Subtyping Pathological Gamblers on the Basis of Affective Motivations for Gambling: Relations to Gambling Problems, Drinking Problems, and Affective Motivations for Drinking

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Pathological gamblers who drink when gambling (n = 158; 77% men; mean age = 36.0 years) completed the Inventory of Gambling Situations (IGS) and gambling and drinking criterion measures. Principal components analysis on the IGS subscales revealed negative (e.g., Unpleasant Emotions) and positive (e.g., Pleasant Emotions) gambling situation factors. Subjecting IGS factor scores to cluster analysis revealed three clusters: (a) enhancement gamblers, with low negative and high positive factor scores; (b) coping gamblers, with very high negative and high positive factor scores; and (c) low emotion regulation gamblers, with low negative and positive factor scores (59%, 23%, and 18% of the sample, respectively). Clusters were validated with a direct measure of gambling motives. Additional validity analyses showed that coping gamblers scored higher than the other groups on a variety of different gambling activities, gambling problems, drinking frequency, drinking problems, and coping drinking motives, whereas low emotion regulation gamblers scored lower than the other groups on gambling frequency, gambling problems, drinking quantity, and enhancement drinking motives. The findings validate this empirical approach to subtyping gamblers and suggest consistency of motives across addictive behaviors.

Keywords: pathological gambling, gambling motives, subtyping, comorbidity, drinking motives

Gamblers often drink alcohol while gambling (Focal Research, 1998; Stewart, McWilliams, Blackburn, & Klein, 2002), and gambling disorders often co-occur with alcohol use disorders (Bland, Newman, Orn, & Stebelsky, 1993; Crockford & el-Guebaly, 1998; Potenza, Steinberg, & Wu, 2005; Stinchfield, Kushner, & Winters, 2005). There are many possible reasons for these associations (Stewart & Kushner, 2003, 2005). Common motives for engaging in these activities are one possible explanation for the gambling–alcohol association. In fact, many motivational models argue that desires for mood alteration (i.e., negative affect reduction or euphoria/excitement induction) underlie various addictive behaviors (Cooper, Frone, Russell, & Mudar, 1995; Cox, & Klinger, 1990; Simons, Gaher, Correia, Hansen, & Christopher, 2005), including gambling (Beaudoin & Cox, 1999; Griffiths, 1991, 1993; Moodie & Finnigan, 2004; Sharpe, 2004; Wulfert, Roland, Hartley, Wang, & Franco, 2005).

In line with this notion, research in the drug abuse literature supports the contention that there are subgroups of substance abusers who use drugs/alcohol for different reasons and that these differing underlying motivations are useful in predicting drug preferences and comorbid psychopathology (Conrod, Pihl, Stewart, & Dongier, 2000a). Similar cluster analytic studies in the area of gambling addictions suggest that there are subgroups of problem gamblers. Lesieur (2001) divided his 156 problem gamblers in an inpatient treatment program into three clusters: impulsive escape seekers, moderately impulsive action seekers, and normal problem gamblers. Blaszczynski and Nower (2002) proposed three

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distinct subgroups of pathological gamblers. First, emotionally vulnerable problem gamblers were said to be motivated to gamble by a need to modulate their emotional states or meet specific psychological needs; they typically suffer from premorbid anxiety and/or depression, poor coping skills, and negative family backgrounds. Second, antisocial, impulsivist problem gamblers were said to possess both biological and psychosocial vulnerabilities, manifesting in multiple forms of psychopathology, such as impulsivity, antisocial personality disorder, and comorbid substance abuse. Third, behaviorally conditioned problem gamblers were said to fluctuate between regular/heavy gambling and excessive gambling as a result of conditioning, distorted cognitions, and poor decision making; this subgroup was thought to display minimal levels of psychopathology. This subtyping model was an extension of earlier work, in which Blaszczynski, McConaghy, and Frankova (1990) distinguished pathological gamblers characterized by depression from those characterized by boredom. Similarly, McCormick’s (1987) psychological model of gambling focused on two very distinct subtypes of gamblers: the recurrently depressed versus the chronically understimulated.

In the case of each of these previously suggested subtyping schemes, two to three subtypes of gamblers have been identified, and those gambling in response to negative moods (i.e., coping or escape gamblers) have been distinguished from those gambling for excitement (i.e., enhancement or sensation seeker gamblers). However, despite the intuitive appeal of these proposed subtyping schemes, none seems to have been routinely adopted for classifying gamblers in clinical practice. This could be because an easy-to-use assessment procedure for classifying gamblers has yet to be proposed and validated.

The purposes of the present study were twofold. First, we wished to examine the utility of subtyping pathological gamblers according to their primary reasons for gambling, as inferred from scores on a commonly used measure of high-risk gambling situations (i.e., the IGS; Turner & Littman-Sharp, 2006). Second, we wished to test the degree of overlap in specific motives for gambling and drinking alcohol among gamblers who usually drink when gambling. In other words, among gamblers who drink alcohol, do those who gamble primarily to cope with negative affective states also use alcohol for similar reasons? And do those who gamble primarily to enhance positive affect also use alcohol for similar reasons? We chose pathological gamblers who usually drink when gambling because of the high co-occurrence of these activities (Focal Research, 1998; Stewart et al., 2002) as well as to ensure against marked differences in their relative frequency, in order to test the second set of hypotheses regarding the within-person overlap in specific motives for gambling and drinking.

We hypothesized that at least two clusters or subtypes of pathological gamblers would emerge: those gambling in response to negative contexts (e.g., unpleasant emotional states) versus those gambling in response to positive contexts (e.g., pleasant emotional states). We expected that these clusters of gamblers identified with the IGS would be validated with a direct measure of gambling motivations. We further expected to observe heavier gambling behaviors (a greater number of gambling activities and more frequent gambling behavior) among the subtype gambling in response to positive contexts relative to the other clusters of gamblers, given prior work in the alcohol literature showing particularly strong relations of enhancement motives to heavy drinking behavior (e.g., Cooper, Russell, Skinner, & Windle, 1992). We also expected to observe greater gambling problems among the subtype gambling in response to negative contexts relative to the other clusters of gamblers, given prior work in the alcohol literature showing particularly strong relations of coping motives to negative consequences of drinking (e.g., Cooper et al., 1992).

We expected to observe associations between gambling and drinking motives among our chosen sample of gamblers. Specifically, we expected that the cluster of gamblers who gamble in response to negative situations would score higher than the other clusters on the Coping-motivated drinking subscale of the Drinking Motives Questionnaire (DMQ; Cooper et al., 1992). Similarly, we expected that the cluster of gamblers who gamble in response to negative situations would also be more likely to report increasing their alcohol consumption when they are losing at gambling. Additionally, we expected that the cluster of gamblers who gamble in response to positive situations would score higher than the other clusters on the DMQ Enhancement-motivated drinking subscale. Similarly, we expected that the cluster of gamblers who gamble in response to positive situations would also be more likely to report increasing their alcohol consumption when they are winning at gambling. Finally, we expected that the cluster of gamblers who gamble in response to positive situations would show higher levels of drinking behavior (i.e., greater quantity and frequency of alcohol use) than the other clusters of gamblers, given their conceptual similarities to the antisocial, impulsivist gambler type identified by Blaszczynski and Nower (2002), who is most at risk for comorbid substance abuse, as described earlier.

