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Texas Hold'em Online Poker: A Further Examination

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Abstract Playing Texas Hold'em Online Poker (THOP) is on the rise. However, there is relatively little research examining factors that contribute to problem gambling in poker players. The aim of this study was to extend the research findings of Hopley and Nicki (2010). The negative mood states of depression, anxiety and stress were found to be linked to problem gambling; yet, the contribution of each factor was not independently assessed. In addition, skill may be particularly important for poker players. Therefore, the effects of two potential contributing factors, yearly monetary earnings and locus of control, on problem gambling were investigated. Participants were self-selected online poker players (N=62) who completed an online survey. Results revealed that participants played an average of 16 h per week. Furthermore, 11.5% of the sample was classified as problem gamblers according to the Canadian Problem Gambling Index. Problem gambling was uniquely predicted by time played, the negative emotion of stress, and locus of control.

Keywords Texas Hold'em online poker · Problem gambling · Depression · Anxiety · Stress · Locus of control

Gambling has been defined as placing a wager on an event or game that has an outcome which is to some degree determined by chance (Raylu and Oei 2002). Gambling is considered to be a problem when it disrupts or damages an individual's personal, business, or family environment (American Psychiatric Association 2000). At this point, an individual may have great difficulty resisting the impulse to gamble and may fail to control their gambling behaviour (Raylu and Oei 2002). This form of gambling has been termed problem gambling: a progressive and chronic disorder (Raylu and Oei 2002). Until relatively recently, gambling was an activity restricted to halls or casinos. However, the

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advent of the Internet has brought legal gambling into the home, thereby increasing the accessibility of gambling to anyone with an Internet connection (Griffiths and Barnes 2008). Within the last decade poker, especially Texas Hold'em online poker (THOP), was one of the fastest growing forms of online gambling, and is relatively stable in popularity at present (Griffiths and Barnes 2008). Recent research suggests that online gamblers are at an increased risk to become problem gamblers, and that financially successful THOP players are not immune to this trend (Hopley and Nicki 2010; Shead et al. 2008; Wood et al. 2007). For example, Wood and colleagues (2007), in their attempt to acquire basic information about the behavior of online poker players, found that 18% of the United Kingdom university sample could be classified as problem gamblers.

To date, little research has been conducted concerning THOP (Griffiths et al. 2010). Poker differs greatly from most other forms of gambling because of the element of skill that is involved in playing the game (Shead et al. 2008). In poker, over the course of a few hands, two players have approximately equal chances of winning. However, after a few hundred hands, a skilled poker player has a decisive advantage over an unskilled player (Alon n.d.). In the virtual setting, it is unlikely that the poker tables are consistently populated by individuals with equal skill. Furthermore, financial success has been found to be positively correlated with length of time as a player, and to be predicted by player discipline, high stakes play, and accurately perceiving one's skill level; this provides support for the conclusion that it is possible to be a winning player in the long run (Bjerg 2010; Browne 1989; Griffiths et al. 2010). These observations and findings may explain part of the growing appeal for poker. Other reasons for the rise in popularity are the media attention garnered by the game on television, and the ease with which one can find a poker game (Wood and Griffiths 2008). Individuals throughout the world have seen online poker as an opportunity to earn a sizable living, or at least as a method to supplement their income, which may explain the high rates of problem gambling in online populations (Hopley and Nicki 2010).

Jacobs (1986) proposed a general theory of addiction, using the problem gambler as an exemplar. The author theorized that addiction begins as a stress reducing behaviour and over time an individual becomes dependent on this behaviour to manage negative emotions (Jacobs 1986). An individual, according to Jacobs (1986), is at risk for developing an addiction if they are exposed to two separate yet related predisposing factors. The first aspect is a unipolar physiological resting state, which is either chronically depressed or excited (Jacobs 1986). This constant state of uncomfortable arousal leads an individual to seek stress reducing outlets, which are often potentially addictive substances or behaviours. The second predisposing factor is of a psychological nature and relates to early childhood experiences (Jacobs 1986). An individual is exposed to social and developmental experiences that cause him or her to have feelings of inadequacy. These feelings make the individual feel as though they are inferior, and unwanted: they are usually the result of being rejected by parents or significant others (Jacobs 1986). As a reaction to these feelings, the individual indulges in addictive behaviours, such as gambling, to dissociate themselves from a painful reality and to fantasize about being important, successful and admired. According to Jacobs (1986), a gambler continues to engage in this addictive behaviour in order to manage arousal or stress, and to generate feelings of social importance.

