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Development of the Temptations for Gambling Questionnaire: A Measure of Temptation in
Recently Quit Gamblers

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Abstract

An important factor in understanding relapse in problem gambling is temptation to gamble. This paper evaluates the factor structure and psychometric properties of the Temptations for Gambling Questionnaire (TGQ), a new measure of temptation to gamble in 21 high-risk situations. The TGQ was administered to 101 recently-quit pathological gamblers (65 males and 36 females). Principle components analysis supported a four-factor structure, with factors representing Negative Affect, Positive Mood / Impulsivity, Seeking Wins or Money, and Social Factors. Construct validity of the scale was supported by the consistency of the factors with social learning theory, Marlatt's cognitive behavioral model of relapse, and prior research on gambling relapse. Internal consistency of the TGQ and its factors was strong ($\alpha = 0.80$ to 0.91). The TGQ holds promise as a reliable and valid measure of temptation to gamble.

Keywords: temptation to gamble, relapse, pathological gambling, scale development, reliability, validity.

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INTRODUCTION

Gambling behaviour exists on a continuum, from occasional gambling with no associated problems to increasingly problematic gambling to pathological gambling. Base rate estimates of pathological gambling range from 1.5% (National Research Council [NRC], 1999) to 3.4% (American Psychiatric Association [APA], 2000). Inclusion of problem gamblers suggests that 15% of individuals will experience some degree of gambling problems in their lifetime (Smith & Wynne, 2002). A number of models have been proposed to account for the development of gambling problems, falling into the domains of biological, psychological (e.g., emotional, behavioural, cognitive, personality), or social explanations. Research on relapse to gambling has identified biological, psychological, and social factors that potentially contribute to individual vulnerabilities to relapse. Of these, factors in the cognitive, behavioural, and social domains may be particularly important, as these may be more amenable to modification for relapse prevention than would be personality or biological variables.

One well-studied model of relapse is based on cognitive-behavioural principles. Marlatt's relapse model (Larimer, Palmer & Marlatt, 1999) proposes that relapse can be precipitated by two classes of factors: *Immediate Determinants* and *Covert Antecedents*. Immediate determinants include specific high-risk situations (e.g., negative mood, interpersonal conflict, or social pressure); outcome expectancies (e.g., stress reduction effects or mood elevating effects of substance use or gambling); and coping skills. Coping skills determine whether relapse occurs during a high-risk situation, and affect one's sense of self-efficacy. That is, individuals who have coped successfully in the past have been found to develop greater self-efficacy about coping with

temptations in the future (Larimer, Palmer, & Marlatt, 1999). In the domain of covert antecedents to relapse in Marlatt's model are factors that indirectly influence relapse, such as general stress and cognitive factors (e.g., rationalization of addictive behaviour, denial of the problem, or temptations). Marlatt's model was originally developed to explain relapse to substance use. Of the factors included in Marlatt's model, temptation is a construct of interest, as it appears to be a major impediment to maintaining abstinence. There have been reports that the use of coping strategies for managing immediate and covert antecedents is associated with successfully terminating a relapse (Moser & Annis, 1996), and relapse prevention programs focused on developing strategies to manage identified high risk situations have been developed (Annis & David, 1991). The role of temptation per se in the substance use research literature has received less attention.

Research on temptations has shown that urges to drink can be influenced by a number of factors, termed high risk situations. High risk situations include outcome expectancies related to social information or past experience; negative emotional states; coping ability (e.g., cognitive or behavioural strategies); and social pressure (Larimer, Palmer, & Marlatt, 1999). Collins, Koutsky, and Izzo (2000) found that levels of temptation to drink and alcohol restraint (using the Temptations and Restraint Inventory) accounted for a significant (28%) proportion of variance in weekly drinking.

Support for a number of the factors associated with temptation in Marlatt's model has been sought in gambling research. Individuals with gambling disorders have been shown to display similar symptoms and pattern of disorder progression to those with substance use disorders. For example, the disorders share similar DSM diagnostic criteria, including preoccupation, physiological effects such as tolerance, use of gambling or substances to escape

negative affect, and interference with social or occupational functioning (APA, 2000). Moreover, there is a high degree of comorbidity between pathological gambling and substance use disorders (Crockford & el Guebaly, 1998). Thus, findings regarding temptation and relapse in substance use has the potential to guide research on temptation and relapse in individuals with gambling problems.

