Gambler Addiction Index

GAI: An Inventory of Scientific Findings

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INTRODUCTION

GAMBLER ADDICTION INDEX

Over the past decade we have witnessed dramatic changes in health care systems, particularly in mental health, chemical dependency and counseling. There is renewed emphasis upon objective and accurate problem identification, appropriate referral and documented outcome. Decisions regarding the type of intervention needed, changes in inpatient-outpatient status, continuation or completion of treatment and effectiveness of treatment are now subject to review. Provider accountability, utilization review and substantiation of decision making are here to stay.

The Gambler Addiction Index (GAI) was developed to help meet these needs. The GAI combines objective assessment with the client's perception of his or her own needs. As Ulenhuth (1970) observed, "it is the patient's opinion with all its biases that is most relevant for the initiation and maintenance of treatment." The Gambler Addiction Index enables staff to compare patient's opinions with empirically based objective measures of client problems and need.

This document is a cumulative research record of the evolution of the Gambler Addiction Index (GAI) into a state-of-the-art clinical assessment instrument. It should be noted that research studies are presented chronologically, from 1980 to the present, in the same order each of the research analyses was done. **Recent studies are most representative of the GAI.** No attempt has been made to incorporate all GAI research into this document. However, it is representative of the GAI's reliability, validity and accuracy.

The Gambler Addiction Index (GAI) is an automated computerized assessment instrument designed for gambler assessment. The proprietary GAI database ensures continued research and development. The GAI is a brief, easily administered and automated (computer scored) test that is designed for gambler assessment. It includes true/false and multiple choice items and can be completed in 30 to 35 minutes. The GAI contains seven empirically based scales: Truthfulness, Gambler, Attitude, Stress Coping Abilities, Suicide, Alcohol and Drugs. The GAI has been researched on outpatients, inpatients, college students and others.

The GAI report explains client's attained scores and makes specific intervention and treatment recommendations. It also presents Truth-Corrected scores, significant items, multiple choice items and much more. The GAI is designed to measure the severity of problems in clinical settings. It is a risk and needs assessment instrument. The GAI has demonstrated reliability, validity and accuracy. It correlates impressively with both experienced staff judgment and other recognized tests.

GAI users usually identify client risk, substance (alcohol and other drugs) abuse and client need prior to recommending intervention, supervision levels and/or treatment. The GAI is to be used in conjunction with a review of available records and respondent interview. No decision or diagnosis should be based solely on GAI results. Client assessment is not to be taken lightly as the decisions made can be vitally important as they effect people's lives. GAI research is ongoing in nature, so that evaluators can be provided with the most accurate information possible.

Information on the Gambler Addiction Index (GAI) is available in the GAI Orientation & Training Manual. Computer scoring information is contained in the GAI Computer Operating Guide. Each of these manuals can be obtained upon request.

GAI MEASURES (SCALES)

Users of the Gambler Addiction Index (GAI) should be familiar with each GAI scale. A description of each GAI scale follows.

SEVEN GAI SCALES (MEASURES)

1. TRUTHFULNESS SCALE: The Truthfulness Scale measures the truthfulness of the client while they were completing the GAI. This scale identifies self-protective, defensive or guarded people who minimize or even fake answers. This type of scale is considered necessary, if not essential, in any objective assessment instrument. In most referral and treatment settings, clients are cooperative and positively responsive to assessment procedures. However, it would be very naïve to believe that all clients answer all assessment questions truthfully. All interview and self-report test information is subject to the dangers of untrue answers due to defensiveness, guardedness, or deliberate falsification. The Truthfulness Scale also identifies clients who are reading impaired.

2. GAMBLER SCALE: The Gambler Scale measures the client's interest and involvement in gambling on a continuum from normal involvement (low risk) to pathological (severe problem) involvement. This scale identifies addicted gamblers.

3. SUICIDE SCALE: The Suicide Scale identifies suicide prone individuals. There are people who are overwhelmed, desperate and potentially dangerous to themselves.

4. ATTITUDE SCALE: The Attitude Scale measures a person's negation as reflected in their resistance, oppositional outlook and attitudes towards help. A positive attitude is often a prerequisite to behavioral change.

5. ALCOHOL SCALE: The Alcohol Scale measures the client's alcohol proneness and alcohol-related problems. This scale was developed with the assistance of experienced chemical dependency program staff. Item selection was based on relevance and comprehensiveness employing a rational consensual agreement procedure. Final item selection is based on each item's statistical properties.

Alcoholism is a significant problem in our society. Woolfolk and Richardson note in "Stress, Sanity and Survival" (1978) that alcoholism costs industry over $15.6 billion annually due to absenteeism and medical expenses. The harm associated with alcohol abuse--mental, emotional and physical, is well documented. The costs and pain associated with alcohol-related problems are staggering.

6. DRUGS SCALE: The burgeoning awareness of the impact of illicit drugs emphasizes the need for any clinical assessment to differentiate between licit and illicit drugs. The Drugs Scale is an **independent** measure of the client's drug-related problems. Without this type of scale many drug abusers would remain undetected. Thus, the Gambler Addiction Index (GAI) differentiates between "alcohol" and "drug" abuse or licit versus illicit drugs. Increased public awareness of drug (marijuana, cocaine, crack, heroin, etc.) abuse emphasizes the importance of a drug scale.

The national outcry in the 1980's concerning cocaine momentarily obscured the fact that a number of other substances are also being abused--including marijuana, cocaine, crack, LSD, heroin, etc. The prevalence of drug-related problems is increasing. The Drugs Scale provides insight into areas of inquiry that may need to be pursued in counseling and treatment.

7. STRESS COPING ABILITIES SCALE: The Stress Coping Abilities Scale establishes how well

the client copes with stress. The National Institute for Occupational Safety and Health (NIOSH) evaluated the health records of 22,000 workers in 130 organizations. **Their conclusion: stress affects workers in all types of job levels; unskilled laborers are equally susceptible, as are top-line executives.** Stress exacerbates symptoms of emotional and mental health problems.

The Stress Coping Abilities Scale is much more than just a measure of stress. It is a measure of how well the client copes with stress. Two people can be in the same stressful situation, however, one person is overwhelmed and the other person handles it well. The Stress Coping Abilities Scale can account for these different reactions to stress.

The following studies summarize research conducted on a variety of clients, e.g., substance abuse inpatients/outpatients, vocational rehabilitation clients, people applying for jobs, victims, college students, municipal court diversion defendants, etc.

Gambler Addiction Index (GAI) research is presented chronologically in the order it was conducted. Chronological presentation enables the reader to follow the evolution of the GAI into a state-of-the-art automated (computerized) screening instrument. More recent studies (toward the end of this document) are most representative of current GAI statistics.

GAI RESEARCH

STRESS QUOTIENT

The Stress Quotient (SQ) or Stress Coping Abilities Scale is based upon the following mathematical equation:

$$SQ = CS/S \times k$$

The Stress Quotient (SQ) scale is a numerical value representing a person's ability to handle or cope with stress relative to their amount of experienced stress. CS (Coping Skill) refers to a person's ability to cope with stress. S (Stress) refers to experienced stress. k (Constant) represents a constant value in the SQ equation to establish SQ score ranges. The SQ includes measures of both stress and coping skills in the derivation of the Stress Quotient (SQ) score. The better an individual's coping skills, compared to the amount of experienced stress, the higher the SQ score.

The Stress Quotient (SQ) scale equation represents empirically verifiable relationships. The SQ scale (and its individual components) lends itself to research. Nine studies were conducted to investigate the validity and reliability of the Stress Quotient or Stress Coping Abilities Scale.

Validation Study 1: This study was conducted (1980) to compare SQ scores between High Stress and Low Stress groups. The High Stress group (N=10) was comprised of 5 males and 5 females. Their average age was 39. Subjects for the High Stress group were randomly selected from outpatients seeking treatment for stress. The Low Stress group (N=10) was comprised of 5 males and 5 females (average age 38.7) randomly selected from persons not involved in treatment for stress. High Stress group SQ scores ranged from 32 to 97, with a mean of 64.2. Low Stress group SQ scores ranged from 82 to 156, with a mean of 115.7. The t-test statistical analysis of the difference between the means of the two groups indicated that the High Stress group had significantly higher SQ scores than the Low Stress group ($t = 4.9$, $p < .001$). This study shows that the SQ or Stress Coping Abilities Scale is a valid measure of stress coping. The Stress Coping Abilities Scale significantly discriminates between high stress individuals and low stress individuals.

Validation Study 2: This study (1980) evaluated the relationship between the SQ scale and two criterion measures: Taylor Manifest Anxiety Scale and Cornell Index. These two measures have been shown to be valid measures of anxiety and neuroticism, respectively. If the SQ or Stress Coping Abilities Scale is correlated with these measures it would indicate that the SQ or Stress Coping Abilities Scale is a valid measure. In the Taylor Manifest Anxiety Scale, high scores indicate a high level of anxiety. Similarly, in the Cornell Index high scores indicate neuroticism. Negative correlation coefficients between the two measures and the SQ were expected because high SQ scores indicate good stress coping abilities. The three tests were administered to forty-three (43) subjects selected from the general population. There were 21 males and 22 females ranging in age from 15 to 64 years. Utilizing a product-moment correlation, SQ scores correlated -.70 with the Taylor Manifest Anxiety Scale and -.75 with the Cornell Index. Both correlations were significant, in the predicted direction, at the $p < .01$ level. These results support the finding that the Stress Coping Abilities Scale is a valid measure of stress coping abilities. The reliability of the SQ was investigated in ten subjects (5 male and 5 female) randomly chosen from this study. A split-half correlation analysis was conducted on the SQ items. The product-moment correlation coefficient (r) was .85, significant at the $p < .01$ level. This correlation indicates that the SQ or Stress Coping Abilities Scale is a reliable measure. These results support the Stress Coping Abilities Scale as a reliable and valid measure.

Validation Study 3: In this study (1981) the relationship between the SQ Scale and the Holmes Rahe Social Readjustment Rating Scale (SRRS) was investigated. The SRRS, which is comprised of a self-rating of stressful life events, has been shown to be a valid measure of stress. Three correlation analyses were done. SRRS scores were correlated with SQ scores and separately with two components of the SQ scale: Coping Skill (CS) scores and Stress (S) scores. It was hypothesized that the SQ and SRRS correlation would be negative, since subjects with lower SQ scores would be more likely to either encounter less stressful life events or experience less stress in their lives. It was also predicted that subjects with a higher CS would be less likely to encounter stressful life events, hence a negative correlation was hypothesized. A positive correlation was predicted between S and SRRS, since subjects experiencing more frequent stressful life events would reflect more experienced stress. The participants in this study consisted of 30 outpatient psychotherapy patients. There were 14 males and 16 females. The average age was 35. The SQ and the SRRS were administered in counterbalanced order. The results showed there was a significant positive correlation (product-moment correlation coefficient) between SQ and SRRS ($r = .4006$, $p<.01$). The correlation results between CS and SRRS was not significant ($r = .1355$, n.s.). There was a significant positive correlation between S and SRRS ($r = .6183$, $p<.001$). The correlations were in predicted directions. The significant correlations between SQ and SRRS as well as S and SRRS support the construct validity of the SQ or Stress Coping Abilities Scale.