Method

Participants

A sample of 158 gamblers (77% men; mean age = 36.0 years, SD = 10.7 years) was recruited from the community with newspaper and television advertisements. Of the total, 98 were recruited from the Toronto, Ontario, area of Canada and tested at the Centre for Addiction and Mental Health, and the remaining 60 were recruited from the Halifax, Nova Scotia, area of Canada and tested at the Gambling Laboratory at Dalhousie University. In order to be eligible for the study, gamblers had to meet criteria for probable pathological gambler status (i.e., score 5 or greater on the South Oaks Gambling Screen [SOGS]; Lesieur & Blume, 1987); the average SOGS score for the entire sample at screening was 11.8 (SD = 4.0). To be eligible, gamblers also had to report consuming alcohol at least 50% of the time when they gamble, and they had to be at least 19 years of age to participate. Respondents also had to be medication-free and alcohol/drug-free for 24 hr prior to testing, as determined by self-report. A history of serious and chronic mental illness (e.g., schizophrenia, bipolar disorder) was an additional exclusionary criterion. Participation was open to those involved in any form of gambling (e.g., slot machines, video lottery terminals [VLTs], racetrack betting). We collected information on the specific gambling activities in which participants were involved through the first item on the SOGS. Many participants were involved in multiple forms of gambling. Activities engaged in once a week or more by at least one third of the sample were as follows: lottery (69.6% of the sample), sports betting (42.4%), slot machines (39.9%), casino gambling (38%), cards for
money (38%), and VLTs (34.2%). The recruitment advertisements did not target any specific group of gamblers and did not promise any treatment. Rather, the advertisements were worded broadly to attract gamblers who were at least 19 years of age. Those who called in response to the advertisements were screened for eligibility criteria over the phone.

Materials

Participants were administered a variety of self-report instruments, including the IGS (Turner & Littman-Sharp, 2006), a demographics questionnaire, the Gambling Motives Questionnaire (GMQ; Stewart & Zack, 2007), the SOGS (Lesieur & Blume, 1987), a measure of pathological gambling symptoms (Beaudoin & Cox, 1999) based on the Diagnostic and Statistical Manual of Mental Disorders (DSM–IV); American Psychiatric Association, 1987), the Drinking Motives Questionnaire (DMQ; Cooper et al., 1992), a measure assessing drinking in response to gambling wins and losses (Zack, Stewart, Klein, Loba, & Fragopoulos, 2005), a drinking behavior questionnaire, and the Brief Michigan Alcoholism Screening Test (B-MAST; Pokorny, Miller, & Kaplan, 1972). Sample items, number of items per scale, and present study alpha values for the multi-item measures are displayed in Table 1.

Inventory of Gambling Situations. The IGS (Turner & Littman-Sharp, 2006) is a 63-item measure designed to measure gamblers’ relative frequency of heavy gambling in a variety of high-risk situations in order to identify a client’s specific profile of potential relapse situations. The IGS is widely used in the gambling treatment system within the Canadian province of Ontario and is also used by gambling treatment professionals and researchers across North America (Littman-Sharp, Turner, Stirpe, Toneatto, & Liu, in press). The IGS was modeled after the psychologically sound Inventory of Drinking Situations (IDS; Annis, Graham, & Davis, 1987; Carrigan, Samoluk, & Stewart, 1998; Stewart, Samoluk, Conrod, Pihl, & Dongier, 2000). Specifically, IDS items were adapted for the gambling context (i.e., those from the Pleasant Emotions, Unpleasant Emotions, Urges and Temptations, Testing Personal Control, Social Pressure, and Conflict With Others scales), and additional items were added that were specific to the gambling context (i.e., those from the Need For Excitement, Winning and Chasing Losses, Worried Over Debts, and Confidence in Skill scales). This initial pool of items was subject to expert review, and items were culled on the basis of the psychometric analyses, including factor analyses (Littman-Sharp & Turner, 2001; Littman-Sharp et al., in press). For the IGS, participants rate their frequency of heavy gambling in 10 categories of situations during the past year. A different number of items comprise each subscale (5–10 items per subscale; see Table 1), and participants are asked to rate each item on a scale ranging from 1 (almost never/never gambled heavily in that situation) to 4 (almost always gambled heavily in that situation). Problem index subscale scores are computed by dividing the total subscale score (sum of item ratings) by the maximum possible total for that subscale and

Table 1
Characteristics of the Multi-Item Measures Used in the Present Study

<table>
<thead>
<tr>
<th>Measure/scale</th>
<th>No. items</th>
<th>α</th>
<th>Sample item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory of Gambling Situations (IGS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpleasant Emotions</td>
<td>10</td>
<td>.91</td>
<td>When I couldn’t stand things any more and needed to get away.</td>
</tr>
<tr>
<td>Worried Over Debts</td>
<td>5</td>
<td>.88</td>
<td>When I was worried about my debts.</td>
</tr>
<tr>
<td>Conflict With Others</td>
<td>7</td>
<td>.90</td>
<td>When I had an argument with a friend.</td>
</tr>
<tr>
<td>Testing Personal Control</td>
<td>7</td>
<td>.88</td>
<td>When I started to believe that gambling was no longer a problem for me.</td>
</tr>
<tr>
<td>Winning and Chasing Losses</td>
<td>6</td>
<td>.83</td>
<td>When I needed to win back the money I lost gambling.</td>
</tr>
<tr>
<td>Urges and Temptations</td>
<td>9</td>
<td>.87</td>
<td>When I suddenly had an urge to gamble.</td>
</tr>
<tr>
<td>Pleasant Emotions</td>
<td>5</td>
<td>.85</td>
<td>When I was happy.</td>
</tr>
<tr>
<td>Social Pressure</td>
<td>7</td>
<td>.82</td>
<td>When someone challenged me to a bet.</td>
</tr>
<tr>
<td>Need for Excitement</td>
<td>6</td>
<td>.85</td>
<td>When I wanted some action.</td>
</tr>
<tr>
<td>Confidence in Skills</td>
<td>5</td>
<td>.80</td>
<td>When I felt confident about my gambling skills.</td>
</tr>
<tr>
<td>Gambling Motives Questionnaire (GMQ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping motives</td>
<td>5</td>
<td>.77</td>
<td>Because it helps when you are feeling nervous or depressed.</td>
</tr>
<tr>
<td>Enhancement motives</td>
<td>5</td>
<td>.78</td>
<td>Because it’s exciting.</td>
</tr>
<tr>
<td>South Oaks Gambling Screen (SOGS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOGS total</td>
<td>11</td>
<td>.78</td>
<td>Have you ever felt guilty about the way you gamble or what happens when you gamble?</td>
</tr>
<tr>
<td>DSM–IV–based measure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM–IV total</td>
<td>11</td>
<td>.88</td>
<td>Have you ever tried to cut down or stop gambling and then found that you couldn’t?</td>
</tr>
<tr>
<td>Drinking Motives Questionnaire (DMQ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping motives</td>
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<td>Because it’s exciting.</td>
</tr>
<tr>
<td>Brief Michigan Alcoholism Screening Test (B-MAST)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-MAST Total</td>
<td>10</td>
<td>.81</td>
<td>Have you ever gotten into trouble at work because of drinking?</td>
</tr>
</tbody>
</table>

Note. IGS (Turner & Littman-Sharp, 2006); GMQ (author-compiled; modeled after the DMQ); SOGS (Lesieur & Blume, 1987); DSM–IV [Diagnostic and Statistical Manual of Mental Disorders, 4th ed.]-based measure of pathological gambling symptoms (Beaudoin & Cox, 1999); DMQ (Cooper et al., 1992); and B-MAST (Pokorny et al., 1972).
multiply by 100 (possible range = 0–100; Turner & Littman-
Sharp, 2006).

