



The Psychometric Properties of the Online Gambling Symptom Assessment Scale (OGSAS)

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Abstract

Over the last decade, many psychometric instruments have been developed that assess various online problematic behaviors. Despite the many scales assessing gambling disorder (and its equivalents), no instrument assessing the consequences of problematic online gambling currently exists. In order to assess the symptoms and consequences of online gambling disorder, the Gambling Symptom Assessment Scale (G-SAS) was modified and its psychometric properties were assessed using exploratory factor analysis. The data were collected from 326 undergraduate and graduate students from a large public Midwestern university in the USA. Results suggest that the newly developed Online Gambling Symptom Assessment Scale (OGSAS) is reliable and valid as regards assessing the symptoms of online gambling disorder.

Keywords Online gambling · Gambling disorder · Problematic online gambling · Online gambling symptom assessment scale (OGSAS)

Since its inception in the mid-1990s, online gambling has quickly become a major leisure activity engaged in by millions of people all over the world (Griffiths et al. 2016). According to the American Psychiatric Association (APA 2013), “gambling involves risking something of value in the hopes of obtaining something of greater value” (p. 586). Research has shown that in almost all countries where national prevalence surveys have been conducted that there are more gamblers than non-gamblers (Calado and Griffiths 2016). Online gambling, similar to online video gaming, comprises virtual platforms where players gamble against computer

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software or each other via the internet using various types of hardware such as laptops, smartphones, tablets, and personal computers (Griffiths et al. 2016). At present, online gambling takes a variety of forms, such as lotteries, roulette games, card games (e.g., poker, blackjack), slot machines, and sports betting (Kuss and Griffiths 2012). Another popular form of online gambling is virtual poker tournaments where players are given an avatar and the flexibility to change or shape their avatar in a virtual gambling environment (Hornle and Zammit 2010).

Research has indicated that online gambling is popular among college and university students (e.g., Petry and Gonzalez-Ibanez 2015; Wood et al. 2007) and that the online medium is more harmful for vulnerable and susceptible individuals (e.g., problem gamblers; Wardle et al. 2011). Griffiths et al. (2010) noted that online poker is becoming an alternative to traditional poker and is one of the fastest growing types of online gambling. However, the research into online gambling is somewhat limited (Kuss and Griffiths 2012). In Griffiths et al.'s (2010) study on problematic gambling behavior among university students, they reported that online gamblers, who played regularly and for a long time, did not adhere to their budget and sometimes gender-swapped while gambling online. Furthermore, these behaviors were predictive of problematic gambling. Most studies show a higher problem gambling prevalence among online gamblers compared to offline gamblers (e.g., Griffiths et al. 2009; McCormack et al. 2013; Wood and Williams 2011). However, most online gamblers also gamble offline, and one nationally representative study found no problem gamblers among those who only gambled online (i.e., Wardle et al. 2011). The latest (fifth) edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) recognizes problematic offline gambling behavior as “gambling disorder” and for the first time as a behavioral addiction rather than a disorder of impulse control (APA 2013, p. 585). Although there are no diagnostic criteria for problematic online gambling behaviors, gambling disorder (predominantly online) is included in the latest (11th) edition of the International Classification of Diseases (ICD) (see 6C50.1 Gambling disorder, predominantly online, ICD-11 [World Health Organization 2018]).

Gambling Disorder and the Negative Consequences of Online Gambling

Dysfunctional behaviors, such as problematic gambling, can have addictive features, symptoms, and consequences without the ingestion of a psychoactive substance. These behaviors might affect specific brain mechanisms and provide rewards similar to psychoactive substance use (Potenza et al. 2003). Although this expanded concept of addiction overlaps with impulse control disorders, it provides a fresh perspective in defining problematic internet use as a potential behavioral addiction (Griffiths 2005). It has been alleged that online gambling presents potential risks for gamers and for society in the long term (Hornle and Zammit 2010) because the online gamblers experiencing problems can be expected to present additional issues, such as mental health problems and substance use (Petry and Gonzalez-Ibanez 2015).

The most important concern is not gambling *per se* (as most people who gamble have no problems whatsoever; Calado and Griffiths 2016), but problematic gambling behavior or gambling addiction. In the most extreme cases, problem gambling can lead to financial, social, and family problems (Hornle and Zammit 2010) as well as criminal activity to fund the activity (Griffiths 2016).

