

Development of a Gambling Addictive Behavior Scale for Adolescents in Korea

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Purpose: This study was conducted to develop a gambling addictive behavior scale for adolescents. **Methods:** The process involved construction of a conceptual framework, initial item search, verification of content validity, selection of secondary items, and extraction of final items. The participants were 299 adolescents from two middle schools and four high schools. Item analysis, factor analysis, criterion validity, internal consistency, and ROC curve were used to analyze the data. **Results:** For the final scale, 25 items were selected, and categorized into 4 factors which accounted for 54.9% of the total variance. The factors were labeled as loss of control, life dysfunction from gambling addiction, gambling experience, and social dysfunction from problem gambling. The scores for the scale were significantly correlated with addictive personality, irrational gambling belief, and adolescent's gambling addictive behavior. Cronbach's alpha coefficient for the 25 items was .94. Scale scores identified adolescents as being in a problem gambling group, a non-problem gambling group, and a non-gambling group by the ROC curve. **Conclusion:** The above findings indicate that the gambling addictive behavior scale has good validity and reliability and can be used with adolescents in Korea.

Key words: Adolescent; Gambling behavior

INTRODUCTION

Gambling is a growing problem in the society today (Griffiths, 2002). Gambling among adolescents is becoming a significantly important public health concern (Kim, 2009). Multiple surveys of adolescents in North America now suggest that between 60% and 80% of adolescents have engaged in some form of gambling for money over the past year (Gupta & Derevensky, 2000). A study of middle and high school students in Korea suggested that 90.9% have experienced gambling behavior in their early lives (Kim). Also some activities of adolescents started out as innocuous behavior and only later are found to be harmful, such as using tanning booths to look healthy (Selekman, 2008). New to this list of activities is adolescent gambling (Barnes, Welte, Hoffman, &

Tidwell, 2010; Park, 2002). Despite the jumps into gambling activities, most parents and many school officials do not understand that gambling can lead to a dangerous addiction (Blinne-Pike, Worthy, & Jonkman, 2010, Hyder & Juul, 2008). Furthermore, gambling has been supported by the government and is increasingly being glamorized on television.

Gambling is a gateway addiction or perhaps an enhancer of existing addiction behavior (Hyder & Juul, 2008). Griffiths (2002), and other researcher lists several reasons for this. First, unlike other addictions, such as alcoholism or heroin addiction, signs or symptoms in gambling addiction are hard to be observed. Second, in a materialistic society, gambling could cause economic problems, such as money shortage or debt, which may lead people to another addictive behavior. The third point the authors (or he or she) make is that adolescent gamblers don't think

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they have problems and try to hide the truth (Desai, Maciejewski, Pantalon, & Potenza, 2005). Finally, adolescent gambling is just one of the various and excessive behaviors. Thus, the problem of adolescent behavior can be connected to an adult problem (Eaton et al., 2008), so the prevention interventions against youth gambling are needed.

Systematic screening to identify adolescents at the risk for developing a gambling problem is an important component of prevention efforts. In order to systematically screen adolescents' gambling, the development of a gambling addictive behavior scale for adolescents should be preceded. Additionally the scales pre-developed abroad do not reflect the differences between Korean gambling cultures and those of other countries (Kim, 2009). And they also fail to deal with the unique traits of Korean adolescents who are somewhat under the direct or indirect influences of home circumstances (Kim) so that Korean adolescents have difficulties in understanding the questionnaires. And the criteria for dividing the gambling groups were thought to be inappropriate. Reported in the journal of the domestic gambling measurement scales (Chon, Choi, & Yang, 2001; Kim; Lee, 2003) that by differentiating pathological gambling which is mainly used to estimate the prevalence of youth gambling addictive behaviors to apply for early intervention is not appropriate. In addition, these scales have been adapted to the international scale and configured the important problems of validity (Lee & Kim, 2009). If the scales developed for adolescents in Korea, which rarely represents a measure of the behavioral characteristics, Kim's adolescent gambling addictive behavior scale developed specifically for gambling games is not appropriate for the modern society. Therefore, it has raised difficulties in writing adolescents' surveys. In addition, developed scales considering the early warning signs of adolescents' gambling addiction which is unexplained absences from home, continual lying about day-to-day movement, constant shortage of money, general increase in secretiveness, neglect of studies, family, friends, health and appearance and agitation, mood swings, loss of friends and social life, and gambling seen as a legitimate way of making money is lacking (Blinn-Pike, Worthy, & Jonkman, 2010; Griffiths, 2002). An effective gambling screening for adolescents should consist of a well-validated measure for gambling in adolescents.

