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Development and validation of the gambling problems scale

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Abstract

The purpose of the present study was to examine the initial psychometric properties of the Gambling Problems Scale (GPS), developed for the college student population. Participants were college students recruited for an ongoing larger clinical trial from a Midwestern university who reported gambling in the past 60 days and who were experiencing gambling-related problems, scoring +3 on the South Oaks Gambling Screen or +1 on the Brief Biopsychosocial Gambling Index (N = 334). Factor analyses and reliability analyses were conducted to examine the validity of score interpretation and the reliability of scores for the measure. Results suggested a 16-item unidimensional measure provided the best parsimony and theoretical fit. Examination of concurrent and incremental validity of scores provided additional support for the psychometric properties of the GPS. The GPS may be a useful tool for researchers and clinicians interested in examining gambling-related problems among college students and other young adults.

Résumé

Notre étude avait pour but d'analyser dans un premier temps les propriétés psychométriques du *Gambling Problems Scale* (GPS), un instrument conçu à l'intention des étudiants postsecondaires. Y ont participé des étudiants d'une université du Midwest recrutés dans le cadre d'un essai clinique plus large, qui avaient rapporté s'être adonnés à des jeux de hasard au cours des 60 derniers jours et qui manifestaient des problèmes de jeu, ayant obtenu +3 au *South Oaks Gambling Screen* ou +1 au *Brief Biopsychosocial Gambling Index* (n = 334). Nous avons mené des analyses factorielles et des analyses de fiabilité afin de déterminer la validité de l'interprétation des scores ainsi que leur fiabilité pour la variable. Les résultats indiquent qu'un vecteur à 16 facteurs procure le meilleur degré de parcimonie et de concordance théorique. Une analyse de la validité convergente et empirique des scores a permis en outre de confirmer les propriétés psychométriques du GPS. Cet

instrument pourrait s'avérer une ressource utile pour les chercheurs et les cliniciens qui s'intéressent à l'étude des problèmes de jeu chez les étudiants postsecondaires et d'autres jeunes adultes.

Introduction

Gambling has become a growing concern on college campuses, with over 40% of college students engaging in some form of gambling (Engwall, Hunter, & Steinberg, 2004; LaBrie, Shaffer, LaPlante, & Wechsler, 2003; Lesieur, Cross, Frank, & Welch, 1991; Rockey, Rockey, Beason, Gilbert, & Howington, 2005). For those college students who gamble, research has indicated that they are also more likely to engage in other risky behaviors such as binge drinking and illegal drug use (Engwall et al., 2004; LaBrie et al., 2003). Findings have suggested that, in addition to the increased likelihood of engagement in high-risk behaviors, many college students who gamble experience negative consequences related to their gambling such as a lower grade point average, financial concerns, and neglect of other responsibilities (Engwall et al., 2004; Lesieur & Blume, 1992). Moreover, 7% of college students have been shown to meet the threshold for problem gambling and 5% the threshold for pathological gambling (Shaffer, Hall, & Vander Bilt, 1999).

Developmental theories have postulated that the transition from high school to college is a time of exploration and growing autonomy for adolescents, with possible risk factors, such as increased stress, leading to the development of psychological disorders (Schulenburg & Maggs, 2002). This developmental period has also been identified as a risk factor for high-risk behaviors and with the belief in a cultural norm that these behaviors are a rite of passage in college. Thus, accurately identifying risky behavior and negative consequences associated with college student gambling has important implications for researchers and clinicians in the development of assessments based on these developmental experiences. Researchers have regularly assessed gambling problems within this population by using measures developed to identify problem and pathological gambling (Lesieur & Blume, 1987, 1991; Shaffer et al., 1999). Although findings have indicated adequate score reliability and validity of score interpretation from these measures in the college population, many of the items on these measures are not particularly relevant to the college population and/or do not include items that assess problems commonly experienced by college students. Traditionally, clinicians and researchers assessing gambling problems among college students have relied on measures designed for adults such as the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), the National Opinion Research Center DSM-IV Screen for Gambling Problems (Wickwire, Burke, Brown, Parker, & May, 2008), and the Addiction Severity Index-Gambling section (Lesieur & Blume, 1991). These measures were developed by using diagnostic criteria from the *Diagnostic*