According to the DSM-5, a gambling disorder is defined as “a cluster of four or more of the symptoms listed in Criterion A occurring at any time in the same 12-month period” (APA 2013; p. 586). The base period of gambling disorder might take place during the years of adolescence or young adulthood. However, some individuals might experience it during middle or even older adulthood (APA 2013). In ICD-11, problematic online gambling behavior is recognized as a classified disorder as gambling disorder, predominantly online, and defined as “gambling disorder, predominantly online is characterized by a pattern of persistent or recurrent gambling behaviour that is primarily conducted over the Internet” (World Health Organization 2018, code: 6C50.1).

The Present Study

As far as the present authors are aware, no instrument assessing the consequences of problematic online gambling currently exists. Consequently, the present study adapted the Gambling Symptom Assessment Scale (G-SAS; see ‘Methods’ section for further details) to address this gap in the psychometric testing literature. The original 10-item G-SAS was developed by Kim et al. (2001) and then modified into a 12-item instrument by Kim et al. (2009) and is a scale that assesses gambling symptom severity. According to Kim et al. (2009), the G-SAS combined the scale concepts from two prior instruments. These were the Leyton Obsessional Inventory (LOI: Cooper 1970) and the Yale-Brown Obsessive Compulsive Scale (YBOCS: Goodman et al. 1989b, b).

Studies have been conducted to assess the psychometric properties of the G-SAS and earlier versions of the instrument. Kim et al. (2001) reported a Cronbach’s alpha reliability coefficient of $\alpha = 0.89$ on a previous version of the G-SAS (10-items), while Kim et al. (2009) reported a Cronbach’s alpha reliability coefficient of $\alpha = 0.86$ for the most recent version of the G-SAS (12-items). In order to assess convergent validity, the G-SAS was compared with the Pathological Gambling Clinical Global Impression (PG-CGI) instrument (Hollander et al. 1998) resulting in moderate to strong convergent validity ranging from 0.67 to 0.82 during the 3-week study period (Kim et al. 2001, p. 917). In another validity study with 207 participants, Spearman correlation coefficients between the total scores of the Yale-Brown Obsessive Compulsive Scale (Goodman et al. 1989b, b) and the G-SAS were reported as $\rho = 0.51$ (Kim et al. 2009, p. 79). Test-retest correlation for the current version of the G-SAS was 0.56 (Kim et al. 2009, p. 79). Given the lack of instruments assessing online gambling disorder, the present study assesses the psychometric properties of an adapted version of the Gambling Symptom Assessment Scale.

Methods

Participants and Procedure A total of 326 undergraduate and graduate students from a large public Midwestern university in the USA participated in the study (demographic details concerning the participants are described in the first section of the “Results” section). The study utilized an online survey created using *Qualtrics* software. The survey link was e-mailed to undergraduate and graduate students by the university’s Office of Information Technology. Thus, each individual had an equal probability of being selected from the population (Cohen et al. 2007). The data for the present study were obtained via the online survey only.

Instruments The survey collected demographic information of all participants and also included the Online Gambling Symptom Assessment Scale (OGSAS). Demographic questions were asked concerning the participants' age, gender, race/ethnicity, grade level, student status, grade point average (GPA), employment status, and average weekly internet usage time in total (both leisure and work).

As noted above, the OGSAS is a 12-item scale designed to assess the severity of gambling behavior (Kim et al. 2009). In the present study, it was modified to assess the severity of online gambling behavior. The modified items assess gambling behavior symptoms based on the past seven days of online gambling activity. Items 1 to 4 assess average online gambling use, items 5 to 7 assess the average online gambling frequency, item 8 assesses the time spent on online gambling or online gambling-related behavior, item 9 assesses the excitement caused by online gambling, item 10 assesses the excitement or pleasure associated with winning online, item 11 assesses emotional distress caused by online gambling, and item 12 assesses personal difficulties from online gambling. Each item has a score ranging from 0 to 4. The total score ranges from 0 to 48, and individuals are classed as 8–20 for mild, 21–30 for moderate, 31–40 for severe, and 41–48 for extreme online gambling behavior symptoms. All items ask for an average symptom based on the past seven days (Kim et al. 2009, p. 77).

