

**Psychiatric disorders, cognitive distortions and substance use disorders in
pathological gamblers**

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SUMMARY

The present thesis aimed to contribute to research and practice by investigating psychiatric disorders, dysfunctional beliefs and substance use disorders in pathological gamblers. The four empirical studies utilised a large Australian community sample of regular gamblers to examine the prevalence and role of Axis I and Axis II psychiatric disorders in regular and pathological gamblers' behaviour and thoughts.

In Paper 1, the prevalence of psychiatric disorders within a community sample of regular gamblers was investigated. Psychiatric disorders were found to be more prevalent among pathological gamblers than other regular gamblers. Mood and anxiety related disorders were twice as common. Furthermore, almost all personality disorders (apart from depressive and obsessive-compulsive personality disorder) were more prevalent among pathological gamblers than non-pathological gamblers. These differences remained significant even after controlling for gender.

Paper 2 examined pathological gambling and gambling-related cognitions to ascertain to what extent they were related to personality disorders and general dysfunctional beliefs. The results showed that pathological gambling was strongly related to borderline personality disorder measure as well as gambling-specific belief scores. A path analysis showed that borderline personality disorder is only weakly related to gambling-related belief after controlling for delusion-proneness. In other words, there is evidence of a pathway between borderline personality disorder scores, delusion-proneness scores and Gambling Related Cognition Scale scores which, in turn, are positively associated with pathological gambling scores. These results support suggestions that dysfunctional beliefs which are associated with borderline personality disorder may make people more susceptible to gambling-related erroneous cognitions.

The study reported in Paper 3 compared the prevalence of psychiatric co-morbidity between pathological gamblers who did, and did not, additionally meet criteria for an alcohol use disorder (dual diagnosis). The findings indicated that psychiatric disorders were most prevalent amongst those with a dual diagnosis, followed by those who only met criteria for pathological gambling. Both of these groups had a higher prevalence of psychiatric co-

morbidity than those regular gamblers in the sample who did not meet criteria for either pathological gambling or alcohol use disorder.

Paper 4 examined associations between pathological gambling and gambling-related dysfunctional belief scores once alcohol use disorder has been controlled for. Pathological gamblers scored higher than other regular gamblers on all these measures. Although alcohol use disorder was not directly related to delusion proneness, a combination of higher alcohol use disorder and delusion proneness was associated with higher gambling-related cognition scores. The findings confirm previous evidence supporting an association between pathological gambling and greater endorsement of erroneous gambling-related cognitions. Alcohol misuse and delusion proneness may be factors that strengthen this association.

By clarifying links between dysfunctional beliefs, Axis I and II psychiatric disorders, substance use and pathological gambling, and suggesting new directions for research and practice, the thesis potentially contributes to better research and outcomes for problem gamblers, clinicians, families and communities

DECLARATION

I, Mohammadreza Abdollahnejad, certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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List of Publication

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Abdollahnejad, R., Delfabbro, P., & Denson, L. (2014, in press). Understanding the relationship between pathological gambling and gambling-related cognition scores: the role of alcohol use disorder and delusion proneness. *International Gambling Studies*. Doi: 10.1080/14459795.2014.886711

Chapter 1: Introduction and literature review

1.1 Overview

The present thesis examines the prevalence of psychiatric disorders and dysfunctional beliefs among pathological gamblers. This research program led to four papers, each of which focuses on different elements of the overall study. All four papers have been published or submitted to leading peer-reviewed journals.

Chapter 1 provides a summary of the nature and prevalence of gambling and pathological gambling, with particular reference to the Australian context. Included in this section is a discussion of definitions of problem and pathological gambling and how these phenomena are assessed, followed by a critical review of the major theoretical approaches to the explanation of problematic gambling behaviour.

Chapter 2 provides a further literature review concerning some constructs which were central to the study. These were psychiatric disorders and personality disorders; substance use disorders; and gambling-related erroneous beliefs. This chapter also provides a rationale for the research project.

