

The Influence of Locus of Control and Sensation Seeking Among Undergraduate Texas Hold'em Players

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Abstract

Texas Hold'em poker has become increasingly popular on university and college campuses. However, not much is known about personality correlates of engaging in Hold'em, which is commonly seen as more skill-based compared to other forms of gambling. The current study sought to determine where, how much, and which students are playing Hold'em, and to further distinguish these patterns among gamblers. The current study describes Canadian university students' Hold'em-specific behaviour and beliefs, as well as determines whether locus of control and sensation seeking traits independently correlate with and predict gambling behaviour among a university sample. Undergraduate students ($N = 96$) completed an online questionnaire containing Rotter's Internality-Externality scale (I-E), the Zuckerman Sensation Seeking Scale (SSS) and the South Oaks Gambling Screen (SOGS). Participants played a round of Hold'em in lab and answered a survey about their perception of Hold'em and of the game they played. Sensation seeking and external locus of control were significantly positively correlated with gambling pathology. Participants overestimated the number of hands played and the time spent playing Hold'em. There was a significant positive correlation between gambling pathology and gambling success. The I-E and boredom susceptibility sensation seeking subscale significantly predicts some problem/pathological gambling. The current study suggests that more pathological gamblers display higher levels of sensation seeking and a more external locus of control than non-problem gamblers, and that the type of gambling activity and setting in which gambling occurs should be considered in future research looking at personality characteristics of certain problem/pathological gamblers.

Keywords: Gambling, Texas Hold'em, poker, sensation seeking, locus of control

Résumé

La version de poker Texas *Hold'em* fait de plus en plus d'adeptes sur les campus. On ne connaît cependant pas grand-chose sur les corrélats de personnalité qui entrent

en jeu dans le *Hold'em*, mais ils semblent généralement plus axés sur les compétences par rapport aux autres formes de jeux de hasard. Cette étude a cherché à déterminer les lieux, le nombre et le genre d'étudiants qui jouent au *Hold'em* et à caractériser plus en profondeur ces modèles parmi les joueurs. L'étude décrit le comportement et les croyances propres aux étudiants universitaires canadiens et détermine si le locus de contrôle et les caractéristiques de recherche de sensation sont en corrélation et prédisent indépendamment le comportement du jeu dans un échantillon universitaire. Pour l'étude, les étudiants de premier cycle (N = 96) ont rempli un questionnaire en ligne contenant l'échelle de Rotter (I-E) sur l'internalité-externalité, l'échelle de Zuckerman sur la recherche de sensation et le *South Oaks Gambling Screen* (SOGS). Les participants ont joué une partie de *Hold'em* en laboratoire et ont répondu à un sondage sur leur perception du *Hold'em* et de la partie qu'ils ont jouée. La recherche de sensations et le lieu de contrôle externe ont été corrélés positivement et substantiellement à la pathologie du jeu. Les participants ont surestimé le nombre de mains jouées et le temps consacré à jouer la partie. Il y a eu corrélation positive importante entre la pathologie du jeu et la réussite du jeu. L'échelle sur l'internalité-externalité et la sous-échelle de la disposition à l'ennui prédisent de manière significative certains problèmes ou pathologies liés au jeu. L'étude actuelle suggère que plus de joueurs pathologiques affichent des niveaux plus élevés de recherche de sensation et un locus de contrôle plus externe que les joueurs sans problème, et que ce type d'activité de jeu et le contexte dans lequel le jeu se produit devraient être pris en compte dans les recherches futures sur les caractéristiques de la personnalité de certains joueurs compulsifs/pathologiques.

Introduction

Poker—specifically Texas Hold'em poker—is one of the most popular forms of gambling worldwide (Caswell, 2006; Hardy, 2006). The rise in popularity occurred in 2000 and is likely attributable to the development of the online poker industry (Wood, Griffiths, & Parke, 2007) and the game's appearance in mainstream media. Parallel with the increasing popularity in the gambling industry, Texas Hold'em poker (hereafter referred to as Hold'em) has become increasingly widespread on university and college campuses. Many undergraduates play Hold'em (Hardy, 2006) and are directly targeted as such by advertisers (Woodyard, 2004). Importantly, university student status is an established risk factor for problem gambling behaviours, particularly on the Internet (Griffiths & Barnes, 2008; Petry & Weinstock, 2007; Wood & Williams, 2009). Approximately 5–9% of university-aged males are problem gamblers—a rate that is more than double that seen in the general adult population (e.g., Nowak & Aloe, 2014; Stinchfield, Hanson & Olson, 2006; Williams, Connolly, Wood & Nowatzki, 2006).

The increased exposure to gambling increases both the rate of gambling and gambling-related problems in those persons who are university aged (Jacques, Ladouceur, &

Ferland, 2000; Room, Turner, & Ialomiteanu, 1999). Understanding which personality characteristics of university-aged individuals are related to a higher relative likelihood of playing Hold'em and a higher relative likelihood to be problem gamblers is therefore critical. However, despite the increasing popularity and increasing risk of Hold'em in university populations, research specifically among Hold'em players is scarce (Hopley, Dempsey, & Nicki, 2012).

