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ORIGINAL PAPER

Comparing the Utility of a Modified Diagnostic Interview for Gambling Severity (DIGS) with the South Oaks Gambling Screen (SOGS) as a Research Screen in College Students

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Abstract The South Oaks Gambling Screen (SOGS) is compared in reliability to a modified version of the Diagnostic Interview for Gambling Severity (DIGS-S) for use as a pathological gambling (PG) screen in college students. Seventy-two undergraduates (83.3% male, mean age of 18.8) from the University of Georgia completed the measures, completing a longitudinal design with 3 sessions over a 2-month time period. The DIGS-S and the SOGS demonstrated good internal consistency over the 3 sessions, with Cronbach's Alphas ranging from 0.73 to 0.89, as well as strong concurrent validity, with correlations of .50 to .80 (Ps $< .001$) between the 2 measures across the 3 sessions. Both Cronbach's alpha and test–retest reliability were higher with the DIGS-S than the SOGS. Given this, and given that the DIGS directly measures symptoms of pathological gambling, future research could benefit from the use of the DIGS-S as a PG screening tool in a college-aged sample.

Keywords Gambling · Decision making · Assessment · Validity

The Diagnostic Interview for Gambling Severity (DIGS; Winters et al. 1996) has emerged as a leading diagnostic measure for Pathological Gambling (PG), partly because of its relative simplicity (20 closed-ended items) and its adherence to the DSM-IV criteria. The DIGS consists primarily of twenty multiple-choice questions, two addressing each of the DSM-IV criteria. As is typical for an individual diagnostic instrument, the DIGS is administered by means of an interview, with a trained individual guiding the process. The DIGS has been shown to correlate well with certain aspects of problem gambling, such as increased frequency of gambling and financial and legal problems (Stinchfield et al. 2007). The reliability of the DIGS in college-aged samples has also been verified through additional research beyond its original validation (Lakey et al. 2007; Weinstock et al. 2007). Strong test–retest values have been observed for the DIGS, with a correlation of .83, $P < .001$ (Winters et al. 1996) at a time interval of 1 week.

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The South Oaks Gambling Screen (SOGS; Lesieur and Blume 1987) is the most frequently used as PG screening instrument for research. It is not directly based on DSM-IV criteria, but the SOGS is reliable and valid in the general population, treatment samples, and college students, as all of these groups were included in the construction of the measure (Lesieur and Blume 1987). It is also reliable and valid in additional treatment samples (Stinchfield 2002) and college-aged samples (Weinstock et al. 2007), and correlates well with the Structured Clinical Interview for Pathological Gambling (SCI-PG; Grant et al. 2004). The SOGS has strong test–retest reliability, which has been shown to be greater for outpatients than for inpatients, with an overall test–retest correlation of .71, $P < .001$ (Lesieur and Blume 1987) at a time interval of 1 month.

The purpose of the present research was to administer the primary interview of the DIGS in the mechanical way that is typical of research screens, in order to examine its reliability and validity in this context toward evaluating its promise as a research screen, in a college sample. The SOGS is currently considered as a superior screening measure for use among college-aged students because it is a more sensitive measure that is better able to identify PG behavior (Weinstock et al. 2007). The original DIGS and the SOGS also correlate well with one another with a Pearson's r of .61, $P < .001$ (Weinstock et al.). Of the two measures, the DIGS has shown the higher test–retest correlation, although this is based on a shorter time interval, and the two measures have shown comparable internal reliability. One goal of the present paper, then, is to directly compare the test–retest validities of the two measures across multiple time frames. We administered both the modified DIGS (DIGS-S) and the SOGS on three separate occasions over a 2 month period of time. These findings help to identify the consistency of these gambling measures over the longest test–retest time interval to date. Another goal is to compare their reliability. Based on the guidelines advocated by Cicchetti (1994), reliability statistics are anticipated to exceed alpha = .70, indicating that the level of clinical significance is acceptable. Furthermore, the three sessions allow for changes to be tracked in the concurrent validity among the DIGS-S and SOGS.

Method

Participants

Participants included 72 undergraduate students recruited from the Research Pool at the University of Georgia who participated for class credit in a lower-division Psychology course. The sample contained 60 men (83.3%) and 12 women ranging in age from 17 to 29, with a mean age of 18.8 (1.54). Most participants self-identified as Freshmen (65.3%), followed by Sophomores (20.8%), Juniors (9.7%), and Seniors (4.1%). As part of the recruitment process, participants classified themselves as frequent gamblers when signing up for the experiment, which was defined as participating in gambling related activities (e.g., poker, sports betting, etc.) at least once a week.