Gambling addictive behavior of an adolescent development scale that measures the validity of higher order according to the degree of gambling in adolescents screening should be implemented. One technique for evaluating the performance of screening instruments is receiver operating characteristics (ROC) curve analysis (Streiner & Cariney, 2007),

which assesses the manner in which a scale classified categories of adolescents in the basis of selected cut-off scores (Watson, Quilty, & Bagby, 2011).

In this study, we want to develop the gambling addictive behavior scale for adolescents in Korea and to analyse validity and reliability. This study tries to identify gambling addictive behavior, and to provide a base for adolescents to seek help. Furthermore, this study aimed to categorize the classification of gaming behaviors of young people, and to provide an early detection to prevent the transition to pathological gamblers. The purpose of this study was to develop a measure that will identify adolescent problem gamblers in Korea.

METHODS

1. Participants and data collection

For ethical considerations of participants, this study was approved by the Institutional Review Board (CR-12-023-PRO-001-R) in a university hospital.

The data collection was conducted during March, 2012. Sample sizes needed to be considered at least 2 to 10 times the number of questions (Lee & Kim, 2002), therefore, 320 students were enrolled by consideration of the dropout rate.

The setting for this study was 2 middle schools and 4 high schools (2 academic high schools; 2 vocational high schools) located in 4 cities in South Korea. Participating schools were selected to represent the region and school type. The questionnaires were reviewed in the schools and gave researcher permission to collect data from their students based on the protection of human subjects. Sampling method was convenience sampling. But class of school was used as the sampling unit, and the sample was stratified by school type, grade, and gender. Depending on the size of each school, either 1 or 2 classrooms of grades 1~3 students were randomly selected.

Informed consent was obtained prior to participation from students and parents. The questionnaires took 30 minutes to complete. Excluding the incomplete questionnaires, data from 299 students were collected and used for analysis.

2. Material and procedure

We conducted an extensive literature review in the online databases

(MEDLINE, CHINEL, PubMed, EBSCOhost, KISS et al.) to identify a conceptual construct, identify an operational definition, and develop an initial instrument. In-depth interviews of adolescent gambling addictive behavior highlighted early warning signs of gambling addiction. These included are the following unexplained absences from home, continual lying about day-to-day movement, constant shortage of money, general increases in secretiveness, neglect of studies, family, friends, health and appearance and agitation, mood swings, loss of friends and social life, and gambling seen as a legitimate way of making money (Blinn-Pike et al., 2010; Griffiths, 2002). In addition, the characteristics of gambling addictive behavior included personal property, tolerance, withdrawal, and life dysfunction. Content validity of the primary scale was determined by measuring the relevance, clarity and comprehensiveness of the gambling addictive behavior scale for adolescents. Content validity of the scale was assessed by an expert panel of twenty academics (four professors in nursing and social work, three psychiatrists, three psychiatric specialist nurses, five clinical psychologists, five counseling teachers in schools). The experts were then asked to rate each items based on a 4-point scale. Each items was tested for content validity index above 0.80 for all questions. A pilot study was conducted to establish whether adolescents could understand and respond appropriately to the questions and to test the logistics of administering the questionnaire.

3. Measurements

1) Addictive personality

Addictive personality was measured using a subscale (addiction scale) of the Eysenck personality questionnaire (EPQ), which was standardized by Lee (1997). This comprises 19 items, which each item is recorded into 2 categories: yes or no. Higher scores indicate greater levels of addiction. Reliability is supported by moderately high internal consistency for adolescents (Lee). In the time of the development sample, internal consistency was obtained, Cronbach's $\alpha = .82$. In the present sample, it was obtained, Cronbach's $\alpha = .81$.