Validation Study 4: This validation study (1982) evaluated the relationship between factor C (Ego Strength) in the 16 PF Test as a criterion measure and the SQ in a sample of juveniles. High scores on factor C indicate high ego strength and emotional stability, whereas high SQ scores reflect good coping skills. A positive correlation was predicted because emotional stability and coping skills reflect similar attributes. The participants were 34 adjudicated delinquent adolescents. They ranged in age from 15 to 18 years with an average age of 16.2. There were 30 males and 4 females. The Cattell 16 PF Test and the SQ scale were administered in counterbalanced order. All subjects had at least a 6.0 grade equivalent reading level. The correlation (product-moment correlation coefficient) results indicated that Factor C scores were significantly correlated with SQ scores ($r = .695$, $p<.01$). Results were significant and in the predicted direction. These results support the SQ or Stress Coping Abilities Scale as a valid measure of stress coping abilities in juvenile offenders.

In a subsequent study the relationship between factor Q4 (Free Floating Anxiety) on the 16 PF Test and S (Stress) on the SQ scale was investigated. High Q4 scores reflect free floating anxiety and tension, whereas high S scores measure experienced stress. A high positive correlation between Q4 and S was predicted.

There were 22 of the original 34 subjects included in this analysis since the remainder of the original files were unavailable. All 22 subjects were male. The results indicated that Factor Q4 scores were significantly correlated (product-moment correlation coefficient) with S scores ($r = .584$, $p<.05$). Results were significant and in predicted directions. The significant correlations between factor C and SQ scores as well as factor Q4 and S scores support the construct validity of the SQ scale.

Validation Study 5: Psychotherapy outpatient clients were used in this validation study (1982) that evaluated the relationship between selected Wiggin's MMPI (Minnesota Multiphasic Personality Inventory) supplementary content scales (ES & MAS) as criterion measures and the SQ scale. ES measures ego strength and MAS measures manifest anxiety. It was predicted that the ES and SC correlation would be positive, since people with high ego strength would be more likely to possess good coping skills. Similarly, it was predicted that MAS and S correlations would be positive, since people experiencing high levels of manifest anxiety would also likely experience high levels of stress. The subjects were 51 psychotherapy outpatients ranging in age from 22 to 56 years with an average age of 34. There were 23 males and 28 females. The MMPI and the SQ were administered in counterbalanced order. The correlation (product-moment correlation coefficient) results indicated that ES and CS were positively significantly correlated ($r = .29$, $p<.001$). MAS and S comparisons resulted in an r of .54, significant at the $p < .001$ level. All results were significant and in predicted directions.

In a related study (1982) utilizing the same population data (N=51) the relationship between the Psychasthenia (Pt) scale in the MMPI and the S component of the SQ scale was evaluated. The Pt scale in the MMPI reflects neurotic anxiety, whereas the S component of the SQ scale measures stress. Positive Pt and S correlations were predicted. The correlation (product-moment correlation coefficient) results indicated that the Pt scale and the S component of the SQ scale were significantly correlated ($r = .58$, $p<.001$). Results were significant and in the predicted direction. The significant correlations between MMPI scales (ES, MAS, Pt) and the SQ scale components (CS, S) support the construct validity of the SQ or Stress Coping Abilities Scale.

Reliability Study 6: The reliability of the Stress Quotient (SQ) or Stress Coping Abilities Scale was investigated (1984) in a population of outpatient psychotherapy patients. There were 100 participants, 41 males and 59 females. The average age was 37. The SQ was administered soon after intake. The most common procedure for reporting inter-item (within test) reliability is with Coefficient Alpha. The reliability analysis indicated that the Coefficient Alpha of 0.81 was highly significant ($F = 46.74$, $p<.001$). Highly significant inter-item scale consistency was demonstrated.

Reliability Study 7: (1985) The reliability of the Stress Quotient (SQ) or Stress Coping Abilities Scale was investigated in a sample of 189 job applicants. There were 120 males and 69 females with an average age of 31. The SQ was administered at the time of pre-employment screening. The reliability analysis indicated that the Coefficient Alpha of 0.73 was highly significant ($F = 195.86$, $p<.001$). Highly significant Cronbach Coefficient Alpha reveals that all SQ scale items are significantly ($p<.001$) related and measure one factor or trait.

Validation Study 8: Chemical dependency inpatients were used in a validation study (1985) to determine the relation between MMPI scales as criterion measures and the Stress Quotient (SQ) Scale or Stress Coping Abilities Scale. The SQ is inversely related to other MMPI scales, consequently, negative correlations were predicted. The participants were 100 chemical dependency inpatients. There were 62 males and 38 females with an average age of 41. The SQ and the MMPI were administered in counterbalanced order. The reliability analysis results indicated that the Coefficient Alpha of 0.84 was highly significant ($F = 16.20$, $p<001$). Highly significant inter-item scale consistency was demonstrated.

The correlation (product-moment correlation coefficient) results between the Stress Quotient (SQ) and selected MMPI scales were significant at the $p < .001$ level and in predicted directions. The SQ correlation results were as follows: Psychopathic Deviate (-0.59), Psychasthenia (-.068), Social Maladjustment (-0.54), Authority Conflict (-0.46), Taylor Manifest Anxiety Scale (-0.78), Authority Problems (-0.22), and Social Alienation (-0.67). The most significant SQ correlation was with the Taylor Manifest Anxiety Scale. As discussed earlier, stress exacerbates symptoms of impaired adjustment as well as emotional and attitudinal problems. These results support the Stress Quotient or Stress Coping Abilities Scale as a valid measure of stress coping abilities.

Validation Study 9: In a replication of earlier research, a study (1986) was conducted to further evaluate the reliability and validity of the Stress Quotient (SQ). The participants were 212 inpatients in chemical dependency programs. There were 122 males and 90 females with an average age of 44. The SQ and MMPI were administered in counterbalanced order. Reliability analysis of the SQ scale resulted in a Coefficient Alpha of 0.986 ($F = 27.77$, $p<.001$). Highly significant inter-item scale consistency was again demonstrated. Rounded off, the **Coefficient Alpha for the SQ was 0.99**.

In the same study (1986, inpatients), product-moment correlations were calculated between the Stress Quotient (SQ) and selected MMPI scales. The SQ correlated significantly (.001 level) with the following MMPI scales: Psychopathic Deviate (Pd), Psychasthenia (Pt), Anxiety (A), Manifest Anxiety (MAS), Ego Strength (ES), Social Responsibility (RE), Social Alienation (PD4A), Social Alienation (SC1A), Social Maladjustment (SOC), Authority Conflict (AUT), Manifest Hostility (HOS), Suspiciousness/Mistrust (TSC-II), Resentment/Aggression (TSC-V) and Tension/Worry (TSC-VII). **All SQ correlations with selected MMPI scales were significant (at the .001 level of significance) and in predicted directions.** These results support the SQ scale or Stress Coping Abilities Scale as a valid measure of stress coping abilities.

The studies cited above demonstrate empirical relationships between the SQ scale (Stress Coping Abilities Scale) and other established measures of stress, anxiety and coping skills. This research demonstrates that the Stress Quotient (SQ) or Stress Coping Abilities Scale is a reliable and valid measure of stress coping abilities. The SQ has high inter-item scale reliability. The SQ also has high concurrent (criterion-related) validity with other recognized and accepted tests. The SQ scale permits objective (rather than subjective) analysis of the interaction of these important variables. In the research that follows, the **Stress Quotient** or **SQ** is also referred to as the **Stress Coping Abilities Scale**.

GAMBLER ADDICTION INDEX RESEARCH

Gambler Addiction Index is designed for gambler assessment. Clinics, hospitals, EAP's, HMO's and health care professionals need an objective, accurate, reliable, valid and fair assessment instrument to augment decision making. The GAI has a long history of research and development, much of which is contained in the following summary. **GAI research is reported in a chronological format, reporting studies as they occurred.** This gives the reader the opportunity to see how the GAI evolved into a state-of-the-art assessment instrument. For current information refer to the more recent studies near the end of this research section.

Initially, a large item pool was rationally developed for GAI scale consideration. Consensual agreement among three Ph.D. level psychologists and other experienced chemical dependency counselors familiar with GAI scale definitions reduced the initial item pool markedly. Final item selection was empirical - comparing statistically related item configurations to known substance abuse groups. Items chosen had

acceptable inter-item reliability coefficients and correlated highest with their respective scales. Final item selection was based on each item's statistical properties. Items with the best statistical properties were retained. The GAI was then objectively standardized and normed on inpatient and outpatient chemical dependency and a variety of counseling clients.

10. A Study of Gambler Addiction Index Test-Retest Reliability

Any approach to detection, assessment, or measurement must meet the criteria of reliability and validity. Reliability refers to an instrument's consistency of results regardless of who uses it. This means that the outcome must be objective, verifiable, and reproducible. Ideally, the instrument or test must also be practical, economical, and accessible. Psychometric principles and computer technology insures GAI accuracy, objectivity, practicality, cost-effectiveness and accessibility.

Reliability is a measure of the consistency of a test in obtaining similar results upon re-administration of the test. One measure of test reliability, over time, is the test-retest correlation coefficient. In this type of study, the test is administered to a group and then the same test is re-administered to the same group at a later date.

Method

College students at two different colleges enrolled in introductory psychology classes participated in this study (1984). A total of 115 students participated and received class credit for their participation. The students were administered the GAI in a paper-pencil test format. One week later they were re-tested with the GAI again.

Results

The results of this study revealed a significant test-retest product-moment correlation coefficient of $r = 0.71$, $p<.01$. These results support the reliability of the GAI. Test-retest consistency was very high and indicates that the GAI scores are reproducible and reliable over a one week interval.

11. Validation of the Truthfulness Scale

The Truthfulness Scale in the GAI is an important psychometric scale as these scores establish how truthful the respondent was while completing the GAI. Truthfulness Scale scores determine whether or not GAI profiles are accurate and are integral to the calculation of Truth-Corrected GAI scale scores.

The Truthfulness Scale identifies respondents who are self-protective, recalcitrant and guarded, as well as those who minimized or even concealed information while completing the test. Truthfulness Scale items are designed to detect respondents who try to fake good or put themselves into a favorable light. These scale items are statements about oneself that most people would agree to. The following statement is an example of a Truthfulness Scale item, "Sometimes I worry about what others think or say about me."

This preliminary study used the 21 Truthfulness Scale items in the Gambler Addiction Index to determine if these Truthfulness Scale items could differentiate between respondents who were honest from those trying to fake good. It was hypothesized that the group trying to fake good would score higher on the Truthfulness Scale than the group instructed to be honest.

Method

Seventy-eight Arizona State University college students (1985) enrolled in an introductory psychology class were randomly assigned to one of two groups. Group 1 comprised the "Honest" group and Group 2 comprised the "Fakers" group. Group 1 was instructed to be honest and truthful while completing the test. Group 2 was instructed to "fake good" while completing the test, but to respond "in such a manner that their faking good would not be detected." The test, which included the GAI Truthfulness Scale, was

administered to the subjects and the Truthfulness Scale was embedded in the test as one of the five scales. Truthfulness Scale scores were made up of the number of deviant answers given to the 21 Truthfulness Scale items.

Results

The mean Truthfulness Scale score for the Honest group was 2.71 and the mean Truthfulness Scale score for Fakers was 15.77. The results of the correlation (product-moment correlation coefficient) between the Honest group and the Fakers showed that the Fakers scored significantly higher on the Truthfulness Scale than the Honest group ($r = 0.27$, $p < .05$).

The Truthfulness Scale successfully measured how truthful the respondents were while completing the test. The results of this study reveal that the Truthfulness Scale accurately detects "Fakers" from those students that took the test honestly.

