

Relationships between online gambling, substance use and mental health: A review

Running head: Online gambling, mental health and substance use

Abstract

This paper reviews the published literature to date examining the relationship between online gambling, mental health problems and substance use. Online gambling, particularly problematic gambling online, was found to be associated with poor mental health and use of various substances. Recent preliminary evidence also suggests that online gamblers may be at greater risk of some substance use and mental health problems, relative to non-online gamblers. However, many of the reviewed studies were limited by investigation of online gambling behaviours only; these samples may have inadvertently comprised individuals who engage in both online and non-online gambling. Future research is required to address these limitations.

Key words: internet gambling; online gambling; mental health, substance use; problem gambling

Online gambling encompasses a wide range of online pursuits which involve betting money on an uncertain outcome or playing games of chance for money. Online gambling can be classified into two main forms; online wagering and online gaming. Online wagering includes sports betting and betting on the outcome of events (e.g., the outcome of a reality TV show or the outcome of a political election), whereas online gaming comprises casino games such as blackjack and roulette, as well as all forms of poker and virtual electronic gaming machines¹. There continues to be rapid growth in the number of online gambling websites available, and the amount of money generated by these sites. The number of online gambling websites listed on <http://online.casinocity.com> is currently (April 2012) approximately 2700; in 2007 this number was only around 2000. Globally, the gross wins from online gambling have risen from €15.2 billion in 2008 to €23.7 billion in 2011, and these are predicted to rise to €30.4 billion in 2015². With new digital and online media technology, online gambling is seemingly ubiquitous and is suggested to be becoming more socially acceptable³. While there continues to be increased opportunities for and accessibility to online gambling, to date, there have been relatively few empirical studies examining online gambling and its implications for health and wellbeing.

While both online and venue-based gambling are similar in so far as many of the same games and activities are available both online and in physical gambling venues, there are fundamental differences between online gambling and venue-based gambling. It has been hypothesised that these disparities may be associated with increased risk of problematic gambling among online gamblers and other related difficulties, such as mental health problems and substance use (e.g.⁴). The primary difference between online gambling and venue-based gambling lies in the much greater accessibility and convenience of online gambling, relative to venue-based gambling^{1,5}. Greater access to gambling through online applications has been hypothesised to increase the prevalence of problem gambling and

related harms by way of allowing greater frequency of play and increased convenience to permit opportunities of impulsive gambling^{1,5}. In addition, the solitary nature and anonymity associated with online gambling have also been suggested to contribute to problems such as underage use of online gambling, and ease of gambling while under the influence of alcohol and drugs^{5,6}.

Although a number of authors have speculated that these disparities between online gambling and venue-based gambling may have implications for rates of problem gambling among online gamblers and harms associated with online gambling, there have been few studies that have evaluated the veracity of these hypotheses. It is not clear whether the differences between online and venue-based gambling have any real impact on the associations between gambling and detrimental outcomes.

There is a large body of literature showing associations between problem gambling and adverse mental health and substance use outcomes. Problem gambling has been shown to be associated with both mental health problems such as depression and anxiety, as well as alcohol and substance use disorders (for a recent systematic review and meta-analysis see⁷). However, in the majority of these studies it is unclear whether problem venue-based gambling or problem online gambling is being investigated. It is reasonable to infer that the majority of the participants in these studies primarily engaged in venue-based gambling given that much of the research was conducted before the widespread availability of online gambling (that is, 1980s, 1990s and early 2000s). As such, given that it is hypothesised that online gambling may be associated with poorer outcomes, it is important to understand the associations between online gambling, mental health and substance use, and whether engaging in online gambling is associated with the same (and more/less prevalent) mental health and substance use problems to those which have been identified in the previous literature among venue-based gamblers.

Therefore, the aim of this review was to systematically summarize and evaluate the available literature examining the associations between online gambling and both mental health and substance use. This review will report on studies that examine online gambling samples specifically. A secondary aim of this paper was to highlight studies which compared online gambling to venue-based gambling to address the question of whether online gambling is associated with the same mental health and substance use problems that are linked with more traditional venue-based gambling.

