ORIGINAL RESEARCH

Development and Psychometric Validation of the Turkish Gambling Disorder Screening Test: A Measure That Evaluates Gambling Disorder Regarding The American Psychiatric Association Framework

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Abstract

Objective: First study aims to develop the Gambling Disorder Screening Test (GDST), a standardized measure that assesses symptoms and prevalence of gambling disorder (GD) regarding the American Psychiatric Association (APA) diagnostic framework. The aim of the second study is to validate the GDST psychometrically.
Methods: In the first study participants were assessed with GDST. Sample comprised of 400 Turkish university students and video game players (54.0% male, mean age 24.30 years, SD=6.83) that was enrolled online. In the second study the sample (n=326; 60.1% male, mean age 23.54 years, SD=4.44) was similar with the first study. Participants were assessed with GDST, the South Oaks Gambling Screen (SOGS) and the Gambling Motives Questionnaire (GMQ).
Results: In the first study, according to the exploratory factor analysis a single component accounted for 64.02% of total variance. The scale was internally consistent with a Cronbach's alpha of 0.93, thus considered as reliable. In the second study, confirmatory factor analysis showed that GDST's factor structure (i.e., the unidimensional structure) was satisfactory. Positive correlations between GDST and the number of self-reported gambling type, SOGS and GMQ scores demonstrated adequate convergent and criterion-related validity. Also the GDST had a Cronbach's alpha of 0.92 in this sample.
Conclusion: These findings from Study 1 and Study 2 suggest that the Turkish GDST is a valid and reliable measure to assess the severity of GD related issues according to APA's framework among young adults and for the purposes of early detection of GD in clinical settings and research.
Keywords: DSM-5, Gambling Disorder, GDST, Scale, Young Adults

INTRODUCTION

Gambling is one of the pastime activities and is commonly found around the globe. However, some gambling types are illegal in some countries including Turkey. Gambling causes problems via yielding financial, emotional and/ or social harm to themselves, their family and/or their friends (1). The prevalence rate of problematic gambling varies depending on the country and the assesment tools (1,2).

Having a true positive diagnosis of gambling disorder (GD) is essential in order to be able to measure the prevalence rate of GD in the general population, improve the general public awareness about GD, manage public health regulations, diagnose patients in clinical settings, and measure treatment outcome (3). It is known that the last version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) was published in 2013 (4). The tittle and diagnostic criteria for GD have revisions when compared to previous editions of DSM. Specifically, the name was entittled as "pathological gambling" (PG) previously in DSM-III, DSM-III-R and DSM-IV (5). In the DSM-5 version, PG has changed into gambling disorder (GD). GD reassigned in the chapter with substance use and addictive disorders (6). Additionally, the minimum

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number of symptoms for a diagnosis has changed; i.e. four symptoms instead of five is sufficient now. Also, illegal activities criterion (has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling) was eliminated (3,6). While the DSM-5 has provided adequate reliability, validity, and classification (3,6), some research indicate that dropping the criterion of criminal actions has little effect on GD diagnosis (3,6), but reducing the diagnostic threshold raises the base rate (6) and decreases false negative errors (3). Some suggestions on GD criteria in DSM-5 include that while the structure underlying the criteria is one-dimensional, the condition is expressed differently depending on the nature of the disorder, suggesting that support is insufficient for the expected equivalent effect of each criterion (7). Furthermore, some psychopathological and functional effects of gambling symptoms tend to be comparable between moderate and medium GD cases, while mild cases are clearly distinct from these cases, suggesting that the standard working concept of GD symptom severity limits has major limitations in terms of possible clinical usefulness (8). However, studies also suggest that the removal of the "criminal actions" item and the reduction of the cut-off score to four positive items, as indicated by the DSM-5 criteria, enhanced the sensitivity and the internal consistency (9).

Previously, the DSM-4 criteria for PG (5) were transformed into a scale (the Gambling Behavior Interview – GBI) comprised of 10 dichotomous questions (Yes / No) with satisfactory psychometric properties (10). Similarly after release of DSM-5, a self-report measure developed, namely, the Gambling Disorder Screening Questionnaire (GDSQ) again with good psychometric properties (9) including sensibility, specificity, internal consistency, and last but not least concurrent validity with the South Oaks Gambling Screen (SOGS; 11).