From a broader perspective, previous research has attempted to delineate personality factors that distinguish between problem and non-problem gamblers (e.g., Lesieur & Blume, 1987; Parke, Griffiths, & Irwing, 2004; Stinchfield et al., 2006) and differing gambling behaviours in university populations (e.g., Buckle, Dwyer, Duffy, Brown, & Pickett, 2013; MacLaren, Best, Dixon, & Harrigan, 2011). Two commonly studied personality traits which have been found to be associated with gambling are locus of control and sensation seeking.

Locus of control is the extent to which individuals believe that their own actions or skills control the events in their lives, as opposed to chance, luck, or other uncontrollable circumstances in the environment (Rotter, 1966). An individual who has a high external locus of control would attribute the outcomes of events in their lives to external forces (e.g., luck) compared to an individual with a high internal locus of control who would attribute the outcomes of events in their lives to their own internal forces (e.g., perceived skill).

In contrast to slot machines, lotteries, and bingo, which can be viewed as games of pure chance such that any perception of skill is an unrealistic expectance of personal success (Cabot, Light, & Rutledge, 2009) or an illusion of control (Dykstra & Dollinger, 1990; Langer, 1975; Martinez, Le Floch, Gaffié, & Villejoubert, 2011), Hold'em is often conceptualized and viewed as a sport or even career, in which players can control the outcome through motivation, strategy, and skill (McMullan & Kervin, 2011). Undergraduate students tend to spend more money on games in which skill is perceived as an important factor in comparison to those games perceived to be more dependent on chance (Kairouz, Paradis, & Monson, 2015). The illusion of control thus refers to an overestimation of the impact of skill on the outcome of the game.

The relationship between locus of control and gambling behaviours is inconsistent in the literature: early studies support that pathological and heavy gamblers score higher on external locus of control (Moran, 1970), whereas other studies found no differences in locus of control between heavy gamblers, light gamblers, and non-gamblers (Kusyszyn & Rutter, 1985). Recent research continues to support an equivocal relationship between locus of control and gambling (Clarke, 2004; de Stadelhofen, Aufrère, Besson, & Rossier, 2009). Importantly, these studies were conducted among participants playing games of "pure chance," such as slot machines. Hopley et al. (2012) found that an internal locus of control was associated with pathological gambling among online Hold'em players. These studies demonstrate that game type and the setting in which the game is played (e.g., online,

friend's home) may moderate the relationship between locus of control and problem gambling.

Sensation seeking is one of the most studied personality traits in the gambling literature (Fortune & Goodie, 2010; Gupta, Derevensky, & Ellenbogen, 2006; Hardoon & Derevensky, 2002; Nower, Derevensky & Gupta, 2004; Zuckerman, 1979). Zuckerman defined sensation-seeking as the seeking of "varied, novel, and complex sensations and experiences, and the willingness to take physical and social risks for the sake of such experience" (Zuckerman, 1979, p. 89).

As gambling involves a high degree of sensory and mental stimulation, problem gamblers report elevated levels of sensation seeking in both youth and adult populations (Nower et al., 2004; Gupta et al., 2006; Hardoon & Derevensky, 2002). Similar to locus of control, studies looking at the association between sensation seeking and pathological gambling have yielded mixed results. Numerous studies have found higher sensation seeking behaviours for pathological gamblers compared to non-pathological gamblers and non-gamblers (e.g., Gupta et al., 2006; Kuley & Jacobs, 1988; Powell, Hardoon, Derevensky, & Gupta, 1999). High sensation seekers exhibit greater risk-taking behaviours, yet do not necessarily view high-risk situations as such (Fortune & Goodie, 2010). This lack of awareness of risk may facilitate pathological gambling behaviours.

Contrarily, Blaszczynski, Wilson, and McConaghy (1986) found that pathological gamblers had sensation-seeking levels that were lower than those of the general population, which was substantiated by studies that found sensation seeking was not a significant predictor of pathological gambling (Anderson & Brown, 1984; Parke et al., 2004). Kuley and Jacobs (1988) found higher sensation seeking scores among problem gamblers, and argued that the non-significant differences between gamblers and non-gamblers in Anderson and Brown's study may be due in part to lack of control for age as sensation seeking scores have been found to negatively correlate with age (Reio & Choi, 2004; Zuckerman, S. B. Eysenck, & H. J. Eysenck, 1978). Another explanation for the conflicting results may be because of differences in the sample population, for example whether the study was conducted among clinical gamblers, community, or student samples.

McDaniel and Zuckerman (2003) examined the relationship between gambling and sensation seeking among a community sample from the US, and found that individuals who scored high on impulsivity and sensation seeking also showed greater interest in gambling. These researchers utilized a 19-item Impulsive Sensation Seeking scale, which distinguished between impulsivity and sensation seeking (Dickerson & Baron, 2000). Thus, another explanation for the mixed results may be a result of differing scales and dimensions used to measure sensation seeking as well as gambling pathology.