A substantial body of research has linked problem gambling with negative mood states such as depression and anxiety (Johansson et al. 2009; Raylu and Oei 2002). Problem gambling is often comorbid with depressive disorders, and problem gamblers have been shown to have higher levels of depression than the general population (Johansson et al. 2009). Therefore, depression may be a significant risk factor for problem gambling. A

second negative mood state, anxiety, has also been shown to be significantly higher among severe problem gamblers (Johansson et al. 2009). Individuals with problem gambling issues experience decreased levels of anxiety after having undergone treatment for problem gambling (Raylu and Oei 2002). This finding suggests that there is a potential causal link between anxiety and problem gambling. A third negative mood state, stress, has also been linked to the development, and especially the maintenance of problem gambling. Individuals may use gambling as a way to reduce stress that is caused by other unpleasant emotional states (Coman et al. 1997). Albeit, while this may be an effective strategy with low risk wagers, the increased risk associated with high risk wagers may result in increased feelings of stress.

Hopley and Nicki (2010) conducted a study investigating the association between negative mood states and online problem gambling within the framework of Jacob's (1986) theory of addiction. The authors surmised that individuals who gamble to temporarily reduce negative mood states eventually feel increased levels of negative emotions. Based on the results, the proposed presence of a "feed-forward cycle of negative emotions [in] the maintenance of gambling behaviour" (p. 380) is likely (Hopley and Nicki 2010). Individuals use gambling to avoid aversive arousal states and to reduce stress, only to eventually feel more depressed, anxious or stressed. The individual then returns to gambling to reduce the negative mood states, and the cycle continues.

Locus of control (LOC) concerns an individual's expectancy of reinforcement. Individuals with a high internal control orientation believe that reinforcement is dependent on their own behaviour, whereas those with a high external control orientation believe that reinforcement is dependent on luck, chance, or powerful others (Duttweiler 1984).

The finding that problem gamblers develop illusory perceptions of control has led to the assertion that gamblers should have high levels of internal control (Carroll and Huxley 1994). Therefore, because a majority of gamblers tend to misunderstand the notion of randomness, they consequently view gambling as a very difficult game of skill. Furthermore, when a gambler experiences a string of losses, a common tendency is to attribute these losses externally. However, wins reinforce notions of internal control. This differential attribution pattern based on outcome led to the proposal that problem gamblers would have high levels of both internal control and chance external control (Meyer de Stadelhofen et al. 2009). In a comparison of 48 diagnosed pathological gamblers to an age matched healthy control group, the authors found that pathological gamblers chance LOC scores differed significantly from the control group, which indicated that pathological gamblers had a stronger belief that the outcome of an event is greatly determined by chance. However, the authors found that the pathological gamblers internal LOC scores did not significantly differ from the control group. Consistent with the former, it has been found that individuals with a strong belief in an external LOC often played games of chance, such as slots or roulette and avoided games of skill such as poker (Lester 1980).

In a recent study, Hopley and Nicki (2010) attempted to replicate the findings of Wood and colleagues (2007) using psychometrically sound measures and to examine whether the individual difference variables seen in general problem gamblers (i.e., impulsivity, boredom proneness, negative emotions, and dissociation) predicted problem gambling in online poker players. The authors recruited 179 self-selected online poker players across North American poker forums and social networking sites. Participants were administered a battery of questionnaires including a basic gambling demographic survey, the Depression Anxiety and Stress Scale (DASS; Lovibond and Lovibond 1995), and other probable predictors of problem gambling as assessed by a subsection of the Canadian Problem Gambling Index (CPGI; Ferris and Wynne 2001) as the criterion variable. The results revealed that hours

played per week, dissociation, boredom proneness, impulsivity and negative emotional states were uniquely predictive of problem gambling in online poker players. However, given the exploratory nature of the findings, the authors could not ascertain the unique impact of depression, anxiety or stress. In addition, 34% of the sample was found to either make a living playing online poker or supplemented their income with earnings from the game, and that the amount of hours spent playing THOP accounted for a large proportion of variance in scores on the Problem Gambling Severity Index (PGSI; Ferris and Wynne 2001). The latter result is in accordance with the observation that the opportunity to gamble is associated with an increased frequency of problem gambling (Johansson et al. 2009).