Methods

The scholarly databases PsychInfo, Pubmed, Scopus, Ebscohost, Web of Knowledge and Proquest were searched using variations of the terms “online gambling/internet gambling” together with variations of the terms “mental health/depression/anxiety/antisocial/substance use/cannabis/alcohol/cigarettes”. These search terms were chosen as they are the most commonly investigated mental health and substance use outcomes examined in relation to venue-based gambling (e.g. ⁷). Search and review procedures were as recommended by the Centre for Reviews and Dissemination ⁸. A broad range of search terms were utilised to ensure that the review was exhaustive, including all published studies to date (key term searches for this study were conducted in December 2011) which have examined associations between online gambling and mental health symptoms or diagnoses and/or substance use or abuse/dependence. Titles and abstracts (and if necessary, full text articles) retrieved in these searches were then inspected to ascertain their relevance. The full-text articles of potentially relevant papers were then screened to confirm whether they satisfied the inclusion criteria. Articles were included if they examined a sample of online gamblers (of any age), and if any type of mental health and/or substance use measures were examined among the sample of online gamblers. The reference lists of

included articles were also checked to locate any further relevant papers. Search strategies yielded 12 original research articles which satisfied these inclusion criteria.

Results

Online gambling and mental health

All of the studies identified for the current review were a cross-sectional design; however, the measures used to assess problem gambling, and the outcomes examined varied across the studies. The first study to specifically examine the relationship between online gambling and mental health was conducted in 2006⁹ among a sample of adults who were recruited from waiting areas of medical and dental clinics. The sample was administered the Short Form Health Survey and it was found that online gambling was a predictor of poor physical and mental health. It was found that even infrequent online gambling was associated with poorer mental health scores, with online gamblers (those who had used the internet to gamble at least once in their life) scoring significantly lower mental health summary scores on average, as compared to individuals who had never gambled online⁹. Petry and Weinstock¹⁰ followed this up with a study of over 1000 university students. Participants were administered the General Health Questionnaire and it was reported that online gambling was associated with poor mental health, with both infrequent and frequent online gamblers having poorer mental health scores, as compared to individuals who had never gambled online¹⁰. While these studies were the first to suggest the presence of an association between online gambling and poor mental health, it is unclear from these studies which specific aspects of poor mental health are associated with online gambling.

A number of subsequent studies have examined associations between online gambling and mental health among samples of online poker players. A study by Wood and colleagues¹¹ recruited self-defined online poker players from a university campus and administered an

online survey asking questions about motivations, strategies and mood states before and after playing online poker. In a regression model, this study found that the strongest predictor of DSM-IV probable pathological gambling among the online poker players was negative mood states after playing¹¹. The authors acknowledged that this association most likely reflected the consequences of gambling itself¹¹. Other statistically significant predictors in the model included gender swapping and playing to escape, and the belief that online poker was about both chance and skill equally¹¹. Similarly, another study investigated online Texas Hold'em poker players recruited from online poker forums and networking sites¹². Negative emotional states (as measured by the Depression Anxiety Stress Scales) was included in a regression model together with measures of dissociation, boredom proneness and impulsivity. Each of these variables were found to be predictive of problem gambling (according to the Canadian Problem Gambling Index; CPGI). Dissociation was the strongest predictor, accounting for 6.4% of the variance in problem gambling scores, while negative emotional states was one of the weakest predictors, uniquely predicting only 1.5% of the variance in problem gambling scores¹². Given that negative emotional states only explained a small amount of the variance in problem gambling scores, it is possible that there are other more important factors that predict severity of problem gambling which were not considered in this study. Alternatively, it may be that the non-specificity of the measure used may have contributed to the magnitude of the explanatory relationship observed. In another study examining a university sample of self-defined online gamblers, general negative mood states and negative mood states after gambling (both measured by the Positive and Negative Affect Schedule) were found to be the strongest predictors of South Oaks Gambling Screen (SOGS) problem gambling score in a regression model¹³. These studies suggest specific associations between severity of problem online gambling and negative emotional states (though negative emotional states may only play a small role in explaining severity of problem gambling scores). However, based on