The Zuckerman Sensation Seeking Scale (SSS) is one of the most widely utilized tools for measuring sensation seeking. This measure combines impulsivity and

sensation seeking, as these constructs have been shown to strongly relate and predict similar phenomena (Zuckerman, 1994). The SSS is split into four subscales: thrill and adventure seeking, experience seeking, disinhibition, and boredom susceptibility. Unfortunately, SSS subscales are rarely reported separately (Harris, Newby, & Klein, 2015). In one of the few studies that has distinguished between subscales, Fortune and Goodie (2010) found that the disinhibition and boredom susceptibility factors of sensation seeking, as measured by the SSS, were related to pathological gambling but experience seeking and thrill and adventure seeking were not associated with pathological gambling. Based on content similarity, researchers have suggested two sub-constructs of sensation seeking: one consisting of thrill and adventure seeking and experience seeking, the other disinhibition and boredom susceptibility (Fortune & Goodie, 2010). Comparing non-problem and pathological/problem gamblers, non-problem gamblers appear to have higher or equal levels of thrill and adventure seeking and experience seeking, while pathological/problem gamblers appear to have equal or higher levels of disinhibition and boredom susceptibility (e.g., Blanco, Orensanz-Munoz, Blanco-Jerez, & Sáiz-Ruiz, 1996; Blaszczynski et al., 1986; Blaszczynski, McConaghy, & Frankova, 1990; Bonnaire, Lejoyeux, & Dardennes, 2004; Carrasco, Sáiz-Ruiz, Hollander, César, & Lopez-Ibor, 1994).

In attempts to delineate which specific types of gambling are associated with sensation seeking, researchers found that, among males, sensation seeking traits were associated with video poker, but not associated with slot machines, sports betting, or lotteries, whereas sensation seeking traits were significantly associated with all forms of gambling except off-track horse betting among females (McDaniel & Zuckerman, 2003). Collectively, these studies suggest that the relationship between sensation seeking and gambling is likely not linear, and may vary based on type of gambling activity, setting of gambling activity, age, and/or gender.

In a seminal study examining the predictors of pathological gambling in a university sample, Griffiths and colleagues (Griffiths, Parke, Wood, & Rigby, 2010) found that online poker players who were more likely to be successful perceived themselves as more skillful and did not overestimate the level of skill involved in poker. The perception of one's own skill, however, did not appear to significantly predict pathological gambling. They reported participants' frequency of play, blinds (i.e., forced bets by players left of the dealer), and session length. However, it is unclear whether participants' perceptions of frequency of play, blinds, and session length matched their actual playing behaviours. The current study determined participants' perception of their own Hold'em behaviours and whether gambling pathology is related to these perceptions.

In a university student population, online poker players tend to play more hands (Montes & Weatherly, 2016), spend more money, and miss school more often (Petry & Gonzalez-Ibanez, 2015) compared to non-online poker players. Further, the context in which gambling occurs (e.g., online vs. non-online) influences the time and money individuals spend on gambling (Kairouz, Paradis, & Monson, 2015).

Therefore, it appears that the setting sought for poker may be related to likelihood of problematic gambling. However, it is unclear how personality factors relate to poker playing behaviours in in-vivo poker games.

The increased recognition of pathological gambling as a public health issue has fostered a growing concern regarding gambling behaviours among adolescents and young adults. However, despite the increasing popularity of Hold'em and the vulnerability to problem and pathological gambling among university students (Engwall, Hunter, & Steinberg 2004; Lesieur & Blume, 1987; Shaffer, Hall, & Vander Bilt, 1997; Stinchfield et al., 2006), the risk factors for pathological gambling for this population remain unknown. Given the unique nature of Hold'em, the present study had two aims: 1) To describe Canadian university students' gambling and Hold'em behaviours, and outline university students' perceptions of Hold'em gambling, and 2) To determine whether locus of control and sensation-seeking traits independently predicted gambling behaviours in a university sample, specifically among Hold'em players.

Methods

Participants

The inclusion criterion for this study was undergraduate status at a large South-western Ontario university. Participants also had to (a) be 18 years of age or older, (b) have previously played Hold'em on at least two prior occasions, and (c) report fluency in English. Individuals in the process of trying to abstain from gambling or those who had sought help from a gambling addiction hotline in the past three months were excluded from the study.

Measures

Rotter's Internality-Externality scale (I-E). Rotter's Internal-External (I-E) Locus of Control Scale (1966) remains one of the most widely used self-report measures of locus of control. The questionnaire consists of 29 items: 23 items which have a forced-choice format and ask participants to select between an internal or external interpretation, as well as six bogus items to make the questionnaire's purpose ambiguous to respondents. Items were designed to measure beliefs about the nature of the world (i.e., a general, non-contextualized dimension of locus of control) (Rotter, 1966). The total score is calculated to indicate the number of external choices made, whereby a higher score reflects a higher external locus of control. The I-E scale has been validated among different samples, including university populations (Beretvas, Suizzo, Durham, & Yarnell, 2008), with internal reliability estimates ranging from .19 to .93 ($M = 0.67$, $Median = 0.69$, $SD = .13$). The internal consistency for the current sample is $\alpha = .57$. Test-retest reliability estimates ranged from .53 to .86, with an unweighted average of .66 and a median of .64 ($SD = .09$) (Beretvas et al., 2008). The I-E scale has shown convergent validity with related

concepts, including self-esteem and neuroticism (Judge, Erez, Bono, & Thoresen, 2002). These results suggest that the I-E scale has sufficient internal consistency, test-retest reliability, and convergent validity.