The first aim of the present study was to extend the findings of the Hopley and Nicki (2010) study by administering the DASS to online poker players along with the PGSI to discover which negative mood state(s) drives the relationship between negative affect and problem gambling. The second aim of this study was to examine the skill component involved in poker. The finding that 34% of the sample was able to use online poker as a sole source of income, or to supplement current earnings, indicates that those individuals recruited on poker forums are highly skilled players. Developing poker playing skills may help or hinder an individual to avoid problems with gambling. Therefore, the current study examined the relationship between yearly net earnings, as an index of skill, and PGSI scores. Lastly, as an individual's LOC orientation may be related to the development of skill in poker, the relationship between LOC and problem gambling was investigated.

These aims provided several empirically testable hypotheses. First, it was hypothesized that each negative mood state will uniquely predict problem gambling in poker players. Second, based on the findings that gamblers who focus their attention on games of low-skill tend to display characteristics of anxiety or stress, and that gamblers who play more skilled games tend to exhibit characteristics of depression, it was further hypothesized that depression will have the strongest relationship to problem gambling (Coman et al. 1996). Third, it was hypothesized that time spent playing THOP and net earnings will each uniquely predict problem gambling. Finally, it was hypothesized LOC will uniquely predict problem gambling in poker players. Specifically, based on the findings of Meyer de Stadelhofen and collegues (2009), those players with high scores on the PGSI will have low scores on the Internal Control Index (ICI; Duttweiler 1984)), indicating an external control orientation.

Method

Participants

A total of 62 participants completed the study (58 males, 3 females, 1 undisclosed), and had a mean age of 30 (18–61, SD=10.44). Furthermore, 76.1% of participants were Caucasian/European, 12.7% were Asian or Asian-American, 7% were other, 2.8% were Latino(a)/Hispanic, and 1.4% were bi- or multi-racial. Participants were self-selected online Texas Hold'em poker players recruited from poker forums and social networking sites.

Materials

The online survey was hosted by SurveyMonkey (http://www.surveymonkey.com). Data entered into the survey were SSL encrypted to ensure complete privacy of the entered data. This method has been shown to be valuable when researching online behaviour (Wood et al. 2004). The survey consisted of demographic questions, followed by specific poker

questions related to the amount of hours spent playing poker in a typical week, multi-tabling (amount of games played at once), and yearly net profit or loss. Next, participants completed the DASS and ICI questionnaires in a counterbalanced, randomized order, followed by the PGSI.

Depression Anxiety Stress Scales (DASS)

The negative emotional symptoms of depression, anxiety and stress were assessed by the 42 item DASS, which has shown good internal consistency (α=.84–.91; Lovibond and Lovibond 1995). The DASS had a Cronbach's alpha value of .96 in this study. The validity of the DASS is supported by strong convergent and discriminant validity, shown by its ability to distinguish among the three negative emotional syndromes (Lovibond and Lovibond 1995). On the DASS, participants had to rate how much each item applies to themselves over the last weeks on a four point scale from "did not apply to me at all" to "applied to me very much, or most of the time" (Lovibond and Lovibond 1995). Scores range from zero to 126. When using the DASS to test each dimension independently, the minimum score for each subscale is zero with a maximum score of 42.

Internal Control Index (ICI)

LOC was measured with the ICI, which has been shown to have sound psychometric properties with good internal consistency (α=.84; Duttweiler 1984). In a convergent validity study, five LOC scales were examined (Goodman and Waters 1987). The results showed evidence of convergent validity with regard to the ICI and Rotter's I/E scale, with a correlation of r=.38. The ICI had the highest internal consistency reliability (α=.83) of the five scales in that study. The internal consistency of the ICI in this study was sufficient (α=.77). The ICI is a 28 item test with each item rated on a 5 point scale. Responses range from "rarely" to "usual," where half of the items are reverse scored to account for response biases. This produces a possible range of scores from 28 to 140, with higher scores reflecting higher internal LOC.