Nowadays, psychometrically sound and culturally responsive measurement for GD regarding DSM-5 criteria lack in Turkish. Therefore, this study aims to develop a Turkish Gambling Disorder Screening Test (GDST) and to test its validity psychometrically (i.e., internal consistency, unidimensionality, and construct, convergent and criterion validities) among young adults. GDST has two adventages over GDSQ; first, in their study Villella et al. (9) used two response options for each question, affirmative or negative. Instead, dichotomous questions converted to Likert type questions and listed in the GDST. Responses were as 0 (never), 1 (yes, at some time in my life), 2 (yes, in the past year)

or 3 (yes, in the past month). By doing so, scale allows to seperate lifetime gambling problems from having gambling problems at present. Secondly, the 8th criterion in DSM-5 is about conflicts due to gambling. Because of its complexity, the criterion is divided and transformed to three questions in order to avoid triple-barreled questions. Also, current research may serve two unique contributions. Firstly, it purposes to report recent prevalance rates of GD for young adults living in Turkey via developing psychometrically sound and culturally responsive measurement regarding American Psychiatric Association (APA) DSM-5 GD criteria. Secondly, results may have cross-cultural implications as well.

METHOD

Participants and Procedure

A cross-sectionally designed online survey was conducted to develop and test the psychometric properties of the Turkish GDST. E-sport players and university students enrolled in the study. Initially data were collected from players. Their communication information derived from database of ESL Turkey Amateur e-sport players (organizer company of E-sports tournaments in Istanbul) and Taleworlds Entertainment (game development company in Ankara). Also, online survey link was distributed across gaming forums in Turkish. Finally, data were collected from Turkish speaking university in Ankara. Those who reported at least one type of gambling activiy across 17 (Item 1 of SOGS) were included in the study.

The Ethical Committee of the Cankaya University (Ankara, Turkey) approved the study protocol. Participation into the study was anonymous and confidential. Participants were given the Plain Language Information Statement and informed consent was recorded online. The data collected via Qualtrics. No penalty was given for unattendance, attrition or drop outs. Cankaya University students were rewarded with bonus credit in exchange of participation. Bonus credit was added their overall score of particular courses.

The data were collected from March 10, 2020 to April 4, 2020. 1,260 potential participants initiated the survey online. However, participants (n=534) with systematically missing data were taken as drop out and their data excluded from the study. Therefore, a total of 726 participants, who completed the survey without missing data, were included in the studies. Participants included until March 22, 2020 were considered as the sample of Study 1 (n=400), and the rest as the sample of Study 2

(n=326). Among the sample of Study 1, 216 were male (54.0%) and 184 were female (46.0%). The mean age of the sample was 24.30 years (SD = 6.83). Among the sample of Study 2, 196 were male (60.1%) and 130 were female (39.9%). The mean age of the sample was 23.54 years (SD = 4.44). Sociodemographic information and gambling related characteristics of the samples of Study 1 and Study 2 are summarized on Table 1. Descriptive statistics of the scales (n, minimum, maximum, mean, standard deviation, skewness, kurtosis) are shown on Table 2.

Table 1. Sociodemographic and clinical variables of Study 1 (*n*=400) and Study 2 (n=326)

	Study 1		Study 2	
	n	%	n	%
Age years; (Mean±SD)	24.30	6.83	23.54	4.44
Gender				
Male	216	54.0	196	60.1
Female	184	46.0	130	39.9
Romantic relationship	167	41.8	144	44.2
Gambling online	114	28.6	97	29.7
Acquaintance with a DG	116	29.0	111	34.0
Borrowed money*	32	8.0	19	5.8

DG: Disordered gambler; * Borrowed money to gamble or pay gambling debts

Table 2. Descriptive statistics of the scales

	n	Min.	Max.	Mean	S.D.	Skewness	S.E.	Kurtosis	S.E.
Study 1	400								
GDST		0	9	1.578	2.727	1.650	0.122	1.338	0.243
Study 2	326								
GDST		0	9	1.696	2.746	1.599	0.135	1.188	0.269
SOGS		0	19	1.733	2.991	2.369	0.135	6.567	0.269
GMQ subscales									
Enhancement		5	20	8.945	4.292	0.916	0.135	-0.249	0.269
Social		5	20	7.503	3.249	1.451	0.135	1.771	0.269
Coping		5	20	7.258	3.412	1.664	0.135	2.084	0.269

Min.: Minimum, Max.: Maximum; S.D.: Standard deviation; S.E.: Standard error

STUDY 1

Measures

Sociodemographic and Gaming-Related Variables

Questions related to the sociodemographic information were asking participants' age, gender, and relationship status. List of gambling related behaviors were given to the participants. They were asked to report whether they engage in any one of these behaviours. They were also asked whether they prefer online gambling, they are familiar with disordered gambling, and they have ever borrowed money to gamble or pay their gambling debts or not.