and Statistical Manual of Mental Disorders (3rd ed., *DSM-III*, American Psychiatric Association, 1980, or 4th ed., *DSM-IV*, American Psychiatric Association, 1994) to assess problem and pathological gambling in the adult population and may not adequately capture the full range of gambling-related problems experienced by college students. Similar to the manner in which measures of college student alcohol problems have been conceptualized (e.g., Kahler, Strong, & Read, 2005; Neal, Corbin, & Fromme, 2006), conceptualizing gambling consequences among college students along a severity continuum from less severe problems to more severe problems could allow researchers and clinicians to better differentiate risky gambling behaviors within this population.

Research to date regarding gambling-related problems among college students has relied heavily on the use of the SOGS (e.g., Engwall et al., 2004; Ghandour & El Sayed, 2013; Larimer & Neighbors, 2003; Petry & Weinstock, 2007; Platz, Knapp & Crossman, 2005; Weiss, 2010). Although some research has supported the validity of SOGS score interpretation within college student samples (Ladouceur, Dube, & Bujold, 1994; Lesieur et al., 1991; Neighbors, Lostutter, Larimer, & Takushi, 2002), the measure includes gambling problems that may be more relevant to older adults and does not include items that address gambling problems that are more specific to college students. Additionally, the SOGS was originally developed to assess for pathological gambling (Lesieur & Blume, 1987), which screens solely for the most severe consequences that result from gambling. When measuring gambling behavior among college students, there could be less severe problems that are nonetheless clinically relevant but have gone unnoticed because of the focus on *DSM* diagnostic criteria as a basis for assessing negative consequences.

A handful of measures have been developed to assess gambling problems among adolescents and/or young adults (e.g., Gambling Problems Index [GPI], Neighbors et al., 2002; South Oaks Gambling Screen-Revised for Adolescents [RA], Winters, Stinchfield, & Fulkerson, 1993), but these measures either suffer from limitations that are similar to those of adult-based measures, or have been underused in research settings. For example, the SOGS-RA was developed to assess gambling behavior and negative consequences within the adolescent population, yet the measure focuses primarily on *DSM* diagnostic criteria related to gambling problems (Winters et al., 1993). In one study, the SOGS-RA was found to inaccurately identify pathological gambling in younger populations because of items being misunderstood by younger participants (Ladouceur et al., 2000). We are aware of only one measure that was developed for the express purpose of examining gambling problems that occur within the college student population: the GPI (Neighbors et al., 2002). This measure was adapted from the Rutgers Alcohol Problems Index (White & Labouvie, 1989) and was designed to be a unidimensional measure of gambling-related problems. Subsequent studies have used the scale in this manner (e.g., Bhullar, Simons, Joshi, & Amoroso, 2012; Larimer et al., 2012). However, results from the initial validation study indicated that the measure was actually multidimensional

and raised concerns regarding its intended use (see Smith, McCarthy, & Zapolski, 2009). Additionally, the development of the measure relied wholly on adapting items from an alcohol measure without consideration of the theoretical underpinnings found in the gambling literature that are important in capturing the salient characteristics of the construct being measured.

In sum, researchers and clinicians have limited options in assessing a wide array of gambling-related negative consequences among the at-risk population of college students, as existing measures either focus too heavily on identifying individuals who are experiencing severe gambling-related problems, or there are concerns associated with their use relative to the available psychometric data on the measure. Thus, the purpose of the current study was to develop and validate a new gambling problems measure that was designed to assess gambling-related negative consequences that are particularly salient among college students. Initially, we modified items from an alcohol consequences questionnaire and gambling problem questionnaires. After developing an initial pool of items for the measure, we examined the factor structure of the scale by using exploratory factor analysis (EFA). Next, we conducted confirmatory factor analyses (CFAs) on the measure and then examined the association between the Gambling Problems Scale (GPS) scores and a variety of gambling-related behaviors.