12. Validation of Four Gambler Addiction Index Scales using Criterion Measures

In general terms, a test is valid if it measures what it is supposed to measure. The process of confirming this statement is called validating a test. A common practice when validating a test is to compute a correlation between it and another (criterion) test that purports to measure the same thing and that has been previously validated. For the purpose of this study, the four Gambler Addiction Index scales (Truthfulness, Alcohol, Drugs and Stress Coping Abilities) were validated with comparable scales on the Minnesota Multiphasic Personality Inventory (MMPI). The MMPI was selected for this validity study because it is the most researched, validated and widely used objective personality test in the United States. The GAI scales were validated with MMPI scales as follows. The Truthfulness Scale was validated with the L Scale. The Alcohol Scale was validated with the MacAndrew Scale. The Drug Scale was validated with the MacAndrew and Psychopathic Deviant scales. The Stress Coping Abilities Scale was validated with the Taylor Manifest Anxiety, Psychasthenia, Social Maladjustment and Social Alienation scales.

Method

One hundred (100) chemical dependency inpatients (1985) were administered both the GAI and the MMPI. Tests were counterbalanced for order effects -- half were given the GAI first and half the MMPI first.

Results and Discussion

Product-moment correlation coefficients were calculated between GAI scales and MMPI scales. These results are summarized in Table 1. Correlation results presented in Table 1 show that all GAI scales significantly correlated (.001 level of significance) with all represented MMPI scales. In addition, all correlations were in predicted directions.

The **Truthfulness Scale** correlates significantly with all of the represented MMPI scales in Table 1. Of particular interest is this scale's highly significant positive correlation with the MMPI Lie (L) Scale. A high L Scale score on the MMPI invalidates other MMPI scale scores due to untruthfulness. This helps in understanding why the Truthfulness Scale is significantly, but negatively, correlated with the other represented MMPI scales. Similarly, the MMPI L Scale correlates significantly, but negatively, with the other GAI scales.

Table 1. (1985) Product-moment correlations between MMPI scales and Gambler Addiction Index scales

MMPI SCALES (MEASURES)	Gambler Addiction Index Scales (Measures)			
	Truthfulness	**Alcohol**	**Drugs**	**Stress Coping**
L (Lie) Scale	0.72	-0.38	-0.41	0.53
Psychopathic Deviant	-0.37	0.52	0.54	-0.59
Psychasthenia	-0.34	0.38	0.41	-0.68
Social Maladjustment	-0.25	0.34	0.26	-0.54
Authority Conflict	-0.43	0.31	0.47	-0.46
Manifest Hostility	-0.45	0.34	0.47	-0.58
Taylor Manifest Anxiety	-0.58	0.47	0.46	-0.78
MacAndrew	-0.40	0.58	0.62	-0.33
Social Alienation	-0.47	0.35	0.45	-0.67

NOTE: All correlations were significant at $p < .001$.

The **Alcohol Scale** correlates significantly with all represented MMPI scales. This is consistent with the conceptual definition of the Alcohol Scale and previous research that has found that alcohol abuse is associated with mental, emotional and physical problems. Of particular interest are the highly significant correlations with the MacAndrew ($r = 0.58$) Scale and the Psychopathic Deviant ($r = 0.52$) Scale. High MacAndrew and Psychopathic Deviant scorers on the MMPI are often found to be associated with substance abuse. Similarly, the **Drugs Scale** correlates significantly with the MacAndrew ($r = 0.62$) Scale and the Psychopathic Deviant ($r = 0.54$) Scale.

The **Stress Coping Ability Scale** is inversely related to MMPI scales which accounts for the negative correlations shown in Table 1. The positive correlation with the L scale on the MMPI was discussed earlier, i.e., Truthfulness Scale. It should be noted that stress exacerbates symptoms of impaired adjustment and even psychopathology. The Stress coping Ability Scale correlates most significantly with the Taylor Manifest Anxiety ($r = -0.78$) Scale, the Psychasthenia ($r = -0.68$) Scale and the Social Alienation ($r = -0.67$) Scale.

These findings strongly support the validity of Gambler Addiction Index scales. All of the GAI scales were highly correlated with the MMPI criterion scale they were tested against. The large correlation coefficients support the validity of the GAI. All product-moment correlation coefficients testing the relation between GAI scales and MMPI scales were significant at the $p < .001$ level.

13. Inter-item Reliability of the Gambler Addiction Index

Within-test reliability measures to what extent a test with multiple scales measuring different factors, measures each factor independent of the other factors (scales) in the test. It also measures to what extent items in each scale consistently measures the particular trait (or factor) that scale was designed to measure. Within-test reliability measures are referred to as inter-item reliability. The most common method of reporting within-test (scale) inter-item reliability is with Coefficient Alpha.

Method

This study (1985) included three separate groups of subjects: 100 outpatients in private practice, 100 substance abuse inpatients, and 189 job applicants -- totaling 389 subjects. Separate inter-item reliability analyses were conducted to compare results across the three groups.

Results and Discussion

The inter-item reliability coefficient alpha and within-test reliability statistics are presented in Tables 2 and

3, respectively. All inter-item reliability coefficient alphas and within-test reliability F-values are significant at p<.001. These results support the reliability of the GAI. The GAI is a highly reliable instrument.

Table 2. Inter-item reliability, coefficient alpha. (1985)
Outpatients, Substance Abuse Inpatients and Job Applicants (N = 389)

GAI SCALES MEASURES	N ITEMS	Outpatients (N = 100)	Inpatients (N = 100)	Job Applicants (N = 189)
Truthfulness Scale	21	0.81	0.79	0.81
Alcohol Scale	21	0.86	0.93	0.83
Drugs Scale	21	0.80	0.85	0.79
Stress Coping Abilities	40	0.81	0.84	0.73

Table 3. Within-test reliability, F statistic.
All F statistics are significant at p<.001.

GAI SCALES MEASURES	N ITEMS	Outpatients (N = 100)	Inpatients (N = 100)	Job Applicants (N = 189)
Truthfulness Scale	21	21.73	53.15	45.91
Alcohol Scale	21	9.29	31.46	47.75
Drugs Scale	21	27.19	16.34	58.18
Stress Coping Abilities	40	46.74	16.20	195.86

These results (Table 2 and 3) demonstrate the impressive reliability of the GAI. Reliability was demonstrated with three different groups of people (outpatients, inpatients and job applicants) taking the GAI.

In each of these subject samples, all GAI scales (measures) were found to be significantly independent of the other GAI scales as shown by the highly significant within-test F statistics. The F statistic is obtained in within-subjects between measures ANOVA performed on each individual GAI scale in each of the samples.

The F statistics show that each GAI scale measures essentially one factor (or trait). In addition, all GAI scales show high inter-item reliability. This is demonstrated by the Standardized Cronbach's Coefficient Alpha - a widely used test of inter-item reliability when using parallel models. This measure reveals that all items in each GAI scale are significantly related and measure just one factor. In other words, each GAI scale measures one factor, yet the factor being measured is different from scale to scale.

The inter-item reliability coefficients show very similar results across the three subject samples. The Truthfulness Scale, Alcohol Scale and Drugs Scale are in close agreement. The Stress Coping Abilities Scale shows similar results for the chemical dependency groups but the job applicant group had a slightly lower coefficient alpha. This difference might be accounted for by the fact that individuals applying for a job would not want to show themselves in a bad light by indicating they have an emotional, stress-related or mental health problem.

Because each sample may have scored differently from the other two samples, the data for all subjects were combined. For example, job applicants may score low on the Alcohol and Drugs Scales and inpatient clients may score high. By combining the data, scale scores would likely be distributed from low to high and result in even better coefficient alphas than each sample separately. Table 4 presents the inter-item

reliability analysis of all of these independent studies (N = 100, N = 100, N = 189) combined (N = 389).

The combined data shows that all coefficient alphas increased in the combined data compared to coefficient alphas of each subject sample alone. These coefficient alphas in the combined data are very high and provide strong support for the reliability of the GAI.

Table 4. Inter-item reliability, coefficient alpha. All data combined (1985, N = 389).
All F statistics are significant at p<.001.

GAI SCALES MEASURES	N ITEMS	COEFFICIENT ALPHA	F VALUE
Truthfulness Scale	21	0.82	96.93
Alcohol Scale	21	0.94	26.68
Drugs Scale	21	0.88	79.71
Stress Coping Abilities	40	0.85	150.78

14. Relationships between Selected GAI Scales and Polygraph Examination

A measure that has often been used in business or industry for employee selection is the Polygraph examination. The polygraph exam is most often used to determine the truthfulness or honesty of an individual while being tested. The Polygraph examination is more accurate as the area of inquiry is more "situation" specific. Conversely, the less specific the area of inquiry, the less reliable the Polygraph examination becomes.

Three Gambler Addiction Index scales were chosen for this study; Truthfulness Scale, Alcohol Scale and Drugs Scale. The Truthfulness Scale was chosen because it is used in the GAI to measure the truthfulness or honesty of the respondent while completing the GAI. The Alcohol and Drugs Scales are well suited for comparison with the polygraph exam because of the situation specific nature of the scales. Alcohol and drug items are direct and relate specifically to alcohol and drug use. The comparison with the Truthfulness Scale is less direct because of the subtle nature of the Truthfulness Scale items as used in the GAI. The respondent's attitude, emotional stability and tendencies to fake good affect the Truthfulness Scale. It was expected that the Alcohol and Drugs Scales would be highly correlated with the polygraph results and the Truthfulness Scale would show a somewhat less but nonetheless significant correlation.

Method

One hundred and eighty-nine (189) job applicants (1985) were administered both the GAI scales and the Polygraph examination. Tests were given in a counterbalanced order, half of the applicants were given the GAI scales first and the other half of the applicants were administered the polygraph first. The subjects were administered the GAI scales and polygraph exam in the same room in the same session with the examiner present for both tests.

Results

The product-moment correlation results between the Polygraph exam and GAI scales indicated there was a significant positive correlation between the Truthfulness Scale and Polygraph exam ($r = 0.23$, $p<.001$). Similarly, significant positive relationships were observed between the Polygraph exam and the Alcohol Scale ($r = 0.54$, $p<.001$) and the Drugs Scale ($r = 0.56$, $p<.001$).

In summary, this study supports the validity of the GAI Truthfulness Scale, Alcohol Scale and Drugs Scale. There were strong positive relationships between the selected GAI scales and the Polygraph examination. The highly significant product-moment correlations between GAI scales and Polygraph examinations demonstrate the validity of the GAI Truthfulness, Alcohol and Drugs measures.

These results are important because the Polygraph exam is a direct measure obtained from the individual being tested rather than a rating by someone else. This is similar to self-report such as utilized in the GAI. The fact that there was a very strong relationship between Polygraph results and GAI scales shows that this type of information can be obtained accurately in self-report instruments.

These results indicate that the GAI Truthfulness Scale is an accurate measure of the respondent's truthfulness or honesty while completing the GAI. The Truthfulness Scale is an essential measure in self-report instruments. There must be a means to determine the honesty or "correctness" of the respondent's answers and there must be a means to adjust scores when the respondent is less than honest. The GAI Truthfulness Scale addresses both of these issues. The Truthfulness Scale measures truthfulness and then applies a correction to other scales based on the Truthfulness Scale score. The Truthfulness Scale ensures accurate assessment. The results of this study show that the GAI is a valid assessment instrument.

15. Replication of GAI Reliability in a Sample of Inpatient Clients

In a replication of earlier GAI research, chemical dependency inpatients (1987) were used to evaluate the reliability of the GAI scales.

Method and Results

The GAI was administered to 192 inpatients in a chemical dependency facility. The inter-item coefficient alpha statistics are presented in Table 5. These results are in close agreement to reliability results obtained in an earlier study using chemical dependency inpatient clients. In some cases the coefficient alphas are higher in the present study as in the previous study. The results of the present study support the reliability of the GAI.