these findings it is unclear which negative mood state/s underpin these associations. Hopley, Dempsey and Nicki¹⁴ recently attempted to address this question. In this study they examined exactly which negative mood states (depression, anxiety and/or stress) were predictors of problem online gambling in a multivariable regression model. Contrary to expectations, stress was the only statistically significant negative mood state predictive of problem gambling score among the online poker players, explaining 7.5% of the variance in problem gambling score¹⁴. This is in contrast to a large body of literature among venue-based gamblers which has shown strong associations between depression and problem gambling (for a review see⁷). The authors proposed two hypotheses to reconcile these contrary findings. Firstly, the particular sample of this study did not exhibit high scores on measures of anxiety or depression, but they showed high scores on the measure of stress; thus, this sample may have been turning to online poker to relieve the symptoms of stress¹⁴. Alternatively, the majority of gamblers in this study reported to have won money consistently (or broke even or nearly even), and thus if depression is not a cause of gambling but rather a consequence of unsuccessful gambling, then the lack of association between online gambling and depression in this sample is logical¹⁴. Further research examining the predictive relationship between problem online gambling and both depression and stress are required to clarify these findings.

Another recent study has attempted to examine in more detail the relationships between online gambling and specific mental health symptoms. This study recruited participants from gambling and gambling-related websites registered within Europe¹⁵. Participants completed an online survey containing a measure of problem gambling and a measure of general health, in addition to the Patient Health Questionnaire to screen for depression, the Mood Disorder Questionnaire to assess for mood elevation and bipolar disorder, the CAGE alcohol screen to assess for alcohol use disorders, and the Drug Abuse

Screening Test to assess for substance use disorders¹⁵. Latent class analysis was used to categorise the sample according to the type of online gambling the participants engaged in. The categories included: none-to-minimal online gambling; online sports betting; casino games and sports betting online; online lottery; and multi-activity online gamblers¹⁵. Chi square analyses revealed that there was a higher prevalence of depression among multi-activity online gamblers as compared to any other group, while casino and sport bettors had a higher prevalence of depression relative to the none-to-minimal gamblers¹⁵. These findings are somewhat at odds with those of Hopley et al.¹⁴ who found no statistically significant predictive relationship between depression and problem online gambling. There are a number of possible reasons for this. Firstly, Hopley et al.¹⁴ examined a sample of poker players only while Lloyd et al.¹⁵ found that multi-activity gamblers were most likely to exhibit depression. There may be important differences between types of online gambling activity, or the number of online gambling activities participated in, which account for the lack of relationship between depression and problem online poker playing in the study by Hopley et al.¹⁴. On the other hand, Lloyd and colleagues¹⁵ found that the multi-activity online gamblers were also the most likely to be problem gamblers. Thus, the relationship between online gambling and depression may be dependent on the severity of gambling problems, and hence was observed in the multi-activity gamblers in the study by Lloyd and colleagues, of which a high proportion were classified as problem gamblers (approximately 80%), but not in the study by Hopley et al.¹⁴ of which only approximately 11% were problem gamblers. However, the findings of these studies should be interpreted with caution as only online gambling behaviours were investigated. It is unclear whether the online gamblers included in these studies also engaged in venue-based gambling.

A recent small (15 online pathological gamblers and 15 venue-based pathological gamblers) preliminary study attempted to compare online gamblers with venue-based

gamblers in terms of the associations with depression and personality disorders¹⁶.

Participants were administered the SOGS to assess problem gambling, the Beck Depression Inventory to assess depressive symptoms, and the Personality Disorders Questionnaire to assess for the presence of personality disorders. Both online and venue-based pathological gambling was found to be correlated with depression; interestingly, among problem online gamblers there was a greater proportion of avoidant-dependant and obsessive-compulsive type personality disorders as compared to problem venue-based gamblers, whereas among problem venue-based gamblers there was a greater proportion of dramatic, emotional or erratic personality disorders¹⁶. Although this study was limited by its very small sample and use of only basic statistical analyses, it provides preliminary evidence for potential differences between online and venue-based gambling in terms of associations with specific mental health disorders.