Zuckerman Sensation Seeking Scale (SSS). The SSS (Zuckerman, 1994) is a 40-item measure used to assess individual differences in arousal and stimulation needs. The SSS produces a total score as well as four factor-analytically derived subscales: (1) Thrill and Adventure Seeking (TAS), (2) Experience Seeking (ES), (3) Disinhibition (Dis), and (4) Boredom Susceptibility (BS). The Dis and ES subscales are said to represent the more maladaptive forms of sensation seeking, whereas the TAS and BS scales are said to reflect more socially adaptive forms of sensation seeking (Zuckerman, 1979). The SSS uses a forced-choice response option of Yes-No. Acceptable to good internal consistency was found in previous research for each of the SSS subscales: TAS ($\alpha = .80$); ES ($\alpha = .75$); Dis ($\alpha = .80$); and BS ($\alpha = .76$) (Roberti, Storch, & Bravata, 2003). A confirmatory factor analysis on a sample of 336 Canadians confirmed a four-factor model, with good internal consistency for the total SSS score ($\alpha = .75$; Ridgeway & Russell, 1980). The internal consistency estimates of the four subscales in the current sample are TAS ($\alpha = .74$), ES ($\alpha = .39$), Dis ($\alpha = .68$), BS ($\alpha = .50$), and total SSS ($\alpha = .73$), which is in line with previous research that found internal consistency scores between .44-.80 and which shows the ES subscale to have the lowest internal consistency (Finn, Ben-Porath, & Tellegen, 2015; Roberti et al., 2003). The SSS has been repeatedly found to be a reliable and valid measure for predicting involvement in sensation-seeking behaviour among university students (Loas et al., 2001; Roberti et al., 2003; Zuckerman et al., 1978).

South Oaks Gambling Screen (SOGS). The SOGS (Lesieur & Blume, 1987) is a widely used internationally standardized survey screen for pathological gambling (Walker & Dickerson, 1996). The SOGS is a 16-item self-report questionnaire where 20 items are summed to produce a final score. The SOGS differentiates between non-problem gamblers (a score of 0), some problem gamblers (a score of 1–4), and probable pathological gamblers (a score of 5 or above). Correlations over .70 have been reported between the Diagnostic and Statistical Manual of Mental Disorders' (American Psychiatric Association, 2000) diagnostic criterion of gambling disorder and SOGS measures of pathological gambling (e.g., Slutske, Zhu, Meier, & Martin 2011; Wickwire, Burke, Brown, Parker, & Ryan, 2008). The internal consistency of the SOGS for the current sample is $\alpha = .70$.

Hold'em-specific Beliefs and Behaviours. The authors also included 14 items of interest specific to participants' Hold'em beliefs and behaviors prior to game play (as part of an online questionnaire) as well as 19 items post-poker play (paper-and-pencil format) in order to better understand participants' perceptions of Hold'em specifically and their beliefs about the game they had played. These items were developed in consultation with leading researchers in the field. Items include previous history playing Texas Hold'em, preference of players, and frequent location of game play. Other items include participants' perception of skills and luck (e.g., "I believe that poker is a game of ___ luck," where participants' assigned a percentage from

0-100%). Post-poker play items included items about the in-lab poker game they had played (e.g., “I believe that in the game I just played __ hands in total”). Subsequent to playing a game of Hold'em, each participant was asked to estimate how long they had been playing for and how many hands they had played for. A time accuracy score was calculated for each player by taking their own estimated time played (in minutes) and dividing it by their actual recorded time played (in minutes) and multiplying by 100. Similarly, a hand accuracy score was calculated. A score of 100 indicated an individual perfectly estimated the length of time or number of hands played; a score below a 100 indicated under-estimating time or number of hands played, whereas a score over 100 signified over-estimating time or number of hands played.

Procedure

Participants completed an online consent form and an online questionnaire that contained basic demographics, the I-E, SSS, SOGS, and the Hold'em beliefs and behaviours items. Participants were subsequently invited to participate in a poker game that took place in a laboratory setting that mimicked a social setting. Cell phones and watches were collected from the participants such that they would be unaware of elapsed time. There were 6–8 participants at each poker game. All participants were randomly assigned seats around the table, with a volunteer serving as the dealer and officiator of the poker game. Researchers observed game play through a one-way mirror in order to record the number of ‘hands’ played. Each session was set for a length of 60 hands (rounds). Following completion of the 60 hands, participants completed the post-poker items. In the event that a participant lost his/her chips prior to reaching 60 hands, he or she completed the post-poker items and was debriefed at that point. The actual time of elapsed play and number of hands was recorded. Participants received three psychology research credits for their participation.

Results

Sample Characteristics

A total of 97 undergraduate students were recruited for the final study. One participant was excluded from the sample as he was seeking help for gambling difficulties at the time of the study. The final sample consisted of 96 undergraduate students. Participants ranged in age from 18 to 30 years ($M = 18.78$ years, $SD = 1.53$). Participants were mostly male ($n = 87, 90.63\%$) and Caucasian ($n = 63, 65.61\%$). The remaining sample identified as Asian ($n = 17, 17.70\%$), Multiracial ($n = 3, 3.20\%$), Black ($n = 1, 1.03\%$), Hispanic ($n = 1, 1.03\%$), other ($n = 6, 6.23\%$), or did not answer ($n = 5, 5.20\%$). Age and gender were not significantly correlated to any of the outcome or predictor variables.