Problem Gambling Severity Index (PGSI)

Gambling severity was tested with the PGSI subsection of the Canadian Problem Gambling Index (Ferris and Wynne 2001). The PGSI displays good internal consistency, test-retest reliability, concurrent validity, criterion validity (α=.84) and correlates with DSM-IV criteria for problem gambling (Abbott and Volberg 2006; Ferris and Wynne 2001). The internal consistency of the PGSI in this study was sufficient (α=.71). The PGSI identifies problem gamblers at a level comparable to DSM-IV measures (Ferris and Wynne 2001). The nine questions of the PGSI are rated on a four point scale, ranging from "never" to "almost always". The item scores are totalled, and a score of zero indicates a non problem gambler, scores of one and two show a low risk for problem gambling, scores of three to seven points towards moderate risk, and scores eight and above reflect problem gambling (Ferris and Wynne 2001).

Design and Procedure

Individuals who viewed the online advertisement were offered a chance to win one of five $50 prizes. Those who clicked on the link were brought to the consent form of the questionnaire which informed potential participants about: the nature of the study, the confidential and anonymous nature of their responses, and their right to withdraw. Of the

112 people who began the study, 62 (55.4%) were not excluded for incompletion or statistical anomalies. This level of completion is comparable to the rate obtained by Hopley and Nicki (2010).

Results

Gambling Demographics

Participants reported a wide range of hours played per week with minimum amount of 2 and a maximum of 60 (M= 16; S=10.8*)*. The degree of multi-tabling fluctuated greatly from player to player, from one to 24 games at once (M=5.5; SD=5.1). Yearly net THOP earnings ranged from an overall loss of $1000 to a profit of $350,000, with a median value of $2000 ($M$=$20,392.89; SD= $53,726.92).

Predictors of Excessive Online Poker Playing

Based on PGSI scores, 12.9% of the participants were non-problem gamblers, 31.4% were categorized as low-risk, 44.2% were considered moderate-risk gamblers, and 11.5% of the sample consisted of problem gamblers. Problem gambling was strongly positively correlated with time spent playing online poker (r=.619; p<.001).

A hierarchical multiple regression analysis was conducted in order to examine the relationship between depression, anxiety, stress, yearly net earnings, locus of control and problem gambling. Means and standard deviations are presented in Table 1. Prior to the analysis, the data were conditioned to meet the assumptions of regression. First, listwise deletion was used to eliminate participants with incomplete data. Secondly, the scores of three univariate outliers were manually reduced in value while maintaining their status as the highest score within the Gaussian curve. That is, outliers were not removed, in order to maximize the power of the analysis. However, one multivariate outlier was removed from the original sample. With regard to assumptions of normality, depression, anxiety and net earnings values were positively skewed; anxiety and net earnings values exhibited a platykurtic distribution. The estimated power of this analysis was 0.99 as determined by G*Power, as a consequence of the large effect size (Faul et al. 2007). An examination of the tolerance statistics indicate that the depression, anxiety and stress scales were redundant with tolerance values of .23, .19, and .15 respectively. This finding is reflected in the high internal consistency index of the DASS reported above. The ICI also exhibited multicollinearity (.258). However, net earnings was only marginally redundant with the aforementioned variables (Tolerance=.788). Therefore, the results of the following analyses should be interpreted with some degree of caution.

Table 1 Means and standard deviations by questionnaire (N=62)

Questionnaire	Mean	Standard deviation
Internal control index	102.75	10.44
Depression subscale score	8.03	9.94
Anxiety subscale score	4.16	6.29
Stress subscale score	8.28	8.09
Problem gambling severity index	3.3	2.92

In the first step of analysis, time spent playing poker was entered as a predictor variable and PGSI score was entered as a criterion variable. This variable was entered first into the model as a means of discovering the effects of the five predictor variables above and beyond the effects of time spent playing poker per week. This step accounted for 38.3% of the variance in problem gambling (Adj. R^2=.373); hours played per week was a significant and unique predictor of problem gambling (sr^2=.383, β=.619, t(1,61)=6.153, p<.001).

