Validation of the Gambling Motives Questionnaire in Emerging Adults

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Abstract

People engage in gambling behaviour for a variety of different reasons, some of which are riskier than others in terms of associations with heavy and problem gambling. Stewart and Zack (2008) developed a measure called the Gambling Motives Questionnaire (GMQ) that assesses levels of three distinct gambling motives: enhancement (to increase positive emotions), coping (to decrease negative emotions), and social (to increase affiliation). While this measure has been validated in a community-recruited sample of middle-aged gamblers (Stewart & Zack, 2008), the GMQ has yet to be validated in emerging adulthood (ages 18-25 years) – a developmental period associated with increased risk for heavy and problematic gambling. The current project tested the psychometric properties of the GMQ in a community sample of emerging adult gamblers using archival data from the Manitoba Longitudinal Study of Young Adults. Participants (N = 487; 73.9% Caucasian; 52.6% female; mean age 22.23 years) completed the GMQ and questionnaire measures of gambling behaviour and problems. Exploratory factor analysis revealed that a three-factor model adequately fit the data; however, problematic items were identified. A modified 9-item version of the GMQ with the problem items removed fit the data well. Both the original 15-item and the 9-item versions had acceptable subscale alpha reliabilities (αs > .78). While all three subscales (from both the 9-item and 15-item versions) were positively correlated with problem gambling, only enhancement motives emerged as a significant independent predictor when the other motives and gambling behaviours were entered as simultaneous predictors. These results suggest the GMQ is a valid measure for tapping motives in emerging adults, and that high enhancement motives are particularly predictive of gambling problems in this developmental period. Future intervention efforts might specifically target enhancement motives in emerging adults.

Validation of the Gambling Motives Questionnaire in Emerging Adults

Risky behaviours such as excessive substance use, unprotected sex, and problem gambling peak during emerging adulthood (ages 18-25 years; Arnett, 2000). Lifetime prevalence estimates for disordered gambling fall between 2-4% in North America; however, this estimate is elevated among college students, with 6-11% meeting criteria for disordered gambling (Shaffer & Hall, 2001). Canadian research indicates that approximately 72% of college students report gambling within the last 6 months, with 1.4% meeting criteria for severe problem gambling and another 6.2% meeting criteria for moderate-risk gambling (Williams, Connolly, Wood, & Nowatzki, 2006). Community samples of emerging adults show similar prevalence rates, with 6.5% meeting criteria for at-risk gambling and another 2.1% meeting criteria for problem gambling (Welte, Barnes, Tidwell, & Hoffman, 2008). In sum, research shows that emerging adults are at increased risk for problem gambling compared to older adults (Johansson, Grant, Kim, Odlaug, & Gotestam, 2009).

Problem gambling is related to many adverse personal, social, financial, and vocational outcomes, including relationship and work problems, bankruptcy, insomnia, depression, and an increased risk for stress-related disorders (Griffiths, 2004). While problem gambling can lead to significant clinical difficulties, problem gamblers exhibit variability in their gambling behaviours and often gamble for different motivations. Thus, the present study aimed to validate a multidimensional scale of gambling motives in emerging adult gamblers.

Theory review

Although different labels have been suggested, one comprehensive review suggests the extant research converges on three distinct gambling motives: enhancement, coping, and social

(Milosevic & Ledgerwood, 2010).[1] Gamblers reporting high levels of enhancement and coping motives gamble to regulate emotional states. Gamblers with high levels of enhancement motives for gambling are also characterized by high levels of sensation seeking and impulsivity, and gamble for the "high" and feelings of excitement that gambling can create (Bonnaire, Bungener, & Varescon, 2009; Ledgerwood & Petry, 2006; Ledgerwood & Petry, 2010; Stewart, Zack, Collins, Klein, & Fragopoulos, 2008; Turner, Jain, Spence, & Zangeneh, 2008; Vachon & Bagby, 2009). In contrast, gamblers with high levels of coping motives are characterized by increased levels of depression, anxiety and neuroticism, and gamble as a maladaptive way to escape these negative emotional states (Bonnaire et al., 2009; Ledgerwood & Petry, 2006; Ledgerwood & Petry, 2010; Stewart et al., 2008; Turner et al., 2008; Vachon & Bagby, 2009). Gamblers with high levels of social motives do not gamble to regulate their emotions, and instead gamble for social affiliation (e.g., as a fun outing with friends; Milosevic & Ledgerwood, 2010). Gamblers with high levels of social motives are generally free of comorbid psychopathology and maladaptive personality traits (Bonnaire et al., 2009; Ledgerwood & Petry, 2010; Moran, 1970; Stewart & Zack, 2008; Stewart et al., 2008; Turner et al., 2008; Vachon & Bagby, 2009). In sum, gamblers vary in their primary reasons, or motives, for gambling. Gamblers with high enhancement motives attempt to maximize positive emotions, gamblers high

[1] Milosevic and Ledgerwood (2010) actually use Blaszczyski and Nower's (2002) terms of behaviourally conditioned, emotionally vulnerable, and antisocial impulsivist to represent what Stewart and Zack (2008) call social, coping, and enhancement motives for gambling, respectively. Because the present paper focuses on Stewart and Zack's (2008) model, we use their terminology throughout the paper. However, many other terms to describe these distinct motives for gambling are currently in use (Milosevic & Ledgerwood, 2010).

in coping motives attempt to minimize negative emotions, and gamblers high in social motives engage in gambling for social affiliation. Although some research attempts to subtype gamblers based on these motivations (e.g., Milosevic & Ledgerwood, 2010; Stewart et al., 2008), the current study used a dimensional framework to examine gambling motives.