Measures

Diagnostic Interview for Gambling Severity (*DIGS*; Winters et al. 1996). The DIGS assesses gambling involvement by using questions that require participants to indicate whether each scenario regarding their personal gambling behavior is very true, somewhat true, or false (e.g., "Have you frequently thought about ways of getting money with which to gamble?"). The 20-item interview is based on the 10 diagnostic criteria for pathological gambling set

forth by the DSM-IV. The 20 items are paraphrased directly from the DSM-IV criteria, with 2 items for each of the criteria, and the items are grouped into pairs to reflect the dichotomous nature of the 10 criteria. For each of the item pairs, any combination of answers other than false–false results in the participant receiving a point. The total score is assessed on a scale of 1–10, with a score of 5 or higher indicating pathological gambling status.

In contrast with the original, diagnostic function of the instrument, we adapted it to a simple, computer-administered survey consisting of the 20 multiple choice questions along with the response options given above ("Very true," "Somewhat true," and "False"). Also in contrast with the original DIGS, during which a trained clinician determines the categorical assignment of "Very true," "Somewhat true," or "False" based on individuals' responses during a structured interview, the modified DIGS allows the participant to determine which category best reflects his or her lifetime gambling behaviors. The number of items used, the question wording, and the scoring criteria remain unchanged.

The South Oaks Gambling Screen (*SOGS*; Lesieur and Blume 1987). Similar to the DIGS, individuals with a score of 5 or higher on the 20-item SOGS are considered to be probable pathological gamblers. Although originally developed according to the DSM-III criteria, the SOGS continues to sustain a strong relationship with DSM-IV criteria (Stinchfield 2002).

Procedure

The study incorporated a longitudinal design wherein participants were required to return for three separate sessions, which is a contributing factor to the small sample size. Participants completed the DIGS-S and SOGS during all three sessions. After completing the measures for the first session, participants were scheduled to return in 4 weeks for their second session. In some instances it was necessary to schedule the second session as much as a week early or late. The same process occurred after the second session, where participants scheduled their return for the third session approximately 4 weeks after their second session. In prior research, an interval of 4 weeks has been shown to be a reasonable test–retest period for gambling screens (i.e., Lesieur and Blume 1987). This time span doubles the 2-week test–retest period previously established for the DIGS.

Results

Gambling Pathology

As previously indicated, normally a score of 5 or higher on the DIGS or the SOGS reflects an elevated score. Table 1 provides the mean and standard deviations for DIGS-S and SOGS scores for each of the three sessions as well as the number of participants who met the criterion on the DIGS-S, the SOGS, or both. The proportion of PG participants was robust, with averages of 29.9% meeting the DIGS-S criterion, 32.4% meeting the SOGS criterion, and 20.4% meeting both criteria.

Reliability

DIGS-S

The DIGS-S was shown to be highly reliable, with Cronbach's Alphas for three sessions of 0.83, 0.85, and 0.89, respectively. DIGS-S scores were also consistent across the three

Table 1 DIGS-S and SOGS statistics for each session

Session	*N*	DIGS-S		SOGS		Both[a]
		M (SD)	>5	*M* (SD)	>5	
1	81	3.60 (2.23)	29	3.46 (2.64)	23	16
2	73	3.49 (2.34)	20	3.93 (2.91)	26	15
3	72	3.35 (2.73)	19	3.65 (3.14)	24	15

[a] Both = number of participants scoring 5 or greater on both the DIGS-S and SOGS

sessions with correlations between sessions ranging from .62 to .79 (all *P*s < .001; see Table 2). With regard to difference scores, which are computed based on the change in DIGS-S scores from Session 1 to Session 3, more than half of the participants (55.5%) had a difference score of 0 or ±1. There was no significant difference between the PG difference score ($M = 1.00$, $SD = 1.88$) and the NPG difference score ($M = -0.03$, $SD = 2.23$; $t = 1.60$, $P > .05$). In other words, DIGS-S scores were consistent regardless of PG status. Furthermore, the change in score from Session 1 to Session 2 ($M = 0.01$, $SD = 1.68$) was not significantly different from the change in score from Session 2 to Session 3 ($M = 0.15$, $SD = 1.69$; $t = 0.46$, $P > .05$), which provides additional evidence for the consistency of the measure.

SOGS

High reliability was also seen with the SOGS with Cronbach's Alphas of 0.73, 0.74, and 0.80 in the sessions 1–3 respectively. As with the DIGS-S, scores were also consistent across all three sessions with correlations ranging from .65 to .79 (all *P*s < .001; see Table 2) and more than half of the participants (58.4%) had a difference score of 0 or ±1. Again, there was no significant difference between PG difference scores ($M = 0.00$, $SD = 2.91$) and NPG differences scores ($M = -0.50$, $SD = 2.29$; $t = .70$, $P > .05$). However, unlike the DIGS-S, the change in score from Session 1 to Session 2 ($M = -0.68$, $SD = 1.81$) was significantly different from the change in score from Session 2 to Session 3 ($M = 0.28$, $SD = 2.18$; $t = 2.54$, $P < .05$).