The IGS has been shown to possess strong psychometric prop-
erties in clinical samples of pathological gamblers (Littman-
Sharp & Turner, 2001; Littman-Sharp et al., in press). For example, using a combina-
tion of exploratory and confirmatory factor analytic tech-
tiques, the IGS has been shown to possess the expected 10-
factor structure at the lower order level (corresponding to the
intended 10 subscales) and a two-factor structure at the higher
order level (i.e., positive vs. negative gambling situations). All 10
subscales have been shown to possess good internal consistency,
with alphas ranging from .84 for the Social Pressure to Gamble
subscale to .92 for the Urges and Temptations, the Negative
Emotions, and the Conflict With Others subscales, respectively
(Littman-Sharp & Turner, 2001; Littman-Sharp et al., in press). In
terms of concurrent validity, all scales have been shown to corre-
late significantly with measures of problem gambling severity,
with correlations with the DSM-IV pathological gambling criteria
ranging from \( r = .54 \) for the Pleasant Emotions scale to \( r = .77 \) for
the Urges and Temptations scale. Correlations with past year
SOGS scores ranged from \( r = .53 \) for the Pleasant Emotions scale
to \( r = .75 \) for both the Urges and Temptations and the Winning
and Chasing scales. Impulsivity has been shown to correlate most
strongly with the Need for Excitement \( (r = .61) \) and the Urges and
Temptations \( (r = .57) \) IGS scales, whereas depression has been shown to correlate most strongly with the Negative
Emotions \( (r = .44) \) and Conflict With Others \( (r = .48) \) IGS scales,
respectively (Littman-Sharp & Turner, 2001; Littman-Sharp et al.,
in press). In the present study, the internal consistencies were good
to excellent (see Table 1). Taken together, these results suggest
excellent psychometric properties for the IGS and a pattern of
findings very similar to those observed for high-risk situations for
alcohol relapse, as assessed with the IDS (e.g., Annis et al., 1987).

Demographics questionnaire. An author-compiled measure
gathered information on participants’ demographic characteris-
tics (i.e., age and sex).

Gambling Motives Questionnaire. Stewart and Zack (2007)
developed the GMQ, a measure of gambling motives that was
modeled after the psychometrically sound Drinking Motives
Questionnaire (DMQ; Cooper et al., 1992). Specifically, the GMQ
assesses gamblers’ relative frequency of gambling for each of 15
reasons. All items on the GMQ, except one, were adapted directly
from the DMQ; the remaining item was reworded from the DMQ
to make it appropriate to the gambling context (i.e., “to get high”
from the DMQ was changed to “to get a ‘high’ feeling” on the
GMQ). As with the DMQ, there are five items per subscale, and
the measure consists of three subscales: Social, Coping, and En-
hancement gambling motives. Relative frequency of gambling
was rated on the same 4-point scale used for the DMQ (1 = almost
never/never; 2 = sometimes; 3 = often; 4 = almost always). This
measure was included as a validation of the gambling motives
information derived from the IGS. With the GMQ, motives are assessed directly (by asking the gambler why he or she gambles),
whereas with the IGS, motives are inferred on the basis of the
typical situations in which he or she gambles (e.g., if a gambler
reports gambling frequently in response to situations involving
conflict with others, it is inferred that gambling is being used for
coping reasons).

Recently the GMQ has been shown to possess strong psycho-
metric properties in a large sample of community recruited gam-
bler (Stewart & Zack, 2007). For example, an exploratory prin-
cipal components analysis revealed three intercorrelated factors
tapping Enhancement, Coping, and Social gambling motives, re-
spectively. Each GMQ subscale showed good internal consistency
(alphas > .80). Probable pathological gamblers scored higher than
nonpathological gamblers on all three scales, with larger differ-
ences for the Coping and Enhancement subscales. In concurrent
validity analyses, Enhancement gambling motives consistently
predicted heavier gambling behavior, and Coping and Enhance-
ment gambling motives consistently predicted more severe gam-
bling problems. In line with findings for the Social motives sub-
cale of the Drinking Motives Questionnaire (Cooper et al., 1992),
social gambling motives were unrelated to either gambling behav-
or or gambling problems. In the present sample, the internal
consistencies were acceptable for the risky gambling motives of
Coping and Enhancement (see Table 1), the two scales of theoret-
ical interest in the current study given their previously demon-
strated associations with gambling behavior and problems (Stewart

South Oaks Gambling Screen (SOGS). The SOGS (Lesieur &
Blume, 1987) is a multi-item self-report questionnaire that asks
respondents to describe their lifetime gambling habits. Twenty
items are used in scoring the SOGS total score. The content of
the SOGS was derived from Gamblers Anonymous 20 questions, from
the Diagnostic and Statistical Manual of Mental Disorders (3rd ed.,
American Psychiatric Association, 1980), and from problem
gambling counselors. A total score of 5 or more is typically used
to identify probable pathological gamblers (Lesieur & Blume,
1987). The SOGS shows acceptable psychometric properties in
clinical samples of problem gamblers, including high internal
consistency, adequate stability, and acceptable sensitivity and
specificity in identifying defined pathological gamblers (Lesieur &
Blume, 1987), as based on the Diagnostic and Statistical Manual of
Mental Disorders (3rd ed., revised [DSM-III-R]; American Psychiatric
Association, 1987). In the present study, the SOGS was used both as a screening tool to identify probable pathological gamblers for study inclusion and, on the test day, as a measure of
the lifetime number of different gambling activities and lifetime
frequency of gambling. For the former test-day dependent mea-
sure, we counted the total number of gambling activities (e.g., slot
machines, VLTs, cards for money) endorsed on the list of 13 items
on the first item of the SOGS (possible range = 1 to 13). For the
latter test-day dependent measure, we calculated the average gam-
bling frequency score (where 1 = less than once a week and 2 =
one a week or more) across all gambling activities endorsed on
Item 1 of the SOGS (possible range = 1 to 2). The latter two
measures were not significantly intercorrelated \( (r = -.07, ns) \),
attesting to the independence of these two aspects of gambling
behavior. However, both were correlated with severity of gam-
bling problems on the DSM-IV-based measure of pathological
gambling symptoms, described next (i.e., \( r_s = .23 \) and .24, respec-
tively, \( p < .005 \)). The internal consistency of the SOGS total score
on the test day was acceptable in the present study (see Table 1).

DSM-IV–based measure of pathological gambling. Beaudoin
and Cox (1999) developed an instrument as an alternative to the
SOGS, designed to be more consistent with the current diagnostic
criteria for pathological gambling (DSM-IV; American Psychiatric
Association, 1994). In this measure, participants are presented with the 11 items comprising the 10 DSM-IV criteria for pathological gambling; the work and relationship difficulties due to gambling criterion from the DSM-IV is split into two separate items. Participants answer each item with responses of 0 (never), 1 (yes, at some time in my life), 2 (yes, in past year), or 3 (yes, in the past month). Beaudoin and Cox (1999) reported a significant correlation between scores on this measure and total scores on the SOGS \((r = .59)\) in a community sample. Similarly, in the present study, scores on this DSM-IV–based measure were significantly correlated with SOGS total scores \((r = .68, p < .001)\). We also found good internal consistency for the scale in this study (see Table 1). It is also possible to calculate probable DSM-IV pathological gambling diagnoses on the basis of this measure. For example, to determine whether an individual has a probable lifetime diagnosis of pathological gambling, one simply calculates whether the individual endorses at least five of the DSM-IV symptoms, with a score of 1 or greater. [Note that one can only obtain credit for either the work or relationship difficulties item on this measure when using it to establish probable pathological gambling diagnoses.] Eighty-seven percent of the present sample met DSM-IV criteria for a probable lifetime diagnosis of pathological gambling, and 39% met criteria for a probable past year pathological gambling diagnosis on this measure.