2) Self-control

Self-control was measured using a Gottfredson and Hirschi's (1990) self-control scale, which was reconstructed by Nam and Ok (2001). This comprises 20 items of which the subjects record the degree of self-control experienced during the past week on a 4-point scale ranging from

strongly disagree to strongly agree. Higher scores indicate greater levels of self-control. Reliability is supported by moderate internal consistency at the time of development, Cronbach's $\alpha = .75$. In the present sample, internal consistency was obtained, Cronbach's $\alpha = .80$.

3) Irrational gambling belief

Irrational gambling belief was measured using a Lee's (2003) irrational gambling belief scale, which was reconstructed by Kwon, Kim and Choi (2006). The irrational gambling belief scale consists of 10 statements that evaluate individuals' irrational belief of gambling. Each item is rated on a 5-point scale ranging from strongly disagree to strongly agree, so that higher scores indicate greater levels of irrational gambling belief.

Reliability is supported by moderately high internal consistency by Kwon et al. Cronbach's $\alpha = .89$. In the present sample, internal consistency was obtained, Cronbach's $\alpha = .91$.

4) Gambling behavior

Gambling behavior was measured using a Kwon et al. (2006) gambling problem scale, which was reconstructed by Kim (2009). This comprises 7 items, of which the subjects record the frequency of gambling experienced during the past week on a 6-point scale ranging from strongly disagree to strongly agree. Higher scores indicate greater levels of gambling. The subjects were divided into two groups according to total scores: gambler group (over 21) and non-gambler group (below 21).

In the time of development sample, internal consistency was obtained, Cronbach's $\alpha = .74$. In the present sample, it was obtained, Cronbach's $\alpha = .88$.

4. Data analysis

The analysis were carried out using SPSS version 19.0 for Windows. Descriptive statistics were used to analyze the characteristics of the sample. Principal component analyses evaluated factor structure using varimax rotations. Cronbach's alpha evaluated internal consistency for the items comprising the gambling addictive behavior scale. To assess convergent validity of the gambling addictive behavior scale for adolescents, correlations were conducted between gambling addictive behavior scale for adolescents and other variables. The scale analyses evaluated classification by using ROC curve.

RESULTS

1. General characteristics of the subject

The participants in this study were 177 (59.2%) male students and 122 (40.8%) female students. The participants were also divided into 131 (43.8%) students in middle school, 92 (30.8%) students in academic high schools and 76 (25.4%) students in vocational high school. The level of the participants ranged from the first grade in the middle school to the third grade in the high school and was dispersed as follows: 40 (13.4%) students of the first grade in the middle school, 42 (14.0%) students of the second grade in the middle school, and 49 (16.4%) students of the third grade in the middle school, 51 (17.1%) students of the first grade in the high school, 64 (21.4%) students of the second grade in the high school, and 53 (17.7%) students of the third grade in the high school. The top one-third of the study was 101 (33.8%) students, the middle 113 (37.8%), and the bottom 85 (28.4%). 21 (7.0%) students ranked at the top for household income (four million won per month), 168 (56.2%) students ranked in the middle for household income (from two million to four million per month), and 110 (36.8%) students were from low income families (under two million per month). 145 (48.5%) students were religious and 154 (51.5%) students did not have any religion.

2. Validity of the scale

1) Construct validity

Construct validity was supported in the factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was .93. Bartlett's test of sphericity was statistically significant ($p < .001$), showing that there were some relationships among the variables. The factors were subjected to varimax rotation to maximize the dispersion of the loadings within factors so that loading a smaller number of variables more highly into each factor results in a more interpretable cluster of factors (Field, 2000).