Method

Participants and Procedure

Participants were college students recruited from a Midwestern university who scored +3 on the SOGS or +1 on the Brief Biopsychosocial Gambling Index (BBGI; Gebauer, LaBrie, & Shaffer, 2010) and who had reported gambling in the past 60 days ($N = 334$). The majority of the sample was Caucasian (79.6%) and male (59.3%), with other ethnicities as follows: Asian/Asian American (8.4%), Black/African American (6.0%), Hispanic (3.0%), and all other ethnicities (3.0%). The mean age of the sample was 21.9 years ($SD = 4.3$).

Participants were recruited for an ongoing larger clinical trial through the university mass communication system via an email announcement. A link was provided for participants to complete a screening questionnaire that included demographic information and contact information to be used if eligible, a questionnaire (SOGS) that assessed gambling-related problems, and the BBGI. If eligible, individuals were called and asked to participate in the study. Interested participants were then asked to attend an enrollment meeting where they provided informed consent, completed the baseline battery of questionnaires, and were randomized to their intervention condition. After completing the baseline procedures, participants were then asked to return to the laboratory 3 months later to complete follow-up surveys. After each phase of the study, participants received $20 in compensation. The university Institutional Review Board approved these procedures.

Materials

Gambling Timeline Followback (G-TLFB; Weinstock, Whelan, & Meyers, 2004). Gambling behaviors over the preceding 60 days were assessed by using the G-TLFB. Participants were asked to identify the days on which they gambled on a calendar and to fill out information regarding their gambling experience, including the amount of time they gambled in hours, amount of money wagered, amount of money intended to wager, and number of days gambled (see Table 1). In the current study, we attempted to define the amount of money wagered by specifically asking the participants, "How much did you *actually* wager?" Additionally, participants were provided with instructions (e.g., paper and electronic) so that they could better understand what we were asking: "*NOTE: This means the total amount of money that is from non-winnings that you gambled (wagered) with during the gambling session. This means take the dollar amount you walked in with in your pocket and add it to any money withdrawn from an ATM or credit card, or any money that you borrowed (from friends, family, or the casino) that you put into play. For example, if you walked into a casino with $100 and then borrowed $200 from a friend, you would type $300 on the calendar for the amount actually wagered. Or, if you played in two $20 home poker tournaments, you would type $40.*" Total scores were summed for each gambling behavior assessed. Studies have supported the reliability of scores and validity of score interpretation for the G-TLFB with college students (e.g., Weinstock et al., 2004).

SOGS (Lesieur & Blume, 1987). Problems related to gambling were assessed with the SOGS. The measure included 16 items scored both dichotomously and

Table 1
Descriptive Statistics for Sample 1 and Sample 2

Characteristic	Sample 1	Sample 2
Gender		
Female	43.10%	38.30%
Male	56.90%	61.70%
Ethnicity		
White	79.60%	79.60%
African American	6.60%	10.20%
Asian	6.60%	5.40%
Native American	.00%	.60%
Hispanic	3.60%	2.40%
Other	3.60%	1.80%
Mean age (*SD*)	22.08 (4.87)	21.70 (3.69)
Mean number of hours gambled (*SD*)	10.50 (11.77)	10.60 (12.32)
Mean amount of money intended to wager (*SD*)	190.51 (401.26)	288.07 (1065.59)
Mean amount of money wagered (*SD*)	245.87 (474.35)	331.29 (1130.33)
Mean number of days gambled (*SD*)	6.66 (6.06)	6.05 (5.29)

polytomously that asked specific questions regarding gambling-related consequences (e.g., ''Did you ever gamble more than you intended to?'' ''Have you ever borrowed from someone and not paid them back as a result of your gambling?''). Total scores were created by using a weighted scoring system, where scores of +5 have been suggested as a cutoff for probable pathological gambling (Lesieur & Blume, 1987). Reliability of scores on the SOGS for this study was acceptable by Cronbach's alpha and intraclass correlation coefficient (ICC; see Table 2).