In order to modify the G-SAS for the purpose of this study, the researchers added the word “online” to the instrument with written permission from the authors who developed the original instrument (i.e., Kim et al. 2009). Examples of the OGSAS items include “If you had unwanted urges to gamble online during the past WEEK, on average, how strong were your urges?” “During the past WEEK, how many hours (add up hours) were you preoccupied with your urges to gamble online?” and “During the past WEEK, approximately how much total time did you spend gambling online or on online gambling-related activities?” (modified from Kim et al. 2009, pp. 81–82).

Results

Demographic Description of the Sample Of the final sample of 326 participants, the mean age of participants was 25.2 years, with a range between 18 and 69 years ($SD = 7.63$ years). Of these, 127 participants were male (39%), 197 were female (60.4%), one participant was transgender, and one participant did not indicate their gender. A total of 253 participants identified themselves as White (77.6%); 15 identified as African-American (4.6%); one identified as American Indian (0.3%); four identified as Hispanic, Latino, or Spanish origin (1.2%); 15 identified as Asian-American (4.6%); and 37 identified other, such as Asian, Indian, Middle-Eastern, Non-Arab Middle-Eastern, Chinese, Korean, South African, Persian, and Black African (11.3%). One person did not indicate their racial-ethnic identity. The sample comprised 32 freshmen, 60 sophomores, 48 juniors, 64 seniors, 58 Master's, and 62 doctoral students. Two people did not indicate their grade level. Of these participants, 283 students were enrolled full-time, and 40 were part-time. Three people did not indicate their student status. The mean GPA of the students was 3.42, with a range between 1.80 and 4.00 ($SD = 0.52$). A total of 207 participants were employed, 117 were not employed, and two students did not indicate their employment status.

Online Behavior Within the past 6 months, 24 students indicated that they spent 1–10 h per week online (7.4%), 96 students indicated that they spent 11–20 h per week online (29.4%), 91

students indicated that they spent 21–30 h per week online (27.9%), 57 students indicated that they spent 31–40 h per week online (17.5%), 56 students indicated that they spent 40 or more hours per week online (17.2%), and two students did not indicate their Internet usage time.

Reliability and Validity of OGSAS Reliability analyses of the current study showed that the OGSAS had a high level of reliability. The Cronbach's alpha reliability coefficient of the OGSAS was 0.83. Exploratory factor analysis was carried out on the whole sample ($N=326$) in order to determine the number and nature of the factors for the data. Principal axis factoring with promax (oblique) rotation was conducted on the whole sample. The minimum acceptable measure of sampling adequacy value is considered as 0.6 in order to conduct a factor analysis (Kaiser 1974). The Kaiser-Meyer-Olkin sample of measuring adequacy value suggested that the sample was factorable, $KMO=0.84$ (see Table 1). The first version of G-SAS (10-item) study ($n=45$) reported both a one-factor and two-factor model (Kim et al. 2001). However, the G-SAS reliability and validity study ($n=44$) with 12 items did not report any factor solutions (Kim et al. 2009). The present study analysis suggested a three-factor solution (see Table 2).

Factor 1 (eight items) accounted for 46.79% of the total variance of OGSAS. Factor 2 (two items) accounted for 12.78% of the total variance. Factor 3 (two items) accounted for 9.01% of the total variance. The pattern matrix of the OGSAS items can be seen in Table 3. Reliability analyses of the three factors were conducted. Factor 1's reliability was $\alpha=0.89$, Factor 2's reliability was $\alpha=0.71$, and Factor 3's reliability was $\alpha=0.75$.