In all of the subject samples studied, the GAI scales were demonstrated to be independent measures. This mutual exclusivity (significant at $p<.001$) was demonstrated by a within-subjects measures ANOVA performed on each GAI scale. These analyses demonstrate that each GAI scale measures one factor or trait. All GAI scales demonstrate high inter-item congruency, as reflected in the standardized Cronbach Coefficient Alpha. The items on each GAI scale are significantly related to the factor or trait each scale was designed to measure. In other words, each GAI scale measures one factor, and the factor (or trait) being measured differs from scale to scale.

Table 5. Inter-item reliability, coefficient alpha.
Chemical dependency inpatients (1987, N = 192).

GAI SCALES MEASURES	N ITEMS	COEFFICIENT ALPHA	F VALUE	P VALUE P<
Truthfulness Scale	21	0.79	13.28	0.001
Alcohol Scale	21	0.92	24.39	0.001
Drugs Scale	21	0.87	22.23	0.001
Stress Coping Abilities	40	0.99	27.77	0.001

GAI scales (measures) have been shown to be both mutually exclusive and have high inter-item scale consistency. The GAI has acceptable and empirically demonstrated reliability. In addition, inter-item reliability studies have shown that each GAI scale is an independent measure of the trait (factor) it was designed to measure.

16. Validation of GAI Scales Using DWI Evaluator Ratings

This study (1987) was designed to demonstrate the relationship between GAI scales and DWI evaluator ratings, i.e., concurrent validity. Participating DWI evaluators had over six years expertise in DWI offender

assessment. Evaluators were instructed to complete their normal and usual screening procedures "prior to rating" clients on the scales incorporated into the GAI, i.e., the Alcohol and Drug Scales. Evaluators were "blind" in the sense that they did not have any knowledge of scale scores at the time of their ratings.

Method and Results

There were 563 DWI offenders included in this study (1987). The participants completed the GAI as part of normal DWI screening and evaluation procedures. Results of staff (evaluator) ratings and scale scores (Alcohol and Drug Scales) are presented in Table 6. As shown in the table below, the product-moment correlation coefficients between staff ratings and scale scores are highly statistically significant at $p<.001$.

Table 6. Agreement Coefficients between Evaluator Ratings and GAI Scale Scores (1987, N=563)

GAI SCALES	AGREEMENT COEFFICIENT	SIGNIFICANCE LEVEL
Alcohol Scale	.63	P<.001
Drug Scale	.54	P<.001

It should be noted that these experienced evaluators invested considerable time in reviewing available records and interviewing each client. In contrast, scale scores were arrived at after 25 minutes of testing time. These results strongly support the validity of the Alcohol and Drug Scales. Concurrent (criterion related) validity is demonstrated.

In addition, product-moment correlations were computed between these scales and the MAST, Sandler and Court Screening procedures used by these experienced evaluators. These results are represented in Table 7.

Table 7. Product-moment correlations (1987, N=563)
Mast, Sandler, and Court Procedures

GAI SCALES	MAST	SANDLER	COURT PROCEDURE
Alcohol Scale	.68	.46	.80
Drug Scale	.37	.11	.32

These results support the validity (criterion) of the GAI scales (Alcohol and Drug Scales). The highest coefficient is between the Alcohol Scale and Court Procedure, indicating that both procedures are essentially reflecting the same information. The Court Procedure involved a review of court records (DUI priors, BAC level, substance abuse-related convictions, MAST results and Sandler scores). These findings support the validity of the Alcohol and Drugs Scales.

Although researchers look for high coefficients, any positive correlation indicates that predictions from the test will be more accurate than guesses. Whether a validity coefficient is high enough to permit use of the test as a predictor, depends upon numerous factors, such as the importance of prediction and evaluation cost.

And, any statistics has a variation from one sample to another. Even if subjects are drawn randomly from the same population, criterion coefficients between variables will differ from sample to sample. Using a large sample makes the correlation more dependable. Correlations between a test and criterion are called validity coefficients, coefficients of productivity and concurrent validity. Concurrent validity procedures involve administering a test and comparing test results with identifiable criterion of performance.

17. Validation of GAI Scales Using the Mortimer-Filkins Test

In this study (1988), GAI Alcohol and Drug Scale scores were validated with Mortimer-Filkins total scores. The Product-moment correlations are presented in Table 8. There were 1,299 participants included in the study.

Table 8. Product-moment correlations. (1988, N = 1,299)
Mortimer-Filkins versus GAI Alcohol And Drug Scales

GAI Measures	First Sample Coefficients	Second Sample Coefficients
Alcohol Scale	.451	.323
Drug Scale	.240	.237

The Mortimer-Filkins total score correlate highly significantly ($p<.001$) with the GAI Alcohol Scale and Drug Scale. These high correlations support the validity of the Alcohol and Drug Scales.

18. Validation of GAI Scales Using the MacAndrews Scale

This study (1989) evaluated relationships between the MacAndrews Scale (in the Minnesota Multiphasic Personality Inventory) and the GAI Alcohol Scale and Drug Scale. Product-moment correlations are reported in Table 9. There were 1,181 participants included in the study.

Table 9. Product-moment correlations. (1989, N = 1,181)
MacAndrews Scale versus GAI Alcohol and Drug Scales

GAI Measures	MacAndrews	Significance Level
Alcohol Scale	.1660	P<.02
Drug Scale	.1694	P<.02

A positive correlation is demonstrated between the MacAndrews Scale and the GAI Alcohol Scale and Drug Scale. These results support the concurrent validity of the GAI Alcohol Scale and the Drug Scale.

19. Validation of GAI Scales Using SAQ Scales as Criterion Measures

This study (1989) compared the Substance Abuse Questionnaire (SAQ) with the GAI. The SAQ has been demonstrated to be a valid, reliable and accurate adult assessment instrument. The GAI is designed for gambler assessment. It contains seven measures or scales: Truthfulness, Gambler, Suicide, Attitude, Alcohol, Drugs and Stress Coping Abilities. Five of these seven GAI scales are analogous (although independent) and directly comparable to SAQ measures or scales. The SAQ is designed for adult offender evaluation. The SAQ contains six measures or scales: Truthfulness, Alcohol, Drug, Aggressivity, Resistance and Stress Coping Abilities.

Although the scales designated Truthfulness, Alcohol, Drugs, Attitude and Stress Coping Abilities are independent and differ in the GAI and SAQ, they were designed to measure similar behaviors or traits. Thus, although essentially composed of different test questions in the GAI and SAQ test booklets, these comparable measures or scales do have similarity.

Method

The GAI and SAQ were administered in group settings to 154 adult offenders, in counter balanced order. All of the subjects in this study were male inmates. The demographic composition was as follows. There were 98 Caucasians, 25 Hispanics, 13 American Indians, 12 Blacks and six other ethnicities'. Five age categories were represented: 16-25 years (N = 26), 26-35 years (N = 74), 36-55 years (N = 38), 46-55 years (N = 11) and 56 or older (N = 5). Six educational levels were represented: Eighth grade or less (N = 7), Partially completed high school (N = 50), High school graduates (N = 70), Partially completed college (N = 16), College graduates (N = 9), and Professional/graduate school (N = 2). Each participant completed both the GAI and the SAQ. Although all inmates volunteered to participate in this study, inmate motivation varied.

Results and Discussion

The results of this study are presented in Table 10. The results demonstrate highly significant relationships between the analogues GAI and SAQ scales. The SAQ has been shown to be a valid measure of substance abuse in adult offenders, hence, these correlation results support the validity of the GAI.

It was noted that inmate motivation varied widely. This is evident in the Stress Coping Abilities correlation coefficient of .7642. Even though this is a highly significant correlation ($p<.001$), the Agreement Coefficient could be expected to be even higher because these scales were nearly identical and only differed by the number of test items. It is reasonable to conclude that low motivation on the part of many inmate volunteers contributed to lower Agreement Coefficients. Inmate volunteers were serving DWI-related sentences and these tests had no bearing on their incarcerated status or sentences. However, in spite of widely varied inmate motivation, Agreement Coefficients for all five sets of scale comparisons were highly significant. The validity of the GAI has been demonstrated on a sample of incarcerated offenders.

Table 10. Product-moment correlations 1988 study of male inmates (1989, N = 154).
All product-moment correlations are significant at p<.001.

SAQ versus GAI Scales	**Agreement Coefficients**
Truthfulness Scale	.6405
Alcohol Scale	.3483
Drug Scale	.3383
Attitude (GAI) versus Aggressivity (SAQ)	.4070
Stress Coping Abilities	.7642

These results support the relationships between independent, but analogous SAQ and GAI scales. Correlation coefficients for this study are presented in Table 10. And, these concurrent validity findings support the accuracy of the GAI Truthfulness Scale, Alcohol Scale, Drug Scale, Attitude Scale and Stress Coping Abilities Scale. These GAI scales measure what they were intended to measure.

20. Validation of the GAI with MMPI Scales as Criterion Measures

This study (1990) validated GAI scales using analogous scales from the MMPI. The GAI Truthfulness Scale was correlated with the MMPI L (Lie) Scale. The GAI Gambler Scale, Alcohol Scale and Drugs Scale were correlated with the MMPI MacAndrews Scale and Psychopathic Deviate Scale. The GAI Suicide Scale was correlated with the Taylor Manifest Anxiety (MAS) Scale, and the Psychasthenia (PT) Scale. The GAI Stress Coping Abilities Scale was correlated with the Hypomania (Mam) and Taylor Manifest Anxiety (MAS) Scales. The GAI Attitude Scale was correlated with the Psychasthenia (PT) and the Social Alienation (SOA) Scales.

Method and Results

The participants in this study (1990) were 100 chemical dependency inpatients. Tests were administered in counterbalanced order. Product-moment correlation coefficients between analogous GAI and MMPI scale scores are discussed individually.

The **Truthfulness Scale** (L, r=0.72) correlates highly significantly with the MMPI Lie (L) Scale. Although independent of each other, the MMPI - L Scale and the GAI - Truthfulness Scale are conceptually similar. Each consists of items that most people agree or disagree with. And, they both determine client honesty. The **Gambler Scale** correlates significantly with the MacAndrews Alcohol (ALC, r=0.60) Scale and the Psychopathic Deviate (PD, r=0.53) Scale. The **Alcohol Scale** correlates significantly with the MacAndrews Alcohol (ALC, r=0.58) Scale and the Psychopathic Deviate (PD, r=0.52) Scale. The **Drug Scale** correlates significantly with the MacAndrews (ALC, r=0.62) Scale and the Psychopathic Deviate (PD, r=0.54) Scale.

High PD and ALC scores on the MMPI are often associated with substance abuse. The **Suicide Scale** correlates significantly with the Taylor Manifest Anxiety (MAS, r=.56), and the Psychasthenia (PT, r=0.47) Scale. The **Stress Coping Abilities Scale** correlates significantly with the Hypomania (Mam r=0.37) and Taylor Manifest Anxiety (MAS, r=0.78) Scales. The **Attitude Scale** correlates significantly with the Psychasthenia (PT, r=0.34) and the Social Alienation (SOA, r=0.36) Scale.

All correlations were highly statistically significant. These results strongly support the validity of the GAI. Validity refers to a test measuring what it is purported to measure. The GAI is a accurate assessment instrument. The GAI measures what it is designed to measure.

21. Reliability of the GAI in a Sample of Outpatient Clients

The present study (1990) investigated the reliability of the GAI in a sample of outpatient clients. Reliability refers to consistency of results, regardless of who uses the test. A common statistical test of reliability is coefficient alpha which is a measure internal consistency.