Prior research

In order to distinguish between these three theoretically distinct motives for gambling, Stewart and Zack (2008) developed the Gambling Motives Questionnaire (GMQ). The GMQ has three distinct subscales of gambling motivations: Enhancement motives (e.g., "because it's exciting"), coping motives (e.g., "to forget your worries"), and social motives (e.g., "as a way to celebrate"). It was developed based on similar theory and research on motivations for drinking alcohol (Cooper, Russell, Skinner, & Windle, 1992). Stewart and Zack (2008) supported their proposed 3-factor model for the GMQ in a community-recruited sample of middle-aged adult gamblers (mean age =35.5 years, *SD* = 10.7) using exploratory factor analysis. Alpha reliabilities were > .80 for all three subscales. Additionally, enhancement and coping gambling motives were significant independent predictors of gambling behaviours and gambling problems in incremental validity analyses (Stewart & Zack, 2008). Subsequent research with middle-aged gamblers have replicated and extended the favorable psychometric properties of the GMQ. For example, Dechant and Ellery (2011) replicated the measure's 3-factor structure.

In sum, there is good preliminary support for the psychometric properties of the GMQ among middle aged adults, including internal consistency, structural validity, concurrent validity, and incremental validity. However, more work to validate this measure is needed, particularly in the emerging adult age range where problem gambling risk is highest (Johansson et al., 2009).

Hypotheses

In the present study, we tested the psychometric properties of the GMQ in a sample of emerging adults (18-25 years old). Prior gambling motives research is limited by relatively small sample sizes with an overrepresentation of male participants; the present study uses a more representative sample of emerging adults in Canada. Previous research with adult gamblers suggests that coping and enhancement (but not social) motives are positively associated with gambling behaviours and problem gambling, supporting the GMQ's concurrent validity (Stewart & Zack, 2008); however, this has yet to be examined in a normative emerging adult sample. In the present study, the incremental validity of the each GMQ subscale was also tested to determine if each motive could predict problem gambling beyond gambling behaviours and the other motives. Previous research with adult gamblers demonstrates that coping motives account for unique variance in problem gambling above gambling behaviour, and enhancement motives are related to problem gambling through increased gambling involvement (Stewart & Zack, 2008), but more research is needed with emerging adults. We had four hypotheses:

H1: Using factor analysis, we expected to find support for the theorized 3-factor model of the GMQ (factorial validity).

H2: Using Cronbach's alpha, all three factors were expected to demonstrate acceptable (> .70) levels of internal consistency (reliability).

H3: Both coping and enhancement motives (but not social motives) were expected to positively predict gambling behaviours on the PGSI when all three motives were entered in as simultaneous predictors (concurrent validity).

H4: Coping motives were expected to positively predict problem gambling on both the PGSI and the CIDI when all three motives and gambling behaviours were entered in as simultaneous predictors (incremental validity).

Method

Participants

Wave 1 of the Manitoba Longitudinal Study of Young Adults (MLSYA; Manitoba Gaming Control Commission, 2011) consisted of 679 participants. In order to participate in the study, participants were required to be in a single cohort (18-20 years old at wave 1) and consent to repeated contact over a five-year period. Participants were recruited through a variety of methods. This included random-digit dialling (16.3%), participant referrals (63.9%), placing advertisements at post-secondary institutions and VLT sites (16.2%), survey recruiting (3.1%), and casino recruiting (.5%). Participants did not necessarily have to be gamblers in order to participate in the MLSYA.

For the current study, only data from wave 4 was used because this was the only wave where the GMQ was administered. At wave 4, the sample size was 530 participants (29.1% attrition from wave 1). Moreover, 43 non-gamblers (i.e., those who did not gamble at all in the past 12 months according to the PGSI) were removed from the analyses, as they could not complete the GMQ, leaving a final sample size of $N = 487$. The majority of the sample identified as Caucasian (73.9%), had an average age of 22.2 years ($SD = 0.9$), and 52.6% of the sample was female. At wave 4, roughly half of the sample (53.4%) reported school as their main activity during the past year, while 41.7% reported mainly working; the remainder of the sample reported looking for work or “other”. The most common types of gambling reported by the sample were charity lotteries (49.4%), followed by lottery tickets (41.5%), instant win tickets (36.1%), casino slots (31.8%), VLTs at a bar or lounge (27.6%), and poker (25.1%). Gambling motive subscale means for the original 15-item version of the GMQ were lower than past samples of emerging adults (Goldstein, Stewart, Hoaken, & Flett, 2013; Stewart, Demetrioff, Ellery, & Wohl, 2011).

This may be because prior data was collected specifically from university student gamblers rather than a normative random sample as in the current study.

Measures

Gambling Motives Questionnaire (GMQ; Stewart & Zack, 2008). The GMQ is a 15-item measure of gambling motives, which was designed to measure enhancement, coping, and social motives. Each subscale is comprised of 5 items that were rated on a 4-point scale (1 = *"almost never/never"*; 2 = *"sometimes";* 3 = *"often"*; 4 = *"almost always"*). The GMQ has demonstrated favorable psychometric properties in a community-recruited sample of middle-age adult gamblers, with exploratory principal components analysis supporting the 3-factor model, and alpha reliabilities all above acceptable levels (α's ranged from .81-.91; Stewart & Zack, 2008). A full list of items can be found in Table 1.