Online gambling and substance use

While a small number of studies were identified which examined relationships between mental health and online gambling to some extent, fewer studies have examined relationships between substance use and online gambling. The earliest study was undertaken by McBride and Derevensky¹⁷. The authors conducted an online questionnaire to examine online gambling behaviours among participants recruited through an online gambling website newsletter. Chi square tests revealed that problem online gamblers were more likely to wager online while consuming alcohol and illicit drugs, relative to social online gamblers¹⁷. Likewise, the afore-mentioned study by Lloyd et al.¹⁵ also found that use of both illicit substances and nicotine was more prevalent among multi-activity online gamblers than among gamblers who engaged in other forms of online gambling. Similarly, among online casino and sports bettors there was more prevalent use of illicit substances relative to those individuals who had minimal-to-no online gambling participation. The same pattern of results

was observed in terms of the relationship between online gambling type and probable substance abuse, as identified with the Drug Abuse Screening Test. A higher proportion of the multi-activity online gamblers were also classified as problematic alcohol users, identified with the CAGE alcohol screen, as compared to all other groups. Similarly, the casino and sports bettors group also had a higher proportion of problematic alcohol users, relative to the online lottery playing cluster and the none-to-minimal online gamblers. In this study, the majority of multi-activity gamblers were also classified as problem gamblers, thus, these findings all appear to be consistent with those of McBride and Derevensky¹⁷ who found a relationship between substance use and problematic online gambling. As such, it may be that the presence of problem online gambling is associated with substance use and abuse, regardless of the type of online gambling. However, as discussed earlier, these studies are limited by only investigating and reporting online gambling behaviours, and thus the sample may include those who also participate in venue-based gambling. Therefore, attributing the findings specifically to the effects of online gambling is problematic.

More recently, a report detailing re-analysis of the British Gambling Prevalence Survey data suggested that there may be differences in substance use among online gamblers relative to venue-based gamblers. This report showed that online gamblers were less likely to be cigarette smokers than non-online gamblers, while on the other hand, online gamblers were more likely to drink alcohol heavily over the preceding week when compared to non-online gamblers⁴. Logistic regression analyses also revealed that individuals who drank alcohol heavily had 2.5 times higher odds of using the internet to gamble. Similarly, another large study among high school student gamblers found that heavy alcohol use was more strongly associated with problem online gambling in regression analyses than with problem non-online gambling¹⁸. In this study, problem gambling (both online and non-online) was associated with dysphoria/depression, use of tobacco, use of marijuana and use of other illicit

substances in regression models¹⁸. An association between illicit substance use and online gambling among adolescents was confirmed in another recent study by Neumark and Bar-Hamburger¹⁹. Using data from the 2009 National School Survey among Israeli adolescents, regression analyses showed that engaging in online gambling, as well as a range of other risky-behaviours such as smoking, drinking and illicit drug use, were predictive of volatile substance misuse (deliberate self-administration of inhalants or solvents).

Summary and Conclusions

Research into online gambling and its implications for health and well-being is still in its infancy. There is growing evidence to suggest that online gamblers are at greater risk of experiencing problem gambling as compared to those who engage in traditional venue-based gambling^{4,13}. While there is a solid base of literature detailing relationships between traditional venue-based gambling and both mental health symptoms and substance use (e.g.⁷), there is a relative paucity of studies examining these relationships among online gamblers. The studies identified in this review suggest that relationships between problem online gambling, mental health and substance use do exist, and are somewhat consistent with those observed between problem venue-based gambling, mental health and substance use. However, given the limited research and the sometimes inconsistent findings, the relationships between problem online gambling and specific mental health and substance use problems require further investigation. Of note, preliminary evidence was found which suggests that online gamblers may be at increased risk of some mental health and substance use problems (particularly alcohol use) when compared to venue-based gamblers. These findings are of concern, and call for further inquiry. Large studies comparing online gamblers with venue-based gamblers, focusing on possible differences in associations with mental health symptoms and substance use are imperative. Studies of this kind will also help to address one of the limitations identified in many of the studies reviewed here. That is, most of

the studies failed to investigate venue-based gambling behaviours in their sample of online gamblers. Therefore, it is unclear whether the online gambling samples included individuals who also engage in venue-based gambling. This complicates interpretation of the findings and limits attribution of these findings to online gambling specifically.