Method and Results

The subjects used in the present study consisted of 294 substance abuse outpatient clients. There were 291 males and 3 females. This sample is summarized as follows, Age: 19 years or younger (14, 4.8%); 19 years to 29 years of age (124, 42.2%); 30 years to 39 years (113, 38.4%); 40 years to 49 years (33, 11.2%); 50 years to 59 years (8, 2.7%) and 60 + years (2, 0.7%). Ethnicity: Caucasian (160, 54.4%); Black (126, 42.9%); Hispanic (1, 0.3%); Asian (4, 1.4%); Native American (2, 0.7%) and Other (1, 0.3%). Education: 8th grade or less (7, 2.4%); Partially Completed High School (72, 24.2%); High School Graduate (111, 37.7%); Partially Completed College (71, 24.2%); College Graduate (15, 5.1%); Advanced Degree (8, 2.8%) and Professional (3, 1.0%). Marital Status: Single (172, 58.5%); Married (47, 16.0%); Divorced (51, 17.3%); Separated (19, 6.5%); Widowed (4, 1.4%) and Missing (1, 0.3%). Employment: Employed (215, 73.1%) Unemployed (79, 26.5%). Reliability (internal consistency) coefficients are presented in Table 11.

Table 11. Reliability coefficients alphas. Outpatients (1990, N=294)

GAI Scales	Coefficient Alpha	Significance Level
Truthfulness Scale	.85	P<.001
Gambler Scale	.85	P<.001
Suicide Scale	.85	P<.001
Attitude Scale	.92	P<.001
Alcohol Scale	.89	P<.001
Drug Scale	.86	P<.001
Stress Coping Ability Scale	.90	P<.001

These results strongly support the statistical reliability of the GAI. All reliability coefficients were significant at p<.001. The GAI is a reliability instrument for the assessment of outpatient clients.

22. A Study of GAI Reliability in a Sample of Inpatient Clients

The present (1992) study was conducted to evaluate the statistical reliability of GAI scales in an inpatient adult sample. As the population of substance abuse clients could conceivably consist of widely varying people, it is important to continue to investigate statistical (reliability) properties on the various substance abuse client population databases.

Method and Results

This study (1992) involved 365 inpatients (222 males and 143 females). The demographic composition of the sample was the following. Age: 18 years or less (41, 1.2%); 19 years to 29 years of age (134, 36.7%); 30 years to 39 years (111, 30.4%); 40 to 49 (47, 12.9%); 50 to 59 (20, 5.5%) and 60 + years (12, 3.3%). Gender: males (222, 60.8%) and females (143, 39.2%). Ethnicity/Race: Caucasian (304, 83.3%); Black (28,

7.7%); Hispanic (21, 5.8%); Asian (3, 0.8%); Native American (7, 1.9%) and Other (2, 0.5%). Education: 8th grade or less (19, 5.2%); Partially Completed High School (82, 22.5%); G.E.D. (28, 7.7%); High School Graduate (116, 31.8%); Partially Completed College (75, 20.5%); Technical/Business School (6, 1.6%); College Graduate (30, 8.2%); Professional/Graduate School (9, 2.5%). Marital Status: Single (190, 52.1%); Married (108, 29.6%); Divorced (21, 5.8%); Separated (38, 10.4%); Widowed (7, 1.9%).

Coefficient Alpha reliability (internal consistency) coefficients are presented in Table 12.

Table 12. Reliability coefficient alphas. Inpatients (1992, N=365)
All reliability coefficients are significant at p<.001.

GAI Scales	Coefficient Alpha
Truthfulness Scale	.85
Gambler Scale	.88
Suicide Scale	.85
Attitude Scale	.91
Alcohol Scale	.90
Drugs Scale	.87
Stress Coping Ability Scale	.95

This study supports the reliability of these scales of the Gambler Addiction Index (GAI). The coefficient alpha is the most widely used statistic of internal consistency or reliability. The GAI produces similar results upon repetition. The GAI is reliable.

23. A Study of GAI Reliability in a Sample of Outpatients
The present study (1994) was conducted to investigate reliability of the GAI in a sample of outpatient participants.

Method and Results
There were 227 adult outpatient participants included in the present study. This sample is summarized as follows: Gender (149 males, 65.9% and 78 females, 34.4%). Age: 18 or less (10, 4.4%); 19 through 29 (77, 33.9%); 30 through 39 (97, 42.7%); 40 through 49 (33, 14.5%); 50 through 59 (6, 2.6%) and 60 + (4, 1.8%). Ethnicity: Caucasian (151, 66.5%); Black (27, 11.9%); Hispanic (44, 19.4%); Native American (4, 1.8%); and Other (1, 0.4%). Education: 8th grade or less (20, 8.8%); Partially Completed High School (67, 29.5); G.E.D. (16, 7.0%); High School Graduate (78, 34.4%); Partially Completed College (33, 14.5%); Technical/Business School (3, 1.3%); College Graduate (9, 4.0%) and Professional/Graduate School (1, 0.4%). Marital Status: Single (126, 55.5%); Married (61, 26.9%); Divorced (30, 13.2%); Separated (6, 2.6%) and Widowed (4, 1.8%). Reliability coefficient alphas are presented in the Table 13.

Table 13. Reliability coefficient alphas. Inpatients (1994, N=227)

GAI Scales	Coefficient Alpha	Significance Level
Truthfulness Scale	.87	P<.001
Gambler Scale	.89	P<.001
Suicide Scale	.90	P<.001
Attitude Scale	.95	P<.001
Alcohol Scale	.90	P<.001
Drug Scale	.89	P<.001
Stress Coping Ability Scale	.92	P<.001

These results are in close agreement with reliability coefficient alphas found in previous GAI studies. These results again demonstrate the internal consistency of the Gambler Addiction Index.

24. Reliability of the GAI in a Large Sample of Outpatients

The purpose of the present study (1995) was to test the reliability of the Gambler Addiction Index in a large sample of outpatients.

Method and Results

The GAI was administered to 887 adult outpatient participants as part of routine evaluation programs. Subjects were administered the GAI individually in paper-pencil test format. There were 663 males and 224 females. The demographic composition of this sample is summarized as follows. Age: 18 or less (65, 7.3%); 19 to 29 (335, 37.8%); 30 to 39 (321, 36.2%); 40 to 49 (113, 12.8%); 50 to 59 (34, 3.8%) and 60 + (18, 2.0%). Ethnicity: Caucasian (615, 69.4%); Black (181, 20.4%); Hispanic (66, 7.4%); Asian (7, 0.8%); Native American (13, 1.5%) and Other (4, 0.5%). Education: 8th grade or less (40, 4.5%); Partially Completed High School (201, 25.0%); G.E.D. (7, 8.2%); High School Graduate (255, 27.4%); Partially Completed College (204, 23.1%); Technical/Business School (13, 1.5%); College Graduate (46, 5.2%); Professional/Graduate School (45, 5.1%). Marital Status: Single (488, 55.1%); Married (217, 24.4%); Divorced (102, 11.5%); Separated (63, 7.1%); Widowed (15, 1.7%).

Reliability coefficient alphas are presented in Table 14.

This study supports the reliability of the Gambler Addiction Index (GAI). The Alpha Coefficient is the most widely used statistic of internal consistency or reliability. The GAI produces similar results upon repetition. The GAI is a reliable adult assessment instrument.

Table 14. Reliability coefficient alphas. Outpatients (1995, N=887)

GAI Scales	Coefficient Alpha	Significance Level
Truthfulness Scale	.89	P<.001
Gambler Scale	.90	P<.001
Suicide Scale	.90	P<.001
Attitude Scale	.91	P<.001
Alcohol Scale	.90	P<.001
Drug Scale	.91	P<.001
Stress Coping Ability Scale	.92	P<.001

25. Reliability Study on Three Samples of Outpatient Clients

This study (1996) examined the reliability of the GAI in three samples of outpatient clients. There were a total of 1,485 participants. The Gambler Addiction Index (GAI) was administered as part of the established intake procedure. **Group 1** consisted of 204 adult outpatient clients. There were 147 males (72.1%), 56 females (27.5%) and 1 (0.5%) missing gender information. The demographic composition of this sample is the following. Age: 18 years or younger (36, 17.6%); 19 through 29 (115, 56.4%); 30 through 39 (35, 17.2%); 40 through 49 (9, 4.4%); 50 through 59 (6, 2.9%); and 60+ (3, 1.5%). Ethnicity: Caucasian (102, 50.0%); Black (16, 7.8%); Hispanic (67, 32.8%); American Indian (6, 2.9%); Other (5, 2.5%); and Missing (8, 3.9%). Education: 8th grade or less (5, 2.5%); Partially Completed High School (49, 24.0%); G.E.D. (13, 6.4%); High School Graduate (63, 30.9%); Partially Completed College (60, 29.4%); Technical/Business School (1, 0.5%); College Graduate (9, 4.4%) and Missing (4, 2.0%). Marital Status: Single (141, 69.1%); Married (34, 16.7%); Divorced (7, 3.4%); Separated (4, 2.0%); and Missing (18, 8.8%).

Group 2 consisted of 116 participants. There were 79 males (68.1%) and 37 females (31.9%).

Demographic composition is summarized as follows. Age: 18 years or younger (12, 10.3%); 19 through 29 (48, 41.4%); 30 through 39 (33, 28.4%); 40 through 49 (17, 14.7%); 50 through 59 (4, 3.4%); 60 years and older (2, 1.7%). Ethnicity: Caucasian (94, 81.0%); Black (19, 16.4%); Hispanic (2, 1.7%); Asian (1, 0.9%). Education: 8th grade or less (8, 6.9%); Partially Completed High School (22, 19.0%); G.E.D. (14, 12.1%); High School Graduate (27, 23.3%); Partially Completed College (37, 31.9%); Technical/Business School (4, 3.4%); College Graduate (3, 2.6%); and Professional/Graduate School (1, 0.9%). Marital Status: Single (70, 60.3%); Married (26, 22.4%); Divorced (8, 6.9%); Separated (9, 7.8%); Widowed (2, 1.7%); and Missing (1, 0.9%).

Group 3 consisted of 1,165 counseling outpatients. Demographic composition is summarized as follows. Of the 1,165 outpatients 842 (72.3%) were men and 323 (27.7%) were women. Age: 18 years or less (95, 8.2%); 19 through 29 (407, 34.9%); 30 through 39 (418, 35.9%); 40 through 49 (173, 14.8%); 50 through 59 (44, 3.8%); 60 years and older (27, 2.3%) and Missing (1, 0.1%). Ethnicity: Caucasian (809, 69.4%); Black (210, 18.0%); Hispanic (107, 9.2%); Asian (8, 0.7%); American Indian (20, 1.7%); and Other (11, 0.9%). Education: 8th grade or less (662, 56.8%); Partially Completed High School (248, 21.3%); G.E.D. (19, 1.6%); High School Graduate (140, 12.0%); Partially Completed College (76, 6.5%); Technical/Business School (2, 0.2%); College Graduate (13, 1.1%); Professional/Graduate Degree (4, 0.3%); and Missing (1, 0.1%). Marital Status: Single (652, 56.0%); Married (277, 23.8%); Divorced (145, 12.4%); Separated (72, 6.2%); Widowed (18, 1.5%); and Missing (1, 0.1%).
Reliability coefficient alphas for all three groups (total N = 1,485) are presented in Table 15.

Table 15. Reliability coefficient alphas. (1996, N = 1,485)
All coefficient alphas are significant at p<.001.

GAI Scale	Group 1 N = 204	Group 2 N = 116	Group 3 N = 1,165
Truthfulness Scale	.85	.85	.86
Gambler Scale	.86	.87	.88
Suicide Scale	.88	.85	.85
Attitude Scale	.95	.95	.95
Alcohol Scale	.89	.88	.89
Drug Scale	.86	.86	.88
Stress Coping Ability Scale	.90	.91	.92

These results support the reliability (internal consistency) of the GAI. The GAI is an objective and reliable assessment instrument. Reliability coefficient alphas across the three groups of adult outpatient participants are in close agreement. These results suggest that the GAI is applicable across different national adult outpatient samples. The GAI is a reliable adult intake assessment instrument.