Concurrent Validity

Concurrent validity represents the degree to which one measure agrees with another previously validated measure during simultaneous administration. The SOGS is a well-

Table 2 Correlations among the DIGS-S and SOGS across three sessions

	DIGS-S-1	DIGS-S-2	DIGS-S-3	SOGS-1	SOGS-2
DIGS-S-2	.73	–	–	–	–
DIGS-S-3	.62	.79	–	–	–
SOGS-1	.72	.59	.50	–	–
SOGS-2	.60	.62	.58	.79	–
SOGS-3	.59	.68	.80	.65	.75

The digit at the end of each measure reflects the session in which it was collected. All values are significant at $P < .001$

validated gambling screen and it indeed showed high concurrent validity with the DIGS-S, as reflected by high correlations between the measures across all three sessions, ranging from .50 to .80 (all *P*s < .001; see Table 2). Unsurprisingly, the correlations appear to be slightly higher within a session than between sessions.

Discussion

The DIGS-S demonstrated both internal consistency and test–retest reliability that were greater than those of the SOGS, and thus may be well considered as a screen for research purposes, in a college student population. Based on the standards set forth by Cicchetti (1994), the DIGS-S demonstrated "good clinical significance" (exceeding .80) while the SOGS met only a level of "fair clinical significance" (between .70 and .80) on two of the three sessions. Using a modified version of any measure has advantages and disadvantages, but with the current measure potential disadvantages are limited due to the overlap between the original DIGS and the research screen version of the DIGS. The administration of the DIGS-S on the computer ensures that the question wording is identical across participants. The main difference between the original DIGS and the DIGS-S is that in the modified version the participants are responsible for determining whether each DIGS item is "Very true," "Somewhat true," or "False," whereas a professional interviewer would determine these selections based upon the participants' open-ended responses in the original version. Although the input of a professional clinician is sacrificed in the DIGS-S screen, the automated presentation of items, in addition to assuring the original wording, also eliminates interviewer bias in interpreting responses. Future research on gambling behavior could benefit from the utilization of the DIGS-S as a screening tool.

The reliability and consistency of the DIGS-S and the SOGS were maintained over the 2-month period across all three sessions. It has been suggested that the SOGS may be the better of the two measures for PG diagnosis in college-aged individuals because it is better able to identify PGs (Weinstock et al. 2007), but the results here do not necessarily support that notion. While the SOGS identified a larger number of probable PGs than the DIGS-S identified in Sessions 2 and 3, the DIGS-S actually identified more PGs than the SOGS in the first session. Furthermore, the DIGS-S had higher reliability values than the SOGS (as represented by Cronbach's Alpha) in all three sessions, and the change scores from session to session were less extreme with the DIGS-S than with the SOGS. In fact, the change scores for the SOGS between Sessions 1 and 2 and Sessions 2 and 3 were significantly different from each other.

Some change in DIGS-S and SOGS scores should be expected, especially when working with a developing population like college students, most of whom were Freshmen just entering college and adapting to a new lifestyle that potentially allows for more freedom and autonomy. Ideally, scores on the DIGS-S or SOGS should rarely decrease, as most of the questions start with "Have you ever …" This phrasing implies that item scores should only ever increase, and not decrease. Whereas the mean score difference from Session 1 to Session 3 was positive for the DIGS-S ($M = 0.17$), the mean score difference was negative for the SOGS ($M = -0.40$). Because the difference score is calculated by subtracting a subsequent score from the previous score (e.g., DIGS-S score at Session 1 minus DIGS-S score at Session 3), a positive difference score actually indicates a decrease in score from Session 1 to Session 3. This difference was nonsignificant, and we attribute any negative changes to error.

Limitations and Future Directions

The longitudinal design used in this study provides new information about the DIGS and the SOGS, but it would be worthwhile to conduct a similar study with still longer test–retest intervals. The longitudinal design, although imperative to the study, also impinged on the small sample size that was achieved. As previously mentioned, this sample included only college students and it would be valuable to conduct a similar study in a more general population. Despite the benefits of administering the modified version on the computer, removing the professional interviewer from the process also has disadvantages. Misunderstanding the questions and not having the opportunity to ask for clarification from an interviewer could lead to less accurate responses from participants.

Although the SOGS was previously identified as the best screen for pathological gambling in college students, the DIGS-S offers a measure that is more directly related to PG and yielded comparable, arguably superior psychometric results in the current sample. We emphasize that the DIGS-S is not intended to supplant the original DIGS or other diagnostic instruments in a clinical setting. The present results suggest only that the screening version of the DIGS (or DIGS-S) may have utility as a research screen, without implications for individual diagnosis or treatment.

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