GD may not occur in isolation but rather coexist with broader emotional and behavioral dysregulation, emphasizing the need for integrated assessment and intervention strategies in both clinical and community settings. GD is strongly associated with depression, anxiety, stress, and suicidal ideation [20, 62–70]. Affected individuals often demonstrate emotional dysregulation, low self-esteem, impulsivity, and deficits in executive functioning, which compound their psychological distress [71]. These internalizing symptoms frequently co-occur with social withdrawal and aggression, particularly in adolescents and young adults [69, 72, 73]. Neuroscientific and behavioral studies indicate that GD involves altered reward processing, maladaptive coping, and impaired emotional and attentional regulation [74, 75]. These impairments are linked to academic failure, occupational dysfunction, and interpersonal difficulties [76]. Gaming behavior—especially at nighttime—reduces sleep duration and quality, leads to erratic sleep patterns and sleep deprivation, and neuroimaging studies suggest that these sleep-related issues are the outcome of dysregulated hippocampal-caudate connectivity [77].

These findings should be interpreted considering the sample characteristics, which were predominantly young, educated, and non-clinical. While this enhances internal consistency and homogeneity for psychometric testing, it limits the generalizability of results to broader populations, particularly clinical groups, older adults, and individuals from diverse socioeconomic and educational backgrounds.

4.1 Implications and future directions

The present study makes a considerable contribution to literature, by creating an empirically strong Urdu version of the GDT and thereby addressing an important gap in the GD-related cross-cultural measurement tools. The GDT-Urdu was a reliable and structurally valid measure of GD, which had significant relationships with key psychopathological test measures, including depression, anxiety, stress, and aggression. These findings support the developing view that GD is a condition that involves a complex and multifactorial psychopathology and is often part of, or aligned with a range of other forms of emotional and behavioral dysregulation [69, 75]. The extent to which the scale produced unidimensionality suggests that the GDT-Urdu is uniquely able to represent the key construct of GD, which will be of use to clinicians in diagnosing GD in clients and researchers in examining GD as a public health surveillance and epidemiological issue.

As the present sample exhibited a high proportion of elevated GD symptoms (approximately 29%), it is incumbent upon mental health professionals, educators, and policymakers to acknowledge the growing burden of disordered gaming behaviors among

Urdu-speaking populations. The comorbid associations with internalizing symptoms and impaired functioning highlight the need for combined screening measures in primary care and school-based mental health services. The GDT-Urdu also has a favorable psychometric profile that provides a basis for its use in longitudinal studies, evaluations of intervention outcomes, and in neurocognitive studies intended to disentangle the causal pathways of GD and its comorbidities.

Future research should examine the predictive validity and cross-linguistic invariance of the GDT-Urdu across age groups, clinical subpopulations, and cultures. Because of the accumulating neurobiological evidence that GD is associated with disrupted neural circuits for reward, attention, and sleep [77], interdisciplinary research using a psychometric, behavioral, and neurocognitive approach would provide a more complete understanding of GD and its etiology and maintenance. In addition, the inclusion of protective psychological factors (e.g., resilience, attentional control and mindfulness, and life purpose) as potential moderators may provide very important information in understanding GD to develop prevention strategies [78].

4.2 Limitations

Data collection for the current study was conducted from a general population sample so that the sample was diverse yet non-clinical. The sample was nevertheless enough to conduct sufficient psychometric procedures making use of Confirmatory Factor Analysis and Rasch modeling. However, the present study relied on a non-clinical sample consisting primarily of young, educated individuals. This restricts the external validity of the findings, as the psychometric properties of the GDT-Urdu may differ in clinical populations or in more socioeconomically and educationally diverse groups. Therefore, caution should be exercised when generalizing these findings beyond the sample studied. Because the GDT does not provide a universally accepted clinical cut-off, tertile-based grouping was applied only to describe score distribution in this sample. These categories are sample-relative and were not used to infer prevalence or diagnosis.

5 Conclusion

This study successfully translated, culturally adapted, and psychometrically validated the GDT for Urdu-speaking populations, offering a reliable and valid instrument for the assessment of GD. The unidimensional factor structure, robust internal consistency, convergent validity with psychological distress variables, and strong item fit across Rasch parameters confirm the scale's utility for both clinical and research contexts.

The finding that nearly one-third of participants exhibited elevated GD symptoms underscores the urgent need for early detection and intervention frameworks. Given the comorbidity of GD with depression, anxiety, stress, aggression, and sleep disturbances—as well as its cognitive, emotional, and social ramifications—holistic and interdisciplinary approaches to prevention and treatment are warranted. As digital technologies continue to permeate everyday life, especially among youth, the GDT-Urdu emerges as a critical tool for mitigating the rising mental health concerns associated with problematic gaming in South Asian contexts.

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Data availability
Data associated with this paper can be produced upon request from the corresponding author.

Declarations

Ethics approval and consent to participate
Ethical approval was granted by the departmental review committee at COMSATS University Code CUI-ISB/HUM/ERC-CPA/2025-12. Informed consent was obtained from the participants. All the procedures performed in this study were in accordance with the 1964 Helsinki Declaration and its later amendments.

Consent for publication
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Competing interests
The authors declare no competing interests.

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