Gambling Activity Types

Initially, participants were asked to report their frequency of involvement in a list of variying gambling activities as a first question of the SOGS. Their involvement scale included "not at all", "less than once a week" or "once a week or more". The options of gambling activity types were updated and rearranged according to our country in line with the suggestions of the authors who developed the SOGS (12). Seventeen categories of gambling activity types were asked to participants if they are involved gambling (Table 3).

Table 3. The frequency of participation in different gambling activities of Sample 1

	Not at all	Less than once a week	Once a week or more
	n (%)	n (%)	n (%)
Bet on horses	346 (86.5)	40 (10.0)	14 (3.5)
Played cards for money (Yanik, Poker, King, Batak, Ihale etc.)	234 (58.5)	118 (29.5)	48 (12.0)
Played Okey for money	244 (61.0)	110 (27.5)	46 (11.5)
Dice games for money (i.e., Barbut)	337 (84.3)	45 (11.3)	18 (4.5)
Cockfighting for money	367 (91.8)	17 (4.3)	16 (4.0)
Sports-Lotto (Sport-Loto / Sport-Toto)	259 (64.8)	95 (23.8)	46 (11.5)
Sports betting (Betting [Iddia], Fold [Misli], Nesine etc.)	229 (57.3)	118 (29.5)	53 (13.3)
Numeral lotto (Sayısal-Loto)	268 (67.0)	112 (28.0)	20 (5.5)
Scratchcard for money (Kazi Kazan)	198 (49.5)	170 (42.5)	32 (8.0)
National Lottery (Milli Piyango)	218 (54.5)	166 (41.5)	16 (4.0)
Playing on Stock Exchange and/ or Forex	331 (82.8)	47 (11.8)	22 (5.5)
Casino games (Craps, Dice, Sic Bo [Chinese dice game], Pai Gow Tiles [Chinese Dominoes], Slot machines, Roulette, Blackjack, Caribbean Stud, Three Card Poker, Baccarat, Spanish 21, Pai Gow Poker etc.)	318 (79.5)	63 (15.8)	19 (4.8)
Virtual casino games (such as Keno, Poker, Roulette, Blackjack, Baccarat and/or Slot applications)	311 (77.8)	59 (14.8)	30 (7.5)
Playing games that want skill for money (such as billiards, golf, swimming)	315 (78.8)	66 (16.5)	19 (4.8)
Lotto (Tombala)	239 (59.8)	141 (35.3)	20 (5.0)
Self-organized games for money making	340 (85.0)	46 (11.5)	14 (3.5)
Some form of gambling not listed above	352 (88.0)	40 (10.0)	8 (2.0)

Gambling Disorder Screening Test (GDST)

The nine DSM-5 criteria for GD (4) were transformed and paraphrased into 11 questions. The 8th item of GD in DSM-5 (Having compromised and/or lost an important relationship, an important education or an important job and/or job opportunity due to gambling) was divided into three items focusing on relationship, education and job/career difficulties. Participants has four options to respond, namely, 'never' "0", 'yes, at some time in my life' "1", 'yes, in the past year' "2", or 'yes, in the past month' "3". The 4-point Likert scale was preferred in order to facilitate the responses given by participants as it makes the decision easier and more realistic. However, during scoring the GDST items were recoded into a "yes" (1) and "no" (0) format in order to resemble the dichotomous structure of GD in DSM-5. Participants' "never" responses were coded as 0 point and evaluated as the criterion was not met. Other responses were coded as 1 point and evaluated as the criterion was met. Given that question 8, 9 and 10 are related to the same criterion of, they are combined in the scoring, that is, answering "yes" on either Item 8, Item 9 or Item 10 (or all items) scores only 1 point. Hence, GDST's composite rating ranged from 0 to 9. With same paradigm 'never' "0" and 'yes, at some time in my life' "1" responses were coded as the criterion was not met (0 point), while other responses were evaluated as the criterion was met (1 point) (also items 8, 9 and 10 were merged) to resemble the dichotomous structure of "present" GD's DSM-5 criteria. A cut-off score of four or more indicated a 'pathological gambler' classification. As Villella et al. (9) made while developing the GDSQ, Criterion B, the differential diagnosis of gambling as a symptom of a manic episode was not included in the GDST.