Problem Gambling Severity Index (PGSI; Wynne, 2003). The PGSI is a 9-item subset of the Canadian Problem Gambling Index (CPGI; Ferris & Wynne, 2001) that specifically examines the extent to which an individual may be engaging in problem gambling behaviours (i.e. *"how often have you bet more than you could afford to lose?"*). Each item is rated on a 0-3 scale (0 = *"never"*, 1 = *"sometimes"*, 2 = *"most of the time"*, 3 = *"all of the time"*), and this measure was administered to all participants. The PGSI exhibits favorable psychometric properties, with a high alpha reliability (α's between 0.83 and 0.86) and concurrent validity with both the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) and DSM-IV (American Psychiatric Association [APA], 1994) criteria for problem gambling (Ferris & Wynne, 2001; Holtgraves, 2009). As in Rockloff and Dyer (2006), PGSI scores were dichotomized in the present study, such that participants were grouped as either reporting one or more gambling problems (i.e., scores of 1 – 27 were coded as 1) or reporting no gambling problems (i.e., scores

of 0 were coded as 0). We scored the PGSI in this fashion because this was a non-clinical sample and this permitted a sufficient sample size of those endorsing problems to allow for statistical comparison. Scores on the PGSI were too positively skewed to permit use of the PGSI as a continuous measure (range 0-13, skewness = 5.76, kurtosis = 39.07). A recent study by Currie, Hodgins, and Casey (2013) supports the validity of our chosen scoring of the PGSI, by demonstrating that the non-problem gamblers group (i.e., PGSI score of 0) is distinct from all other gambler groups (low-risk, moderate-risk, and problem gamblers) on amount of money spent gambling per month, the number of games played in the last year, and the prevalence of a substance use disorder. They also showed that the problem gamblers group (i.e., scores of ≥ 8 on the PGSI) was distinct from all other gambler groups, but that the low and moderate risk groups did not differ significantly. Their findings would justify a dichotomization of non-problem gamblers versus all other gamblers, or a dichotomization of problem gamblers versus all other gamblers, but not a dichotomization of moderate-risk and problem gamblers vs. non-problem and low risk gamblers. As ours was a non-clinical sample, there were too few participants meeting PGSI criteria for problem gambler status; thus, the non-problem gambler vs. all other gamblers dichotomization was chosen for our study.

Composite International Diagnostic Interview (CIDI; Kessler & Üstün, 2004). The CIDI is a standardized structured interview. Its pathological gambling subscale was used as a secondary measure of problem gambling. This measure has excellent internal consistency (α = .90) and convergent validity with ICD-10 (World Health Organization [WHO], 1993) and DSM-IV (APA, 1994) criteria for pathological gambling (Kessler, Hwang, LaBrie, Petukhova, Sampson, Winters, & Shaffer, 2008). Participants were asked if they have a) ever bet or spent money on gambling activities; b) had a time in their lives when gambling interfered with close

relationships or important responsibilities such as work or school; c) lied to others about the extent of gambling; and d) ever spent $250 or more on gambling in a single year. Responding "yes" to any of questions b-d prompted a series of questions covering the ten DSM-IV (APA, 1994) diagnostic criteria for pathological gambling. CIDI scores were dichotomized such that all participants were grouped as either reporting one or more gambling problems (i.e., scores ≥ 1 were coded as 1) or reporting no gambling problems (i.e., scores of 0 were coded as 0). Once again, we scored in this fashion because this was a non-clinical sample and this permitted a sufficient sample size of those endorsing problems to allow for statistical comparison. Scores on the CIDI were too positively skewed to permit use of the CIDI as a continuous measure (range 0-4, skewness = 3.23, kurtosis = 12.25).

Money spent gambling. The yearly amount of money participants spent on gambling was measured using a subset of questions from the CPGI (Ferris & Wynne, 2001). For 14 different types of gambling (i.e. lottery tickets, slot machines, etc.) participants were asked '*in the past 12 months, how much money did you spend, not including winnings, on [type of gambling] in a typical month?'* Reported values were multiplied by 12 to obtain a yearly amount, and the amounts from each type of gambling were summed to create a total yearly amount. This was then divided by 365 to obtain money spent gambling per day in Canadian dollars. Two extreme univariate outliers were identified by visual inspection of the distribution, and were winsorized by transforming them to the next highest value plus one (Tabachnick & Fidell, 2011).[2]

Time spent gambling. Time spent gambling was also assessed using a subset of questions from the CPGI (Ferris & Wynne, 2001). For the 14 types of gambling, participants were asked '*in the past year, how much time did you normally spend each time you bet or spent money on*

[2] In all cases where winsorizing was used, analyses did not change substantially when the outliers were left in the dataset untransformed.

[type of gambling]?' For each activity, average time was multiplied by frequency in order to obtain the total yearly time spent gambling (in minutes). This value was then divided by 60 to obtain the total yearly time spent gambling in hours. Two extreme univariate outliers were winsorized (Tabachnick & Fidell, 2011).

Frequency of gambling occasions. The frequency of gambling occasions was also assessed using a subset of questions from the CPGI (Ferris & Wynne, 2001). For the 14 types of gambling, participants were asked '*in the past year, how often did you bet or spend money on [type of gambling]?'* Reported values were scored such that participants could gamble from one to 365 (daily gambler) occasions for each gambling activity endorsed. Scores were then summed across activities to obtain a total gambling frequency in the past year. One extreme univariate outlier was winsorized (Tabachnick & Fidell, 2011).