Chapter 3, 4, 5, and 6 provides copies of the four papers submitted for peer review along with a statement that outlines the principal analyses contained in each paper.

Chapter 7, the final chapter, provides an overall summary and discussion of the project: conclusions and limitations; theoretical and clinical implications; and a discussion of potential future directions arising from this research.

1.2 Prevalence and nature of gambling and problem gambling in Australia

Gambling is one of the most popular recreational activities in Australia. The scale of the gambling industry in Australia has expanded considerably over the last 20 years. Recent estimates (2009-2010) suggest that Australians spend over \$19 billion dollars per year on gambling with around 60% of this expenditure arising from electronic gambling machines (or EGMs). By 1999, 20% of Australia's GDP was thought to arise from the gambling industry making it the second largest industry after mining. The gambling industry employs 100,000 people in Australia in casinos, clubs and hotels and other outlets that provide gambling services. Gambling is usually divided into two major categories in Australia: gaming and wagering. Gaming refers to casino table games, keno, lotteries and EGMs which are played according to strict mathematical rules, whereas wagering usually refers to placing bets on sporting and race events where the odds are determined by the agencies of operators.

According to Delfabbro (2010), more than half of all Australian adults (around 70%) gamble at least once each year. Lotteries are generally the most popular activities in relation to overall participation (55-60%), followed by scratch tickets (around 30%) and gaming machines (around 20%). There is clear evidence to suggest that the popularity of gambling has declined from the very high levels observed during the mid 1990s. For example, the participation rate for electronic gaming machines (EGMs) in South Australia has fallen from 40% in 1999 to around 30% in 2005; and to around 20% in some other jurisdictions (Delfabbro, 2010). Similar declining trends have been observed for other forms of gambling (Productivity Commission, 2010). Some growth has occurred in sports betting and gambling online, but these represent only a relatively small proportion of the overall market (less than 10%).

Australian research into the prevalence of gambling and problem gambling/pathological gambling (PG) dates back to the early 1990s. The first national study of gambling was undertaken by the Productivity Commission, which reported in 1999 that the prevalence rate of PG in Australia was 2% of the adult population (approximately 200,000 Australians). More recent estimates (Productivity Commission, 2010) suggest that this rate has remained very stable or even fallen. In the 1999 national study estimates were based on the South Oaks Gambling Screen (SOGS), whereas most post-2000 studies have used the Canadian Problem Gambling Index (or PGSI) so this may provide some reason for the discrepancy. However as Delfabbro (2010) reported, studies conducted in Queensland for

over a decade have consistently applied the PGSI as the screening measure, and reported a gradual downward trend in PG prevalence rates. This suggests that a diminishingly small proportion of the population is accounting for much of the total expenditure on gambling.

1.3 Definitions of pathological and problem gambling

According to the Australian national definition, PG is “difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community” (Neal, Delfabbro, & O’Neil, 2005). Similar international definitions exist, but with some geographical differences. As Delfabbro (2010) observes, the term ‘problem gambling’ is widely used in Australia among researchers and clinicians, whereas other countries such as New Zealand, North America and Europe have more commonly used terms such as ‘pathological’ or ‘compulsive’. In North America in particular it is more common for excessive gambling to be referred to in terms of a medical, or disease-based, disorder. In Australia, such usage has been challenged for several reasons. The first is that to employ the term “compulsive” when describing individuals with PG might be misleading because of its potential association with obsessive-compulsive disorders (OCDs). Although OCDs are more common in pathological gamblers than other people, Blaszczynski and Nower (2002) point out that OCDs typically involve engaging in behaviour to reassert control and to relieve dysphoric states, whereas PG often includes a desire for positive reinforcement via gambling. Similarly, questions have been raised about the extent to which genuine tolerance and withdrawal occurs in PG, especially given that no clearly defined physiological mechanism or chemical has been identified as explaining the development of the disorder. (e.g., Delfabbro, 2009; Law, 1997; Walker, 1992a). For example, a link has been suggested between the intensity of gambling and arousal measures, but evidence has proved elusive (Dickerson, Hinchey, England, Fabre, & Cunningham, 1992). Other studies (e.g., Blaszczynski, Walker, Sharpe, & Nower, 2008) have suggested that tolerance in PG was different from that defined in the traditional addiction model. That is, problem gamblers might increase their bet size not because of tolerance, or an increasing desire to seek arousal and excitement, but because of their wish to win more money. These arguments are examined in more detail in Section 1.5.2 in relation to the evidence for applying traditional addiction models to gambling.