Discussion

Results showed that 63% of the weekly Internet usage of the participants was over 20 hours and therefore overusing the internet according to some researchers (e.g., Ko et al. 2007; Cassidy-Bushrow et al. 2015). More specifically, overuse of the internet has been defined by some as being online for more than 20 hours a week (e.g., Ko et al. 2007) or using the Internet more than 2 hours a day every day (e.g., Cassidy-Bushrow et al. 2015). However, this literature did not draw the line between educational, professional, and leisure usage. Therefore, more than 20 hours of weekly usage is unlikely to be problematic if Internet use at work is included. In contemporary society, 2 hours daily Internet use is normal and it is unrealistic to label it as overuse due to the increasingly ubiquitous place of technology in our personal and professional lives (particularly via Wi-Fi-enabled mobile devices such as smartphones and tablets). Existing instruments do not typically ask about usage time and usage type (although some do specify that questions should be answered in relation to leisure use rather than including work-related or educational-related activities). Therefore, questions are needed in regard to specific usage time (i.e., leisure usage, and work/educational usage of the Internet) as well as specific usage of online activities (such as online gambling). The present study did not specifically ask

Table 1 Online Gambling Symptom Assessment Scale measure of sampling adequacy

Kaiser-Meyer-Olkin measure of sampling adequacy		0.84
Bartlett's test of sphericity	Approx. chi-square	2168.91
	d.f.	66
	Sig	.0001

Table 2 Online Gambling Symptom Assessment Scale factor loadings

Component	Initial Eigenvalues			Extraction sums of squared loadings		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	5.61	46.79	46.79	5.24	43.70	43.70
2	1.53	12.78	59.57	1.15	9.62	53.32
3	1.08	9.01	68.58	.71	5.92	59.24

Extraction method: Principal axis factoring. Rotation method: Promax

how much time participants actually spent gambling online. Future studies also need to differentiate leisure and work/educational use and their effects on people's daily life activities in order to identify moderate use and overuse of the Internet although some studies have

Table 3 Online Gambling Symptom Assessment Scale pattern matrix

	Component		
	1	2	3
2. During the past week, how many times did you experience urges to gamble online?	0.895		
6. During the past week, approximately how many hours (add up hours) did you spend thinking about placing bets?	0.861		
11. During the past week, how much emotional distress (mental pain or anguish, shame, guilt, embarrassment) has your online gambling caused you?	0.800		
12. During the past week, how much personal trouble (relationship, financial, legal, job, medical or health) has your online gambling caused you?	0.779		
5. During the past week, how often did thoughts about gambling online and placing bets come up?	0.777		
3. During the past week, how many hours (add up hours) were you preoccupied with your urges to gamble online?	0.597		
1. If you had unwanted urges to gamble online during the past week, on average, how strong were your urges?	0.582		
8. During the past week, approximately how much total time did you spend gambling online or on online gambling activities?	0.316		
10. During the past week, on average, how much excitement and pleasure did you feel when you won on your bet? If you did not actually win at online gambling, please estimate how much excitement and pleasure you would have experienced if you had won.		0.930	
9. During the past week, on average, how much anticipatory tension and/or excitement did you have <i>shortly before</i> you engaged in online gambling? If you did not actually gamble online, please estimate how much tension and/or excitement you believe you would have experienced if you had gambled online.		0.676	
4. During the past week, how much were you able to control your urges?			0.810
7. During the past week, how much were you able to control your thoughts of gambling online?			0.698

Extraction method: Principal axis factoring. Rotation method: Promax with Kaiser normalization. Rotation converged in six iterations

examined excessive Internet use while working as an indicator of work addiction rather than internet addiction (Quinones et al. 2016) while other studies have reviewed the impact of online gambling in the workplace (Griffiths 2009).

Preliminary analyses were conducted to examine the reliability of the OGSAS instrument. The OGSAS showed a high level of reliability in the present study ($\alpha = 0.83$). The original developers of the G-SAS reported a Cronbach's alpha reliability coefficient of 0.86 (Kim et al. 2009). The initial version of the G-SAS reported a one-factor and two-factor solution (Kim et al. 2001), whereas the most recent G-SAS psychometric study did not report any factor solutions (Kim et al. 2009). The present study reported a three-factor solution. This may be a consequence of the very small sample sizes of the original G-SAS studies (under 50 participants in each as they were clinically based studies rather than of an epidemiological nature). Therefore, further studies with larger sample sizes need to be conducted in order to further develop the OGSAS and more rigorously understand its factor structure.