Procedure

Data was analyzed using an archival data set provided by the MLSYA. The MLSYA followed a sample of emerging adults in Manitoba over a five-year period (2007-2011), and participants were 18-20 years old at the first wave. Four waves of data collection occurred, at approximately 12-18 month intervals. The study received ethics committee approval in accordance with Canada's Tri-Council Policy Statement for Ethical Conduct for Research Involving Humans. All persons gave their informed consent prior to their inclusion in the study. During each wave of the study, participants were initially contacted by telephone to complete a telephone interview that included both closed- and open-ended questions. This was followed by a questionnaire battery that participants had the option of completing online (97.9%) or through a mail-in questionnaire (2.1%), both of which included the same measures in the same order.

Results

Data Analytic Strategy

The current study employed more rigorous factor analyses using a maximum likelihood approach to examine the factor structure of the GMQ, rather than the principal components analyses used in prior studies (e.g., Dechant & Ellery, 2011; Stewart & Zack, 2008). Maximum likelihood approaches are less likely to inflate estimates of variance accounted for when compared to principal components analyses (Costello & Osborne, 2005). Overall, 8.2% of data were missing, with covariance coverage ranging from .80 to 1.00. In Mplus 7.0, full information maximum likelihood estimation was used to account for missing data, which provides relatively unbiased parameter estimates when data are missing at random, and produces less bias when compared to listwise deletion and single imputation (Enders & Bandalos, 2001). This is an approach for structural equation models, of which factor analysis and regression are special cases. When interpreting overall model fit for both a confirmatory factor analysis (CFA) and an exploratory factor analysis (EFA) in Mplus 7.0, a root-mean-square error of approximation (RMSEA) around 0.05, and a standardized root mean square residual (SRMR) around .08, and a comparative fit index (CFI) and Tucker-Lewis Index (TLI) around .95 are indicative of excellent fit (Kline, 2011). Furthermore, as an EFA compares nested models, a $\Delta CFI \geq .01$ between models was used as the criterion for model selection (Cheung & Rensvold, 2002).

Before going moving on with hypothesis testing, descriptive statistics and bivariate correlations were analyzed. We specified a negative binomial distribution in Mplus 7.0 for predicting gambling involvement as these outcomes are count variables without a normal distribution (skewness ranged from 1.85 to 6.23, kurtosis ranged from 17.44 to 43.38). This was more appropriate than a zero-inflated solution or a Poisson distribution, as there were no zero values for these variables (all 43 non-gamblers were removed from the analysis) and the means

and variances were not equal (a Poisson distribution assumes the mean and variance is equal). Pseudo-R^2 values were then calculated according to the formula $R^2 = 1 – LLF/LLI$, where LLF is the log-likelihood value for the model with the predictors and LLI is the log-likelihood value for the intercept-only model (Hilbe, 2011). When examining problem gambling, a likelihood ratio test (lr =2(LL2 – LL1),where LL1 is the log likelihood value of the model with fewer parameters and LL2 is the log likelihood value of the model with more parameters) was used to see if gambling motives predicted problem gambling above gambling behaviours.

15-item Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted on the original 15 items of the GMQ, with items loading as theorized in Stewart and Zack (2008). Fit indices for this CFA revealed that a three-factor model was a poor fit to the data, $\chi^2(N = 487) = 316.36$, $p < .001$; $\chi^2/df = 3.64$; CFI = 0.85; TLI = 0.81; SRMR = .08; RMSEA = .09 (90% CI: .08, .10). Factor loadings were all significant ($p < .001$) and salient (i.e., > .32; Tabachnick & Fidell, 2011), and ranged from .70-.83 for the enhancement motives factor, from .61-.74 for the social motives factor, and from .67-.83 for the coping motives factor. Latent correlations between the motives factors were as follows: social and coping ($r = .61$), social and enhancement ($r = .78$), and enhancement and coping ($r = .69$).

15-item Exploratory Factor Analysis

Given the poor fit when using CFA, exploratory factor analysis (EFA) was conducted to explore why the hypothesized model did not provide a stronger fit to the data. Geomin rotation (a type of oblique rotation) was used. Using a criterion of $\Delta CFI \geq .01$ when comparing nested models, a 3-factor model was found to fit the data best. The three-factor model adequately fit the data, $\chi^2(N = 487) = 176.41$, $p < .001$; $\chi^2/df = 2.80$; CFI = 0.94; TLI = 0.90; SRMR = .03;

RMSEA = .06 (90% CI: .05, .08), and accounted for 51.7% of the variance. However, the items did not load precisely as expected based on Stewart and Zack's (2008) theory. See Table 1 for items, factor loadings, and communalities. Latent correlations between the factors were as follows: social and coping (r = .11), social and enhancement (r = .59), and enhancement and coping (r = .46). Eleven of the 15 items showed strong and salient loadings only on the theorized factor. However, the EFA also revealed one cross-loading item and three items loadings onto unintended factors, which may help explain the poor fit indices generated by the 15-item, 3-factor CFA. Specifically, the items "*because it's something I do on special occasions*" and "*as a way to celebrate*" loaded on the enhancement motives factor rather than the theorized social motives factor. Similarly, the item "*to relax*" loaded on the enhancement motives factor rather than the theorized coping motives factor. Finally, the item "*to cheer up when you're in a bad mood"* loaded onto the coping motives factor as theorized, but also unexpectedly cross-loaded onto the onto the enhancement motives factor. Overall, this re-analysis suggests decent support for a 3-factor model, with some room for improvement.