The GD criteria of DSM-5 were translated into Turkish by two native speaker psychiatrists, who are also fluent in English as well, for this study. The translated version was agreed by these specialists. In order to establish their comparability, the test was back-translated by a separate translator. Paraphrasing the criteria into questions and after spliting the Item 8 into three items, the final translation was presented to 40 students (20 were male and 20 were female; mean age = 22.3, SD age = 3.5) from Cankaya University. The aim was to gather feedback to see whether the scale's language was clear, and to ensure its face validity. None of the respondents reported a significant problem regarding the questionnaire.

Statistical Analysis

IBM SPSS Statistics Version 20 was used for statistical analyses. Data was cleaned through the inspection of cases with severe missing values across the measures beforehand. Consecutive steps included investigation of the psychometric properties of the Turkish GDST. Initially, the scale's factorial structure was examined via exploratory factor analysis (EFA). Also, internal consistency was assessed by using Cronbach's alpha.

RESULTS

Factor Structure

Bartlett's Test of Sphericity and the Keiser-Meyer-Olkin measurement of sampling adequacy (KMO) were checked to be sure about the sample size sufficiency beforehand so EFA was conducted in order to examine the factor structure of the GDST. The Bartlett's Test of Sphericity was significant ($\chi^2 = 2404.508$, $df=36$, $p < 0.001$) for the GDST, and the KMO was acceptable at 0.924. Principal Axis Factoring extraction method with Promax (oblique) rotation on the nine items of the GDST was performed to preliminary examine its factorial structure and construct validity. The number of components to be extracted was determined through examination of scree pilot (16) in combination with the conventional Kaiser criterion guideline (all factors with eigenvalues greater than one) (17). A scree plot from a principal components analysis of GDST is shown on Figure 1. Furthermore, the acceptable threshold of items with factor loadings above 0.50 and/or parallel loadings below 0.20 was used to retain items (18). Based on these procedures, the EFA resulted in a one-factor solution for the nine items of the GDST by reaching the criterion of an Eigenvalue greater than one (5.762). Overall, the total variance accounted for by this component was 64.02% (Table 4).

Table 4. Summary of the results from the EFA on the Gambling Disorder Screening Test (GDST), Cronbach's alpha, item-total correlations and Cronbach's alpha if item deleted obtained from the nine items of the GDST

Item	Mean	SD	Factor Loadings for EFA	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1. I needed to gamble with increasing amounts of money in order to achieve the excitement I desired.	0.215	0.411	0.715	0.648	0.927
2. During my attempts to cut down or stop gambling, I become restless or irritable.	0.168	0.374	0.830	0.778	0.918
3. I made repeated unsuccessful efforts to control, cut back, or stop gambling.	0.185	0.389	0.819	0.765	0.919
4. I am often preoccupied with gambling (i.e. I am having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).	0.178	0.383	0.783	0.722	0.921
5. Often, I am gambling when feeling distressed (helpless, guilty, anxious, depressed).	0.178	0.383	0.804	0.746	0.920
6. After losing money gambling, I often return another day to get even (I "chase" my losses).	0.203	0.402	0.829	0.777	0.918
7. I lie to conceal the extent of involvement with gambling.	0.165	0.372	0.802	0.737	0.920
8. I have jeopardized or lost a significant relationship because of gambling.*	0.168	0.374	0.823	0.762	0.919
9. I have jeopardized or lost a significant educational opportunity because of gambling.*					
10. I have jeopardized or lost a significant job or career opportunity because of gambling.*					
11. I rely on others to provide money to relieve desperate financial situations caused by gambling.	0.120	0.325	0.790	0.723	0.922
Mean±SD	1.578±2.727				
Eigenvalue	5.762				
Variance %[a]	64.017				
Cronbach's alpha	0.929				

a: Percentage of the total variance explained. All factor loadings and item-total correlations were statistically significant (p<0.001), *Items 8, 9 and 10 are considered as a single item. EFA: Exploratory *factor* analysis