**Drinking Motives Questionnaire (DMQ).** We used the three-dimensional DMQ (Cooper et al., 1992) as the measure of drinking motives. The DMQ contains three subscales (Social, Coping, and Enhancement drinking motives) of 5 items each. Participants are asked to indicate the relative frequency of their alcohol use for each of the 15 reasons provided, using the same 4-point scale described above for the GMQ. In adult community and University samples, the DMQ has previously been shown to possess excellent psychometric properties, including structural validity (i.e., a three-factor structure identical to the one described above for the GMQ), concurrent validity with drinking behavior and problems (i.e., with Coping and Enhancement, but not Social, drinking motives proving most risky in terms of associations with heavy drinking and alcohol problems), and high internal consistency (e.g., Cooper et al., 1992; Stewart, Zeitlin, & Samoluk, 1996). In the present study, the internal consistencies were good for the risky motives of Coping and Enhancement (see Table 1), the two scales of theoretical interest.

**Drinking in response to gambling wins and losses.** Participants also completed an author-complied measure assessing their drinking in response to gambling wins and losses (Zack et al., 2005). This measure was modeled after a measure developed by Zack, Poulos, Fragopoulos, and MacLeod (2003) to assess drinking in response to negative emotional states. Specifically, in the present study, each participant was asked “When I win at gambling, I am…” (a) “much more likely to drink alcohol”; (b) “much less likely to drink alcohol”; or (c) “neither more nor less likely to drink alcohol.” Participants were also asked, “When I lose at gambling, I am…” (a) “much more likely to drink alcohol”; (b) “much less likely to drink alcohol”; or (c) “neither more nor less likely to drink alcohol” (see Zack et al., 2005). As in Zack et al. (2005), we converted each of these two measures into a dichotomously coded outcome indicating whether the participant was (a) or was not (b or c) much more likely to drink alcohol in the specified situation.

**Drinking behavior measure.** Participants were queried about their drinking behavior with standard quantity–frequency methods (see Stewart, Peterson, & Pihl, 1995). Specifically, participants were asked how many times they normally drink per week (i.e., drinking frequency). Those who drink less than once a week were asked to provide estimates of their monthly or yearly drinking occasions, which were later converted to weekly estimates. Participants were then asked how many standard alcoholic beverages they normally consume per drinking occasion (i.e., drinking quantity). Participants were informed that one alcoholic beverage equals one 12-oz (355-ml) bottle or can of beer, one 4-oz (118-ml) glass of wine, or one 1-oz (29.6-ml) shot of hard liquor, either straight or with a mixer. We followed published recommendations for enhancing the accuracy of these self-reports (Sobell & Sobell, 1990). For example, these items were embedded in the demographics questionnaire described previously to reduce their salience, and the items were presented in an open-ended response format. In the present study, these two indices of drinking behavior were significantly, but only moderately, intercorrelated \((r = .22, p < .01)\), attesting to their being relatively independent aspects of drinking behavior. Both were significantly related to severity of alcohol problems on the B-MAST, described next \((rs = .40 and .34, respectively, ps < .001)\).

**Brief Michigan Alcoholism Screening Test (B-MAST).** The B-MAST (Pokorny et al., 1972) is a shortened version of the Michigan Alcoholism Screening Test (MAST; Selzer, 1971). It can reliably distinguish individuals with a known alcohol use disorder (Pokorny et al., 1972). Participants answer “yes” or “no” to 10 questions about their drinking. Responses to three items on the B-MAST are assigned a dichotomous score of either 0 or 5, and the remaining responses are assigned a dichotomous score of either 0 or 2. Thus, total scores can range from 0 to 29, and a score of 6 or more is considered to indicate a probable alcohol use disorder. See Ellery and Stewart (2007) for a review of the generally good psychometric properties of the B-MAST across a variety of populations.

**Procedure**

The study received formal approval from the Institutional Review Boards at both sites where data were collected (i.e., Dalhousie University in Halifax, Nova Scotia, Canada, and the Centre for Addictions and Mental Health in Toronto, Ontario, Canada). When potential participants contacted the laboratory in response to the advertisements, they were screened for eligibility over the phone by a trained research assistant. Of those who responded to the advertisements, 159 were excluded for various reasons, the most common of which were not meeting the drinking while gambling criterion \((n = 132; 83\% of those excluded) or not meeting the SOGS screening criteria for probable pathological gambling \((n = 13; 8\% of those excluded)\). The rest were excluded for a likely history of serious and chronic mental illness (e.g., schizophrenia) or self-reports of current medication use. Those who were eligible were scheduled for testing at the laboratory.

Participants were tested individually in a quiet, well-lit room. They were requested to abstain from alcohol for at least 12 hr prior to their testing session; abstinence was confirmed via a breath alcohol test upon arrival to the laboratory. Those passing the breath test were then provided with a consent form, which fully described
the study procedures and risks. Testing commenced after participants had the opportunity to ask questions and to provide their signature indicating informed consent to participate. Participants first completed a computerized reaction time task, the results of which are described elsewhere (Zack et al., 2005). Next, participants took a short break, before completing the self-report measures described above. Questionnaires were presented in a randomized order that was counterbalanced across participants. When participants completed all measures, they were debriefed, compensated for their time and effort, and dismissed.

Results

Examination of Gambler Clusters Differing in Affective Motivations for Gambling

Factor analyses were performed on the IGS subscale scores to reduce the 10 subscales to a smaller number of core types of gambling situations prior to cluster analyses. First, scores on the 10 subscales of the IGS were submitted to a principal components analysis. The Kaiser–Meyer–Olkin measure of sampling adequacy was .50 (i.e., .92), indicating that the principal components analysis could proceed with the present data set. Oblique rotation was chosen to allow for intercorrelation among factors, as prior work suggests intercorrelations between different motives for addictive behaviors. Kaiser’s eigenvalue > 1 rule and an examination of the scree plot both suggested a two-factor solution (first four eigenvalues = 7.009, 1.108, 0.516, and 0.383, respectively). The two-factor solution evidenced excellent simple structure (i.e., only one complex loading [Urges and Temptations showed loadings on both factors]; no hyperplane items; and a large number of salient loadings per factor; see Table 2). The two factors were moderately intercorrelated (r = .64) and together accounted for 81.2% of the variance in IGS item scores. The first factor showed strong salient loadings from subscales, such as Unpleasant Emotions, Worried Over Debts, and Conflict With Others and thus was labeled Negative Situations for gambling. This factor accounted for 70.1% of the variance in IGS subscale scores prior to rotation. The second factor showed strong salient loadings from subscales such as Pleasant Emotions, Social Pressure, and Need for Excitement and thus was labeled Positive Situations for gambling. This factor accounted for an additional 11.1% of the variance in item scores prior to rotation. The communality values showed that the two factors together explained a substantial proportion of the variance in each of the 10 IGS subscale scores (range = 63.9% to 91.8%; see Table 2). The two obtained factors correspond to those described by Littman-Sharp et al. (in press), with the same subscales showing the highest loadings on each of the two factors (i.e., Positive Emotions, Need for Excitement, Confidence in Skill, and Social Pressure showing the highest loadings on the Positive Situations factor and the Conflict With Others, Negative Emotions, and Worried Over Debt showing the highest loadings on the Negative Situations factor); Urges and Temptations showed a complex loading on both factors in both studies.