26. GAI Reliability in a Large Sample of Inpatient Clients
A study (1996) was conducted to determine the reliability of the GAI in a large sample of inpatient clients. The sample contained 630 inpatient clients at a hospital treatment center for substance (alcohol and other drugs) abuse. Demographic composition of this sample is as follows. Of the 630 inpatients 439 were males (69.7%) and 191 were females (30.3%). Age: 18 years and younger (19, 3.0%); 19 through 29 (209, 33.2%); 30 through 39 (241, 38.3%); 40 through 49 (132, 21.0%); 50 through 59 (23, 3.7%); 60 years and older (6, 1.0%). Ethnicity: Caucasian (493, 78.3%); Black (130, 20.6%); Hispanic (1, 0.2%); Asian (1, 0.2%); American Indian (1, 0.2%); and Other (4, 0.6%). Education: 8th grade or less (12, 1.9%); Partially Completed High School (110, 17.5%); G.E.D. (66, 10.5%); High School Graduate (277, 44.0%); Partially

Completed College (128, 20.3%); Technical/Business School (7, 1.1%); College Graduate (23, 3.7%); Professional/Graduate School (3, 0.5%); and Missing (4, 0.6%). Marital Status: Single (254, 40.3%); Married (192, 30.5%); Divorced (136, 21.6%); Separated (41, 6.5%); Widowed (6, 1.0%); and Missing (1, 0.2%). Reliability coefficient alphas are represented in Table 16.

Table 16. Reliability coefficient alphas. Inpatients (1996, N = 630).
All coefficient alphas are significant at p<.001.

GAI Scales	Coefficient Alphas
Truthfulness Scale	.88
Gambler Scale	.89
Suicide Scale	.90
Attitude Scale	.95
Alcohol Scale	.90
Drug Scale	.88
Stress Coping Ability Scale	.94

These results support the internal consistency (reliability) of the GAI for this inpatient sample. These results are similar to those reported earlier on other inpatient and outpatient client populations. Similar results will be obtained upon replication or retest. Outcomes are objective, verifiable and reproducible. GAI test results are reliable.

27. GAI Reliability in a Sample of Outpatient Clients

A study (1996-1997) was conducted to determine the reliability of the Gambler Addiction Index in a sample of adult counseling outpatient clients. The sample consisted of 2,141 adult clients in outpatient counseling. Of the 2,141 outpatients 1,527 were men (71.3%); and 613 women (28.6%). Demographic composition of this sample was the following: Age: 18 years or younger (162, 7.6%); 19 through 29 (787, 36.8%); 30 through 39 (741, 34.6%); 40 through 49 (334, 15.6%); 50 through 59 (78, 3.6%); 60 and older (38, 1.8%); and Missing (1, 0.1%). Ethnicity: Caucasian (1,502, 70.2%); Black (375, 17.5%); Hispanic (195, 9.1%); Asian (10, 0.5%); American Indian (28, 1.3%); Other (22, 1.0%); and Missing (9, 0.4%). Education: 8th grade or less (688, 32.1%); Partially Completed High School (438, 20.5%); G.E.D. (113, 5.3%); High School Graduate (514, 24.0%); Partially Completed College (305, 14.2%); Technical/Business School (14, 0.7%); College Graduate (51, 2.4%); Professional/ Graduate Degree (8, 0.4%); and Missing (10, 0.5%). Marital Status: Single (1,134, 53.0%); Married (532, 24.8%); Divorced (298, 13.9%); Separated (126, 5.9%); Widowed (26, 1.2%) and Missing (25, 1.2%).

Reliability coefficient alphas are represented in Table 17.

These results support the reliability of the GAI for this a sample of outpatient clients. These results are similar to those reported earlier on other client populations. All coefficient alphas are significant at p<.001. These results support the reliability of the GAI.

Table 17. Reliability coefficient alphas. Outpatients (1996-1997, N = 2,141).
All coefficient alphas are significant at p<.001.

GAI Scales	Coefficient Alphas
Truthfulness Scale	.88
Gambler Scale	.88
Suicide Scale	.87
Attitude Scale	.95
Alcohol Scale	.89
Drug Scale	.87
Stress Coping Ability Scale	.93

28. Reliability of the GAI in Three Adult Samples

This study (1998) was conducted to test the reliability of the Gambler Addiction Index in three samples of adult participants. The participants were administered the GAI as part of normal intake evaluation procedures.

Method and Results

There were three groups of subjects in this study (1998) that consisted of a total of 477 adult counseling clients. Group 1 consisted of 100 participants. There were 74 males (74%) and 26 females (26%). Demographic composition of these participants is as follows: Age: 19 & under (6%); 20-29 (37%); 30-39 (32%); 40-49 (18%); 50-59 (5%) and 60 & Over (2%). Ethnicity: Caucasian (80%); Black (7%) and Hispanic (13%). Education: Eighth grade or less (9%); Some H.S. (30%); H.S. graduate (42%); Some college (17%) and College graduate (2%). Marital Status: Single (60%); Married (20%); Divorced (17%); Separated (1%) and Widowed (2%).

Group 2 consisted of 181 participants. There were 152 males (84%) and 29 females (16%). Demographic composition of these participants is as follows: Age: 19 & under (8%); 20-29 (37%); 30-39 (30%); 40-49 (20%); 50-59 (4%) and 60 & Over (1%). Ethnicity: Caucasian (79%); Black (6%); Hispanic (14%); Asian (1%); Native American (1%) and Other (1%). Education: Eighth grade or less (8%); Some H.S. (24%); H.S. graduate (53%); Some college (13%) and College graduate (2%). Marital Status: Single (64%); Married (22%); Divorced (12%) and Separated (3%).

Group 3 consisted of 196 participants. There were 157 males (80%) and 39 females (20%). Demographic composition of these participants is as follows: Age: 19 & under (13%); 20-29 (43%); 30-39 (24%); 40-49 (13%) and 50-59 (6%). Ethnicity: Caucasian (16%); Hispanic (79%); Native American (4%) and Other (1%). Education: Eighth grade or less (8%); Some H.S. (28%); H.S. graduate (46%); Some college (13%) and College graduate (5%). Marital Status: Single (70%); Married (15%); Divorced (11%); Separated (3%) and Widowed (1%).

Reliability coefficient alphas are presented in Table 18.

The results of the study support the reliability of the GAI. All coefficient alphas are significant at p<.001. All scale reliability coefficients maintained high levels. These results show that the GAI is a reliable risk assessment instrument.

Table 18. Reliability coefficient alphas (1998, N = 477).
All coefficient alphas are significant at p<.001.

GAI Scale	Group 1 N=100	Group 2 N=181	Group 3 N=196
Truthfulness Scale	.87	.87	.87
Gambler Scale	.88	.85	.88
Suicide Scale	.88	.86	.88
Alcohol Scale	.92	.86	.92
Drugs Scale	.85	.85	.85
Attitude Scale	.90	.91	.90
Stress Coping Abilities	.92	.92	.92

29. Reliability, Validity and Scale Risk Range Accuracy of the GAI

This study (1999) was conducted to test the reliability, validity and accuracy of the Gambler Addiction Index in a sample of adult participants. Reliability of the GAI, validity and risk range percentile score accuracy was investigated in the present study.

Method and Results

The subjects in this study consisted of 476 adult counseling clients. Demographic composition of these participants is as follows: Age: 19 & under (10%); 20-29 (29%); 30-39 (33%); 40-49 (21%); 50-59 (5%) and 60 & over (2%). Ethnicity: Caucasian (82%); Black (11%); Hispanic (4%); Asian (1%); Native American (1%) and Other (2%). Education: Eighth grade or less (5%); Some H.S. (24%); H.S. graduate (47%); Some college (20%) and College graduate (4%). Marital Status: Single (44%); Married (27%); Divorced (20%); Separated (7%) and Widowed (1%).

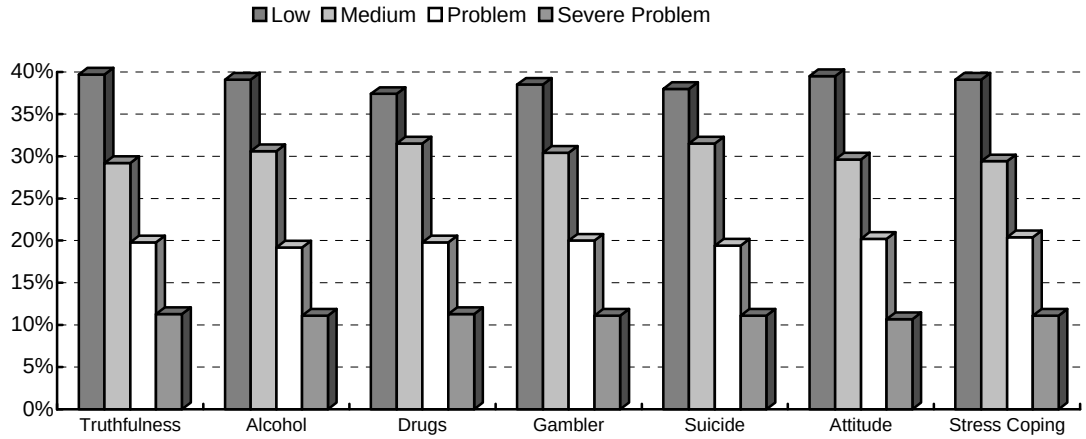
Accuracy of the GAI

Risk range percentile scores are calculated for each GAI scale. These risk range percentile scores are derived from scoring equations based on responses to scale items and Truth-Corrections, then converted to percentile scores. 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.

Analysis of the accuracy of GAI risk range percentile scores involves comparing the risk range percentile scores obtained from GAI test results to the predicted risk range percentages as defined above. The percentages of participants expected to fall into each risk range are the following: Low Risk **(39%)**, Medium Risk **(30%)**, Problem Risk **(20%)** and Severe Problem or Maximum Risk **(11%)**. The actual percentage of individuals falling in each of the four risk ranges, based on their risk range percentile scores, was compared to these predicted percentages.

The risk range percentile score results for the 476 participants administered the GAI are presented in Table 19. These obtained risk range percentile scores are shown in the graph with the actual data shown in the table below the graph. The obtained risk range scores can be compared to the predicted risk range scores that are shown in the right-hand column of the table.

Table 19. Risk Range Percentile Scores, 1999, N = 476 adult clients.



Risk Range	Truthful-ness	Alcohol	Drugs	Gambler	Suicide	Attitude	Stress Coping	**Predicted**
Low	39.7	39.1	37.4	38.5	38.0	39.5	39.1	**39%**
Medium	29.2	30.6	31.5	30.4	31.5	29.6	29.4	**30%**
Problem	19.8	19.2	19.8	20.0	19.4	20.2	20.4	**20%**
Maximum	11.3	11.1	11.3	11.1	11.1	10.7	11.1	**11%**

These results show that obtained risk range percentile scores closely approximated the predicted risk range percentile scores for each of the seven GAI scales presented in Table 19 for the adult clients included in the study. **These results indicate that the GAI is a very accurate risk assessment instrument.**

The results of the comparisons between obtained risk percentages and predicted percentages show that all obtained scale risk range percentile scores were within 1.6 percent of predicted. For the Problem Risk and Maximum Risk categories, all comparisons showed that the obtained percentages were within one percentage point of predicted. **This is very accurate assessment.**

Reliability of the GAI

Reliability coefficient alphas are presented in Table 20.