Demographics. Participants completed a measure consisting of relevant demographic information, including age, gender, race, and ethnicity.

Item Selection for the GPS. Initial item selection was conducted by modifying existing items from validated measures of alcohol and gambling-related problems. First, we modified items from a measure of alcohol-related consequences among young adults, the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler et al., 2005). For example, the question, ''When drinking, I have done impulsive things I regretted later'' was modified to ''When gambling, I have done impulsive things I regretted later.'' Furthermore, items were added to reflect consequences likely to be experienced by college students, such as ''The quality of my work or schoolwork has suffered because of my gambling.'' Additionally, we modified questions from the National Opinion Research Center DSM-IV Screen for Gambling Problems to examine more severe gambling-specific problems and to use wording that was similar to the BYAACQ items. For example, ''On one or more of the times when you tried to stop, cut down, or control your gambling, were you restless or irritable?'' was modified to ''When I try to cut down on my gambling, I become irritable.'' Twenty-three items were created. Participants were asked to respond to the 23 items and to indicate whether they had experienced problems associated with gambling in the past 3 months by answering either ''Yes'' or ''No'' to each item. To create a total problems score, we sum scored the ''Yes'' responses.

Data Analysis

Internal consistency, test-retest reliability ICC, correlations, and descriptive statistics were calculated by using SPSS version 20. Because of the dichotomous

Table 2
Internal Consistency and Test-Retest Reliability

	Sample 1	Sample 2	
Measure	α	α	ICC
Gambling Problems Scale	.73	.75	.71
South Oaks Gambling Screen	.91	.89	.72

Note. α = Cronbach's alpha; ICC = intraclass correlation coefficient.

response pattern of the items created for the GPS, the EFA and CFA were carried out by using Mplus Version 7 (Muthén & Muthén, 2012). We randomly split the sample in half and conducted an EFA on the first half of the sample (Sample 1: n = 167) and CFA on the second half of the sample (Sample 2: n = 167). Sample characteristics for each half are reported in Table 1. Subsequent analyses assessing correlations and the reliability of scores for the scale were conducted on Sample 2 by using SPSS version 20.

Results

Exploratory Factor Analysis

Endorsement of items. In Sample 1, the proportion of individuals who endorsed the 23 problems ranged from 3.0% (''I have found that I needed to gamble more to feel in control'') to 56.9% (''When I gamble, I try to win back the money I have lost''). The mean score of the survey was 4.1 (median = 3.0).

In order to conduct the EFA, we used tetrachoric correlations because the items were dichotomously scored. We also used robust weighted least-squares mean and variance adjusted (WLSMV) estimation procedures and geomin rotation (an oblique rotation), which are appropriate for dichotomous data (Muthén & Muthén, 2012). Initial results identified four items within the 23-item survey with low endorsement, in which less than 5% of the sample endorsed the items: ''The quality of my work or schoolwork has suffered because of my gambling''; ''My physical appearance has been harmed by my gambling''; ''I have neglected my obligations to family, work, or school because of gambling''; and ''I have found that I needed to gamble more to feel in control.'' Additionally, the following items were redundant and assessed problems that were similar to other items within the scale: ''I have had less energy or felt tired because of my gambling''; ''I have said or done embarrassing things in order to gamble/while gambling''; and ''When gambling, I have done impulsive things I regretted later.'' For example, of the following two items, included to assess risk taking, ''When gambling, I have done impulsive things I regretted later'' was retained and ''I have taken foolish risks when I have been gambling'' was removed. Items with low endorsement were removed, as items answered similarly by the vast majority of respondents may not provide substantial information regarding the construct, and decreased variability can lead to weak and unstable correlations with other items, thus affecting subsequent analyses (Clark & Watson, 1995). Furthermore, redundant items were removed from all further analyses to avoid measuring the construct too narrowly. For the EFA, the results of the 16-item scale revealed five eigenvalues greater than 1, which may indicate the possibility of at least five latent factors. However, analyses that included three or more factors resulted in saturated models. Although a two-factor model fit the data well (e.g., comparative fit index [CFI] = .98; Tucker-Lewis index [TLI] = .98; root mean square error of approximation [RMSEA] = .02), there was one item that resulted in a Heywood case, along with item loadings that generally lacked