In guiding future research, categorisation of the sample based on type of online gambling each participant engages in would assist future studies to disentangle whether associations between mental health symptoms and substance use relate to specific categories of online gambling, or online gambling more generally. Again, it will be important to consider both online and venue-based gambling when doing this as the distinction between online and venue-based gambling may turn out to be arbitrary; instead it may be that specific gambling activities are associated with certain mental health or substance use outcomes, regardless of whether they are played online or in a land-based venue. Alternatively, it may be that associations with mental health and substance use relate to the severity and/or prevalence of problem gambling among the samples, and the number of gambling activities individuals engage in, regardless of the type of gambling medium (online or venue-based) and the type of gambling activity (i.e. casino games versus poker). Future studies of this kind will also help contribute to further conceptual understanding of the mechanisms underlying comorbidity between gambling and both mental health and substance use. The presence of associations specific to particular mental health problems or substance addictions may further inform of whether each type of comorbidity reflects a common underlying neurobiological mechanism, or whether the comorbidity is simply as a result of the social and financial effects of gambling.

A prominent limitation of all of the studies identified for this review was that none of them were longitudinal and therefore they did not address the issue of causality or the mechanisms underlying the observed relationships. Therefore, it is unclear whether engaging

in online gambling leads to mental health and/or substance use problems, or whether mental health and/or substance use problems put an individual at greater risk of engaging in online gambling. That is, those with mental health or substance use problems may be attracted to gamble online, or alternatively, engaging in online gambling may lead individuals to develop poor mental health. The nature of any causal relationships and the mechanism of action of these remains to be determined in future research using longitudinal designs.

In addition, the studies reviewed here all used differing measures of problem gambling, each of which have different criteria for severity of problem or pathological gambling. For example, a number of studies have found that the SOGS classifies more individuals as affected by pathological gambling than does the DSM-IV criteria²⁰. Differences in the measures used to diagnose problem or pathological gambling may result in different prevalence rates of online gambling across different studies, and varying relationships between mental health and/ or substance use and problem online gambling. In addition, and more pertinent to the current paper, the existing gambling screens do not distinguish between problem online gambling and problem venue-based gambling. That is, when administering these measures to individuals who gamble both online and in land-based venues, it cannot be determined if the individual's online or venue-based gambling is problematic, or whether they have problems with both types of gambling. This limitation associated with the existing measures of problem gambling hinders more thorough examination of the implications of problem online gambling.

Lastly, though many of the studies reviewed here reported some sort of relationship between problem online gambling and measures of mental health and substance use, the clinical significance of some of these relationships is unclear. For example, relationships reported between negative emotional states and problem gambling (e.g.¹¹) are unlikely to have much clinical relevance, whereas the relationship between depression and multiactivity

online gambling observed by Lloyd and colleagues¹⁵ is likely to be clinically relevant given that the patient health questionnaire used in this study diagnoses depression based on DSM-IV criteria and has been shown to be sensitive to clinically significant depression, depression outcomes, and changes over time²¹. Further studies using measures validated and sensitive to detect clinically significant mental health and substance use disorders are needed to determine whether problem online gambling is associated with mental health and substance use disorders that are clinically relevant.

Finally, understanding the differences between online gambling and venue-based gambling, in terms of their implications for mental health and substance use, will assist in the development of policies and legislation governing the provision of online gambling. If future research suggests that online gambling is associated with a greater likelihood of mental health and substance use problems, then tighter control and regulation of online gambling may be needed. Similarly, research of this kind can be translated into community education programs and provision of appropriate services with the intention of reducing harmful outcomes associated with online gambling.

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