

Gambler Addiction Index

An Empirical Investigation of Reliability, Validity & Accuracy in Gambler Risk Assessment

The Gambler Addiction Index (GAI) is a multifaceted measure that incorporates seven distinct scales (i.e., Truthfulness, Gambler, Suicide, Alcohol, Drugs, Attitude, Stress Coping Abilities) to directly measure gambling risk as well as criminogenic needs (i.e., changeable predictors of gambler risk). The GAI was designed to provide comprehensive and thorough information (through objective and accurate assessment) that lends support for treatment, court, and referral decisions. It should be noted that research was conducted previously to demonstrate the reliability and validity of the GAI scales (e.g., test-retest reliability, internal consistency, convergent validity with other assessments). Detailed descriptions of prior research are presented in, "Gambler Addiction Index (GAI): An Inventory of Scientific Findings." The present document contains detailed descriptions of two studies that were conducted to investigate the soundness of the GAI when used as a screening measure to identify the presence and levels of risk among adult gamblers. Specifically, the focus of investigation was reliability, validity, and accuracy of the GAI in the first study. These analyses were then replicated using a second sample of adult gamblers to provide evidence for generalizability of results and to further confirm the superior quality of the GAI in gambler addiction assessment from an objective, empirical perspective.

Study 1: Reliability, Validity & Accuracy of the GAI among Adult Gamblers

A study was conducted (2002) to further investigate the reliability, validity and accuracy of the Gambler Addiction Index (GAI) as an effective screening measure for gambling addiction in adults. All seven GAI scales (i.e., Truthfulness, Gambler, Alcohol, Drugs, Attitude, Suicide, Stress Coping Abilities) were incorporated into the investigation. A description of this research study follows.

Method

The sample consisted of 190 adult gamblers tested with the GAI as part of gambler screening and assessment in court referral settings. There were 142 males (74.7%) and 48 females (25.3%). The ages of the participants ranged from 19 through 40 as follows: 20 & under (12.8%); 21-30 (41.4%); 31-40 (27.6%); 41-50 (12.2%); 51-60 (4.3%) and 60 & over (1.6%). The demographic composition of participants was as follows. Race/Ethnicity: Caucasian (80.9%); Black (6.9%), Hispanic (2.1%), Native American (8.5%) and Other (1.6%). Education: Eighth grade or less (1.6%); Some high school (14.8%); High school graduate/GED (43.8%); Some college (25.8%) and College graduate (3.8%). Marital Status: Single (51.6%); Married (21.8%); Divorced (20.2%) and Separated (6.4%).

Results

The reliability of the GAI scales was investigated to determine the degree of consistency in relation to the widely accepted inter-item reliability standard of .80. The

inter-item reliability coefficient alphas for the seven GAI scales are presented in Table 1. All scales were highly reliable. Reliability coefficient alphas for all GAI scales exceeded 0.89. These results demonstrate that the GAI is comprised of scales that evidence impressive consistency with regard to their respective items. In other words, the GAI is a very reliable adult gambler assessment test.

Table 1. Reliability of the GAI (N=190)

<u>GAI SCALES</u>	<u>Coefficient Alphas</u>	<u>Significance Level</u>
Truthfulness Scale	.90	p<.001
Gambler Scale	.94	p<.001
Suicide Scale	.91	p<.001
Alcohol Scale	.94	p<.001
Drugs Scale	.94	p<.001
Attitude Scale	.90	p<.001
Stress Coping Abilities	.94	p<.001

Discriminant validity results are presented in Table 2. In these analyses the answer sheet items “Number of alcohol arrests” and “Number of drug arrests” were used to define first offenders (one or no arrest) and multiple offenders (2 or more arrests). T-test comparisons were used to study the statistical significance between the offender groups. “Number of alcohol arrests” was used for the Alcohol Scale, which had 125 first offenders and 65 multiple offenders (2 or more arrests). “Number of drug arrests” was used for the Drugs Scale, which had 151 first offenders and 39 multiple offenders (2 or more arrests).