Hold'em Beliefs and Behaviours (Pre-Poker Play)

More than 80% of the sample reported they have played Hold'em on ten or more prior occasions. Only 12% reported that they have played Hold'em “five to ten

times” and 6% reported playing fewer than five times. Over 85% of the sample reported that had previously watched Hold'em on television.

The most common weekly gambling activity was playing cards for money (16.29%) followed by sports betting (10.42%), lottery tickets (8.29%), stock market (6.26%), dice games (2.10%), bingo (1.03%), off track betting (1.03%), and pull tabs or paper games (1.03%). The most frequent location of game play was at a friend's home (61.46%), followed by the participant's own home (14.58%), online practice websites (12.50%), university residence (7.29%), and online paid websites (4.17%). In-vivo Hold'em play was over five times more common than online play, 83.33 % to 15.67%, respectively. Participants most preferred playing Hold'em with friends (84.38%), compared to family members (3.13%), or unknown online gamers on the Internet (3.13%). Few respondents (9.56%) reported that they preferred playing with their family members and friends equally.

Prior to poker play, on average, participants reported that Hold'em was a game of 48.03% ($SD = 21.41$) luck. In a separate question, on average, participants reported that Hold'em was a game of 51.89% ($SD = 21.76$) skill. When asked the same questions again following playing Hold'em in the lab tournament, on average, participants reported that Hold'em was a game of 51.40% ($SD = 20.22$) luck and, on average, 48.87% ($SD = 20.38$) skill. Post-poker play, only 6.25% ($n = 6$) participants endorsed the statement that they believed they could make a successful living as a Hold'em poker player. The mean score for time and hand accuracy was 126.67 ($SD = 34.66$) and 139.12 ($SD = 84.54$), respectively.

Gambling Pathology and Personality Traits

The mean score on the SOGS scale was 1.43 ($SD = 2.01$, range 0-20). Eight participants fit the probable pathological gambler category. SOGS categories by gender are presented in Table 1. Descriptive statistics for the I-E, SSS and subscale scores, for the Sensation-Seeking Scale are presented in Table 2.

Relationship between Locus of Control, Sensation Seeking, Gambling Pathology and Success

Pearson product-moment correlation coefficients were calculated to examine the relationship between locus of control, sensation-seeking, SOGS scores, and participants'

Table 1
Participants' SOGS categories for the total sample and by gender

	Sample ($n = 96$) n (%)	Male ($n = 87$) n (%)	Female ($n = 9$) n (%)
Non-problem	41 (42.71)	35 (40.23)	6 (66.67)
Some Problem	47 (48.96)	44 (50.57)	3 (33.33)
Probable Pathological	8 (8.33)	8 (9.20)	0 (.00)

rank in the tournament/game play (see Table 3). The I-E scale was positively correlated with some problem gambling ($r(94) = .40, p < .001$, two-tailed), such that higher external locus of control scores were associated with higher pathological gambling scores. There was a significant positive correlation between the total SSS score and SOGS score ($r(94) = .35, p < .001$, two-tailed), such that higher sensation seeking scores were related to higher pathological gambling scores. The only SSS subscale that correlated with gambling pathology was BS ($r(94) = .38, p < .001$, two-tailed). SOGS score was also positively correlated with the rank in the in-vivo tournament ($r(94) = .86, p < .001$, two-tailed), such that higher pathological gambling scores indicated higher tournament rank. Hand accuracy was significantly positively correlated with SSS total score ($r(94) = .25, p = .015$), such that those who overestimated the number of hands they played had higher sensation-seeking scores.

Table 2
Mean Scores, Standard Deviations and Range for Personality Constructs (n = 96)

Scale	Mean	SD	Range
I-E	11.42	3.32	2–19
Total SSS	23.28	5.42	6–35
TAS	7.28	2.39	0–10
ES	5.05	1.75	1–9
Dis	6.49	2.32	0–10
BS	3.79	1.94	1–8

Note. Total SSS = Total sensation seeking score; TAS = Thrill and adventure seeking; ES = Experience seeking; DIS = Disinhibition; BS = Boredom susceptibility; I-E = Internality-Externality Scale; SOGS = South Oaks Gambling Screen; Rank = Ranking of success recording as participant’s place in the tournament.

Table 3
Pearson Product-Moment Correlations Between Locus of Control, Sensation Seeking, and Gambling Pathology and Success (N = 96)

Variable	Total SSS	TAS	ES	Dis	BS	I-E	SOGS	Rank	Time	Hand
Total SSS	—	.55**	.45**	.54**	.41**	.32**	.35**	.20*	-.07	.25*
TAS		—	.35**	.29**	-.04	.04	-.06	.14	-.10	.13
ES			—	.16	-.08	.06	.02	.06	-.04	.13
Dis				—	.20	.23*	-.07	.03	-.12	.13
BS					—	.20	.38**	.03	-.13	.14
I-E						—	.40**	.03	-.05	.11
SOGS							—	.86**	.04	.02
Rank in tournament								—	.05	-.14
Time Accuracy									—	.03
Hand Accuracy										—

Note. Total SSS = Total Sensation Seeking Scale; TAS = Thrill and Adventure Seeking; ES = Experience Seeking; DIS = Disinhibition; BS = Boredom Susceptibility; I-E = Internality-Externality Scale; SOGS = South Oaks Gambling Screen; Success = Position in the tournament, whereby higher scores indicate higher success (leading chip holders).