Factor analysis showed that a four-factor was the most appropriate approach. All 25 items had factor loading greater than 0.4. The basic assumptions were satisfied with the value of factor loading (Lee & Kim, 2002). And these four-factors explained 54.9% of the variance. Factor 1 (loss of control) accounted for 17.5% of the variance (eigen value = 4.37), factor 2 (life dysfunction from problem gambling) accounted for 32.7% of the accumulative variance (eigen value = 3.80), factor 3 (gambling experience) accounted for 44.8% of the accumulative variance (eigen

value = 2.78) and factor 4 (social dysfunction from problem gambling) accounted for 54.9% of the accumulative variance (eigen value = 2.47). Factor 1 had nine items, factor 2 had four items, factor 3 had seven items and factor 4 had five items. Factor loadings are shown in Table 1. factor analysis for final items.

2) Convergent validity

The correlation between gambling addictive behavior of adolescents and addictive personality, self-control, irrational gambling belief and gambling behavior are shown in Table 2. Results showed evidence of convergent validity with gambling addictive behavior of adolescents score correlating significantly with related variables. Significant positive correlations were established with the addictive personality, irrational gambling belief and gambling behavior towards gambling addictive behavior of adolescents. Significant negative correlations were established with self-control towards gambling addictive behavior of adolescents. All correlations were significant at .01 level (two-tailed).

3. Reliability of the scale

Cronbach's alpha for the overall scale was .94. Reliability was also found for each of the four subscales: Factor 1 (Cronbach's alpha = .90); Factor 2 (Cronbach's alpha = .89); Factor 3 (Cronbach's alpha = .88); Factor 4 (Cronbach's alpha = .90).

4. Classification according to the scale

Table 3 shows the ROC statistics for the scale hypothesized to demonstrate the significant differences among classification groups. Adolescents were classified as problem gambling group, non-problem gambling group and non-gambling group according group to the addictive personality score. The problem gambling group was defined as adolescents who reported having gambled every days and having somatic and symptoms with tolerance and withdraw. The problem gambling group according to the addictive personality score had the largest combined sensitivity and specificity, and exhibited the largest area under curve (AUC), which was .74 (95% confidence interval, CI : 0.66-0.81, $p < .001$). The sensitivity of the problem gambling group using a cut-off of 70 and specificity was 76%. The non-problem gambling group according to the addictive personality score had the largest combined sensitivity and specificity, and exhibited the largest AUC, which was .75 (95% confi-

Table 1. Factor Analysis for Final Items

(N = 299)

Factors (no of items)	Items	Factor loading	Eigen values	Accumulative variance (%)
Loss of control (9)	14. I gamble repeatedly in order to feel the excitement I feel when I partake in gambling activity.	.79	4.37	17.5
	15. I get excited just thinking about gambling.	.79		
	18. I usually think of gambling.	.79		
	13. I borrow money or bet my things for gambling.	.76		
	12. I gamble again to get my money back.	.69		
	17. I spend more and more time gambling.	.59		
	19. I get depressed or irritated if I can not gamble.	.53		
	20. I spend money on gambling without paying for necessary things.	.43		
	11. I introduce gambling to my friends or ask them to gamble together.	.43		
Life dysfunction from problem gambling (4)	33. I miss school because of my gambling addictive behavior.	.86	3.80	32.7
	29. I have health problems such as stress, anxiety, and lack of sleep because of my gambling addictive behavior.	.80		
	23. I do not leave a place all day to gamble.	.63		
	26. I sleep fitfully because of gambling related thoughts or gambling debts.	.51		
Gambling experience (7)	2. I play online gambling such as Go-Stop(Korean card game), Poker or Roulette.	.72	2.78	44.8
	5. I play Go-Stop game.	.61		
	7. I play Jjal-Jjal-Ee (Korean coin guessing game) with my friends.	.59		
	16. I have little time to play other things or to do activities except for gambling.	.58		
	4. I play card games such as One-card, Yu-Gi-Oh, or Poker.	.44		
	8. I bet money on billiards or soccer with friends.	.43		
	6. I play machine games in the convenience store near my school.	.40		
Social dysfunction from problem gambling (5)	22. It is hard for me to pass by a PC room, billiards room, or amusement arcade without stopping by.	.60	2.47	54.9
	9. I spend money or culture gift cards for gambling.	.59		
	30. I tell lies to parents or family members because of my gambling addictive behavior.	.54		
	32. I fret easily to close friends or those around me over nothing because of gambling.	.42		
	11. I bet money or prizes for gambling beyond my pocket money.	.41		