Furthermore, Blaszczynski et al. (2008) have suggested that it was easy for underlying problems such as anxiety and depression to be misinterpreted as or confounded with symptoms of withdrawal; and that the dysphoric moods often observed after gambling sessions might reflect people's responses to financial losses, rather than being a physiological reaction to the cessation of gambling (Orford, Morison, & Somers, 1996). Orford et al. conducted a pilot study among two groups of people with alcohol use disorder (AUD) (n=16) and PG (n=16). The results showed that, although both pathological gamblers and individuals with alcohol problems attached to gambling and alcohol similarly, pathological gamblers exhibited lower withdrawal symptoms. Further, the authors suggested that the pathological gamblers' excessive attachment to the activity were mainly related to financial factors (i.e., the need to win and recover losses). They concluded that true tolerance and withdrawal might be less significant to PG. In a similar vein, Walker (1989) asserts that the withdrawal symptoms exhibited by pathological gamblers are more psychological than physical, and thus different from the withdrawal symptoms of AUD.

A second important component of Australian definitions of PG is the emphasis on consequences, specifically harm. Such definitions of PG are based on its adverse consequences for the gambler, family, friends, colleagues and/or community (Neal et al., 2005). There is strong evidence to support the existence of many forms of harm, but it should be acknowledged that the prevalence rates for different forms of harm will vary depending upon whether community or help-seeking populations are surveyed. Typically prevalence rates for harm will be considerably higher when studying people with very severe problems who are either in treatment or seeking assistance, because some forms of harm (e.g., legal problems, attempted suicide) are less common amongst pathological gamblers in the community who may not yet need or seek professional assistance. Some researchers, e.g., Walker (1995), have criticised harm-based definitions of gambling for excluding those gamblers who have all the characteristics and symptoms of pathological gamblers except that they can still afford to gamble. Another difficulty based on harm-based diagnostic criteria is that by definition a person must experience harm before they can be considered a problem gambler. For these reasons, Delfabbro (2010) suggests that definitions should include some information concerning the behavioural characteristics of pathological gamblers, e.g., evidence of impaired control or chasing losses.

In general in Australia, the term 'problem gambling' has come to represent the public health definition of the disorder and refers to a behavioural syndrome that leads to various

forms of harm. By contrast, ‘pathological gambling’ is used as a more medical or psychiatric term referring to the presence of an underlying disorder.

1.4 Assessment of PG

There are more than 27 instruments to measure PG and probably more will be designed in future (Shaffer, LaBrie, LaPlante, Nelson, & Stanton, 2004). The validated measures try to assess pathological gamblers based on varying definitions, as described above: medical/diagnostic, harm-based and/or behavioural definitions. According to Delfabbro (2008), the most commonly-used PG measures in Australia are, (a) DSM-IV criteria; (b) NORC DSM Screen for Gambling Problems (NODS); (c) Canadian Problem Gambling Index (CPGI). These will now be described briefly.

1.4.1 The Diagnostic and Statistical Manual of Mental Disorders (DSM)

Although the *DSM-5* was released in May 2013, the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 1994) and its text revision the *DSM-IV-TR* (4th ed., text rev.; *DSM-IV-TR*; American Psychiatric Association, 2000) were current throughout the data-collection phase of this project. The *DSM* first formally recognised PD as a disorder in 1980 and modified the definition in 1987. The *DSM-IV-TR* listed PG among Impulse-Control Disorders Not Elsewhere Classified (American Psychiatric Association, 2000), although the definition closely resembled that for substance dependence (First, Frances, & Pincus, 2004).