** $p < 0.01$ (two-tailed). * $p < 0.05$ (two-tailed)

One-Way ANOVAs of Pathological Gambling and Personality Traits

Results were further analyzed using the categorical SOGS variable: non-problem, some problem, and probable pathological gamblers (see Table 4).

A one way analysis of variance (ANOVA) indicated that at least two of the three categories significantly differed from one another on scores of I-E, $F(2, 93) = 15.29$, $p < .001$. A post-hoc analysis, using the Bonferroni correction, indicated that probable pathological gamblers had higher external locus of control ($M = 16.88$, $SD = 2.01$) than some problem ($M = 10.95$, $SD = 3.17$), and non-problem gamblers ($M = 11.00$, $SD = 2.76$; $p < .001$ for all).

A one-way ANOVA was conducted to compare the total SSS across the three categories of gamblers. Results were significant for the total SSS score, $F(2, 93) = 9.48$, $p < .001$. The only subscale of the SSS that differed across groups was the BS subscale, $F(2, 93) = 7.13$, $p < .001$. A post-hoc analysis, using the Bonferroni correction, indicated that probable pathological gamblers had higher total SSS scores ($M = 30.25$, $SD = 2.54$) than some problem gamblers ($M = 22.78$, $SD = 4.79$), and non-problem gamblers ($M = 22.48$, $SD = 5.63$; $p < .001$ for all). Probable pathological gamblers had higher BS scores ($M = 6.13$, $SD = 1.64$) than some problem gamblers ($M = 3.64$, $SD = 1.92$; $p = .002$), and non-problem gamblers ($M = 3.51$, $SD = 1.74$; $p = .001$).

Regression Analyses for Variables Predicting Some Problem/Pathological Gambling

Because of the small number of probable pathological gamblers in the current study, a hierarchical regression analysis was conducted to determine how locus of control and sensation seeking predict some problem/pathological gambling as measured by the continuous SOGS score (see Table 5). In order to account for any variance attributed to age and gender, variables were entered in two blocks: (1) gender, age (2) I-E and four SSS subscales (TAS, ES, Dis, and BS). The four subscale scores were included

Table 4
SOGS Categories and the Relationship to Locus of Control and Sensation Seeking

	Non-problem	Some Problem	Probable Pathological	One-way ANOVA	
	(<i>n</i> = 41) <i>M</i> (<i>SD</i>)	(<i>n</i> = 47) <i>M</i> (<i>SD</i>)	(<i>n</i> = 8) <i>M</i> (<i>SD</i>)	<i>F</i> (2, 93)	<i>P</i>
Total SSS ^a	22.48 (5.63)	22.78 (4.79)	30.25 (2.54)	9.48	<.001
TAS	7.36 (2.51)	7.34 (2.29)	6.50 (2.44)	.46	.63
ES	5.34 (1.72)	4.72 (1.75)	5.50 (1.77)	1.66	.20
Dis	6.56 (2.34)	6.45 (2.33)	6.38 (2.77)	.04	.96
BS	3.51 (1.74)	3.64 (1.92)	6.13 (1.64)	7.13	.001
I-E	11.00 (2.76)	10.95 (3.17)	16.88 (2.01)	15.29	<.001

Note. Total SSS = Total sensation seeking score; TAS = Thrill and adventure seeking; ES = Experience seeking; DIS = Disinhibition; BS = Boredom susceptibility; I-E = Internality-Externality Scale; SOGS = South Oaks Gambling Screen.

Table 5
Hierarchical Regression Analysis for Predicting SOGS Score

Variable	β	t	sr^2	ΔR^2
Step 1				.02
Gender	-.16	-1.54	.02	
Age	-.04	-.43	.00	
Step 2**				.29
Gender	-.12	-1.29	.01	
Age	-.04	-.43	.00	
I-E**	.40	4.32	.14	
TAS	-.02	-.18	.00	
ES	.09	.90	.01	
Dis*	-.23	-2.38	.04	
BS*	.31	3.23	.08	

Note. TAS = Thrill and adventure seeking; ES = Experience seeking; Dis = Disinhibition; BS = Boredom susceptibility; I-E = Internality-Externality Scale; SOGS = South Oaks Gambling Screen.

** $p < 0.001$ (two-tailed). * $p < 0.05$ (two-tailed).

instead of the total SSS scale as previous research suggests that the subscale scores differentially relate to some problem/pathological gambling (Fortune & Goodie, 2010).