Table 2. Comparisons between first offenders and multiple offenders (N=190).

<u>GAI Scale</u>	<u>First Offenders Mean</u>	<u>Multiple Offenders Mean</u>	<u>T-value</u>	<u>Level of significance</u>
Alcohol Scale	6.97	26.38	t = 25.40	p<.001
Drugs Scale	10.44	24.78	t = 17.48	p<.001

Table 2 shows that mean (average) scale scores of first offenders were significantly lower than scores for multiple offenders on GAI Alcohol and Drugs Scales. As expected, multiple offenders scored significantly higher than did first offenders. GAI substance abuse severity measurement scales differentiated between first offenders and multiple offenders. These results support the validity of the GAI Alcohol and Drugs Scales. Other GAI scales do not have relevant criterion measures to define offender groups. Consequently, they were not included in this analysis.

In order to directly assess convergent validity between the GAI Alcohol and Drugs scales and other criteria, correlation analyses were performed. Correlation coefficients between respondents’ criminal history and related GAI scales are presented in Table 3. Statistically significant correlation coefficients between GAI Alcohol and Drugs scales and alcohol and drug arrests provide supporting evidence for convergent validity. GAI scales that measure alcohol and drug problems were expected to be correlated with alcohol and drug arrests. Participants’ criminal histories were obtained from GAI answer sheets that were completed by the participants.

Table 3. Relationships between Criminal History Variables and Related GAI Scales

	<u>Alcohol</u> <u>Scale</u>	<u>Drugs</u> <u>Scale</u>
Alcohol arrests	.63**	.10
Drug arrests	.12	.58**

Note: Significance level ** p<.001.

Concurrent validity results for the correct identification of problem behavior (gambling addiction, suicide tendencies, drinking and drug abuse problems) are presented in Table 4. Table 4 shows the percentages of respondents who had or admitted to having problems and who scored in the problem risk range. For the Alcohol and Drugs Scales criteria, problem behavior means the client had alcohol or drug treatment. For the Gambler, Suicide and Attitude scales the client attended Gamblers Anonymous, admitted suicide ideation and admitted resistance problems, respectively. In these analyses scale scores in the Low risk range (zero to 39th percentile) represent "no problem," whereas, scores in the Problem and Severe Problem risk ranges (70th percentile and higher) represent gambling, suicide, resistance, alcohol and drug problems. The moderate risk range (40th to 69th percentile) was not included in these analyses since it was of primary importance to differentiate between individuals who clearly posed a problem and those who clearly did not.

The Alcohol Scale is very accurate in identifying respondents who have alcohol problems. There were 49 clients who had attended Alcoholics Anonymous and these clients were classified as problem drinkers. All 49 clients, or 100 percent, had Alcohol Scale scores at or above the 70th percentile. The Alcohol Scale correctly identified all of the clients categorized as problem drinkers.

The Drugs Scale was also very accurate in identifying respondents who have drug problems. There were 32 clients who had been in drug treatment, all 32 clients, or 100 percent, had Drugs Scale scores at or above the 70th percentile. This result strongly substantiates the accuracy of the Drugs Scale.

Table 4. Concurrent Validity of the GAI

<u>GAI</u> <u>Scale</u>	<u>Correct Identification of</u> <u>Problem Behavior</u>
Alcohol	100%
Drugs	100%
Gambler	100%
Suicide	100%
Attitude	100%

The Gambler Scale accurately identified clients (100%) who admitted gambling problems. Clients who attended Gamblers Anonymous scored in the problem range. The Suicide Scale identified all 8 client (100%) who admitted being suicidal. The Attitude Scale identified all (10 individuals or 100%) of the clients who admitted they were resistant to authority and staff help. The remaining two GAI scales were not included in

these analyses because of a lack of direct admission or other criterion measure within the GAI database.