In evaluating the gambling literature, comparing results across studies can be difficult due to inconsistency in the definition of relapse. Some have defined relapse differently depending on treatment goals. For example, Brownell and colleagues (1986) specified that for a treatment goal of abstinence, return to any level of gambling (e.g., a single episode to prolonged periods of gambling) would constitute relapse. However, if the treatment goal was control or moderation of gambling, only heavy gambling might be considered a relapse. Other researchers have distinguished between a lapse and a relapse, where a lapse is defined as a single episode or very brief return to gambling, followed by return to abstinence, and a relapse is more prolonged. There is some basis for such a distinction, as some researchers have found that lapses do not invariably lead to gambling relapse, even at very long follow-up intervals of 2-9 years (Blaszczynski, McConaghy & Frankova, 1991a; Blaszczynski, McConaghy & Frankova, 1991b). However, the number of days that would constitute a lapse versus a relapse remains unclear. Marlatt's model of relapse (Larimer, Palmer & Marlatt, 1999) is less prone to this operational dilemma, as it characterizes relapse as a "transitional process" (p.151). That is, a single episode would be considered an earlier stage of a relapse than a month of regular gambling.

A recent study evaluating precipitants to relapse in recently-quit pathological gamblers, (Hodgins & el-Guebaly, 2004) demonstrated that cognitions about winning and a drive to make money frequently contributed to their urges to gamble. In addition, positive and negative

emotions were equally likely to precede a relapse. In contrast to Marlatt's taxonomy of relapse, which has been applied to a variety of addictive behaviours, Hodgins and el-Guebaly found that cognitive and financial factors were more salient in leading to relapse, while Marlatt has found that intra and interpersonal negative emotions were predominant. Use of gambling as a means of escape from boredom or negative circumstances has also been demonstrated (Blaszczynski & Nower, 2002; Diskin & Hodgins, 1999; 2001), suggesting that boredom or negative emotion may lead to urges to gamble. In a prospective study of gambling urge and precipitants to relapse using ecological momentary assessment, Sorbo, Hodgins, and Holub (2002) found that a number of factors influenced urges to gamble. The most common of these were wanting to escape, being in a good mood, feeling anxious or tense, and interpersonal factors. Regarding treatment, relapse prevention programs involving developing strategies for dealing with high risk gambling situations have been successful (Echeburua, et al, 2000), but such programs tend not to focus explicitly on dealing with temptations themselves.

The relapse study of pathological gamblers (Hodgins, el-Guebaly & Armstrong, 2001) also examined temptations as a relapse factor. This study assessed individuals' reasons for engaging in gambling (i.e., terminating abstinence) and the relative importance of those reasons; measured individuals self-efficacy (confidence to not gamble) and their degree of temptation to gamble. At the time of the study, self-report measures of self-efficacy and temptation in gambling were unavailable. Self-efficacy scales have been developed for alcohol use, such as the Alcohol Abstinence Self-efficacy Scale (AASE; Di Clemente, et al., 1994) and the Controlled Drinking Self-Efficacy Scale (Sitharthan, et al., 2003) and for other drugs (e.g., the Self-efficacy List for Drug Users by van der Weert, et al., 2000). Little gambling research has focused on

measuring the construct of temptation. Thus, a measure of self-efficacy and a measure of temptation were developed for the current study.

The Gambling Abstinence Self-efficacy Scale (GASS) was developed as a measure of individuals' confidence that they would not gamble in specific high-risk situations. The GASS is a 21 item self-report scale measuring level of confidence that one will not gamble in high-risk situations such as negative mood state or when invited to gamble. Confidence is rated on a 6-point Likert-type scale ranging from 0 (Not at All Confident) to 5 (Extremely Confident).

Analysis of the factor structure of the GASS revealed that the scale is comprised of four factors representing *Winning/ External Situations*, *Negative Emotion*, *Positive Mood/ Testing Urges*, and *Social Factors* (Hodgins, Makarchuk, & Peden, submitted). The GASS was found to have strong internal consistency reliability ($\alpha = 0.93$) and has shown some evidence of predictive validity. For example, self efficacy as measured by GASS scores had significant negative relationships with days spent gambling and moderate relationships with self reported confidence in remaining abstinent (Hodgins, Peden & Makarchuk, 1999).