The first-step of the regression model with gender and age did not significantly predict the SOGS score ($F(2,93) = 1.28, ns$). Gender and age were non-significant predictors. The addition of I-E and sensation seeking subscales resulted in significant incremental change ($F(5,88) = 7.61, p < .001$) of 29% variance. The I-E, Dis, and BS subscales were all significant predictors of SOGS, and explained 14%, 4%, and 8% of the variance, respectively. This suggests that having greater external locus of control, higher BS, and lower disinhibition increased the likelihood that individuals in our sample had higher SOGS scores (i.e., were more likely to be probable/pathological gamblers). The overall regression model with gender, age, I-E, and all four sensation seeking subscales significantly predicted the SOGS score ($F(7, 88) = 5.94, p < .001$) and explained 32% of the variance.

Discussion

The first goal of the current study was to describe Texas Hold'em beliefs and behaviours among Canadian university students. Playing cards for money was the most common weekly gambling activity (16.29%) and poker was most frequently played at a friend's home (61.46%). Although online poker is increasingly popular (Wood et al., 2007), only 4.17% of our population reported online paid websites to be their most common Hold'em setting. This low percentage may be reflective that our sample consisted of undergraduate students who perhaps play Hold'em as a social activity with friends as opposed to on online paid websites.

In terms of participants' perceptions of Texas Hold'em, skill and luck were reported to be equally important. Horbay and Fritz (1998) showed that successful poker

players emphasized the skill component of poker play, and believed that luck played a minimal role. Contrary to these results, no such significant correlations were reported in the current study with respect to perceptions of skill and luck, which may be because of the fact that questions were placed sequentially one after the other such that participants may have wrongly assumed that these values should total 100% and/or they may have speculated that the “correct” answer would be an even 50-50 split. Gambling measures have been developed that consider individuals’ perceptions of skill and luck. For example, McInnes and colleagues (McInnes, Hodgins, & Holub, 2014) refined the Gambling Cognitions Inventory into two subscales. The Skill and Attitude Subscale reflects skill and attitude cognitions (e.g., “I am a very skilled gambler”), whereas the Luck and Chance Subscale reflects luck/chance cognitions (e.g., “I lose because I am having a bad or unlucky day”). Future research in Hold’em could measure participants’ perceptions of skill and luck using such measures.

The second study aim was to examine the personality correlates of locus of control and sensation seeking with some problem/pathological gambling in a university sample. External locus of control was related to gambling pathology, suggesting that probable pathological gamblers may attribute life’s outcomes to external forces. Previous research (Chantal & Vallerand, 1996) has shown that gamblers who participate in skill-based forms of gambling are more likely to report motivations that are intrinsic, such as challenges associated with improving their skill as motivating factors. On the locus of control scale, the probable pathological gamblers differed significantly from the some problem and non-problem gamblers, but the some problem gamblers did not significantly differ from the non-problem gamblers. Generally, gamblers may attribute gambling success to internal factors (e.g., skill), and attribute gambling losses to external factors (e.g., luck) (Griffiths, 1990). However, those who have external locus of control may feel they are unable to control their gambling behaviours, predisposing them to problem gambling (Orford, Morison, & Somers, 1996), which is consistent with our results suggesting that pathological gambling (or higher likelihood of pathological gambling) is associated with greater external locus of control. Research has found no differences between “problem” and non-problem gamblers (Clarke, 2004); however, Clarke (2004) used a lower cutoff score than that used for probable pathological gamblers in the current study. Therefore, external locus of control may be associated with increased likelihood of pathological gambling.

Probable pathological gamblers were characterized by relatively high levels of sensation seeking. This finding is consistent with Zuckerman’s (1994) original hypothesis that predicted a relationship between gambling and sensation seeking. Researchers (Kuley & Jacobs, 1988) have pointed out that the lack of significant differences between gamblers and non-gamblers in previous studies could be a result of not controlling for age. Certain researchers have further suggested that it may not be the relationship between gambling pathology and sensation seeking that should be studied, but the betting behaviour itself (Walker, 1992).

Although the non-problem gamblers, the some problem gamblers, and the probable pathological gamblers did not differ on thrill and adventure seeking, disinhibition

and experience seeking, statistically significant differences were reported on the total sensation seeking score and on boredom susceptibility. Specifically, the probable pathological gamblers scored higher on total sensation seeking and boredom susceptibility than some problem and non-problem gamblers. The some problem and non-problem gamblers did not significantly differ from each other on these scales. These results suggest that pathological gambling may be related to more social aspects of the game or to alleviate boredom, rather than the “thrill of the game,” in line with previous research showing elevated levels of boredom susceptibility in pathological gamblers (Fortune & Goodie, 2010). With respect to sensation seeking, the findings have been mixed, and may be dependent on the type of gambling problem gamblers engage in. Our results are in line with previous research that shows that sensation seeking traits were associated with video poker (McDaniel & Zuckerman, 2003).