Table 20. Reliability coefficient alphas (1999, N = 476).
All coefficient alphas are significant at p<.001.

GAI Scale	**Coefficient Alphas**
Truthfulness Scale	.86
Gambler Scale	.91
Suicide Scale	.90
Alcohol Scale	.92
Drugs Scale	.93
Attitude Scale	.89
Stress Coping Abilities	.94

The results of the study support the statistical reliability of the GAI. All coefficient alphas are significant at p<.001. All scale reliability coefficients are well above the generally accepted level of .80 for assessment instruments. These results show that the GAI is a highly statistically reliable risk assessment instrument.

Validity of the GAI

In assessment, a measurement can be considered a prediction. For example, the Alcohol Scale is a measure of alcohol abuse or severity of abuse. Alcohol Scale scores would predict if an individual has an alcohol problem. A benchmark that can be used for the existence of an alcohol problem is admission of being an alcoholic or a recovering alcoholic. If an individual states that he or she is an alcoholic then the individual is known to have had an alcohol problem. Therefore, the Alcohol Scale should predict if an individual has an alcohol problem or admits to alcoholism.

Statistical decision-making is closely related to predictive validity of a test. The quality of statistical decision-making and test validity are both assessed by the accuracy with which the test (Alcohol Scale) classifies "known" cases (alcoholic admission). Predictive validity was evaluated in the Gambler Addiction Index (GAI) by using scale scores and admission of alcoholism. Alcohol and drug abuse information was obtained from clients' answers to GAI test items concerning alcoholism or recovering alcoholic.

Results demonstrated that the GAI Alcohol Scale accurately identified 97 percent who admitted to abusing alcohol. Of the 147 clients who stated they were alcoholics or recovering alcoholics, 142 individuals or 97 percent had GAI Alcohol Scale Scores in the Problem or Severe Problem risk ranges (70^{th} percentile or higher). In addition to the high correct identification rate, the false positive rate was very low. Only one percent of the clients who did not indicate abusing alcohol scored in the Problem or above risk range. The Alcohol Scale was very accurate in identifying clients who admitted to abusing alcohol. These results support the validity of the GAI Alcohol Scale.

The Drugs Scale correctly identified all of the clients who admitted to abusing drugs. Of the 142 clients who admitted they were drug addicts or recovering from drugs, 100 percent scored in the Problem or Severe Problem risk ranges on the GAI Drugs Scale. The false positive rate was less than two percent. These results strongly support the validity of the GAI Drugs Scale.

GAI scale scores correlate significantly (<.001) with recognized measures of the attitude, behaviors and traits incorporated in the seven GAI scales. And GAI findings corroborate (<.001) experienced evaluators judgments. The GAI measures what it purports to measure.

Taken together these results strongly support the reliability, validity and accuracy of the GAI. Reliability coefficient alphas were significant at $p<.001$ for all GAI scales. Validity of the Alcohol Scale and Drugs Scale was shown by the accuracy with which the scales identified problem risk behavior (admission to abusing or recovering from abuse). **The Alcohol Scale accurately identified 97 percent and the Drugs Scale accurately identified 100 percent of the clients who admitted to alcohol and drug problems.** These results support the reliability, validity and accuracy of the GAI.

30. Reliability, Validity and Scale Risk Range Accuracy of the GAI

This study (2002) was conducted on 190 gamblers to test the reliability, validity and accuracy of the Gambler Addiction Index in a sample of adult participants.

Methods and Results

The subjects in this study consisted of 190 adult gambler counseling clients. Demographic composition of these participants is as follows: Sex: Males (74.7%) and Females (25.3%). Age: 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%). 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 (35.8%) and College graduate (3.8%). Marital Status: Single (51.6%); Married (21.8%); Divorced (20.2%) and Separated (6.4%).

Accuracy of the GAI

Analysis of the accuracy of GAI risk range percentile scores involved comparing the risk range percentile scores obtained from GAI test results to the predicted risk range percentages. The predicted percentages of participants expected to fall into each risk range are the following: Low Risk (39%), Medium Risk (30%), Problem Risk (20%) and Severe Problem (11%). The actual percentage of individuals falling into 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 are shown in bold parentheses in the table below.

Table 21: Accuracy of GAI Risk Range Percentile Scores (N = 190, 2002)

Scale	Low Risk **(39%)**		Medium Risk **(30%)**		Problem Risk **(20%)**		Severe Problem **(11%)**	
Truthfulness	39.5	**(0.5)**	30.5	**(0.5)**	19.7	**(0.3)**	10.3	**(0.7)**
Gambling	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)**

As shown in Table 21, GAI scale scores are very accurate. The objectively obtained percentages of participants falling in each risk range are very close to the expected percentages for each risk category. **All of the obtained risk range percentages were within 2.3 percentage points of the predicted percentages and most (22 of the 28) were within 1.0 percentage points.** These results demonstrate that the GAI scale scores accurately classify gambler risk.

Reliability of the GAI

The reliability coefficient alphas are presented in Table 22 (N = 190, 2002)

Table 22: Reliability coefficient alphas (N = 190, 2002)
All coefficient alphas are significant at p < .001

GAI Scale	Coefficient Alpha
Truthfulness Scale	**.90**
Gambling Scale	**.97**
Suicide Scale	**.91**
Alcohol Scale	**.95**
Drugs Scale	**.94**
Attitude Scale	**.90**
Stress Coping Abilities	**.98**

The results of the study support the statistical reliability of the GAI. All coefficient alphas are significant at p < .001. All scale reliability coefficients are well above the generally accepted level of .80 for assessment instruments. These results show that the GAI is a highly reliable assessment instrument.

Validity of the GAI

Two different validity analyses were conducted to support the validity of the GAI, i.e., predictive and discriminant validity.

Predictive validity results for the correct identification of problem behavior (gambling addiction, suicide

tendencies, drinking and drug abuse problems) are presented in Table 23. Table 23 shows the percentages of respondents who had or admitted to having problems and who scored in the problem risk range.

Table 23. Predictive Validity of the GAI (2002, N = 190)	
GAI Scale	**Correct Identification of Problem Behavior**
Alcohol	100%
Drugs	100%
Gambling	100%
Suicide	100%
Attitude	100%

Discriminant validity results are presented in Table 24. In these analyses answer sheet items "Number of alcohol arrests" and "Number of drug arrests" were used to define first offenders (one or no arrests) and multiple offenders (2 or more arrests). T-test comparisons were used to study the statistical significance between offender groups mean GAI scale scores.

Table 24. Comparison between first offenders and multiple offenders (2002, N = 190)				
GAI Scale	**First Offenders Mean**	**Multiple Offenders Mean**	**T-value**	**Level of Significance**
Alcohol	6.97	26.38	t = 25.40	p < .001
Drugs	10.44	24.78	t = 17.48	p < .001

Table 24 shows that mean scale scores of first time gambler offenders were significantly lower than scores for multiple offenders on GAI Alcohol and Drugs Scale. As expected, multiple gambler offenders scored significantly higher than did first offenders. GAI substance abuse severity measurement scales differentiated between first time gambler offenders and multiple gambler offenders. These results support the validity of the GAI Alcohol and Drugs Scales. We did not have relevant criterion measures to define gambler offender groups on the other GAI scales, consequently they were not included in this analysis.

These results demonstrate accurate gambler assessment with the Gambler Addiction Index (GAI). The GAI accurately measures gamblers risk of gambling, suicide, substance (alcohol and drugs) abuse, resistant behavior as well as, emotional and mental health problems.

31. Reliability, Validity and Scale Risk Range Accuracy of the GAI

This study (2004) was conducted to investigate the reliability, validity and accuracy of the Gambler Addiction Index in a sample of adult participants.

Methods and Results

The subjects in this study consisted of 269 adult gambler counseling clients. Demographic composition of these participants is as follows: Sex: Male (75.1%) and Female (24.9%). Age: 20 and under (10.8%); 21-30 (42.8%); 31-40 (27.5%); 41-50 (14.1%); 51-60 (3.7%) and 60 and above (1.1%). Race/Ethnicity: Caucasian (80.5%); Black (7.5%); Hispanic (3.4%); Asian (2.2%) and Native American (6.4%). Education: 8th grade or less (1.6%); Some high school (13.7%); GED (8.5%); High school graduate (47.2%); Some College (24.6%); Technical/Business school (0.8%) and College graduate (3.6%). Marital Status: Single (52.1%); Married (22.8%); Divorced (18.6%); Separated (5.2%) and Widowed (1.1%).

Accuracy of the GAI (N = 269, 2004)

Analysis of the accuracy of GAI risk range percentile scores involves comparing the risk range percentile

scores obtained from GAI test results to the predicted risk range percentages. The predicted percentages of participants expected to fall into each risk range are the following: Low Risk (39%), Medium Risk (30%), Problem Risk (20%) and Severe Problem (11%). The actual percentage of individuals falling into 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 are shown in parentheses in the table below.

Table 25: Accuracy of GAI Risk Range Percentile Scores (N = 269, 2004)

Scale	Low Risk (39%)		Medium Risk (30%)		Problem Risk (20%)		Severe Problem (11%)	
Truthfulness	42.0	**(3.0)**	29.7	**(0.3)**	21.1	**(1.2)**	7.1	**(3.9)**
Gambler	40.9	**(1.9)**	33.4	**(3.4)**	19.8	**(0.2)**	5.9	**(5.1)**
Suicide	38.3	**(0.7)**	30.1	**(0.1)**	19.7	**(0.3)**	11.9	**(0.9)**
Attitude	41.3	**(2.3)**	28.6	**(1.4)**	20.1	**(0.1)**	10.0	**(1.0)**
Alcohol	42.8	**(3.8)**	30.8	**(0.8)**	19.3	**(0.7)**	7.1	**(3.9)**
Drugs	38.7	**(0.3)**	30.4	**(0.4)**	20.1	**(0.1)**	10.8	**(0.2)**
Stress Coping	39.0	**(0.0)**	29.8	**(0.2)**	20.0	**(0.0)**	11.2	**(0.2)**

As shown in Table 25, GAI scale scores are very accurate. Of the 28 possible risk range differences 21 are within 2.0 percentage points. Only 1 comparison was more than 3.2 percentage points from the predicted. These results demonstrate that the GAI scale scores accurately classify gambler risk.

Reliability of the GAI

The reliability coefficient alphas are presented in Table 26.

Table 26: Reliability coefficient alphas (2004, N = 269). All coefficient alphas are significant at p < .001

GAI Scale	Coefficient Alpha
Truthfulness Scale	**.90**
Gambling Scale	**.95**
Suicide Scale	**.91**
Alcohol Scale	**.95**
Drugs Scale	**.94**
DSM-IV Scale	**.88**
Stress Coping Abilities	**.96**

The results of the study support the statistical reliability of the GAI. All coefficient alphas are significant at $p < .001$. All scale reliability coefficients are well above the generally accepted level of .80 for assessment instruments. These results show that the GAI is a highly statistically reliable assessment instrument.

Validity of the GAI

Discriminant validity results are presented below in Table 27. In this analysis the answer sheet items "Number of alcohol arrests" and "Number of drug arrests" were used to define first offenders (one or no arrests) and multiple offenders (2 or more arrests).

Table 27. Comparison between first offenders and multiple offenders (2004, N = 269)

GAI Scale	First Offenders Mean	Multiple Offenders Mean	F-value	Level of Significance
Alcohol	8.24	22.71	F = 131.77	p < .001
Drugs	10.54	22.51	F = 90.06	p < .001

Table 27 shows that mean scale scores of first offenders were significantly lower than mean scores for multiple offenders on GAI Alcohol and Drugs Scale. As predicted, 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. We did not have relevant criterion measures for other GAI scales, consequently other GAI scales were not included in this analysis.