The Temptations for Gambling Questionnaire (TGQ) was also developed for the relapse study. As temptation and self-efficacy are thought to be related (Stephens, Wertz, & Roffman, 1995), the TGQ was written as a parallel to the GASS, assessing individuals' temptation to gamble in the same 21 high-risk situations assessed by the GASS. Temptation is rated from 0 (Not at All Tempted) to 5 (Extremely Tempted). Determining the factor structure of the TGQ is of interest in assessing the validity of information gathered in the study of gambling relapse, and because these measures have the potential to inform gambling theory. Furthermore, these measures have potential clinical utility in relapse-prevention-based treatment strategies for

gambling problems, where identifying high-risk situations and developing skills to counter temptation are key approaches (Larimer, Palmer & Marlatt, 1999).

This paper presents an analysis of the factor structure of the TGQ. As the Temptations for Gambling Questionnaire was written to parallel the GASS, and as the construct of temptation has been found to be moderately correlated with self-efficacy (Stephens, Wertz & Roffman, 1995), the TGQ is hypothesized to parallel the four-factor structure of the GASS. However, as temptation and self-efficacy remain distinct constructs, and as the theoretical support for models of gambling relapse is in the early stages, it was recognized that some differences in scale structure could exist. Thus, it was anticipated that the two constructs would be moderately correlated. The goals of the current study were to 1) evaluate the factor structure of the TGQ; 2) compare the factor structure of the TGQ to the GASS; and 3) provide information on the reliability and validity of the TGQ.

METHODS

Data for the analysis of the Temptations for Gambling Questionnaire came from the study of gambling relapse described above. Further details regarding the methodology of the relapse study can be found in Hodgins and el-Guebaly (2004).

Participants

One hundred and one participants (65 males and 36 females) were recruited via media advertisements soliciting volunteers who had recently stopped or cut back gambling. The mean age of the sample was 39.2 ($SD = 0.1$) years and mean grade level of education was 11.7 ($SD = 0.8$) years. Of those with some post-secondary education, the mean number of years was 1.8 ($SD = 2.1$). Demographic characteristics of the sample are summarized in Table 1. The mean score on the SOGS was 12.2 ($SD = 3.4$), which indicates a substantial level of gambling problems. 89%

of participants met DSM-IV criteria for Pathological Gambling (APA, 2000). Participants reported experiencing a mean of five years of problem gambling ($SD = 7$). With regard to type of gambling involvement, 49% reporting problematic involvement with video lottery terminals (the most accessible type of gambling locally); 12% reported problems with casino games. And an additional 34% reported problems with both VLTs and casino games. 25% of individuals were currently involved in some form of gambling treatment or Gamblers Anonymous.

Of the original sample, 35 % of participants ($n = 35$) were recruited to complete a two to three-week retest reliability follow-up ($M = 22$ days, $SD = 8.4$), and these data were used for test-retest reliability analyses. There were no significant differences on demographic or gambling history variables between the 35 participants that were re-tested and the remainder of the 101 participants in the original sample.

Procedures

All participants received a baseline interview lasting about 90 minutes, in which a detailed assessment of gambling behaviour, personality traits, mood and substance use disorders, and standardized assessment of gambling problems and factors contributing to relapse (e.g., reasons for gambling, self-efficacy, and temptations to gamble). Participants were included if they met criteria for *Probable Pathological Gambler* (total score > 4) on the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1995); had gambled within the past four weeks; and were willing to provide the names of three individuals to act as collateral sources for validation purposes. Participants were randomly assigned to one of two conditions, *Retrospective* or *Prospective*. The Retrospective group received follow-up face-to-face interviews and assessments at 1, 3, 6, and 12 months, while the Prospective group received weekly phone calls in addition to the face-to-face sessions at the follow-up intervals listed above.

Assessment Instruments

Demographic information was collected, including age, sex, marital status, ethnicity, education level, income, and occupation. Substance use and mood disorders were assessed with the Substance Use and Mood Disorders Schedules of the Structured Clinical Interview for Diagnosis (SCID-R - DSM-IV; Spitzer, et al., 1990). Gambling history was collected by interview and problem gambling was objectively assessed with the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1995). The Socialization Scale of the California Psychological Inventory (Gough, 1996), the Reasons for Gambling Scale (Hodgins, el-Guebaly, & Armstrong, 2001), the Gambling Abstinence Self-efficacy Scale (GASS; Hodgins, Makarchuk & Peden, 1999) and the Temptations for Gambling Questionnaire were also administered at each session.