We then performed cluster analyses to gain a perspective on the distribution of the two IGS factors in the sample. Initial clusters were obtained with Ward’s squared Euclidean distance method using factor scores derived from the previous analysis. The percentage change in agglomeration coefficients (sum of the squared distances between clusters) to next level for two to six clusters, respectively, were 44.8, 35.9, 21.9, 26.2, and 22.3. The scree plot method for determining the number of clusters in a data set indicated a three-cluster solution (i.e., the point at which the slope for change in agglomeration coefficients became 0). We then performed a K-means clustering analysis, constrained to a three-cluster solution, on the IGS factor scores. Table 3 presents mean IGS factor scores on each gambling situation dimension for the three clusters yielded from this analysis. The first cluster represented 59% of the sample (n = 94) and was characterized by positive scores on the Positive Gambling Situations factor and by negative scores on the Negative Gambling Situations factor. This cluster was labeled “enhancement gamblers” as a result of the selective elevation on the positive gambling situations IGS factor. The second cluster represented an additional 23% of the sample (n = 36) and was characterized by high scores on both the Positive Gambling Situations factor and the Negative Gambling Situations factor, with particularly strong elevations on the latter. This cluster was labeled “coping gamblers” on account of the particularly high scores on the Negative Gambling Situations IGS factor. The third cluster represented the final 18% of the sample (n = 28) and was characterized by low scores on both the Positive and Negative Gambling Situations factors. This cluster was labeled “low emotion regulation gamblers” as a result of the low scores on both IGS factors.

We tested whether the cluster groups differed significantly in either age or gender composition. A one-way (cluster group) analysis of variance (ANOVA) on age revealed no significant main effect of cluster group, F(2, 151) = 1.56, ns. Mean (SD) ages were 35.8 (10.37), 34.2 (9.83), and 38.9 (12.41) years in the enhancement, coping, and low emotion regulation subtypes, respectively. A 3 (cluster group) × 2 (gender) chi-square analysis revealed no significant association between these variables, $\chi^2(2) = 1.97$, ns. The enhancement, coping, and low emotion regulation subtypes were composed of 80%, 69%, and 75% men, respectively. The symmetry in age and gender composition of the three subtypes enabled us to proceed with hypothesis testing without controlling for these demographic factors.

Table 2

Pattern Matrix From Principal Components Analysis of Inventory of Gambling Situations (IGS) Subscale Scores Following Oblique Rotation (N = 158)

<table>
<thead>
<tr>
<th>IGS subscale</th>
<th>Factor 1: Negative situations</th>
<th>Factor 2: Positive situations</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpleasant Emotions</td>
<td>.976</td>
<td>−.029</td>
<td>.918</td>
</tr>
<tr>
<td>Worried Over Debts</td>
<td>.945</td>
<td>−.072</td>
<td>.812</td>
</tr>
<tr>
<td>Conflict With Others</td>
<td>.938</td>
<td>−.034</td>
<td>.840</td>
</tr>
<tr>
<td>Testing Personal Control</td>
<td>.886</td>
<td>.032</td>
<td>.821</td>
</tr>
<tr>
<td>Winning and Chasing Losses</td>
<td>.764</td>
<td>.202</td>
<td>.821</td>
</tr>
<tr>
<td>Urges and Temptations</td>
<td>.603</td>
<td>.425</td>
<td>.873</td>
</tr>
<tr>
<td>Pleasant Emotions</td>
<td>−.105</td>
<td>.930</td>
<td>.751</td>
</tr>
<tr>
<td>Social Pressure</td>
<td>−.036</td>
<td>.899</td>
<td>.768</td>
</tr>
<tr>
<td>Need for Excitement</td>
<td>.246</td>
<td>.757</td>
<td>.872</td>
</tr>
<tr>
<td>Confidence in Skills</td>
<td>.173</td>
<td>.678</td>
<td>.639</td>
</tr>
</tbody>
</table>

Note. Salient loadings (≥.40) are indicated in boldface.
Table 3
Final Cluster Centers on the Negative and Positive Gambling Situation Factors From the Inventory of Gambling Situations (IGS) for Three Subtypes of Gamblers

<table>
<thead>
<tr>
<th>IGS factor</th>
<th>Enhancement gambler (n = 94)</th>
<th>Coping gambler (n = 36)</th>
<th>Low emotion regulation gambler (n = 28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Gambling Situations</td>
<td>−0.173</td>
<td>1.317</td>
<td>−1.112</td>
</tr>
<tr>
<td>Positive Gambling Situations</td>
<td>0.074</td>
<td>1.061</td>
<td>−1.613</td>
</tr>
</tbody>
</table>

Validation of Cluster Analysis With the GMQ

Factor analyses were performed on the GMQ. Briefly, the PCA with oblique rotation revealed the expected three factors of Enhancement, Social, and Coping motives. (Kaiser’s eigenvalue 1 criterion was used to determine the number of factors to retain.) Scores on each of these factors were saved and used in hypothesis tests so that each gambling motive score would be weighted for the relative contributions of each GMQ item. We conducted a 3 (cluster group) × 2 (subscale) analysis of variance (ANOVA) on the GMQ Enhancement and Coping factor scores to validate the cluster analyses. A main effect of cluster group, \(F(2, 151) = 35.22, p < .001\), was revealed, which was qualified by the predicted Cluster Group × Subscale interaction, \(F(2, 151) = 3.44, p < .05\). Mean (SE) factor scores on the GMQ are given in Table 4a and reveal that the interaction reflected relatively stronger enhancement versus coping motives in enhancement gamblers, as compared with relatively stronger coping versus enhancement motives in coping gamblers.

Table 4
Responses to the Gambling-Related Criterion Measures as a Function of Gambler Subtype

<table>
<thead>
<tr>
<th>Measure</th>
<th>Enhancement gambler (n = 94)</th>
<th>Coping gambler (n = 36)</th>
<th>Low emotion regulation gambler (n = 28)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SE</td>
<td>M</td>
</tr>
<tr>
<td>Gambling motives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhancement</td>
<td>0.406_\text{b}</td>
<td>0.067</td>
<td>0.770_\text{a}</td>
</tr>
<tr>
<td>Coping motives</td>
<td>0.109_\text{b}</td>
<td>0.090</td>
<td>1.028_\text{a}</td>
</tr>
<tr>
<td>Gambling behavior/problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOGS gambling frequency</td>
<td>1.42_\text{a}</td>
<td>0.03</td>
<td>1.58_\text{a}</td>
</tr>
<tr>
<td>SOGS no. of gambling activities</td>
<td>9.09_\text{a}</td>
<td>0.23</td>
<td>9.86_\text{a}</td>
</tr>
<tr>
<td>DSM-IV–based measure</td>
<td>12.90_\text{a}</td>
<td>0.62</td>
<td>19.74_\text{a}</td>
</tr>
</tbody>
</table>

Note. Across rows, means with different subscripts differ significantly from one another \((p < .05)\) according to Games–Howell post hoc tests. Gambling motives were assessed with factor scores from the author-compiled Gambling Motives Questionnaire, which was adapted from the Drinking Motives Questionnaire (Cooper et al., 1992); SOGS = South Oaks Gambling Screen (Lesieur & Blume, 1987); SOGS gambling frequency = average frequency of gambling across activities \((\text{range} = 1 \text{ to } 20)\); SOGS no. of gambling activities = number of different gambling activities engaged in across the life span \((\text{range} = 1 \text{ to } 13)\); DSM-IV–based measure = Diagnostic and Statistical Manual of Mental Disorders (4th ed.) measure of criteria for pathological gambling according to Beaudoin and Cox (1999). The degrees of freedom vary across these analyses of variance because 4 participants failed to complete the DSM-IV measure of gambling problems.