GAI risk range percentile accuracy is presented in Table 5. Risk range percentile scores are derived from scoring equations based on clients' pattern of responding to scale items and criminal history, when applicable. There are four risk range categories: Low Risk (zero to 39th percentile), Medium Risk (40 to 69th percentile), Problem Risk (70 to 89th percentile) and Severe Problem or Maximum Risk (90 to 100th percentile). Risk range percentile scores represent degree of severity. The higher the percentile score is the higher the severity of the respondent's problems.

Analysis of the accuracy of GAI risk range percentile scores involved comparing the client's obtained risk range percentile scores to predicted risk range percentages as defined above. The percentages of clients expected to fall into each risk range are: Low Risk (39%), Medium Risk (30%), Problem Risk (20%) and Severe Problem or Maximum Risk (11%). These percentages are shown in parentheses in the top row of Table 5. The actual percentage of clients falling in each of the four risk ranges, based on their risk range percentile scores, was compared to these predicted percentages. The differences between predicted and obtained percentages are shown in parentheses.

Table 5. Accuracy of GAI Risk Range Percentile Scores

Scale	Low Risk (39% Predicted)		Medium Risk (30% Predicted)		Problem Risk (20% Predicted)		Severe Problem (11% Predicted)	
Truthfulness	39.5	(0.5)	30.5	(0.5)	19.7	(0.3)	10.3	(0.7)
Gambler	38.5	(0.5)	32.0	(2.0)	19.0	(1.0)	10.5	(0.5)
Alcohol	37.2	(1.8)	31.7	(1.7)	19.5	(0.5)	11.6	(0.6)
Drugs	38.9	(0.1)	30.0	(0.0)	19.5	(0.5)	11.6	(0.6)
Attitude	37.4	(1.6)	31.0	(1.0)	20.5	(0.5)	11.1	(0.1)
Suicide	38.7	(0.3)	32.3	(2.3)	18.2	(1.8)	10.8	(0.2)
Stress Coping	38.9	(0.1)	30.0	(0.0)	20.0	(0.0)	11.1	(0.1)

All of the obtained risk range percentages were within 2.3 percentage points of the expected percentages and most (22 of the 28) were within 1.0 percentage point. These results demonstrate that the GAI scale scores accurately classify gambler risk.

Conclusion

This exceptional empirical investigation convincingly confirms the sound quality of the GAI and each of its scales for use with adult populations affected by gambling addiction. The GAI is a reliable, valid and accurate measure of gambling addiction among adults. This was demonstrated through the use of internal consistency statistics, observation of differences between first offenders and multiple offenders, relationships between GAI scales and external measures, and comparisons to risk range percentiles.

Study 2: Replication Study of GAI Reliability, Validity & Accuracy in an Adult Sample

The present investigation (2004) was conducted to observe the reliability, validity and accuracy of the Gambler Addiction Index (GAI) as evidenced in a sample of 250 adults. The particulars of the research study are provided below.

Method

This sample included 250 adults tested with the GAI. Among these 250 adults, 182 (72.8%) were males and 68 (27.2%) were females. The ages of participants were as follows: 19 & under (8.8%); 20-29 (44.0%); 30-39 (28.0%); 40-49 (17.2%); 50-59 (1.6%); and 60 & over (0.4%). The racial/ethnic composition of the sample was: Caucasian (88.0%); African American (6.0%); Hispanic (4.0%); Native American (1.2%); and Other (0.8%). Educational achievement among participants was: Eighth grade or less (0.4%); Some high school (24.6%); High school graduate/GED (50.8%); Some college (19.0%) and College graduate (4.8%). Marital status among sample participants is represented as follows: Single (54.4%); Married (20.4%); Divorced (19.6%) and Separated (5.6%).

Reliability of the GAI scales was investigated by relying on an internal consistency statistic, Cronbach's alpha. The minimum accepted standard for internal consistency is .80. Table 6 shows the coefficient alphas for all GAI scales. The reliability coefficients observed for the seven GAI scales are quite impressive when compared to the widely accepted minimum standard. All coefficient alphas in this study were observed to be higher than .84.