Data analysis

The construct validity of temptation as measured by the TGQ was estimated by inspecting the content of the components extracted from the principal components analysis and comparing this with Marlatt's categorization of relapse (e.g., representing negative mood, interpersonal conflict, social pressure, stress reduction effects or mood elevating effects of gambling, lack of coping skills, rationalization of addictive behaviour, or denial of the problem). Convergent validity was assessed by comparing scores on the TGQ with performance on measures of gambling severity, hypothesizing that individuals who had more severe gambling problems would be likely to experience greater temptation to gamble. In addition, divergent validity was assessed by inspecting the relationship between temptation and self-efficacy. Divergent validity would be supported by findings of a negative relationship between temptation and self-efficacy.

RESULTS

Analysis of Scale Structure

Principal components analysis (PCA), using the computer program SPSS, was conducted for the Temptations for Gambling Questionnaire, replicating the analytic procedures used by Hodgins, Peden and Makarchuk (submitted). As items on the scale were written to parallel those of the GASS, the factor structure of the TGQ was hypothesized to be similar. However, as temptation and self-efficacy are distinct constructs, an exploratory factor analytic method was employed so as not to force the data into an inappropriate factor solution. Criterion for retaining items on a factor was based on Comrey and Lee's (1992, as cited in Tabachnick & Fidell, 2001) classification of factor loading: ≥ 0.71 is excellent; ≥ 0.63 is very good; ≥ 0.55 is good; ≥ 0.45 is fair; and ≥ 0.32 is poor. As the intent of this research is to develop a strong measure of temptation to gamble, a conservative level of ≥ 0.55 (good loading) was chosen for inclusion on the factor.

The data was inspected for outliers before PCA, and one item was deleted because it had a highly skewed distribution due to infrequent endorsement (Feeling physically ill or in pain). As the factors were hypothesized to be conceptually distinct, varimax rotation was used. Six components with eigenvalues greater than 1 were found, indicating that these factors were relatively stable (Diekhoff, 1992). Inspection of the varimax rotated sums of squares loadings revealed that these components accounted for 71.5% of the variance in the data. Evaluation of the content of the factors, however, revealed that the six factor solution did not form conceptually clear factors. Following the procedure used for the development of the Alcohol Abstinence Self-efficacy Scale by DiClemente, et al. (1994) and procedures described in Tabachnick and Fidell (2001) and Diekhoff (1992) the scree plot was inspected as an aid to

determining the number of factors. Inspection of the scree plot suggested that three to six factors could be retained. Six, five, four and three factor solutions were examined. The four factor solution was the most interpretable from a theoretical standpoint. Similarly, the previous principal components analysis of the Gambling Abstinence Self-efficacy Scale identified four factors that accounted for 66% of the variance. The TGQ was intended to function as a parallel measure to the GASS. Thus, based on the theoretical consistency of the items on each of the factors and the consistency of the overall structure with the GASS, a four factor solution was deemed to be most interpretable and parsimonious on both statistical and conceptual grounds.

After initial analysis, two additional items were deleted from the scale. Two were eliminated because they failed to load greater than or equal to 0.55 on any factor (When I have the opportunity to gamble, I just have to give in; When I didn't care anymore). Inspection of communalities for the analysis of the remaining 21 items revealed that all items met or exceeded the criterion of ≥ 0.4 (Tabachnick & Fidell, 1996/2001). Table 2 contains the factor loadings on the four components after varimax (orthogonal) rotation. Each component contained at least three items, supporting stability of the factor from the standpoint of number of items (Tabachnick & Fidell, 2001). Comparison of the content of the four factors of the GASS with the proposed four factors of this scale revealed a high degree of content consistency. Based on the item content, the four factors were named *Negative Affect*, accounting for 21% of the variance; *Positive Mood/Impulsivity*, accounting for 16% of the variance; *Seeking Wins or Money*, accounting for 13% of the variance; and *Social Factors*, accounting for 12% of the variance. A total of 62% of the variance was accounted for by the four factors.