theoretical cohesion. In contrast, the one-factor solution not only fit the data well (χ^2 = 119.99, *df* = 104, *p* = .14; CFI = .95; TLI = .94; RMSEA = .03), but also resulted in a more theoretically interpretable model (i.e., gambling-related problems fall along a single continuum). Additionally, all factors loaded above .30 and were statistically significant (see Table 2).

Reliability

Internal consistency and test-retest reliability analyses were conducted by using the one-factor model consisting of 16 items on Sample 2 (see Table 3). Internal consistency estimates were calculated by using Cronbach's alpha and were considered adequate. Additionally, ICC analyses to examine score test-retest reliability were performed on participants in the control condition in the parent study (*n* = 55) so as to avoid possible intervention effects. The ICC indicated adequate test-retest reliability.

Confirmatory Factor Analysis

Endorsement of items. Endorsement of items in Sample 2 using the 16-item scale ranged from 4.2% (''I have trouble sleeping because of my gambling'') to 61.1% (' When I gamble, I try to win back the money I have lost''). The scale had a mean score of 3.6 (median = 3.0).

We conducted the CFA on Sample 2 by using the one-factor model consisting of the 16 items retained from the EFA. We used the WLSMV estimator, as this estimator is appropriate for categorical data and for conducting a chi-square difference test (Muthén & Muthén, 2012). We conducted a chi-square difference test between one- and two-factor solutions. Results of the CFA indicated good model fit to the one-factor model (χ^2 = 1114.84, *df* = 104, *p* = .22; CFI = .97; TLI = .97; and RMSEA = .03). One item (''I have not gone to work or missed classes at school because of gambling'') was the only item not to reach statistical significance (*p* = .07) and loaded below .30. All other items loaded above .30 and were statistically significant (see Table 2). Additionally, the chi-square difference test indicated that the two-factor model was not a significantly better fit than the one-factor model (χ^2 = 0.05, *df* = 1, *p* = .83). Therefore, we concluded that the one-factor model provided the most appropriate model, parsimony, and theoretical fit.

Correlations

Zero-order correlations. We conducted zero-order correlations (see Table 4) with GPS scores, SOGS scores, and gambling behaviors (e.g., frequency of gambling, wagering) to examine convergent validity of scores. Results indicated that GPS scores were significantly associated with SOGS scores (*r* = .58, *p* < .001), which supports the concurrent validity of GPS scores. When we examined the association between GPS scores and other gambling behaviors, we observed that the