Table 2. Correlation of Gambling Addictive Behavior for Adolescents with related Variables

(N = 299)

Variables	Addictive personality	Self-control	Irrational gambling belief	Gambling behavior*
	r (p)	r (p)	r (p)	r (p)
Self-control	-.54 (<.001)			
Irrational gambling belief	.45 (<.001)	-.39 (<.001)		
Gambling behavior*	.52 (<.001)	-.49 (<.001)	.35 (<.001)	
Gambling addictive behavior for adolescents	.55 (<.001)	-.49 (<.001)	.29 (<.001)	.59 (<.001)
Loss of control	.57 (<.001)	-.59 (<.001)	.36 (<.001)	.33 (<.001)
Life dysfunction from problem gambling	.49 (<.001)	-.39 (<.001)	.24 (<.001)	.62 (<.001)
Gambling experience	.51 (<.001)	-.50 (<.001)	.29 (<.001)	.71 (<.001)
Social dysfunction from problem gambling	.41 (<.001)	-.36 (<.001)	.23 (<.001)	.34 (<.001)

*Value of Kim (2009)'s scale.

Table 3. Sensitivity and Specificity according to ROC Curve

(N = 299)

Groups	Addictive personality score cutoff	Sensitivity	Specificity	AUC	p
Problem gambling group	70	.69	.76	.74	<.001
Non-problem gambling group	42	.68	.73	.75	.001
Non-gambling group	32	.65	.73	.71	<.001

AUC=Area under curve.

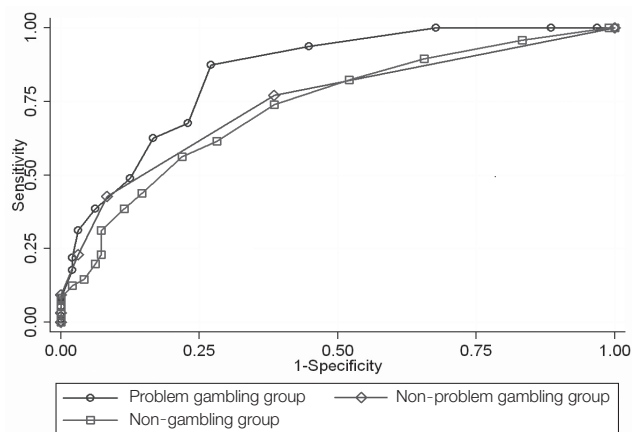


Figure 1. Classification according to the scale.

dence interval, CI : 0.62-0.87, $p = .001$). The sensitivity of the non-problem gambling group using a cut-off of 42 and specificity was 73%. The non-gambling group were defined as adolescents who reported not having gambled in the previous any times. The non-gambling group according to the addictive personality score had the largest combined sensitivity and specificity, and exhibited the largest AUC, which was .71 (95% confidence interval, CI : 0.65-0.82, $p < .001$). The sensitivity of non-gambling group using a cut-off of 0 and specificity was 73% (Figure 1).

DISCUSSION

This study was designed to develop a measure that could identify adolescent problem gamblers in Korea. This study examined the validity and reliability of the gambling addictive behavior scale for adolescents.

Validity pertains to determine whether a scale instrument is able to make an accurate scale (Kadioglu, Susman, & Ergun, 2012). In this study, we used content, construct and convergent validity.

Content validity measures the comprehensiveness and representativeness of the content of a scale (Kadioglu et al., 2012). Lynn (1986) and Kadioglu et al. has proposed that a content validity index of at least 83% is required for an acceptable level of content validity. In our study, the overall content validity index was 94.3%, which signified that the scale has a good content validity.