9-item Confirmatory Factor Analysis

A modified three-factor model was also examined where the three most salient items per factor from the previous EFA were retained (i.e., the strongest factor loadings on the expected factor and least amount of cross-loading). This created a 9-item measure, with three items per subscale (enhancement motives = items 3, 9, and 15; social motives = items 4, 7, and 13; coping motive = items 5, 8, and 11). The 3-item length of each revised scale is comparable to that used in a recently-developed short form of the Drinking Motives Questionnaire-Revised (see Kuntsche & Kuntsche, 2009). A CFA with these 9 GMQ items showed that a three-factor model provided an excellent fit to the data: $\chi^2(N = 487) = 45.56$, $p < .001$; $\chi^2/df = 1.90$; CFI = 0.97; TLI

= 0.95; SRMR = .04; RMSEA = .05 (90% CI: .03, .07). The standardized factor loadings were all statistically significant ($p < .05$) and salient (i.e., > .32; Tabachnick & Fidell, 2011), and ranged from .73-.79 for enhancement motives, .73-.79 for coping motives, and .69-.82 for social motives. Latent correlations between the motive factors were as follows: social and coping (r = .48), social and enhancement (r = .63), and enhancement and coping (r = .68).

Conclusion of Factor Analyses

Overall, the theorized three-factor model had better absolute fit indices for the brief 9-item version of the GMQ than the original 15-item version. However, the 15-item version has the advantage of being more directly comparable to past research using the GMQ. Thus, we conducted all subsequent psychometric analyses using both the 15-item and 9-item versions separately to maximize factorial validity and comparability to prior research.

Descriptives and Bivariate Correlations

All three subscales demonstrated acceptable alpha reliabilities, indicating acceptable internal consistency (Table 2). Subscale means for enhancement motives and social motives were both higher than coping motives, a finding consistent with the theoretical model and past research with non-clinical samples (e.g., Dechant & Ellery, 2011; Goldstein et al., 2013). Dichotomized PGSI and CIDI scores revealed 8.0% - 15.0% of the sample acknowledged at least one gambling-related problem, respectively.

For the original 15-item measure, all three motive subscales were positively correlated with each other, with male sex, with problem gambling, as well as the gambling behaviour outcomes (money, time, and frequency). Moreover, the strength of the correlations between the motive subscales and the gambling behaviour and problem gambling outcomes is consistent with the theoretical model, such that enhancement and coping motives show a stronger correlation

with the gambling criterion measures compared to social motives. There was one exception to this pattern, as enhancement and social motives showed a stronger correlation with time spent gambling than coping motives (although the correlation with enhancement was still the largest). Also as expected, there was a strong convergence between the two indices of problem gambling (PGSI and CIDI), as well as between the gambling behavioural outcomes. The gambling behavioural outcomes were also significantly positively correlated with problem gambling. The 15-item and 9-item versions of the GMQ were highly correlated, and the motive subscales on both versions demonstrated similar positive correlations with gambling problems and gambling behaviours.

Negative Binomial Regression Analyses when Predicting Gambling Behaviours

Negative binomial regression was used to examine the incremental validity of each gambling motive on the original 15-item measure when predicting the gambling behaviour outcomes (money, time, and frequency), after controlling for sex. As shown in Table 3, both enhancement and coping motives significantly predicted money spent gambling (social motives did not), supporting hypothesis 3. Enhancement motives also significantly predicted gambling frequency. Both enhancement and social motives predicted time spent gambling. Pseudo-R^2 values (Hilbe, 2011) indicated that gambling motives accounted for approximately 8-10% of the variance within these gambling behaviour outcomes.

Using the revised nine-item GMQ, a similar set of analyses was conducted. In this analysis, each gambling motive variable was specified as a latent variable with 3 indicators each (see 9-item CFA results above for measurement model fit indices). In this re-analysis, only enhancement motives emerged as a significant independent predictor of both money and frequency (see Table 3). Both enhancement and social motives remained significant predictors of

time spent gambling. Pseudo-R^2 values were then calculated using the Hilbe (2011) formula, indicating that gambling motives accounted for 8-10% of the variance within these gambling behaviours.

Logistic Regression Analyses Predicting Gambling Problems

Logistic regression was used to examine the incremental validity for gambling motives when predicting gambling problems, after controlling for gambling behaviours. A likelihood ratio test revealed that motives predicted the CIDI ($lr = 37.23$, $p < .001$) and PGSI ($lr = 62.71$, $p < .001$) beyond gambling behaviours. As shown in Table 4, enhancement motives significantly predicted gambling problems on both the PGSI and the CIDI, while coping and social motives did not[3]. Odds ratios demonstrate that for every 1.00 unit increase in enhancement motives, young people are 1.14 – 1.20 times more likely to report at least one problem gambling symptom. Frequency remained a significant predictor of problem gambling on both the PGSI and the CIDI, as well as money on the CIDI. Pseudo-R^2 values indicate that, together, gambling motives and gambling behaviours account for 39% and 44% of the variance in reporting at least one problem gambling symptom on the CIDI and the PGSI, respectively.

Using the revised nine-item GMQ, a similar set of analyses was conducted. In this analysis, each gambling motive variable was specified as a latent variable with 3 indicators each as in the negative binomial regressions (see Table 4). A likelihood ratio test revealed that motives predicted the CIDI ($lr = 456.03$, $p < .001$) and PGSI ($lr = 489.77$, $p < .001$) beyond

[3]All significant predictors in Tables 3 and 4 remain significant when sex was added as a covariate. Moreover, sex was a significant independent predictor of gambling problems (i.e., men gambled more than women), accounting for an additional 1-4% of the variance over and above the three gambling behaviours and the three gambling motives.

gambling behaviours. Similar to the analyses using the 15-item GMQ, only enhancement motives emerged as a significant independent predictor of gambling problems on the CIDI; however, no motives were significant independent predictors of gambling problems on the PGSI. For the CIDI, odds ratios indicated that for every 1.00 unit increase in enhancement motives, there was a 5.07 unit increase in the likelihood of reporting at least one symptom of problem gambling[4]. Similar to the 15-item model, money was also a significant predictor of problem gambling on both the PGSI and the CIDI. Time and frequency were also significant predictors of problem gambling on the PGSI. Pseudo-R^2 values demonstrated that gambling motives and behaviours together accounted for 33% and 37% of the variance within problem gambling on the CIDI and PGSI, respectively.