We then examined the simple effects of cluster group membership separately for each GMQ subscale. A significant simple effect of cluster group membership was revealed for the Enhancement motives subscale, \(F(2, 151) = 17.79, p < .001\). For all post hoc comparisons conducted in the present study, we used Games–Howell tests because of the unequal \(n\) across subtypes as well as to protect against violations of the assumption of homogeneity of variances. Games–Howell tests revealed that, as hypothesized, the enhancement gamblers had higher Enhancement factor scores than did the low emotion regulation gamblers. Additionally, the coping gamblers had greater scores on the Enhancement factor than did either the low emotion regulation gamblers or the enhancement gamblers. A significant simple effect of cluster group was also revealed for the Coping subscale, \(F(2, 151) = 20.08, p < .001\). As hypothesized, coping gamblers had greater Coping factor scores than did either the low emotion regulation or the enhancement gamblers. Coping factor scores did not differ between enhancement and low emotion regulation gamblers. Thus, the clusters of gamblers identified with the IGS were cross-validated by selective elevations in GMQ Coping motives in coping gamblers and by elevations in GMQ Enhancement motives in both enhancement and coping gamblers (see Table 4a).

Relations of Gambling Clusters to Gambling Behavior and Problems

Means (SEs) on the two SOGS gambling behavior measures (i.e., lifetime number of different gambling activities and gambling frequency) and on the DSM-IV–based measure of gambling problems are shown in Table 4b as a function of cluster group membership. A one-way ANOVA for the first index showed a significant main effect of cluster group, \(F(2, 155) = 19.90, p < .001\). Games–Howell post hoc tests showed that, as hypothesized, the enhancement gamblers scored higher than did low emotion regulation gamblers in terms of number of different gambling activities engaged in across the life span.
Relations of Gambling Clusters to Drinking Motives

We first conducted a principal components analysis with oblique rotation on the DMQ scores of the total sample. Following Kaiser’s eigenvalue 1 criterion to determine the number of factors to retain, this analysis revealed the hypothesized three-factor solution with factors labeled Enhancement, Coping, and Social Drinking motives, respectively. Factor scores from the principal components analysis of DMQ scores were used in the hypothesis test regarding the expected correspondence between gambling and drinking motives. Factor scores were selected above subscale scores so that each drinking motive score would be weighted for the relative contributions of each DMQ item. Specifically, we conducted a 3 × 2 (cluster group: coping vs. enhancement vs. low emotion regulation gamblers × subscale: enhancement vs. coping drinking motives) mixed-model ANOVA on the DMQ risky drinking motive factor scores. A main effect of cluster group, F(2, 151) = 36.16, p < .001, was revealed, which was qualified by the hypothesized significant Cluster Group × Subscale interaction, F(2, 151) = 7.42, p = .001. Mean (SE) factor scores on the DMQ Coping and Enhancement dimensions are shown in Table 5a as a function of gambling cluster group.

We then examined the simple effects of cluster group membership separately for each DMQ subscale. A significant simple effect of cluster group membership was revealed for the Enhancement drinking motives factor, F(2, 151) = 10.46, p < .001. As hypothesized, Games–Howell tests revealed that the enhancement gamblers had greater enhancement-motivated drinking factor scores than did the low emotion regulation gamblers. Coping gamblers also had higher enhancement-motivated drinking factor scores than did the low emotion regulation gamblers. However, enhancement and coping gamblers did not differ significantly in enhancement drinking scores (see Table 5a). A significant simple effect of cluster group was also revealed for the Coping drinking motives factor, F(2, 151) = 44.01, p < .001. As hypothesized, coping gamblers had greater coping-motivated drinking factor scores than did either low emotion regulation or enhancement gamblers. Additionally, the enhancement gamblers scored higher in coping-motivated drinking factor scores than did low emotion regulation gamblers (see Table 5a).

Relations of Gambling Clusters to Drinking in Response to Gambling Wins and Losses

Responses to the two items on the author-compiled measure of drinking in response to gambling wins and losses were subjected to chi-square analyses. A 3 (cluster group) × 2 (drinking when winning) chi-square test revealed a significant association between these variables, \( \chi^2(2) = 7.20, p < .05 \). This association was primarily due to the larger proportion of those in the enhancement (79.1%) and the coping (94.3%) gamblers groups who reported being much more likely to drink when winning at gambling, relative to those in the low emotion regulation gamblers group (67.9%; Table 5b). A parallel 3 (cluster group) × 2 drinking when losing) chi-square test revealed a significant association between these variables, \( \chi^2(2) = 17.99, p < .001 \), one-tailed test. This association was primarily due to the larger proportion of coping gamblers (71.4%), who reported being much more likely to drink when losing at gambling, relative to both low emotion regulation gamblers (17.9%) and enhancement gamblers (50.5%; Table 5b).

Relations of Gambling Clusters to Drinking Behavior and Problems

Means (and standard errors) on the drinking frequency, quantity, and problems (i.e., B-MAST) measures are shown in Table 5c as a function of gambler subtype. The ANOVA on the drinking quantity measure showed a significant main effect of cluster group, F(2, 150) = 7.57, p < .005. Consistent with the hypothesis, Games–Howell post hoc tests showed that enhancement gamblers scored higher than low emotion regulation gamblers on this measure. Contrary to the hypothesis, enhancement gamblers did not differ significantly from coping gamblers on typical drinking quantity. Coping gamblers also scored higher than did low emotion regulation gamblers on this drinking

1 To ensure that the finding that coping gamblers had higher gambling problem severity did not result simply from the fact that the DSM-IV criteria include an item on coping motives (i.e., “Do you ever gamble as a way of escaping from problems in life or as a way of getting rid of unpleasant feelings?” [italics added for illustration]), we recalculated the total scores on the DSM-IV–based measure of gambling problems after removing scores on this potentially redundant item and repeated the ANOVA described above. Again, a main effect of cluster group was revealed, F(2, 151) = 32.72, p < .001. Moreover, Games–Howell post hoc tests showed the same group effects reported above, including the finding that coping gamblers still scored higher than both of the other two groups in gambling problem severity. A similar analysis was conducted to ensure that the finding that enhancement gamblers had higher gambling problem severity than the low emotion regulation gamblers did not result simply from the fact that the DSM-IV criteria included mention of enhancement motives in one of the diagnostic criteria (i.e., “Do you find you need to gamble with increasing amounts of money in order to get the desired level of excitement?” [italics added for illustration]). Even after recalculating total scores on the DSM-IV–based measure of gambling problems after removing scores on this potentially redundant item, a main effect of cluster group was still evident, F(2, 151) = 31.39, p < .001. Again, Games–Howell post hoc tests showed the same group differences to be evident, including the significantly higher scores in gambling problem severity among enhancement gamblers as compared with low emotion regulation gamblers.
criterion variable. The ANOVA on the drinking frequency measure showed a significant main effect of cluster group, \( F(2, 151) = 9.98, p < .001 \). Contrary to the hypothesis, enhancement gamblers did not differ significantly from low emotion regulation gamblers on this drinking criterion variable. Additionally, coping gamblers were unexpectedly shown to score higher than both enhancement and low emotion regulation gamblers on drinking frequency. The ANOVA on the B-MAST measure of severity of alcohol problems showed a significant main effect of cluster group, \( F(2, 147) = 13.13, p < .001 \). Contrary to the hypothesis, enhancement gamblers did not differ significantly from low emotion regulation gamblers on severity of drinking problems. Additionally, coping gamblers were unexpectedly shown to score higher than both enhancement and low emotion regulation gamblers in terms of severity of drinking problems (see Table 5c).