Construct validity is based on the extent to which a test measures a theoretical construct or trait (Haber & Lobiondo-Wood, 2006). In this study, we excluded five items from the original scale. However, the factor load was above the set point of .40 for all selected items. The number of items for the four subscales which were loss of control, life dysfunction from problem gambling, gambling experience, and social dysfunction

from problem gambling was 4-9. Therefore, the basic assumptions were satisfied with the number of items for each of the factors and should be included in at least three or more variables (Lee & Kim, 2002). Subscales were used in this study because there was a difference in the number of questions. To determine the mean score in each subscale, further research on gambling addictive behavior is necessary to obtain and analyze, and compare.

Significant positive correlations were demonstrated with other instruments assessing gambling related variables including addictive personality, irrational gambling belief, and gambling behavior. Significant negative correlations were also established with self-control. So convergent validity is enough in this study.

In our study, Cronbach's alpha for the overall scale was .94. To measure the social scientific concept of the tool using questionnaires, Ryu (2006) suggests that reliable confidence should be more than 0.70. This study resulted in a 0.90 confidence rating and so therefore, the reliability of the developed scale in this study should not be neglected. The high level of internal consistency for the entire scale indicated that computing the total score is appropriate and useful for research and screening activities and assisting in planning a gambling prevention program. However, because the data used in this study was cross-sectional in nature, it does not assess the sensitivity of the scale to changes over time. Future studies need to determine the test-retest reliability of the 25-item scale, whether or not the scores change over time and where it is sensitive to change date in this scale, due especially to the result of a successful gambling prevent program.

The total scale score has the ability to discriminate among problem gamblers, non-problem gamblers and non-gamblers depending on the CPCI score by ROC curve analysis. Classification of gambling addictive behavior by ROC curve analysis assesses the manner in which a scale classifies categories of adolescents on the basis of selected cut-off scores (Watson et al., 2011). However, given the cross-sectional nature of the data, future studies need to explore why this scale is distinct from others.

The findings should be viewed in light of the limitation of the study. The results can be only generalized to 4 cities in Korea. In other words, it may not be fully generalized to the Korean adolescent population. Despite the limitations, the present findings suggest the scale is an appropriate one for assessing gambling addictive behavior of adolescents. Unlike pre-developed scales (Kim, 2009; Lee, 2003), this developed gambling addictive behavior of adolescents scale can improve the understanding of the youth and an unacceptable problems, then reflect their

own unique quality. This has a high validity and reliability among adolescents, which supplement the weakness of Kim's gambling behavior scale. And the scale can be used to screen potential problem gamblers in adolescents. Also, the scale can be used to evaluate prevention as well as treatment intervention programs for adolescents in Korea. There are measuring instruments for assessing gambling addictive behavior in Korea, but the measuring instruments are not sufficient for assessing adolescents. There are no classified instruments to measure adolescent gambling addictive behavior depending on the degree of gambling thus far. The development of the gambling addictive behavior scale in this study is timely under the situation that adolescent gambling addictive behavior is more common and is attracting more attention. This scale is also significant in that it is the first to analyze the ROC curve for measuring gambling addictive behaviors.

This developed gambling addictive behavior scale has a great validity and reliability which can evaluate characteristics of addictive gambling in adolescents. Using the scale developed in this study suggests that we need to develop intervention to prevent addictive gambling addictive behavior of adolescents. The study also suggests to apply the scale to test the effect of the hypothesis. In this study, a useful tool was developed to assess gambling addictive behavior among middle school, high school and general adolescents in Korea. The study suggests to develop a scale in consideration of adolescents' characteristics and development for assessing gambling addictive behavior.

CONCLUSION

In this study, the scale has a significant validity and reliability, suggesting that the scale is a useful tool to assess gambling addictive behavior among general adolescents in Korea. It is a much-needed self-report measure to help screen for adolescents with high levels of ROC curve score among a school population and explore those who may be more at risk of developing gambling problems. This will provides a step towards developing similar scales or adapting this scale for problem gamblers. More importantly, it provides the first step toward developing a gambling prevention program. Additionally the scales provide an education or guideline, and proper physical and mental health management of youth in research and practice for the promotion of education.

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