We failed to replicate Fortune and Goodie’s (2010) finding of elevated disinhibition subscale scores in pathological gamblers. This may have been because of the small number of individuals in the probable pathological gamblers category (i.e., $n = 8$) in the present study, which may have reduced power to detect such an effect. In the current study, a regression analysis using a continuous problem/pathological gambling score showed that external locus of control, higher boredom susceptibility, and lower disinhibition significantly predicted gambling pathology, accounting for 32% of the total variance. Our results suggest that boredom susceptibility significantly predicts some problem/pathological gambling, in line with previous research. However, the current sample showed that lower disinhibition scores were predictive of higher likelihood of some problem/probable pathological gambling in our regression analysis, contrary to previous research. Compared to other sensation seeking facets, disinhibition appears to be unique in that it is related to decreased problem gambling risk. These results may be because of differences between types of gamblers. Bonnaire et al. (2009) found that disinhibition scores were lower among pathological gamblers who play traditional games, such as roulette and card games. Therefore, it may be such that the some problem/pathological gamblers in the current study who self-selected to be a part of the current study were more likely to have lower disinhibition scores compared to other types of gamblers. These results suggest that different subsets of gamblers might display unique personality characteristics.

University students appear to play Hold’em as a means of escaping boredom and as a form of social activity in their university setting. Furthermore, because of the perceived skill of this game, one can speculate that the challenge that Hold’em presents to players is a motivator unique to poker play. These results are corroborated with the tendency for players to overestimate the elapsed time and number of hands played in the in-lab poker tournament. It is clear that future research needs to control for differences between gambling forms, as this may help to explain differences among gamblers’ personality traits.

The tendency to overestimate elapsed time and the number of hands played may be because of the environment in which Hold’em was played. Casinos are usually

designed to influence gambling behaviour and avoid clocks and windows, and introduce ambient music to reduce reference to time passed, which results in underestimation of duration of slot playing (Noseworthy & Finlay, 2009). Our lab environment attempted to replicate these conditions (e.g., researchers removed clocks/watches/cell phones; had a nice poker table and bar stools set up in a basement of a student-type building). However, participants were aware that this was a research study, which may have impacted sense of game play time. In the “real world” setting, the most frequent place of Hold’em play among our sample was a friend’s home. Future studies could examine if the amount of time university students play online or in-vivo (e.g., friends’ homes, residence) differs, and if they are aware of how long they are playing for and the number of hands played.

This study adds to previous research that examines Hold’em behaviours in online settings (e.g., Griffiths et al., 2010; Montes & Weatherly, 2016; Petry & Gonzalez-Ibanez, 2015) by investigating beliefs and behaviours in a real-world poker game. Further, external locus of control and higher levels of sensation seeking and boredom susceptibility characterize probable pathological gamblers compared to some problem and non-problem gamblers in a university sample. The results of this study suggest that the sample (e.g., university, community) and the type of gambling are important factors that contribute to the relationship between personality traits, some problem/pathological gambling, and gambling beliefs and behaviours.

Limitations and Future Directions

Limitations of this study include problems related to the self-developed items, concerns regarding the use of gambling pathology scale, low internal consistency of some of the measures used, and the generalizability of results. In terms of the self-developed items, the questions regarding skill and luck seemed to be not well understood by participants. Further, although the sample was picked specifically for its experience with Texas Hold’em, most participants (82%) reported playing over 10 times. A more sensitive measure of Texas Hold’em experience would be necessary to determine how skill and familiarity influence gambling behaviours.

It is unclear whether participants’ level of some problem/pathological gambling relates specifically to Hold’em. Further research should determine whether some problem/pathological gambling can be specifically related to certain types of gambling, and, further, determine how these individuals might display unique personality traits.

There are numerous measures used to determine gambling pathology, measures that distinguish between non-problem, some problem, and probable pathological gambling. The SOGS has weak predictive power of some problem gamblers; however, these criticisms are also true for other widely used measures of problem and pathological gambling, including the CPGI and the NODS (Williams & Volberg, 2014). The poor predictive power of gambling measures appears to be a result of divergent interpretations of concept operationalization and has implications for the

sensitivity of distinguishing between non-problem, some problem, and probable pathological gambling in the current study. Despite this, the SOGS continues to be widely utilized and preferred to newer measures, like the CPGI, which has faced criticism regarding its definitions and measurement approach (Svetieva & Walker, 2008). Further, the low internal consistency of the certain scales, particularly the experience seeking, disinhibition, and boredom susceptibility subscales of sensation seeking and the I-E scale, suggest that the measure may not in fact accurately reflect sensation seeking and locus of control and may, therefore, in turn limit the interpretability of the results.

The current study focused on a university sample, as university populations are particularly susceptible to problem gambling. Having a better understanding of gambling behaviours in this population allows a more holistic picture of how gambling pathology develops. However, this focus limits the generalizability of results. A longitudinal study could explore how locus of control and sensation seeking change as individuals engage in more problem gambling behaviours. Furthermore, the lack of comparison group of our sample to non-Texas Hold'em players limits the ability to infer comparisons of sensation seeking and locus of control between players and non-players.

The utility of personality traits as predictors of gambling pathology has been inconclusive. The results of our findings are limited because we only examined two factors known to be associated with gambling pathology. Future research should consider other dimensions of personality, and the potential for mediation and moderator effects. However, the numerous implications of locus of control and sensation seeking as predictors of gambling pathology warrant future research. Previous research has devoted insufficient focus on type of gambling activity as a moderator of gambling pathology and personality traits. Level of skill and luck involved in gambling has been largely ignored in gambling research. The skill-luck distinction has the potential to clarify the historically complicated relationship between gambling pathology and personality traits.

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