Discussion

The current study tested the psychometric properties of the GMQ in a normative sample of emerging adults. Initially, confirmatory factor analysis indicated that the theorized factor structure was a relatively poor fit to the data. To investigate this issue further, exploratory factor analysis was used, which identified some problematic items. This unexpected result led to the examination of both the original 15-item GMQ and a modified 9-item GMQ, in which the problematic items were removed. Confirmatory factor analysis on the 9-item measure supported this modification, as the absolute fit indices were higher compared to the 15-item measure. In both models, all three motives subscales demonstrated acceptable internal consistency and were

[4]However, the large confidence interval of this estimate in Table 4 suggests that this estimate of effect size is imprecise when measurement error is accounted for in the latent variable model, so readers are cautioned not to interpret this larger effect size substantively when compared to the 15-item GMQ.

significantly correlated with problem gambling. We found that 8.0%-15.0% of the sample endorsed at least one symptom of problem gambling, an estimate in line with previous research indicating that 8.6% of emerging adults report at-risk or problem gambling (Welte et al., 2008). However, when all three motives were entered simultaneously into a regression analysis (which controlled for gambling behaviour), only enhancement motives were a significant predictor of problem gambling. Coping motives were not found to be a significant independent predictor of problem gambling, which was unexpected based on prior work and theory (Stewart & Zack, 2008).

The enhancement motives subscale of the GMQ seems to be both reliable and valid in emerging adults. As expected, enhancement motives remained a significant predictor of money gambled, time gambled, and frequency of gambling in both the original 15-item GMQ and the modified 9-item GMQ. That enhancement motives proved to be a robust predictor of gambling behaviour is consistent with past work in the gambling area (Stewart & Zack, 2008), and with addictive behaviours more broadly (e.g., Cooper et al., 1992). Furthermore, enhancement motives remained the only motive significantly predicting problem gambling even when controlling for gambling behaviours. This supports the psychometric validity of this subscale and suggests that among emerging adult gamblers in the community, enhancement motives are most strongly linked to experiencing at least one symptom of problem gambling. While previous research has also shown that enhancement motives are significant predictors of problem gambling in adult samples, this was association was no longer significant when controlling for gambling behaviour (i.e., coping motives were the only significant motive that significantly predicted problem gambling when controlling for gambling behaviour; Stewart & Zack, 2008). In the current study, the link between enhancement motives and problem gambling remained

significant beyond gambling behaviour. This finding may be related to the young age of the participants, as research indicates that addictive behaviours are more strongly related to externalizing then internalizing traits among young people (King, Iacono, & McGue, 2004). Moreover, traits linked with enhancement motives such as sensation seeking (Comeau, Stewart, & Loba, 2001) reach their peak during emerging adulthood at 18-20 years of age (Zuckerman, 1974), and the frontal lobes of the brain are still undergoing development until the mid-20s (Sowell, Thompson, Holmes, Jernigan, & Toga, 1999) which suggests there is still relatively little executive control exerted over thrill-seeking urges in emerging adulthood. For these reasons, enhancement motives (rather than coping motives) may be more important predictors of problem gambling among emerging adults, although this pattern may change with age.

As expected, social motives did not generally predict gambling problems or gambling behaviour, supporting the motivational theory (Cooper et al., 1992) that gambling for social reasons (i.e., not for affective regulation) is less risky. The one exception was that social motives significantly predicted time spent gambling. The general pattern indicates that the social motives subscale of the GMQ is also reliable and valid in emerging adults, as previous research also demonstrates that social motives are more commonly endorsed by non-problem gamblers and are less commonly endorsed by problem gamblers, who instead endorse both enhancement and coping motives most strongly (Dechant & Ellery, 2011; Stewart & Zack, 2008).

Finally, the coping motives subscale was a significant predictor of money spent, but not of the other gambling behaviours. As coping motives for drinking are more strongly related to quantity than frequency of alcohol use (e.g., Cooper et al., 1992), coping motives for gambling may also be more strongly related to money than frequency. Contrary to hypotheses, coping motives were not a significant independent predictor of problem gambling. It is important to note

that compared to previously-tested samples of emerging adult gamblers, consisting largely of university students (Goldstein et al., 2013; Stewart et al., 2011), the present community-recruited normative sample of emerging adults reported a significantly lower endorsement of all three gambling motives (e.g., Cohen's *d* (Cohen, 1998) range from .40-.82, all $p < .01$, relative to Stewart et al., 2011). In particular, the endorsement and variability of coping motives in this sample was especially low, providing a possible explanation for the null findings for coping motives in the prediction of problem gambling symptoms in the present study. It appears that emerging adults in the community, as a group, rarely report gambling to cope, and thus are unlikely to develop problem gambling symptoms through this motivational pathway. Additionally, as coping motives have been shown to be related to problem gambling in university samples of emerging adults (Stewart et al., 2011) but were unrelated to problem gambling in the current study, something about the experience of university may be conferring increased risk for problem gambling via gambling to cope. For example, it might be that university students experience more stress and negative emotions, which leads to more coping behaviours in general. Indeed, numerous studies have shown that university students experience significant psychological distress, with students experiencing increases in both anxiety and depression throughout the course of their degrees (Bayram & Bilgel, 2008; Bewick, Koutsopoulou, Miles, Slaa, & Barkham, 2010; Keyes, Eisenberg, Perry, Dube, Kroenke, & Dhingra, 2012). This discrepancy in the role of coping motives across studies may also be related to demographic and other social and psychological differences between community and university samples. However, such statements are merely speculative and future research on this issue is needed. In particular, it would be interesting to test whether coping gambling motives interact with neurotic personality traits (e.g., neuroticism, anxiety sensitivity, hopelessness) or

with emotional disorder symptoms (e.g., symptoms of anxiety or depressive disorders) in predicting problem gambling symptoms in emerging adults.