For the second step, depression, anxiety, stress, ICI scores, as well as net earnings were entered as predictor variables with PGSI scores as the criterion variable. Step two accounted for 67.3% of the variance in problem gambling scores (Adj R^2=.638). Depression, anxiety and net earnings were not found to be significant and unique predictors of problem gambling. However, stress was found to significantly and uniquely account for 7.5% of the variance in PGSI scores (sr^2=.075, β=.705, t(6,62)=3.573, p=.001). Furthermore, ICI scores were found to significantly and uniquely explain approximately 5% of the variance in PGSI scores (sr^2=.05, β=.439, t(6,62)=2.920, p=.005).

Discussion

The present study attempted to replicate and expand upon the initial findings of Hopley and Nicki (2010) by examining whether depression, anxiety, stress, net earnings, locus of control, and hours spent playing poker could each uniquely predict problem gambling in THOP players. Multiple hypotheses were examined. That is, each negative mood state was hypothesized to uniquely predict problem gambling, with depression having the strongest relationship. Furthermore, it was hypothesized that net earnings and time spent playing poker would uniquely predict problem gambling. Finally, it was hypothesized that locus of control would uniquely predict problem gambling in poker players, and that those with high PGSI scores would have a higher external locus of control.

The results of the present study supported the hypothesis that time spent playing online poker uniquely predicts problem gambling. However, of the three hypothesized dimensions of negative mood states, only stress uniquely predicted problem gambling. This result runs counter to the expectation that each dimension of negative affect assessed herein would uniquely predict problem gambling, and that depression would yield the strongest association with PGSI scores. ICI scores uniquely predicted problem gambling in the sample; however, this finding was opposite to expectations, as an internal LOC was predictive of problem gambling. Lastly, the hypothesis that net yearly earnings would uniquely predict problem gambling was not supported by the data. Therefore, it remains a possibility that skill is unrelated to problem gambling. Alternatively, as net yearly earnings are only one indirect aspect of skill, this relationship should not be ruled out based solely on these results.

The finding of a positive relationship between time spent playing THOP and problem gambling scores replicated the results of Hopley and Nicki (2010). Time spent playing THOP uniquely predicted 38.3% of the variance in problem gambling. This finding provides further support for the claim that an increased opportunity to gamble is related to increased problem gambling behaviours (Johansson et al. 2009). Due to the accessibility of online gambling, this finding suggests that THOP players are at a substantial risk for developing gambling problems. This finding is of vital importance as 55.7% of the sample could be classified at least as being moderate-risk gamblers, which highlights the important need for prevention strategies.

The finding that stress was a significant predictor of problem gambling only partially supports the proposed hypothesis regarding negative mood states. Previous research has

shown that those who are depressed prefer games of skill and those who are stressed or anxious choose games of chance (Coman et al. 1997). Based on DASS scores in the current study, THOP players are not experiencing high levels of depression or anxiety; rather, they are experiencing high levels of stress. Therefore, THOP problem gamblers may be turning to poker to obtain temporary relief from symptoms of stress, and the presence of chronic stressors may explain the maintenance of excessive online poker playing. The results are consistent with Jacob's (1986) theory, as THOP problem gamblers seem to be seeking relief from an uncomfortable internal state: stress. Alternatively, the possibility exists that a failed ambition to be a successful THOP player may cause stress. Indeed, while there were consistent winners in the sample, several individuals broke even or nearly even, supporting this potential interpretation. However, the majority of gamblers won money in this study, including the problem gamblers. Therefore, if depression is not a cause but a consequence of problem gambling, the lack of significant depression in this sample is logical. Contrasted to typical games where the gamblers statistically lose money, potentially resulting in social and psychological problems including depression, THOP players win money, thereby negating one potential distal trigger for depression.