One possible limitation of the study surrounds the honesty in which participants responded with respect to items on the OGSAS. More specifically, the OGSAS instrument items might have caused discomfort to some participants due to the illegality of online gambling in the USA. This discomfort might have affected the veracity of their responses. In addition, self-report data is subject to well-known biases including memory recall biases and social desirability biases. Another limitation was the self-selection of the sample that is likely to have resulted in a biased sample because the recruitment of participants used non-probability sampling. The sample size itself was modest (although appreciably larger than the previous G-SAS studies). The study data were collected from university students from one university in the USA and therefore were not necessarily representative of either other US students or students from other countries. Also, students themselves are not representative of the population more generally. Future psychometric testing of the OGSAS needs to be carried out on larger samples with more representative samples and across other countries and cultures. Further research into online gambling also needs to be conducted in order to refine the OGSAS and identify the at-risk status of people who might have online gambling problems (see [Appendix](#) for all items in the OGSAS).

In conclusion, the present study's findings suggest that the modified OGSAS instrument is reliable and valid in regard to assessing the symptoms of online gambling disorder (ICD-11 2018). College counseling centers and treatment practitioners can use OGSAS to identify individuals with possible symptoms of online gambling disorder in order to create treatment modalities for those who experience negative outcomes of the gambling disorder (predominantly online).

Compliance with Ethical Standards

Conflict of Interest MG's university currently receives funding from *Norsk Tipping* (the gambling operator owned by the Norwegian Government) for ongoing research. MG has received funding for a number of research projects in the area of gambling education for young people, social responsibility in gambling, and gambling treatment from Gamble Aware (formerly the Responsibility in Gambling Trust), a charitable body which funds its research program based on donations from the gambling industry. MG also undertakes consultancy for various gaming companies in the area of social responsibility in gambling.

The first author (BK) has no conflicts of interest.

Appendix 1: Online Gambling Symptom Assessment Scale (OGSAS)

The following questionnaire consists of 12 items. Please read each question carefully and then pick out the one response that is most appropriate for each question.

1. If you had unwanted urges to gamble online during the past week, on average, how strong were your urges?
 - 0—None
 - 1—Mild
 - 2—Moderate
 - 3—Severe
 - 4—Extreme

2. During the past week, how many times did you experience urges to gamble online?
 - 0—None
 - 1—Once
 - 2—Two to three times
 - 3—Several to many times
 - 4—Constant or near constant

3. During the past week, how many hours (add up hours) were you preoccupied with your urges to gamble online?
 - 0—None
 - 1—1 h or less
 - 2—1–7 h
 - 3—7–21 h
 - 4—Over 21 h

4. During the past week, how much were you able to control your urges?
 - 0—Complete
 - 1—Much
 - 2—Moderate
 - 3—Minimal
 - 4—No control

5. During the past week, how often did thoughts about gambling online and placing bets come up?
 - 0—None
 - 1—Once
 - 2—Two or four times
 - 3—Several to many times
 - 4—Constantly or near constantly

6. During the past week, approximately how many hours (add up hours) did you spend thinking about gambling online and thinking about placing bets?

0—None
1—1 h or less
2—1 to 7 h
3—7 to 21 h
4—Over 21 h

7. During the past week, how much were you able to control your thoughts of gambling online?

0—Complete
1—Much
2—Moderate
3—Minimal
4—None

8. During the past week, approximately how much total time did you spend gambling online or on online gambling related activities?

0—None
1—2 h or less
2—2 to 7 h
3—7 to 21 h
4—Over 21 h

9. During the past week, on average, how much anticipatory tension and/or excitement did you have *shortly before* you engaged in online gambling? If you did not actually gamble online, please estimate how much tension and/or excitement you believe you would have experienced if you had gambled online.

0—None
1—Minimal
2—Moderate
3—Much
4—Extreme

10. During the past week, on average, how much excitement and pleasure did you feel when you won on your bet. If you did not actually win at online gambling, please estimate how much excitement and pleasure you would have experienced if you had won.

0—None
1—Minimal
2—Moderate
3—Much
4—Extreme

11. During the past week, how much emotional distress (mental pain or anguish, shame, guilt, embarrassment) has your online gambling caused you?

- 0—None
- 1—Mild
- 2—Moderate
- 3—Severe
- 4—Extreme

12. During the past week, how much personal trouble (relationship, financial, legal, job, medical or health) has your online gambling caused you?

- 0—None
- 1—Mild
- 2—Moderate
- 3—Severe
- 4—Extreme

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