Figure 1. A *scree plot* from a principal components analysis of Gambling Disorder Screening Test.
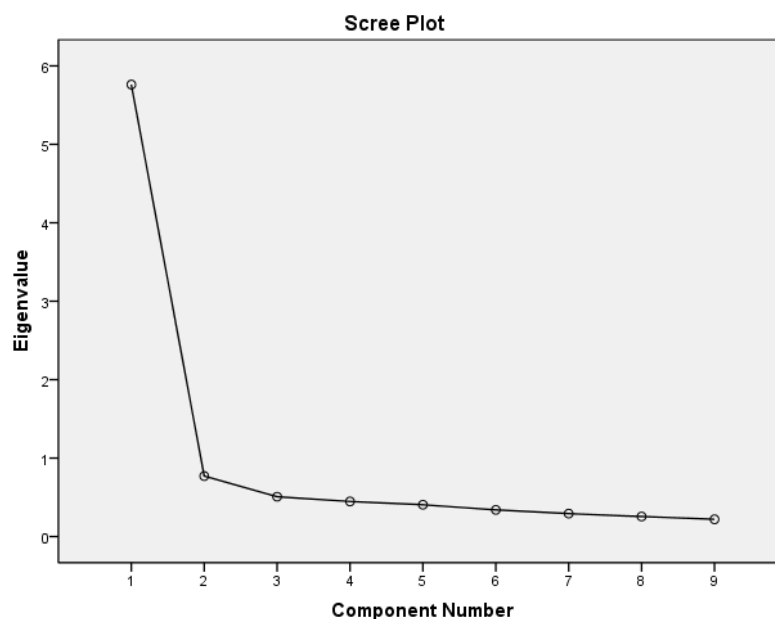
Internal Consistency Reliability

In terms of reliability of the Turkish GDST, the Cronbach's alpha coefficient was high (α = 0.93), thus considered as reliable (Table 4). Moreover, the Cronbach's alpha did not increase by deleting any of the nine items of the scale (Table 4). Furthermore, item-total correlations for the GDST were equally robust, ranging between 0.648 (item 1) and 0.778 (item 2) (Table 4). Finally, inter-item correlations for the GDST ranged between 0.387 (between item 1 and 11) and 0.720 (between item 8,9,10 and 11) (Table 5).

Table 5. Inter-item correlations for the GDST in Sample 1

Items	1	2	3	4	5	6	7	8,9,10*
2	0.629							
3	0.597	0.683						
4	0.505	0.598	0.604					
5	0.537	0.633	0.638	0.640				
6	0.599	0.607	0.625	0.645	0.596			
7	0.440	0.558	0.569	0.534	0.622	0.664		
8,9,10*	0.499	0.641	0.614	0.580	0.545	0.624	0.684	
11	0.387	0.617	0.557	0.533	0.573	0.599	0.686	0.720

All inter-item Pearson correlations were statistically significant (p<0.001), *Items 8, 9 and 10 are considered as a single item.

STUDY 2

Measures

Sociodemographic and Gaming-Related Variables, Gambling Activity Types, GDST were also used in the Study 2 as they were used in the Study 1.

South Oaks Gambling Screen (SOGS)

The SOGS is a self-report assesment instrument measuring participants' severity of the gambling problem (11). Participants filled the questionnaire consisting 19 scored and some unscored items. Minimum total score, which participants can get, is 0, while maximum total score is 19. Beside scored items, participants also answer questions determining their level of involvement in varying gambling activities. For instance, they report their frequency of involvement in item 1 with a scale comprised of options such as "not at all", "less than once a week" or "once a week or more". In item 2, participants were asked the largest amount of money that they spent for gambling in one day. Lastly, participants' parental and relative involvement in gambling were asked in item 3.

For the current study, the Turkish adaptation of the original scale, which has a good psychometric properties,

is used (13). Additionally, item 1 and 2 were updated and rearranged according to our country in line with the suggestions of the authors who developed the scale (12). Cronbach's alpha for the SOGS was found to be 0.89 for this sample.