The *DSM-IV-TR* defined PG as a “persistent and recurrent maladaptive gambling behaviour that disrupts personal, family, or vocational pursuits.”(American Psychiatric Association, 2000). The diagnosis was made if any five, or more, of ten diagnostic criteria or indicators applied (see Table 1) and this was usually determined using a clinical interview (Battersby, Thomas, Tolchard, & Esterman, 2002). Similar to the Australian definition of PG, these diagnostic indicators referred both to behaviour and harm. As Delfabbro (2010) observes, not all of these criteria are beyond criticism. Earlier versions of the *DSM* were criticised for including the types of harm that might typically be experienced by those who were white, middle-class and male, and had a partner, house and job, whereas recent

discussions relating to the emergent *DSM-5* have questioned the relevance of the final item relating to illegal acts because of its low prevalence.

Table 1

DSM-IV-TR Classification for Problem Gambling (2000)

- 1) Preoccupied with gambling and gambling related activities
 - 2) To achieve the desired excitement, need to increase the amount of money.
 - 3) Several unsuccessful attempts to reduce and cease gambling.
 - 4) When attempting to reduce or stop gambling, experiencing a great amount of irritability and discomfort.
 - 5) Using gambling as a way to escape from uncomfortable feelings and problems.
 - 6) After losing money, gambler returns another day to recoup their money.
 - 7) Lying to friends and family to hide the extent of their involvement with gambling.
 - 8) Committing illegal acts such as forgery, fraud, theft or embezzlement to finance gambling.
 - 9) Damaging or lost their relationship with others including partner, education, job due to gambling
 - 10) Depending on others to assist them for financial difficulties which caused by gambling.
-

1.4.2 NORC DSM Screen for Gambling Problems (NODS)

The NODS is a structured interview administered to examine the prevalence of PG. It comprises 17 lifetime and past-year questions based on *DSM-IV* criteria. Each item utilises YES/NO response options and the maximum score is 10 (1 point per criterion) even though some criteria have 2 or 3 associated questions. Based on the total score, the instrument classifies each respondent into one of four categories: low-risk gambler, at-risk gambler, problem gambler or pathological gambler.

Table 2. *DSM-IV* criteria and matched NODS Lifetime items

Preoccupation	1	Have there ever been periods lasting two weeks or longer when you spent a lot of time thinking about your gambling experiences or planning out future gambling ventures or bets? OR
	2	Have there ever been periods lasting two weeks or longer when you spent a lot of time thinking about ways of getting money to gamble with?
Tolerance	3	Have there ever been periods when you needed to gamble with increasing amounts of money or with larger bets than before in order to get the same feeling of excitement?
Withdrawal	4	Have you ever tried to stop, cut down, or control your gambling?
	5	On one or more of the times when you tried to stop, cut down, or control your gambling, were you restless or irritable?
Loss of control	6	Have you ever tried but not succeeded in stopping, cutting down, or controlling your gambling?
	7	If so, has this happened three or more times?
Escape	8	Have you ever gambled as a way to escape from personal problems? OR
	9	Have you ever gambled to relieve uncomfortable feelings such as guilt, anxiety, helplessness, or depression?
Chasing	10	Has there ever been a period when, if you lost money gambling one day, you would return another day to get even?
Lying	11	Have you ever lied to family members, friends, or others about how much you gamble or how much money you lost on gambling?
	12	If so, has this happened three or more times?
Illegal acts	13	Have you ever written a bad check or taken money that didn't belong to you from family members or anyone else in order to pay for your gambling?
Risked significant relationship	14	Has your gambling ever caused serious or repeated problems in your relationships with any of your family members or friends? OR

	15	ASK ONLY IF R IS IN SCHOOL Has your gambling caused you any problems in school, such as missing classes or days of school or your grades dropping? OR
	16	Has your gambling ever caused you to lose a job, have trouble with your job, or miss out on an important job or career opportunity?
Bailout	17	Have you ever needed to ask family members or anyone else to loan you money or otherwise bail you out of a desperate money situation that was largely caused by your gambling?