Table 6. Reliability of the GAI (N=250)

<u>GAI SCALES</u>	<u>Coefficient Alphas</u>	<u>Significance Level</u>
Truthfulness Scale	.88	p<.001
Gambler Scale	.94	p<.001
Suicide Scale	.85	p<.001
Alcohol Scale	.94	p<.001
Drugs Scale	.94	p<.001
Attitude Scale	.87	p<.001
Stress Coping Abilities	.94	p<.001

Results, demonstrating the discriminant validity of the GAI Alcohol and Drugs scales, are depicted in Table 7. In these analyses the answer sheet items "Number of alcohol arrests" and "Number of drug arrests" were used to define first offenders (one or no arrest) and multiple offenders (2 or more arrests). Mean difference statistical tests were employed to study potential differences between offender groups. "Number of alcohol arrests" was used for the Alcohol Scale, which had 141 first offenders and 109 multiple offenders (2 or more arrests). "Number of drug arrests" was used for the Drugs Scale, which had 195 first offenders and 55 multiple offenders (2 or more arrests).

Table 7. Comparisons between first offenders and multiple offenders (N=250).

<u>GAI Scale</u>	<u>First Offenders Mean</u>	<u>Multiple Offenders Mean</u>	<u>F-value</u>	<u>Level of significance</u>
Alcohol Scale	9.18	22.82	F = 104.59	p<.001
Drugs Scale	13.49	27.85	F = 59.27	p<.001

Table 7 shows that mean scale scores of first offenders were significantly lower than scores observed for multiple offenders on GAI Alcohol and Drugs Scales. As expected (due to the chronic nature of their criminal history), multiple offenders scored significantly higher than did first offenders. GAI substance abuse severity measurement scales differentiated between first offenders and multiple offenders. These results support the validity of the GAI Alcohol and Drugs Scales. The other GAI scales did not have relevant criterion measures to define offender groups and were not included in this analysis.

Convergent validity was also investigated by comparing the GAI Alcohol and Drugs scales to other measures suggestive of alcohol and drug abuse. Table 8 shows observed correlations between GAI scales and these other measures (i.e., criminal history). Statistically significant correlation coefficients between GAI Alcohol and Drugs scales and alcohol and drug arrests provided supporting evidence for convergent validity. GAI scales that measure alcohol and drug problems were expected to be correlated with alcohol and drug arrests. Participants' criminal histories were obtained from GAI answer sheets that were completed by the participants.

Table 8. Relationships between Criminal History Variables and Related GAI Scales

	<u>Alcohol Scale</u>	<u>Drugs Scale</u>
Alcohol arrests	.62**	.04
Drug arrests	.05	.49**

Note: Significance level ** p<.001.

Concurrent validity results for the Gambler, Suicide, Alcohol, Drugs and Attitude scales are presented in Table 9. The percentages of respondents who had or admitted to having problems and who scored in the problem risk range are shown. For the Alcohol and Drugs scales criteria, problem behavior means the client had alcohol or drug treatment. For the Gambler, Suicide and Attitude Scales the client attended Gamblers Anonymous, admitted suicide ideation and admitted resistance problems, respectively. In these analyses scale scores in the Low risk range (zero to 39th percentile) represent "no problem," whereas, scores in the Problem and Severe Problem risk ranges (70th percentile and higher) represent gambling, suicide, resistance, alcohol and drug problems. The moderate risk range (40th to 69th percentile) was not included in these analyses since it was of primary importance to differentiate between individuals who clearly posed a problem and those who clearly did not. As can be observed in Table 9, all five GAI scales investigated are exceptionally accurate.