32. Reliability, Validity and Scale Risk Range Accuracy of the GAI

This study (2006) was conducted to investigate the reliability, validity and accuracy of the Gambler Addiction Index in a sample of adult participants.

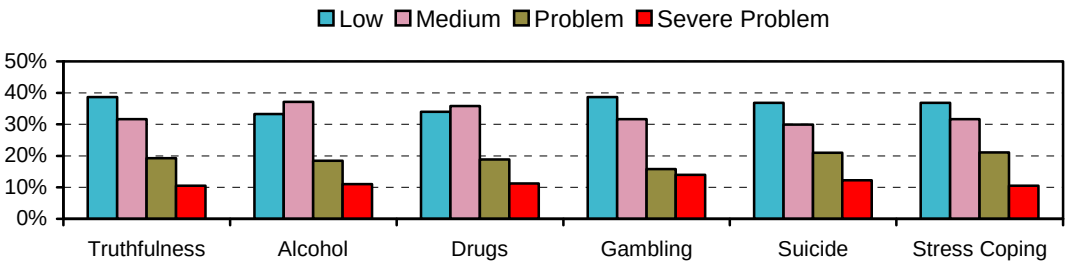
Methods and Results

The GAI was administered to **57 problem gamblers** between January and June 2006. There were 33 males (58%) and 24 females (42%). The problem New Jersey gambler population is broadly defined as Caucasian (91%), 30 through 59 years of age (85%), High School or more education (78%), and married (47%).

Accuracy of the GAI

The four Gambler Addiction Inventory (GAI) risk ranges (low, medium, problem and severe) and the predicted percentages for each risk range category are shown in parentheses in bold print in the top row of the table below. The percentages for each GAI scale and risk range category were obtained from the problem gamblers' attained scale scores. The difference between predicted and obtained percentages for each scale's risk range are presented in bold parentheses in the following table.

Table 28. GAI Accuracy (N = 57)



Scale	Low Risk (39%)		Medium Risk (30%)		Problem Risk (20%)		Severe Problem (11%)	
Truthfulness Scale	38.6	**(0.4)**	31.6	**(1.6)**	19.3	**(0.7)**	10.5	**(0.5)**
Alcohol Scale	33.3	**(5.7)**	37.1	**(7.1)**	18.5	**(1.5)**	11.1	**(0.1)**
Drugs Scale	34.0	**(5.0)**	35.8	**(5.8)**	18.9	**(1.1)**	11.3	**(0.3)**
Gambling Scale	38.6	**(0.4)**	31.6	**(1.6)**	15.8	**(4.2)**	14.0	**(3.0)**
Suicide Scale	36.8	**(2.2)**	29.9	**(0.1)**	21.0	**(1.0)**	12.3	**(1.3)**
Stress Coping Scale	36.8	**(2.2)**	31.6	**(1.6)**	21.1	**(1.1)**	10.5	**(0.5)**

All but 5 of the obtained risk range percentages (19 of 24) were within 3.0 percentage points of the predicted percentage. Accuracy of the GAI is shown by the small differences between obtained risk range percentages and predicted percentages. **The GAI can be considered 97% accurate.** Indeed, with a larger sample, we expect even more impressive reliability, validity and accuracy.

Reliability of the GAI

All Gambler Addiction Inventory (GAI) scales have reliability coefficient alphas of .90 or higher. The Gambling Scale, notably, has an alpha score of .95. The professionally accepted reliability standard is .75

and higher. All GAI scales are significantly higher than this accepted reliability standard. **All GAI scales are highly reliable.**

Table 29. Reliability Coefficient Alphas for the GAI. (N=57)

Scale	Coefficient Alpha*
Truthfulness Scale	**.90**
Alcohol Scale	**.94**
Drugs Scale	**.92**
Gambling Scale	**.95**
Suicide Scale	**.90**
Stress Coping Abilities Scale	**.93**

***All alphas are significant at p<.001.**

All Gambler Addiction Inventory (GAI) scales have reliability coefficient alphas of .90 or higher. The Gambling Scale, notably, has an alpha score of .95. The professionally accepted reliability standard is .75 and higher. All GAI scales are significantly higher than this accepted reliability standard. **All GAI scales are highly reliable.**

Validity of the GAI

Predictive validity measures how well scale scores distinguish between problem gamblers with known problems in a given area and those that had no known problems in that area. For instance, problem gamblers who had been treated for alcohol abuse would be predicted to have higher scores on the Alcohol Scale than problem gamblers that had not been treated for alcohol abuse.

One-hundred percent **(100%)** of the problem gamblers that had been treated for a gambling problem had scores placing them in the High Risk (70^{th} percentile and above) range on the Gambling Scale. The same **(100%)** was true of problem gamblers that had been treated for alcohol and drug problems: **100%** were in the High Risk range on the Alcohol and Drugs Scales, respectively. One-hundred percent **(100%)** of problem gamblers who admitted being suicidal scored in the High Risk range on the Suicide Scale. **These results strongly support the predictive validity of the Gambler Addiction Inventory (GAI).**

33. Reliability, Validity and Scale Risk Range Accuracy of the GAI

This study (2009) was conducted on 482 gamblers to test the reliability, validity and accuracy of the Gambler Addiction Index in a sample of adult participants.

Methods and Results

The subjects in this study consisted of 482 adult gamblers. Demographic composition of these participants is as follows: Sex: Males (78.2%) and Females (21.8%). Age: 19 & Under (2.1%); 20-29 (25.4%); 30-39 (26.5%); 40-49 (20.6%); 50-59 (15.8%) and 60 & over (9.6%). Race/Ethnicity: Caucasian (80.8%); Black (3.8%); Hispanic (2.7%); Asian (3.6%), Native American (8.4%) and Other (0.8%). Education: Eighth grade or less (3.1%); Some high school (15.2%); High school graduate/GED (40.3%); Technical/Business School (2.2%), Some college (20.3%), College graduate (14.3%) and Professional/Graduate School (4.6%). Marital Status: Single (49.2%); Married (30.0%); Divorced (14.3%), Separated (4.4%) and Widowed (2.1%).

Accuracy of the GAI

To analyze the GAI risk range percentile scores for accuracy, the risk range percentile scores obtained from

GAI test results were compared to the predicted risk range percentages. The predicted percentages of participants expected to fall into each risk range are the following: Low Risk (39%), Medium Risk (30%), Problem Risk (20%) and Severe Problem Risk (11%). The actual percentage of individuals falling into 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 are shown in bold parentheses in the table below.

Table 30: Accuracy of GAI Risk Range Percentile Scores (N = 482, 2009)

Scale	Low Risk **(39%)**		Medium Risk **(30%)**		Problem Risk **(20%)**		Severe Problem **(11%)**	
Truthfulness	35.3	**(3.7)**	30.7	**(0.7)**	23.0	**(3.0)**	11.0	**(0.0)**
Alcohol	38.0	**(1.0)**	31.5	**(1.5)**	19.6	**(0.4)**	10.9	**(0.1)**
Drugs	39.8	**(0.8)**	29.9	**(0.1)**	19.3	**(0.7)**	11.0	**(0.0)**
Gambling Severity	39.9	**(0.9)**	29.2	**(0.8)**	19.8	**(0.2)**	11.1	**(0.1)**
Suicide	40.5	**(1.5)**	28.7	**(1.3)**	20.5	**(0.5)**	10.3	**(0.7)**
Stress Coping	39.4	**(0.4)**	30.3	**(0.3)**	20.0	**(0.0)**	10.3	**(0.7)**

As shown in Table 30, GAI scale scores are very accurate. The objectively obtained percentages of participants falling in each risk range are very close to the expected percentages for each risk category. **All of the obtained risk range percentages were within 3.7 percentage points of the predicted percentages. The average difference between attained and predicted scores was only 1.2 points.** These results demonstrate that the GAI is an exceptionally accurate gambler assessment or test.

Reliability of the GAI

The reliability coefficient alphas are presented in Table 31 (N = 482, 2009)

Table 31: Reliability coefficient alphas (N = 482, 2009)
All coefficient alphas are significant at p < .001

GAI Scale	Coefficient Alpha
Truthfulness Scale	**.89**
Gambling Severity Scale	**.97**
Suicide Scale	**.96**
Alcohol Scale	**.95**
Drugs Scale	**.91**
Stress Coping Abilities	**.94**

The results of the study support the statistical reliability of the GAI. All coefficient alphas are significant at p < .001. All scale reliability coefficients are well above the generally accepted level of .75 for assessment instruments. These results show that the GAI is a highly reliable assessment instrument.

Validity of the GAI

Two different validity analyses were conducted to support the validity of the GAI, i.e., predictive and discriminant validity.

Predictive validity results for the correct identification of problem behavior (gambling addiction, suicidal tendencies, alcohol abuse problems and drug abuse problems) are presented in Table 32, which shows the percentages of respondents that had or admitted to having problems and that scored in the problem risk range.

Table 32. Predictive Validity of the GAI (2009, N = 482)	
GAI Scale	**Correct Identification of Problem Behavior**
Alcohol Scale	100.0%
Drugs Scale	97.2%
Gambling Severity Scale	97.9%
Suicide Scale	100.0%

Discriminant validity results are presented in Table 33. In these analyses the answer sheet items "number of alcohol-related arrests" and "number of drug-related arrests" were used to define first offenders (one or no arrests) and multiple offenders (2 or more arrests). *T*-test comparisons were used to study the statistical significance between offender groups' mean GAI scale scores.

Table 33. Comparison between first offenders and multiple offenders (2009, N = 482)				
GAI Scale	**First Offenders Mean Scores**	**Multiple Offenders Mean Scores**	**T-value**	**Level of Significance**
Alcohol Scale	6.49	26.68	t = -16.86	p < .001
Drugs Scale	7.49	28.87	t = -16.28	p < .001

Table 33 shows that mean scale scores of first-time offenders were significantly lower than scores for multiple offenders on the GAI Alcohol Scale and Drugs Scale. As expected, multiple offenders scored significantly higher than first offenders. GAI substance abuse severity measurement scales differentiated between first time offenders and multiple offenders. These results support the validity of the GAI Alcohol and Drugs Scales. Due to a lack of relevant criterion measures to define gambler offender groups on other GAI scales, only the Alcohol Scale and Drugs Scale were used for this analysis.

The preceding results demonstrate that accurate gambler assessment is accomplished with the Gambler Addiction Index (GAI). The GAI accurately measures involvement with gambling, suicide risk, substance (alcohol and drugs) use/abuse and emotional and mental health problems.

SUMMARY

In conclusion, this document is not intended as an exhaustive compilation of GAI research. Yet, it does summarize many studies and statistics that support the reliability and validity of the GAI. Based on this research, the GAI presents an increasingly accurate picture of gambling clients and the risk they represent. The GAI provides a sound empirical foundation for responsible decision making.

Summarized research demonstrates that the GAI is a reliable, valid and accurate instrument for gambler assessment. It is reasonable to conclude that the GAI does what it purports to do. The GAI acquires a vast amount of relevant information for staff review prior to decision making. Empirically based scales are objective and accurate. Assessment has shifted from subjective opinions to objective accountability. The GAI is a research based gambler assessment instrument or test.

The Gambler Addiction Index is not a personality test, nor is it a clinical diagnostic instrument. Yet, it is much more than just another assessment test. The GAI is designed specifically for screening gamblers for emotional/mental health problems, as well as their alcohol and drug problems. The GAI enables gambler evaluators to match, when present, problem severity with treatment intensity.