Table 3
Factor Analysis Item Loadings

Item		Factor Loadings	
		EFA	CFA
1.	I have taken foolish risks when I have been gambling.	**.58**	**.46**
2.	I've lost (track of) large stretches of time while gambling.	**.53**	**.62**
3.	My gambling has gotten me into situations I later regretted.	**.57**	**.73**
4.	I often have ended up gambling on nights when I had planned not to gamble.	**.38**	**.60**
5.	I have borrowed money to finance my gambling.	**.58**	**.64**
6.	I have not gone to work or missed classes at school because of gambling.	**.61**	.28
7.	I have trouble sleeping because of my gambling.	**.88**	**.69**
8.	When I gamble, I try to win back the money I have lost.	**.44**	**.37**
9.	I have spent too much time gambling.	**.66**	**.81**
10.	I have felt badly about myself because of my gambling.	**.72**	**.49**
11.	My gambling has created problems between myself and my boyfriend/girlfriend/spouse, parents, or other near relatives.	**.76**	**.63**
12.	I have felt like I needed to gamble.	**.32**	**.52**
13.	When I gamble, I feel better about myself.	**.48**	**.45**
14.	I have often found it difficult to limit how much I gamble.	**.65**	**.87**
15.	When I try to cut down on my gambling, I become irritable.	**.82**	**.84**
16.	I have become very rude, obnoxious, or insulting while gambling.	**.33**	**.35**

Note. Bold indicates statistical significance. EFA = exploratory factor analysis; CFA = confirmatory factor analysis.

values ranged from $r = .22$, $p < .01$ (amount of money intended wager) to $r = .45$, $p < .001$ (number of hours gambled). These results indicated that individuals who engaged in more gambling behaviors were also more likely to endorse gambling problems. Findings also indicated that GPS scores were significantly associated with gender ($r = .23$, $p < .01$), with males being more likely than females to endorse problems.

Partial correlations. We conducted partial correlation analyses to examine the unique association between gambling problems measures (the GPS and the SOGS) and other gambling behaviors (see Table 5). In each analysis, the effects of the other gambling problems measure were controlled for. When controlling for SOGS scores, GPS scores were significantly associated with gambling behaviors with values that ranged from $r = .16$, $p < .05$ (amount of money intended to wager) to $r = .35$, $p < .001$ (number of hours gambled). These effects accounted for between 3% and 12% of unique variance, respectively. In contrast, after controlling for GPS scores, SOGS scores were significantly associated only with number of days gambled ($r = .20$, $p <$

Table 4
Sample 2: Correlations Among Gender, Gambling Behaviors, and Gambling Problems

Measures	1.	2.	3.	4.	5.	6.	7.
1. Gender	-						
2. Number of days gambled	.10	-					
3. Amount of money wagered	.13	.50**	-				
4. Amount of money intended to wager	.11	.44**	.99**	-			
5. Number of hours gambled	.16*	.62**	.48**	.44**	-		
6. Total SOGS	.09	.39**	.20*	.15*	.31**	-	
7. Total GPS	.23**	.41**	.29**	.22**	.45**	.59**	-

Note. SOGS = South Oaks Gambling Screen; GPS = Gambling Problems Scale.
*$p < .05$. **$p < .01$.

.01), which accounted for 4% of unique variance. These results supported the incremental validity of GPS scores in that GPS scores accounted for unique variance in relation to gambling behaviors above and beyond that of SOGS scores.

Discussion

The purpose of the present study was to examine the psychometric properties of GPS scores, a gambling problems measure developed specifically for the college student population. Prior research assessing gambling-related problems among college students has either relied heavily on the use of adult assessments based on *DSM* criteria (e.g., the SOGS), or has used measures in a manner that has not been supported by psychometric data (e.g., the GPI). Initial results from the present study preliminarily supported the construct validity of the GPS as a unidimensional problems measure. In addition, concurrent, convergent, and incremental validity of scores was established, as not only were the scores from the measure associated with gambling behaviors, but they also accounted for unique variance in these behaviors over and above the effects associated with SOGS scores.