### Post Hoc Analyses of Covariance Controlling for Gambling Problem Severity

It is possible that the current subtyping scheme is redundant with gambling problem severity, with coping gamblers representing severe gamblers, enhancement gamblers representing moderate gamblers, and low emotion regulation gamblers representing mild gamblers. In order to examine this possibility, we repeated all of the analyses reported above using our index of gambling problem severity (i.e., the \( DSM-IV \)-based measure; Beaudoin & Cox, 1999) as a covariate. For the continuous dependent measures, we conducted a set of binary logistic regressions, with cluster group as a categorical predictor variable and scores on the \( DSM-IV \)-based measure as a continuous predictor variable. In all but three cases, the cluster group effect remained significant. For the exceptions, the effects of cluster group on drinking when winning \( (p = .070) \) and SOGS gambling frequency \( (p = .062) \) and the Cluster Group \( \times \) Subscale interaction on the DMQ \( (p = .058) \) were reduced to marginal significance when gambling problems were controlled. However, for the DMQ, cluster group simple main effects remained significant in the case of both coping and enhancement drinking motives \( (ps < .001) \) when controlling gambling problem severity. For all dependent measures, the pattern of covariate-adjusted means remained identical to that reported previously. Thus, the proposed subtyping scheme provides important clinical information about pathological gamblers beyond severity of gambling problems per se.

### Discussion

In light of clinical and etiological heterogeneity in pathological gamblers, the present study assessed the feasibility of empirical classification of gamblers on the basis of primary antecedents and motives for gambling, using scores on two multi-item self-report scales. This initial test was conducted on a large sample of lifetime probable pathological gamblers who regularly drink alcohol when they gamble, which helped to ensure adequate variation on both drinking and gambling-related dimensions. Three subtypes of pathological gamblers were identified on the basis of cluster analyses of scores from the Inventory of Gambling Situations and validation with the Gambling Motives Questionnaire: a group that gambles purely for positive reinforcement (i.e., enhancement gam-

### Table 5

<table>
<thead>
<tr>
<th>Measure</th>
<th>Enhancement gambler ( (n = 94) )</th>
<th>Coping gambler ( (n = 36) )</th>
<th>Low emotion regulation gambler ( (n = 28) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( M )</td>
<td>SE</td>
<td>( M )</td>
</tr>
<tr>
<td>Drunking motives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhancement motives</td>
<td>0.53b</td>
<td>0.099</td>
<td>0.410a</td>
</tr>
<tr>
<td>Coping motives</td>
<td>−.161b</td>
<td>.084</td>
<td>1.304a</td>
</tr>
<tr>
<td>Drinking when winning/losing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More likely to drink when losing</td>
<td>72</td>
<td>(79.1%)</td>
<td>33</td>
</tr>
<tr>
<td>Not more likely to drink when winning</td>
<td>19</td>
<td>(20.9%)</td>
<td>2</td>
</tr>
<tr>
<td>More likely to drink when losing</td>
<td>46</td>
<td>(50.5%)</td>
<td>25</td>
</tr>
<tr>
<td>Not more likely to drink when losing</td>
<td>45</td>
<td>(49.5%)</td>
<td>10</td>
</tr>
<tr>
<td>Drinking frequency</td>
<td>3.15b</td>
<td>.18</td>
<td>4.37a</td>
</tr>
<tr>
<td>Drinking quantity</td>
<td>6.86b</td>
<td>.51</td>
<td>9.86a</td>
</tr>
<tr>
<td>B-MAST</td>
<td>7.40b</td>
<td>.81</td>
<td>13.94a</td>
</tr>
</tbody>
</table>

Note. Across rows, for the continuous measures, means with different subscripts differ significantly from one another \( (p < .05) \) according to Games–Howell post hoc tests. For the Drinking when winning/losing measure: Percentages are calculated for each subtype; 0 cells have expected counts less than 5; and \( N = 154 \), as 4 participants failed to complete this measure. Drinking motives were assessed with factor scores from the Drinking Motives Questionnaire (Cooper et al., 1992); drinking frequency = drinking occasions per week; drinking quantity = number of alcoholic beverages per drinking occasion; B-MAST = scores on the Brief version of the Michigan Alcoholism Screening Test (Pokorny et al., 1972). The degrees of freedom vary across the analyses of variance because not all participants completed all of the criterion measures.
blers); a group that gambles for both positive and negative, but mainly for negative, reinforcement (i.e., coping gamblers); and a third group that gambles for reasons other than direct modulation of affect (i.e., low emotion regulation gamblers). Unexpectedly, no pure coping-motivated gambler was identified. Instead, our results suggest that, among non–treatment-seeking individuals, coping-based gambling occurs most often in combination with moderate elevations on enhancement-motivated gambling. We nonetheless labeled this subtype coping gamblers because of the primary elevations on the Negative Gambling Situations factor. This label was validated with the Gambling Motives Questionnaire in that only the coping gamblers scored higher than the other two groups on the Coping Motives factor of the GMQ. Further research is needed to determine whether this group is best conceptualized as coping gamblers or as high emotion regulation gamblers who gamble instrumentally in order to alter their moods, both negative and positive.

The present subtyping scheme shows many similarities to those previously suggested in the literature (Table 6). The coping gamblers group bears similarities to subtypes of gamblers previously referred to as escape seekers (Lesieur, 2001), recurrently depressed (McCormick, 1987), depression prone (Blaszczynski et al., 1990), and emotionally vulnerable (Blaszczynski & Nower, 2002), respectively. The enhancement gamblers group bears similarities to subtypes of gamblers previously referred to as impulsive action seekers (Lesieur, 2001), chronically understimulated (McCormick, 1987), boredom prone (Blaszczynski et al., 1990), and antisocial impulsivist (Blaszczynski & Nower, 2002), respectively. Only some of the previously described subtyping schemes in the literature have produced a third subtype of gamblers, as we did in the present study. This may reflect the non–treatment-seeking status of our sample. Nonetheless, our group of low emotion regulation gamblers bears similarities to subtypes of gamblers previously referred to as behaviorally conditioned (Lesieur, 2001) and as behaviorally conditioned (Blaszczynski & Nower, 2002), respectively. The fact that our subtyping scheme bears such strong similarities to those previously described in the literature provides some evidence of the construct and convergent validity of the subtyping scheme. At the same time, the present subtyping scheme has the advantage of being readily applicable in the clinical setting with a single, relatively brief self-report questionnaire (i.e., IGS; Turner & Littman-Sharp, 2006).

### Table 6

**Comparison of Proposed Subtyping Scheme with Previously Suggested Schemes**

<table>
<thead>
<tr>
<th>Researchers</th>
<th>Proposed subtypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stewart et al. (present study)</td>
<td>Coping gamblers</td>
</tr>
<tr>
<td></td>
<td>Enhancement gamblers</td>
</tr>
<tr>
<td></td>
<td>Low emotion regulation gamblers</td>
</tr>
<tr>
<td>Lesieur (2001)</td>
<td>Impulsive escape seekers</td>
</tr>
<tr>
<td></td>
<td>Impulsive action seekers</td>
</tr>
<tr>
<td></td>
<td>Problem gamblers</td>
</tr>
<tr>
<td>McCormick (1987)</td>
<td>Recurrently depressed</td>
</tr>
<tr>
<td></td>
<td>Chronically understimulated</td>
</tr>
<tr>
<td>Blaszczynski et al. (1990)</td>
<td>Depression prone</td>
</tr>
<tr>
<td></td>
<td>Boredom prone</td>
</tr>
<tr>
<td></td>
<td>Antisocial impulsivist</td>
</tr>
<tr>
<td></td>
<td>Behaviorally conditioned</td>
</tr>
</tbody>
</table>

Consistent with hypotheses, coping gamblers, who comprised just over one quarter of our sample, were characterized by a greater severity of gambling problems than the other groups on a DSM-IV-based measure of gambling problems (Beaudoin & Cox, 1999). This finding is consistent with results in the broader addictions literature that motivations involving coping with negative emotions and life concerns are associated with particularly problematic forms of addictive behavior (e.g., Birch, Stewart, & Zack, 2006; Cooper et al., 1992). Addictive behaviors motivated by a desire to reduce or avoid negative states may result in a functional or instrumental dependence on the addictive activity, which compounds physiological aspects of dependence (i.e., tolerance, withdrawal, and craving) and leads to greater overall addiction severity. In line with this, coping gamblers showed significant elevations on all of the criterion variables examined in this study, relative to one or both of the other gambler subtypes.