Table 9. Concurrent Validity of the GAI

<u>GAI Scale</u>	<u>Correct Identification of Problem Behavior</u>
Alcohol	100% (N=72)
Drugs	100% (N=53)
Gambler	100% (N = 7)
Suicide	100% (N = 7)
Attitude	100% (N=12)

Results demonstrating the accuracy of the GAI are presented in Table 10. Risk range percentile scores are derived from scoring equations based on clients' pattern of responding to scale items and criminal history, when applicable. The four risk range categories are: Low Risk (zero to 39th percentile), Medium Risk (40 to 69th percentile), Problem Risk (70 to 89th percentile) and Severe Problem (90 to 100th percentile). Risk range percentile scores represent the degree of severity posed by a particular individual in a specific domain, as indicated by the focus of the GAI scale. The higher the percentile score, the higher the severity of the respondent's problems.

Investigation of GAI accuracy involved comparing the client's obtained risk range percentile scores to predicted risk range percentages as defined above. The actual percentage of clients scoring in each of the four risk ranges, based on their risk range percentile scores, was compared to these predicted percentages. The differences between predicted and obtained percentages are shown in parentheses.

Table 10. Accuracy of GAI Risk Range Percentile Scores

Scale	Low Risk (39% Predicted)		Medium Risk (30% Predicted)		Problem Risk (20% Predicted)		Severe Problem (11% Predicted)	
Truthfulness	42.0	(3.0)	30.0	(0.0)	20.8	(0.8)	7.2	(3.8)
Gambler	35.2	(3.8)	26.0	(4.0)	19.6	(0.4)	19.2	(8.2)
Alcohol	38.0	(1.0)	29.2	(0.8)	22.0	(2.0)	10.8	(0.2)
Drugs	38.0	(1.0)	30.8	(0.8)	20.4	(0.4)	10.8	(0.2)
Attitude	38.0	(1.0)	28.0	(2.0)	18.8	(1.2)	15.2	(4.2)
Suicide	40.0	(1.0)	29.6	(0.4)	19.2	(0.8)	11.2	(0.2)
Stress Coping	38.8	(0.2)	29.2	(0.8)	20.0	(0.0)	12.0	(1.0)

Only one risk range percentage (i.e., Gambler, Severe Problem) was 8.2 percentage points from the expected percentage. Most attained scores (19 of the 28) were within 1.0 percentage point. These results demonstrate that the GAI scale scores accurately classify risk on each of the respective GAI scales.

Conclusion

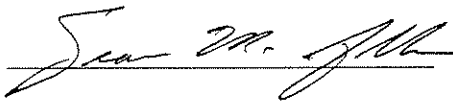
Confirmation of the sound quality of the GAI and each of its scales is provided by this empirical investigation. The GAI is a reliable, valid and accurate measure of gambling addiction among adults. This was demonstrated through the use of internal consistency statistics, observation of differences between first offenders and multiple offenders,

relationships between GAI scales and external measures, and comparisons to risk range percentiles.

Summary

Two empirical studies were described herein that provide objective documentation of the reliability, validity, and accuracy of the GAI and its seven scale components. The first study demonstrated the soundness of the GAI as a quality assessment of gambler risk while the second study provided generalizability evidence and confirmation of said quality (as determined from reliability, validity, and accuracy results). With regard to reliability, all coefficient alphas in the first study were observed to be .90 or greater, which is very impressive. These results largely held true in the second investigation where all coefficient alphas far exceeded the widely accepted minimum standard of .80. Validity was investigated using discriminant, convergent and concurrent techniques. Consistent with theoretical expectations, the GAI scale scores successfully differentiated between first time offenders and chronic offenders (based on alcohol and drug arrests). It was also observed that Alcohol and Drugs scale scores were highly correlated with other measures of alcohol and drug abuse (i.e., alcohol arrests and drugs arrests, respectively). Moreover, superb accuracy in classifying respondents with admitted problems was observed for various GAI scales. These findings were replicated in the second study.

Taken together, the results of these two separate investigations reveal that the GAI is highly reliable, valid and accurate when used as a screening test to detect the presence and severity of gambler risk. The findings presented here enable mental health professionals, courts, probation officers, and the like to use the GAI with confidence when making important treatment, referral, and court decisions.



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