In establishing the construct validity, an EFA and CFA were conducted and supported the unidimensionality of the measure. After we initially removed seven items, the remaining 16 items had strong loadings on a one-factor solution, and the one-factor solution had strong theoretical relevance and model fit over and above a two-factor solution. Results from the examination of concurrent and convergent validity of scores for the one-factor solution were also supported by positive correlations with gambling-related behaviors such as gambling frequency, amount of money wagered, and scores on the SOGS. Of particular importance, the scores on the GPS were positively associated with a variety of gambling-related behaviors

Table 5
Sample 2: Partial Correlations Controlling for SOGS Scores and GPS Scores Among Gender and Gambling Behaviors

	Controlled for SOGS Scores							Controlled for GPS Scores						
Measures	1.	2.	3.	4.	5.	6.		1.	2.	3.	4.	5.	6.
1. Total GPS	-						1. Total SOGS	-					
2. Hours gambled	.35**	-					2. Hours gambled	.07	-				
3. Intended	.16*	.42**	-				3. Intended	.03	.40**	-			
4. Risked	.22**	.45**	.99**	-			4. Risked	.04	.41**	.99**	-		
5. Days gambled	.24**	.56**	.42**	.47**	-		5. Days gambled	.20*	.53**	.40**	.44**	-	
6. Gender	.22**	.14	.10	.11	.08	-	6. Gender	-.06	.06	.07	.07	.01	-

Note. Intended = amount of money intended to wager; Risked = amount of money actually wagered; SOGS = South Oaks Gambling Screen; GPS = Gambling Problems Scale.
*$p < .05$. **$p < .01$.

after the effects of SOGS scores were controlled for; with one exception, scores on the SOGS were not associated with these behaviors when the effects of GPS scores were controlled for. Furthermore, GPS scores accounted for at least 3% of unique variance across multiple gambling behaviors after SOGS scores were controlled for, whereas SOGS scores were associated with variance in gambling frequency only when the effects of GPS scores were controlled for. Such findings suggest that there is a more robust association between a variety of gambling-related activities and problems assessed by the GPS than there is in those assessed by the SOGS.

The findings also suggest that gambling-related problems among college students may be accurately classified as a unitary construct. This has considerable appeal for both researchers and clinicians in the field, as a unidimensional measure of gambling-related problems creates a relatively straightforward way for researchers to classify such problems in the context of their studies. For example, the GPS may be a direct means of assessing changes in gambling-related problems among college students after they receive some type of clinical intervention. Similarly, it may serve as a simple measure for clinicians interested in obtaining a general overview of the scope in which clients are experiencing gambling-related problems. This is not to say that multidimensional measures of such problems would not have value if theory and research suggested that gambling-related problems could be classified in such a manner. There are, however, clear advantages to assessing constructs in a unidimensional fashion (Smith et al., 2009); this was, perhaps, the impetus for assessing gambling-related problems among college students in such a manner in prior studies, even when the psychometric evidence for doing so was limited (e.g., Bhullar et al., 2012; Larimer et al., 2012).

There are limitations to the current study. Although the present sample size was adequate to perform both an EFA and CFA, a larger sample size, or, more ideally, independent samples, could have been used for each analysis. While correlation analyses provided support for concurrent, convergent, and incremental validity of scores, other tests for validity of score interpretation, such as predictive utility and discriminant validity, would have provided further support of the psychometric properties of the measure. The reliability of scores for the GPS was adequate; however, test-retest reliability estimates were based on a smaller sample and would benefit from further examination. Additionally, most of the sample was composed of Caucasian undergraduate college students from one geographic location, which limits the ability to generalize the findings to other populations. Another limitation of this study is that it involved a high-risk sample of gamblers who were required to have gambled in the past 60 days and to have experienced gambling-related problems prior to research involvement. Future research should examine the validity-reliability of GPS scores with a more general, diverse sample of gambling college students.

In conclusion, the current study provided initial support for the validity of GPS score interpretation and reliability of scores. In time-limited clinical and research

settings, the limited number of items, brief scoring method, and unidimensional structure of the GPS could offer flexibility and brevity in screening for gambling-related problems. We encourage researchers to continue to engage in psychometric work on the measure, addressing issues such as the predictive and discriminant validity of the measure, its sensitivity to clinical interventions, and item response theory-based analyses to examine the range in severity of problems assessed by the measure.

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