Structural Equation Modeling

The relationships between the GASS and the TGQ were compared. It was anticipated that the factor structure of the two scales would be consistent. That is, that both temptation and self-efficacy would be comprised of four factors similar in content, and that the two constructs would be negatively related. Pearson zero-order correlation analyses confirmed that these constructs are moderately correlated ($r = -0.52, p \leq 0.01$), indicating that low levels of temptation are associated with greater self-efficacy and vice versa. Structural equation modeling was conducted using the LISREL program. The path diagram appears in Figure 1. In the model, each of temptation and self-efficacy are composed of factors representing social factors, negative mood, positive mood, and drive for money / wins.

The analysis of the model indicated a good fit between the hypothesized model and the data ($\chi^2(19, N=101) = 80.8, p = 0.00$). The Root Mean Square Residual was within acceptable limits at 0.08, Goodness of Fit Index was 0.86 and the Comparative Fit Index was 0.88. These latter indices are less strong, being below the conventionally used value of 0.9 or greater (Tabachnick & Fidell, 2001). The Phi matrix confirmed that temptation and self-efficacy are significantly negatively related ($p \leq 0.05$). Paths from *Negative Mood*, *Positive Mood*, *Money/Chasing*, and *Social Factors* to temptation were significant. Similarly, path coefficients *Negative Emotion*, *Positive Mood*, *Money/Winning*, and *Social Factors* to self-efficacy were significant. Inspection of the modification indices suggested the addition of a path from self-efficacy in external situations (*Money/Winning factor*) and temptation, and addition of several paths allowing the measurement error in the factors of one scale to be correlated with the error in measuring the factors of the other scale. However, none of these suggested paths could be justified by theory or conceptually, and therefore no modifications were conducted.

Reliability

Psychometric properties of the scale were assessed. Cronbach's Alpha was used as a measure of internal consistency. Following guidelines presented by Cicchetti, (1994), alphas from 0.80-0.89 were rated *good*, and values above 0.90 were rated *excellent*. In keeping with a conservative approach to this research, only values of 0.80 and greater were considered acceptable. The 21-item TGQ yielded an excellent reliability level ($\alpha = 0.91$). For the four components, values were considered good: Negative Affect $\alpha = 0.86$; Positive Mood/Impulsivity $\alpha = 0.81$; Seeking Wins or Money $\alpha = 0.86$; Social Factors $\alpha = 0.80$.

Test-retest reliability was assessed using the intraclass correlation coefficient (ICC), computed between the TGQ scores at initial and follow-up periods. Using interpretive guidelines provided by Cicchetti (1994), 0.60-0.74 were rated *good*, and 0.75-1.00 were considered *excellent*. Test-retest reliability analyses were conducted on a subset of the sample ($n = 35$). The mean retest interval was 22.2 days ($SD = 8.4$ days). The average Intra-Class Correlation Coefficient (ICC) for the total score was 0.92. For *Negative Affect* the ICC value was 0.90; for *Social Factors, Positive Mood/Testing, and Seeking Wins/Money*, $ICC = 0.91$. This analysis indicates that participants' ratings of temptation were stable across the 3 week interval.

Validity

Criterion-related validity was inspected by examining the correlation between the TGQ total score and degree of gambling severity as measured by the SOGS questionnaire. Total scores on the TGQ were significantly correlated with the SOGS total score ($r = 0.21, p \leq 0.05$), indicating a moderate relationship. Divergent validity was demonstrated by a moderate negative correlation between the TGQ total score and the GASS total score ($r = -0.52, p \leq 0.01$), confirming that the two scales measure opposite constructs. To assess the construct validity of the TGQ, the factor structure was compared to recent research on factors associated with relapse

in general (i.e., Marlatt's model) and literature on gambling relapse specifically. All factors were consistent with the main reasons for relapse identified by Hodgins and el-Guebaly (2004), namely, positive and negative mood, a drive to win, and social factors.