The finding that internal LOC uniquely predicted problem gambling in THOP players is counter to expectations. Based on the findings of Meyer de Stadelhofen and colleagues (2009), it was expected that problem gambling would be associated with an external LOC. The findings of this study, however, support earlier points of view which suggest that problem gamblers develop illusory perceptions of control, and consequently, an internal LOC (Carroll and Huxley 1994). The skill component of poker adds a unique element to the relationship between LOC and gambling, as feelings of control may be warranted in certain situations (Bjerg 2010). For example, players may experience long sequences in which they are controlling the table and winning many hands. This pattern of winning would naturally strengthen an internal LOC, which may persist even in times of losses. The finding that high levels of internal control are related to problem gambling in THOP players highlights an aspect of problem gambling unique to poker players. Bjerg (2010) found that problem gamblers may have logical or irrational perceptions of the poker game. Therefore, it becomes increasingly important to distinguish between cognitive perceptions and self-imaginary distortions by examining the unique situation of each player (Bjerg 2010). Forms of gambling which are purely ones of chance offer payouts randomly; therefore, any perceptions or beliefs which contain elements of control or predictability can be categorized as cognitive distortions (Bjerg 2010). However, because the outcome of a poker hand is not solely determined by chance, an a priori classification of these beliefs as erroneous does not capture the complexity of poker (Bjerg 2010). A statement which centers around the fact that the gambler believes their skill can increase the likelihood of profit can only be established *a posteriori* as a cognitive distortion (Bjerg 2010). If said player has amassed an astronomical debt, this belief would be evidence for the presence of distorted thinking; conversely, should said player be a recurrent winner, this statement would most likely be true, and therefore, not distorted.

Financial difficulties typically accompany most forms of addiction, yet in THOP, long-term controlled play may result in financial gain. This paradox may be a strong deterrent for THOP players to initially admit to a gambling problem, let alone to seek a solution. Traditional gambling treatment involves education about the randomness of the outcome and correction of irrational gambling beliefs (Shead et al. 2008). However, THOP players' beliefs about the outcome of the game may be entirely accurate (Bjerg 2010). Therefore, if feelings of internal control are warranted in THOP, traditional treatment approaches for successful poker players who gamble problematically will not be effective. Bjerg (2010)

also raises a question posed by Hopley and Nicki (2010), that is, whether the diagnostic tools used to assess problem gambling are applicable to poker, due to the greater disconnect between gambling and financial loss as compared to most other forms of gambling.

There are several limitations to the present study. First, the sample was recruited from online poker forums and these sites tend to attract skilled poker players looking to increase their knowledge of the game. Consequently, the present findings may not generalize to samples of casual THOP players. Similarly, respondents were self-selected and primarily male; therefore, these findings may not generalize to female THOP players. The low completion rate of the questionnaires points to a limitation of this medium for collecting data and supports the use of brief measures. Furthermore, the study is correlational in design; consequently, conclusions regarding causation cannot be made. In addition, prior to the collection of longitudinal data, no conclusions can definitively be drawn indicating that playing THOP in the long term can be financially successful. Finally, because there exists no direct measure of poker skill, the indirect index of net earnings employed in this study was less than optimal.

Future research should seek to examine the second predisposing factor that is associated with addiction according to Jacobs (1986): early negative social experiences and current desires for fame and social recognition. The possibility exists that the prospect of earning great wealth and popularity through THOP may lure certain types of gamblers looking to increase feelings of social importance. Given that this is the first study which has discovered the link between stress and problem gambling in a THOP playing sample, the results require replication. Subsequently, a longitudinal study examining the origins and evolution of stress in THOP players would address causality. With respect to LOC, future research may benefit from an examination of the stability of LOC in winning and losing players and the prevalence of problem gambling.

In sum, this study has replicated and extended the findings of Hopley and Nicki (2010). Further support for the hypothesis that increased time spent playing THOP is positively related to the level of problem gambling was found. Furthermore, the finding that stress uniquely predicted problem gambling in THOP players may have clinical implications with regard to the development of a treatment protocol for problem gamblers who play online poker. Lastly, the finding that an internal LOC uniquely predicts problem gambling in THOP players warrants future examination into the relationship between LOC and gambling. Following replication, if results confirm the nature of the relationship between LOC and problem gambling in THOP players, it may prove beneficial for therapists to take LOC into account when designing treatment plans. Overall, the general trend of evidence to date supports the need to examine the type of game played when discussing problem gambling.

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