The enhancement gamblers group was the most common subtype in our sample of probable pathological gamblers who drink when gambling, comprising over half (59%) of the sample. Given their conceptual similarity to the antisocial impulsivist gambler subtype described by Blaszczynski and Nower (2002), a group said to be at increased susceptibility for comorbid substance abuse, we had hypothesized that the enhancement gamblers would show elevations relative to the other two subtypes on our two measures of drinking behavior. This hypothesis was only partially supported in that the enhancement gamblers evidenced greater drinking only in relation to the low emotion regulation gamblers and only on the drinking quantity measure. Instead, it was the coping gamblers who appeared to be more susceptible to heavy, frequent drinking and also to greater severity of alcohol problems, in relation to the other two groups. This finding may appear less surprising when we see that the coping gamblers were characterized by greater coping-related drinking than were the other subtypes (as discussed later), given the strong established link between coping motives for drinking and alcohol problems (see Birch et al., 2006). It remains to be determined in future research whether enhancement gamblers would show higher levels of abuse of other drugs with primarily arousal-enhancing or psychostimulant effects, such as cocaine, as might be predicted from Blaszczynski and Nower’s (2002) theory.

Additionally, the enhancement gamblers scored higher than did the low emotion regulation gamblers on the DSM-IV-based measure of gambling problems (Beaudoin & Cox, 1999) and on the SOGS gambling frequency measure (Lesieur & Blume, 1987), suggesting more frequent gambling and greater severity of gambling symptoms in this group. Thus, as in other areas of addictive behaviors (Cooper et al., 1992), engaging in the activity for reasons of enhancing pleasurable emotional states (e.g., gambling to pursue feelings of excitement) also appears to constitute a risky set of reasons for gambling that, like coping motives, is associated with increased gambling frequency and severity of gambling problems.

A third subtype, comprising just under one fifth of the sample, was labeled low emotion regulation gamblers because they scored low on both IGS factors and, thus, presumably gamble for reasons other than motives involving emotion regulation. Future research should focus on understanding the gambling motives for this third cluster to ultimately assist in treatment planning for these individuals. For example, it is possible that this group gambles more out of habit than for emotional regulation reasons. Given their conceptual similarities to Blaszczynski and Nower’s (2002) behavior-
ally conditioned problem gamblers subtype, future research could investigate whether this group’s problem gambling is more a function of conditioning (e.g., a history of a particularly big win) or distorted cognitions (which could be measured with an instrument such as the Informational Biases Scale; Jefferson & Nicki, 2003). Consistent with Blaszczynski and Nower’s (2002) observations that their behaviorally conditioned problem gamblers subtype displayed minimal levels of comorbid psychopathology, our low emotion regulation gamblers subtype showed significantly lower scores on a measure of alcohol abuse (the B-MAST; Pokorny et al., 1972) when compared with the coping gamblers.

We also examined the correspondence between gambling motives and drinking motives to determine whether gamblers who gamble to cope also tend to drink to cope and, similarly, whether gamblers who gamble for enhancement reasons also tend to drink to enhance positive emotional states. Our results showed that, as hypothesized, the coping gamblers scored higher than the other groups on the Coping-motivated drinking subscale of the DMQ (Cooper et al., 1992) and that the low emotion regulation cluster scored lower than the other groups on the DMQ Enhancement-motivated drinking subscale. The finding that gambler clusters also differed in risky drinking motivations is consistent with the idea that motives may be traits, in that they display cross-situational consistency across different forms of addictive behavior (Stewart, Brown, Devoulyte, Theakston, & Larsen, 2006). Alternatively, this correspondence between motives across addictive behaviors might be explained by motives being a property of more commonly characterized traits, such as negative emotionality and sensation seeking/impulsivity (Cooper et al., 1995).

Several potential limitations of the current study should be acknowledged. First, all of the measures in the present study were self-report. Future research might examine whether the gambler subtypes identified in the present study differ in theoretically expected ways on measures gathered through means other than self-report (e.g., clinical interview, behavioral observation, implicit cognition, collateral reports). Second, the subtyping was achieved with a relatively new measure—the IGS—which has yet to be subjected to extensive psychometric scrutiny in the literature. Similarly, the validation of the clusters was evaluated with an even newer instrument: the GMQ. Third, although acceptably accurate (see Sobell & Sobell, 1990), quantity/frequency measures of addictive behavior such as those used in the present study are not as accurate as other measures, such as the Timeline Followback (Sobell & Sobell, 1992), which has recently been shown to possess adequate reliability and validity for assessing concurrent drinking and gambling behaviors (Weinstock, Whelan, & Meyers, 2004). Fourth, given our stringent inclusion criteria, research should determine whether similar subtypes emerge with the IGS when used in other samples of gamblers (e.g., regular gamblers who are not necessarily drinkers or pathological gamblers, university student gamblers). Indeed, the primary reason for exclusion in this study (n = 132; 83% of those excluded) was not drinking regularly while gambling. This is noteworthy because, despite their epide-miological association (Stewart & Kushner, 2005), pathological gambling and alcohol use disorders are typically not concurrent in treatment-seeking samples (e.g., Ladd & Petry, 2003; Stinchfield & Winters, 2001). Thus, the clinical utility of the proposed subtyping scheme will be dependent on showing that it extends beyond the present subgroup of probable pathological gamblers who usually drink when gambling. Fifth, because the data in the present study are cross-sectional rather than reflecting stable trait-like subtypes of gamblers, it is possible that the three observed IGS groups represent stages through which gamblers move over time (e.g., from low emotion regulation to enhancement to coping). Although this alternative interpretation seems unlikely (e.g., the coping gamblers were not older than other gamblers), future prospective research should determine whether there is consistency of gambling motives within individuals over time. Finally, a possible criticism of this subtyping scheme is that it presents information redundant with gambling severity. However, this concern is mitigated by the persistence of statistically significant cluster group effects for all but three measures after severity of gambling problems was controlled in ANCOVAs and logistic regressions.

The results of our study could have important practical implications. In other areas of addictive behaviors, subtyping on the basis of personality and underlying motivations for substance misuse has led to the development of effective motivation-matched treatments that have proved effective in randomized controlled trials (e.g., Conrod et al., 2000b). Presumably, similar motivation-matched treatments could be developed for coping versus enhancement gamblers, which might help improve treatment outcomes for pathological gamblers. Moreover, our evidence for consistency of motives across gambling and alcohol use suggests that this sort of subtype matching might be useful in the treatment of comorbid pathological gambling and alcohol use disorders, where the interventions would focus on tackling the common underlying source of the co-occurring problem behaviors.

References
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