Limitations and Future Directions

The results of the current study are limited to a normative general population sample of emerging adults, and may not be generalizable to clinical samples or to other samples of emerging adults (i.e., university students). Furthermore, because this was a cross-sectional study, cause and effect relations between the variables cannot be established. While the results indicated that the 15-item GMQ demonstrated acceptable fit of a three-factor model in the EFA, the examination of individual items showed some areas for improvement. Steps were taken to address this issue by removing the problematic items, creating the 9-item short form GMQ where a three factor model fit the data well. As both the 15-item and 9-item GMQ exhibited essentially the same results in concurrent validity analyses, it is unlikely that any findings in this study are due simply to factorial validity issues. This said, coping motives were not commonly endorsed in this population, decreasing the variance and thus possibly increasing Type II error for tests involving coping motives. Thus, future research might increase the sample size to increase power, or over-sample participants who endorse high and low coping motives to more clearly examine this relationship. The dichotomous scoring for the problem gambling measures (i.e., as presence or absence of any problem gambling symptoms) may also be considered a possible study limitation, as this was not the original intended use of these measures. Nonetheless, this operationalization has been previously used by others (Rockloff & Dyer, 2006). This liberal inclusion was necessary in the current study to maximize statistical power in this non-clinical sample. Future studies may use a more stringent cut-off with a larger sample to capture a more problematic group, to provide a stronger test of whether coping motives are a significant

independent predictor of more clinically-significant problem gambling. An additional potential limitation is that the GMQ may not comprehensively tap all of the possible motives for gambling (see McGrath, Stewart, Klein, & Barrett, 2010). Future research should explore the role of other motives (e.g., conformity motives, financial motives) not tapped on the GMQ in the gambling behaviour of emerging adults.

Our results suggest that future prevention and treatment efforts should specifically target enhancement motives in emerging adults. Specifically, enhancement motivated emerging adult gamblers might be given motivation-matched treatments and/or prevention strategies, such as treatments that focus on finding more adaptive ways of achieving stimulation and excitement. Similar targeted interventions have been shown to be effective in reducing both enhancement and coping drinking motives, and were also effective in reducing symptoms of problem drinking and binge drinking in young people (Conrod, Castellanos-Ryan, & Mackie, 2011; Conrod, Stewart, Comeau, & MacLean, 2006). While the present paper finds the most support for enhancement motives as a predictor of gambling behaviour and problems in emerging adult gamblers, the positive association of coping motives with money spent gambling is also of clinical concern. Problem gamblers spend more money on gambling relative to non-problem gamblers (Nower & Blaszczynski, 2010), and thus the link between coping motives and money observed in the present study may be an early indicator of problem gambling among coping-motivated gamblers. Future longitudinal research is needed to examine the relationship that unfolds over time between coping motives, money spent gambling, and the development of problem gambling.

Conclusions

In sum, the GMQ appears to be a reliable and valid measure suitable for use in emerging adult populations, with enhancement motives emerging as the most salient predictor of gambling behaviour and problems at this developmental stage. Although the 15-item measure exhibited some potentially problematic items in terms of factorial validity, the concurrent and incremental validity results did not vary greatly when these items were removed. Enhancement motives (but not social or coping motives) were a salient predictor of problem gambling and gambling behaviour across motives measures in this normative sample of emerging adults, suggesting that emerging adulthood might be a distinct developmental stage where enhancement gambling motives are particularly salient. Finally, this study led to the development of a psychometrically-sound short-form GMQ which may prove useful in situations where the length of the long form is prohibitive, such as in large-scale survey studies (see Kuntsche & Kuntsche, 2009).

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Table 1

Exploratory Factor Analysis: Factor loadings of the 15 original GMQ items.

	Factor 1: *Enhancement motives*	Factor 2: *Social motives*	Factor 3: *Coping motives*	Communalities
GMQ item				
Enhancement motives subscale				
3. Because you like the feeling	**.860***	-.019	-.060	.74
6. Because it's exciting	**.850***	.009	-.248*	.78
15. Because it makes you feel good	**.796***	-.086	.032	.64
12. Because it's fun	**.708***	.174*	-.233*	.59
9. To get a "high" feeling	**.634***	-.100	.152	.44
Social Motives Subscale				
7. To be sociable	-.064	**.859***	-.014	.74
13. Because it makes a social gathering more enjoyable	.010	**.715***	.189*	.55
4. Because it's what most of your friends do when you get together	.028	**.606***	.190*	.40
10. Because it's something I do on special occasions	**.354***	.266*	.019	.20
1. As a way to celebrate	**.635***	.049	.002	.41
Coping motives subscale				
11. Because it helps when you are feeling nervous or depressed	.149	.073	**.745***	.58
8. Because you feel more self-confident or sure of yourself	-.013	.262*	**.670***	.52
14. To cheer up when you're in a bad mood	**.346***	.003	**. 595***	.47
5. To forget your worries	.292*	-.042	**.515***	.35
2. To relax	**.510***	.135	.209*	.32

*Note. *p < .05;* bold indicates salient factor loadings (≥ .32).