Gambling Motives Questionnaire (GMQ)

The GMQ (14) is originally adapted directly from the Drinking Motives Questionnaire (DMQ) (15). It aims to assess why individuals gamble. This questionnaire focuses on 15 reasons and thier frequency (14). The DMQ item 'to get high' was adapted as 'to get a high feeling' on the GMQ. Similarly, the scale comprised of three dimensions, namely, social motives subscale (SMS; external, positive reinforcement motives; i.e. to increase social affiliation), coping motives subscale (CMS; internal, negative reinforcement; i.e. to reduce or avoid negative emotions) and enhancement motives subscale (EMS; internal, positive reinforcement; i.e. to increase positive emotions). Each dimension / subscale has five items. Participants report their frequency of involvement in gambling acts on a 4-point Likert type scale. It ranges from 1 to 4 ("1", almost never / never; "2", sometimes; "3", often; "4", almost always). Unfortunately, the DMQ is not validated in Turkish. Nevertheless, Cronbach's alpha values were high for the present sample (i.e. 0.85 for SMS, 0.91 for CMS and 0.94 for EMS).

Statistical Analysis

IBM SPSS Statistics Version 20 and Amos were used for statistical analyses. While the Amos was used for confirmatory factor analysis (CFA), the SPSS was used for the remaining statistical analyses. Data was cleaned through the inspection of cases with severe missing values across the measures beforehand. Initially, the scale's factorial structure was examined via CFA. Secondly, convergent and criterion-related validity were determined by estimating Pearson product moment correlation coefficients between the total scores of the GDST, SOGS, GMQ subscales and number of self-reported gambling type. Lastly, internal consistency was assessed by using Cronbach's alpha.

RESULTS

Construct Validity

The Bartlett's Test of Sphericity was significant (χ^2 = 1793.283, df=36, $p < 0.001$) for the GDST, and the KMO was acceptable at 0.926. The unidimensionality of the

Turkish GDST was then assessed via CFA with maximum likelihood. In order to evaluate the quality of the model estimated in the CFA, several fit indices were used and the following thresholds adopted: χ2/df ≤ 5, Goodness of Fit Index (GFI), Tucker-Lewis Fit Index (TLI) and Comparative Fit Index (CFI) > 0.90, and Root Mean Square Error of Approximation (RMSEA) < 0.05 (Ferguson and Cox, 1993; Kaiser, 1960; Lin et al., 2013; Wu et al., 2015). The estimation of a unidimensional model produced a good fit (χ^2/df = 26.753/21 = 1.27; GFI = 0.982, CFI = 0.997, TLI = 0.994 and RMSEA = 0.029). All item-component loadings were statistically significant (ranged from 0.69 to 0.78) and within the conventional acceptable threshold of > 0.50 (17). Thus, results from the CFA suggest that the GDST assesses a unidimensional construct. Summary of the results from the CFA is shown on Table 6.

Table 6. Summary of the results from the CFA on the Gambling Disorder Screening Test (GDST)

Item	Factor Loadings for CFA	Estimates	S.E.	C.R.
Item 1	0.761	0.071	0.007	10.591
Item 2	0.762	0.063	0.006	10.477
Item 3	0.709	0.069	0.006	11.004
Item 4	0.716	0.073	0.007	11.004
Item 5	0.742	0.080	0.007	10.745
Item 6	0.753	0.081	0.008	10.695
Item 7	0.775	0.052	0.005	10.210
Items 8, 9 and 10*	0.688	0.076	0.007	11.114
Item 11	0.743	0.052	0.005	10.594

*Items 8, 9 and 10 are considered as a single item. CFA: Confirmatory factor analysis

Convergent and Criterion-Related Validity

Convergent validity was also assessed by correlating the GDST scores with the scores of two related scales (i.e., the SOGS and GMQ) and criterion-related validity was evaluated through examination of the correlation between the GDST scores and number of self-reported gambling type. The correlation between the GDST and the SOGS (r = 0.82, p < 0.001) and the subscales of GMQ (r = 0.65, p < 0.001 for Enhancement Motives Subscale; r = 0.66, p < 0.001 for Social Motives Subscale; r = 0.78, p < 0.001 for Coping Motives Subscale) was statistically significant. Moreover, this result was also consistent with the association between the GDST scores and number of self-reported gambling type (r = 0.61, p < 0.001). Overall, these results demonstrate positive correlations among the variables of interest in the expected direction according to the underlying theory, thus supporting the validity of the GDST. Also Cronbach's alpha coefficient for GDST was high (α = 0.921) in the Study 2.