DISCUSSION

One goal of this research was to assess the factor structure of the Temptations for Gambling Questionnaire and to evaluate its psychometric properties. Exploratory factor analyses supported a four-factor solution, with the total scale accounting for 62% of the variance. The factors represented *Negative Affect*, *Positive Mood/Impulsivity*, *Seeking Wins or Money*, and *Social Factors*. Although the sample size was small for the purposes of factor analysis, the factors made conceptual sense and accounted for a practically significant amount of variance. This suggests that temptation to gamble, and therefore risk of relapse, is greatest under four conditions – positive mood, negative mood, social stresses or pressures, and financial motivations (winning or making money). These are factors that are known to be associated with higher risk for relapse to gambling. This research suggests that temptation to gamble may mediate whether a high risk situation will actually lead to relapse.

A second goal of the research was to compare the factor structure of the scale with the factor structure of the GASS. This was accomplished using a structural equation modeling program (LISREL). The results suggested that the model relating temptations to self-efficacy (see Figure 1) and the factors to the latent constructs of temptation and self-efficacy was a good fit. Thus, the two scales appear to be parallel but not redundant. That is, temptation and self-efficacy are correlated to a moderate degree and appear to be separate constructs. Several modifications to the path model were suggested on statistical grounds. Most of these suggested modifications revolved around allowing the error terms of the subscales to be correlated with the

error associated with the subscales of the other scale. As none of these changes to the path model could be justified conceptually or on the basis of theory and current knowledge about temptation in gambling, no modifications were made.

Psychometric Properties of the TGQ

Both reliability and validity of the TGQ were assessed. Reliability measures for the scale, as assessed by Cronbach's alpha, were promising. The scale as a whole ($\alpha = 0.91$) had excellent reliability and the four components displayed good reliability levels ($\alpha = 0.80-0.86$). These findings suggest that the TGQ possesses a high degree of internal consistency. Test-retest reliability was also strong (0.90), suggesting that individuals scored at similar levels across time. This could indicate that feelings of temptation to gamble are stable across time, suggesting that they may remain a risk for relapse if not targeted for intervention.

Construct validity of the TGQ was assessed. It was not possible to assess construct validity by comparison with pure measures of gambling urge, as no such self-report scale currently exists. Instead, this task was accomplished by conceptual comparison with theoretical ideas (i.e., Marlatt's taxonomy) and empirical findings on factors leading to temptation to gamble. The factor content on the TGQ was consistent with some of the categories included in Marlatt's taxonomy (Larimer, Palmer & Marlatt, 1999), though not all of Marlatt's factors were represented. That is, Marlatt's high-risk situations for relapse involving Negative Emotional States (including anger, frustration, and anxiety), Social Pressure or Interpersonal Difficulties, and Positive Emotional States (including positive mood and non-specific cravings) were supported by the current study. This suggests that factors affecting relapse in gambling are similar to those in substance use relapse. A more complete comparison was not possible, as the TGQ did not assess all aspects of precipitants to relapse that are included in Marlatt's model.

In line with etiological models of gambling problems, the presence of a Social Factors component on the TGQ was consistent with the known role of social learning in gambling behaviour. Social learning theory predicts that processes such as modeling and verbal persuasion can influence behaviour and temptation. These processes were represented by scale items that loaded on the Social Factors component, such as seeing others gamble and being invited to gamble. Moreover, research in gambling relapse indicated that the negative mood and positive mood factors accounted for a practically significant proportion of variance on the TGQ, consistent with the finding that both negative and positive mood can precede a relapse to gambling (e.g., Hodgins & el-Guebaly, 2004). Last, the appearance of a factor related to winning and finances was consistent with the findings of Hodgins and el-Guebaly that relapses were frequently preceded by thoughts about winning and a drive to make money. This consistency between empirical knowledge about precipitants to relapse and the factor structure of the TGQ provides support for the construct validity of the subscales of the TGQ.

Establishing construct validity of the scale is an essential step in scale validation, and can be assessed once the reliability of the scale has been established. Construct validity assessment begins with determining that the scale reflects the theory of the construct of interest (Clark & Watson, 1998; Dawis, 1998; Kazdin, 2003). Further support is then gathered from other types of validity. For example, the finding that temptations and self-efficacy are negatively related (divergent validity) support construct validity because these constructs should theoretically be opposite. The consistency of the components of the Temptations for Gambling scale with social learning theory and with Marlatt's model of relapse, divergence with provides preliminary support for the scale's construct validity. However, construct validity is a multidimensional

concept, incorporating a number of aspects of validity (Kazdin, 2003). Thus, support for the construct validity of the TGQ in the present study can only be considered preliminary.