Table 2

Bivariate correlations between study variables.

	1	2	3	4	5	6	7	8	9	10	11	12
1. EM (5-item)												
2. SM (5-item)	.65**											
3. CM (5-item)	.61**	.54**										
4. EM (3-item)	.93**	.58**	.66**									
5. SM (3-item)	.54**	.91**	.44**	.47**								
6. CM (3-item)	.48**	.43**	.91**	.56**	.36**							
7. Sex	.17**	.11*	.16**	.18**	.14**	.12**						
8. PGSI	.36**	.25**	.29**	.36**	.23**	.25**	.21**					
9. CIDI	.33**	.22**	.25**	.35**	.19**	.17**	.19**	.49**				
10. Money	.39**	.23**	.32**	.40**	.21**	.23**	.25**	.44**	.48**			
11. Time	.29**	.24**	.17**	.30**	.18**	.17**	.20**	.38**	.34**	.67**		
12. Frequency	.35**	.25**	.26**	.33**	.22**	.18**	.22**	.46**	.42**	.64**	.46**	
Mean	7.96	7.96	5. 88	4.07	4.75	3.36	---	---	---	1.84	25.05	28.42
SD	2.97	2.73	1.79	1.66	1.89	.98	52.6% female	15.0% problem	8.0% problem	4.39	79.14	52.51
Á	.85	.78	.83	.80	.78	.79	---	---	---	---	---	

Note. EM = enhancement motives, SM = social motives, CM = coping motives. Money is dollars spent gambling per day, Time is hours spent gambling per year, and Frequency is number of gambling occasions per year. Sex was coded as 1 = female, 2 = male. ***p <.01, *p <.05*

Table 3

Negative binomial regression with GMQ subscales predicting gambling behaviour (money spent on gambling per day, time spent gambling per year, and frequency of gambling occasions in past year).

	Money			Time			Frequency		
	B (SE)	Pseudo-R^2	95% CI B	B (SE)	Pseudo-R^2	95% CI B	B (SE)	Pseudo-R^2	95% CI B
EM (5 item)	.18*** (.04)		[.10, .25]	.12*** (.03)		[.07, .17]	.16*** (.04)		[.07, .24]
SM (5 item)	.02 (.03)		[-.05, .08]	.06* (.02)		[.01, .11]	.05 (.04)		[-.03, .12]
CM (5 item)	.16** (.06)		[.04, .27]	.04 (.04)		[-.03, .11]	.03 (.06)		[-.08, .15]
		.08			.09			.10	
EM (3 item)	1.60*** (.35)		[.92, 2.28]	.63*** (.15)		[.33, .93]	1.75*** (.55)		[.66, .2.81]
SM (3 item)	.19 (.34)		[-.48, .86]	.56*** (.17)		[.24, .89]	.09 (.47)		[-.83, 1.01]
CM (3 item)	-.38 (.69)		[-1.74 .97]	-.37 (.27)		[-.90, .16]	-1.30 (.75)		[-2.78, .17]
		.08			.08			.10	

Note. A negative binomial distribution was specified to correct for non-normality. EM = enhancement motives, SM = social motives, CM = coping motives. *** $p < .001$, ** $p < .01$ * $p < .05$

Table 4

Logistic regression with GMQ subscales and gambling behaviours (money, time, and frequency) predicting any problem gambling symptoms on both the PGSI and the CIDI

	PGSI Problem Gambling Symptoms				CIDI Problem Gambling Symptoms			
	B (SE)	OR	Pseudo-R^2	95% CI OR	B (SE)	OR	Pseudo-R^2	95% CI OR
Money	.09* (.05)	1.10		[1.00, 1.22]	.17*** (.05)	1.18		[1.08, 1.30]
Time	.02 (.01)	1.02		[.99, 1.04]	-.02 (.02)	.99		[.95, 1.02]
Frequency	.01** (.01)	1.01		[1.00, 1.02]	.01* (.00)	1.01		[1.00, 1.01]
EM (5 item)	.13* (.07)	1.14		[1.01, 1.31]	.17* (.09)	1.20		[1.02, 1.42]
SM (5 item)	-.04 (.08)	.96		[.82, 1.13]	.01 (.11)	1.01		[.82, 1.26]
CM (5 item)	.15 (.09)	1.16		[.98, 1.39]	.10 (.11)	1.11		[.89, 1.39]
			.39***				.44***	
Money	.11* (.05)	1.11		[1.00, 1.23]	.19*** (.05)	1.20		[1.08, 1.34]
Time	.03* (.01)	1.03		[1.01, 1.05]	-.01 (.02)	.99		[.96, 1.02]
Frequency	.01** (.00)	1.01		[1.01, 1.02]	.01 (.01)	1.01		[1.00, 1.01]
EM (3 item)	.59 (.47)	1.80		[.72, 4.55]	1.62** (.60)	5.07		[1.56, 16.44]
SM (3 item)	-.25 (.52)	.78		[.28, 2.14]	-.01 (.69)	.99		[.26, 3.87]
CM (3 item)	1.28 (.87)	3.59		[.65, 19.91]	-1.02 (1.09)	.36		[.04, 3.04]
			.37***				.33***	

Note. OR = Odds ratio, EM = enhancement motives, SM = social motives, CM = coping motives. *** $p < .001$, ** $p < .01$ * $p < .05$