Prevalence Rates of Gambling Disorder

As per the diagnosis recommendation made by the APA, participants answering items either with 'Yes, at some point in my life' "1", 'Yes last year' "2" or 'Yes, last month' "3" in this study were operationally classed as probable lifetime gambling disorder, whereas those answering items either with 'Yes last year' "2" or 'Yes, last month' "3" operationally classed as probable present gambling disorder (4). Thus, the prevalence of probable lifetime GD was about 15.6% (n = 51) and potential present GD was 5.5% (n=18).

DISCUSSION

Current studies mainly aimed to develop the GDST and assess its validity psychometrically in two different samples recruited from Turkey. To be able to fulfill these aims, the scale was tested in a cross-sectional online study. University students and those who play games amateur or professionaly enrolled. Results revealed a statistical support to the validity of the GDST across several levels. A single-factor solution for the GDST was found across both EFA and CFA. This finding is consistent with the previous studies that used similar methods to develop a scale that correspond gambling disorder criteria in DSM-IV (10) and DSM-5 (9). The results of the EFA and CFA yielded statistically significant and relatively high factor loadings, further demonstrating that all items were adequate indicators of the GD construct and that the scale has adequate psychometric properties, alongside a solid factor structure. In previous study, the GDSQ (nine DSM-5 criteria of GD) showed adequate reliability (Cronbach's alpha of 0.926) among Italian participants (9), which was the same as found in the present study. In addition to this result, criterion-related and convergent validity were supported by the expected positive pattern of correlations that have emerged between the GDST and all the related measures. The convergent validity of the scale was indicated by the significant correlations of the GDST with the SOGS and the GMQ, whereas the criterion-related validity of the scale was indicated by the significant correlation with the number of (among seventeen categories of) gambling activity types. In general, higher mean scores on the test indicated greater number of gambling activity types and higher severities of GD and motives for gambling. The GDST provided a valid and reliable measure of GD with good diagnostic accuracy that can be used for research and diagnostic purposes among male and female young

adults. The result of correlation found between the GDST and the SOGS (r = 0.79, p < 0.001) in the present study was high, and even higher than the previous studies (r=0.66 between SOGS and DSM-5 symptoms [19] and as 0.47 between SOGS and GDSQ [9]). Finally, a through literature review of studies conducted between 1987 and 2018 estimated proportion of probable pathological gamblers among students to be 6.13%, while the rate of problem gambling was computed to be 10.23% (20). These rates are consistent with the rates found in present study.

Current study has limitations as well. Firstly, this study conducted online. Therefore, those without Internet access could not be able to involve in the study. Consequently, those without online access were excluded. The sample of this study may be biased and cannot be generalized to those who gamble mostly offline and do not have Internet access. Secondly, the sample of the study was not a clinical sample but a general sample, and participants were not assessed for an GD diagnosis using a gold standard. This research was therefore unable to determine sensitivity and specificity of IGDT-10 in the detection of GD. Thirdly, participants in this were self-selected. Thus, the results of the current study cannot be extended to the general population directly. Fourthly, the results of this study heavily rely on participant's self-reports. Self-reports may yield limitations due to biases such as social desirability and short-term recall. Lastly, it can be said that there is no golden standart to apply for the diagnosis of GD. Therefore, it can be concluded that current study has limitations regarding sensitivity and specificity of the GDST in detecting GD. These potential shortcomings within this research should be taken into consideration. Also, further research could benefit from replicating these findings among individuals clinically diagnosed with GD.

Despite mentioned possible limitations, results of the current study revealed that the GDST is a measure with a unidimensional construct. It is a valid and reliable screening tool in examining the symptoms and the prevalence of GD among young adults. Findings of this study determined that the GDST could be used for early diagnosis and examining PG and GD in prospective relevant research protocols. The test based on the DSM-5 criteria of GD. A measurement instrument including nine GD criteria of DSM-5 can make screening, evaluations and diagnosis easier for the clinicians. Second, GDST can be administered quickly because it includes only eleven items, possibly assisting clinicians in crowded clinical environments.

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