Limitations of this Research

Subsequent research must be conducted to provide stronger empirical support for construct validity, including relationship of other variables known to be related to temptation (convergent validity) and the relationship between temptation and relapse to problem gambling (predictive validity). In addition to the above, whether the predictive and convergent relationships hold when the TGQ is applied to clinical, rather than research, populations will provide information on the external (ecological) validity of the scale.

For the analyses using structural equation modeling, the Goodness of Fit (GFI) statistic was below the guideline of ≥ 0.90 at 0.87. However, a number of other indicators of fit were in the acceptable range, and it is likely that small sample size relative to the number of estimated paths was a problem. Seventeen parameters were estimated (ratio of 6:1), and a commonly accepted rule of thumb for sample size is 10 data points per parameter (Tabachnick & Fidell, 2001). It is anticipated that a more stable solution would be found with a larger sample.

Several limitations to this research are noted here. First, the sample size of 101 is small for scale construction, as a rule of thumb is generally 10 data points per scale item (Tabachnick & Fidell, 1996/2001). A statistical limitation of this study is the sole use of exploratory factor analytic techniques. The four-factor solution determined in this analysis is consistent with previous literature on similar constructs (Di Clemente, Carbonari & Montgomery, 1994; Hodgins, Peden & Makarchuk, submitted) and is conceptually interpretable.

Directions for Future Research

Scale development is an iterative process. With regard to continued scale validation, an important next step would be validation of the four factors by convergent validation using measures specific to the construct measured by the factors. For example, the *Social Factors* component of the TGQ could be validated by using a scale specifically measuring social factors leading to temptation and relapse, interview data with gamblers, or observational methods. Further research should also focus on the predictive validity of the TGQ, whereby the degree to which the TGQ predicts likelihood of relapse to gambling would be very useful from both a research and a clinical perspective.

Applications of the Temptations for Gambling Questionnaire (TGQ) include clinical practice as well as theoretical and empirical research. Regarding clinical applications, the TGQ can be integrated into existing interventions for relapse prevention such as cue-exposure strategies. Cue exposure involves developing coping skills and desensitizing individuals to the cues (emotional states or other high-risk situations) that represent temptation to terminate abstinence (Marlatt, 1990), and the TGQ could be used to identify the relative importance of the factors leading to temptation. Relapse prevention strategies involving cue exposure have been tested with pathological gambling, and one year follow-up data suggests that these strategies are effective (Echeburua, Fernandez-Montalvo & Baez, 2000). In future research applications, the TGQ could be used to track level of temptation before and after clinical intervention.

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Table 1

Summary of Demographic Characteristics of the Sample (N = 101)

| Variable | Percentage |
|-------------------------------|---------------------|
| Marital Status | |
| Never married | 37.6 |
| Married / Common Law | 28.7 |
| Separated / Divorced | 33.6 |
| Occupation | |
| Student | 2.0 |
| Lesser Professional | 17.8 |
| Clerical/Sales | 22.8 |
| Skilled / Semi-skilled Manual | 35.7 |
| Unskilled | 19.8 |
| Employment Status | |
| Full Time | 55.4 |
| Part Time | 11.9 |
| Retired | 2.0 |
| Unemployed | 21.8 |
| Ethnicity | |
| Caucasian ¹ | 89.1 |
| East-Indian | 1.0 |
| Aboriginal Canadian | 2.0 |
| Variable | Mean (SD) |
| Annual Income | \$34, 000 (\$2,300) |
| Number of Children | 1.1 (1.3) |

1. Canadian, French Canadian, German, Irish, Scottish, British

Table 2

Rotated factor loadings on the four components extracted by Principle Components Analysis of the Temptations for Gambling Scale

| Item | Component Loading* | | | |
|--|--------------------|------|------|------|
| | 1 | 2 | 3 | 4 |
| 1. Feeling angry or frustrated with myself or because things were not going my way | 0.72 | | 0.44 | |
| 3. Feeling anxious or tense | 0.67 | 0.43 | | |
| 4. Feeling sad | 0.67 | | | |
| 5. Feeling physically uncomfortable because I want to gamble | 0.61 | | | |
| 10. Feeling angry or frustrated because of my relationship with someone else | 0.80 | | | |
| 11. Being with others having a good time, and we felt like gambling together | 0.63 | | | |
| 12. Feeling worried or tense because of my relationship with someone else | 0.66 | | | |
| 13. Feeling other were being critical of me | 0.66 | | | 0.41 |
| 21. When I wanted to escape from my thoughts and feelings | 0.56 | | | |
| 2. Feeling Bored | 0.40 | 0.56 | | |
| 6. Being in a good mood | | 0.76 | | |

Rotated factor loadings on the four components extracted by Principle Components Analysis of the Temptations for Gambling Scale, continued

| Item | Component Loading* | | | |
|---|--------------------|------|------|------|
| | 1 | 2 | 3 | 4 |
| 7. Wanting to see what would happen if I gambled just a little | | 0.57 | 0.42 | |
| 8. Feeling tempted to gamble out of the blue | | 0.77 | | |
| 17. An opportunity to gamble happened out of the blue | | 0.72 | | |
| 15. Wanting to win | | | 0.71 | |
| 16. Needing to win back past losses | | | 0.69 | |
| 18. Feeling lucky | | 0.51 | 0.56 | |
| 19. Feeling pressured by financial debts | | | 0.68 | |
| 9. Someone invited me to gamble | | | | 0.77 |
| 14. Seeing others gamble | | | | 0.76 |
| 20. When I am in a situation in which I am in the habit of gambling | | 0.41 | | 0.55 |

* Item loadings of ≥ 0.55 are considered *Good* (Comrey & Lee, 1992, as cited in Tabachnick & Fidell, 2001). Items loading < 0.55 were not included on the component. Values below 0.40 are not reported.

Figure 1.

Path model of the factor structure of the Temptations for Gambling Questionnaire.

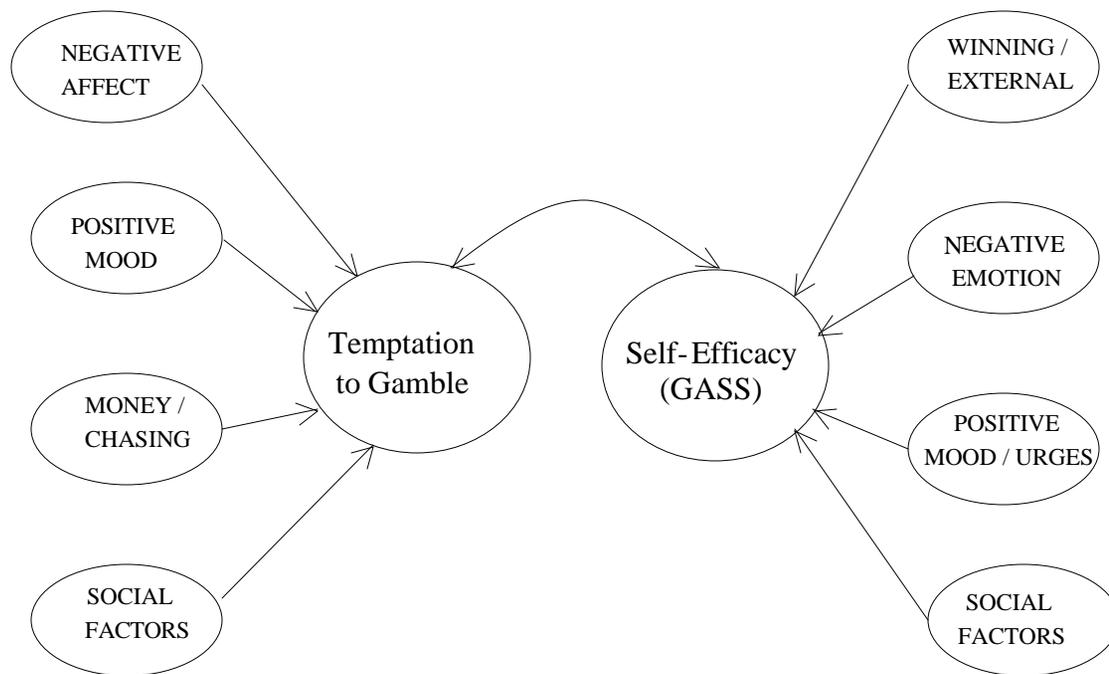


Figure Caption

Figure 1.

Path model of the factor structure of the Temptations for Gambling Questionnaire.