Adapted from Gerstein et al. (1999)

1.4.3 The Problem Gambling Severity Index (PGSI)

Ferris and Wynne (2001) designed the larger CPGI to measure gambling within community samples: and a modified version, the PGSI, measures PG. In contrast to other more clinical or diagnostic measures, the PGSI was validated for use in community prevalence studies (Neal et al., 2005). The PGSI was based on an extensive literature review, consultation with experts, and large surveys. The measure has been shown to have good internal reliability and test-retest reliability (Ferris & Wynne, 2001). According to Neal et al. (2005) the PGSI is the most suitable measure for prevalence research in Australia. Nonetheless, PGSI has been criticised for being very similar to the SOGS and *DSM-IV* and for not being a valid measure of harm (Delfabbro, 2010; Svetieva & Walker, 2008).

Table 3

Problem Gambling Severity Index (PGSI) items

In the last 12 months how often have you [or have, for item 7]?

1. Bet more than you could really afford to lose?
2. Needed to gamble with larger amounts of money to get the same feeling of excitement?
3. Gone back another day to try and win back the money you lost?
4. Borrowed money or sold anything to get money to gamble?
5. Felt that you might have a problem with gambling?
6. Felt that gambling has caused you health problems, including stress and anxiety?
7. People criticised your betting or told you that you have a gambling problem, whether or not you thought it was true?
8. Felt your gambling has caused financial problems for you or your household?
9. Felt guilty about the way you gamble or what happens when you gamble?

Scoring: 0 = Never, 1 = Sometimes, 2 = Most of the time, 3 = Almost always. Cut-off scores: 1–2 = Low risk, 3–7 = Moderate risk, 8–27 = Problem Gambler.

Adapted from Ferris and Wynne (2001)

1.5 Theories of problem/ pathological gambling

For over three decades, clinicians and researchers have debated why some people gamble more than others and why some people appear more susceptible to developing gambling-related problems. Several different theoretical explanations have been advanced within psychology and related disciplines. The major theoretical approaches are introduced in the following sections.

1.5.1 Behavioural theories / explanations

Behavioural factors have been reported to play a decisive role in the development of disordered gambling (e.g., Sharpe & Tarrier, 1993). According to the behavioural perspective, gambling is strongly influenced by environmental contingencies. For example, according to the principles of operant conditioning identified by Skinner (1938) and Ferster and Skinner (1957), gambling is thought to be maintained by patterns of intermittent reinforcement. Most forms of gambling are thought to follow a variable ratio schedule of reinforcement. This is known from animal studies to generate a very rapid and consistent level of behaviour that is resistant to extinction (e.g., Cornish, 1978; Delfabbro, 2010; Dickerson et al., 1992). Early laboratory studies by Lewis and Duncan (1958), for example, examined the impact of different levels of reinforcement on the behaviour of slot machine players. They found that those gamblers who obtained lower levels of reward persisted longer than those who received higher levels of reward. Other studies conducted in field environments (e.g., Delfabbro & Winefield, 1999; Dickerson et al., 1992) have shown that gambling behaviour appears to be sensitive to the schedule of reinforcement provided. Both of these studies found larger wins could cause disruption in play-rates, whereas smaller wins in the Dickerson et al. study were found to increase response rates. According to the operant conditioning model, individuals continue to gamble because they habituate to the intermittent reinforcement schedule under which gambling operates (Dixon, Hayes, & Aban, 2000; Griffiths & Delfabbro, 2001). As a consequence, individuals continue to gamble and show resistance to long gambling sessions without any reinforcement. Effectively, they develop a dysfunctional belief and conditioned expectation that wins will eventually follow losses (Dixon, Hayes, Rehfeldt, & Ebbs, 1998). Existing evidence has also shown that people tend to choose immediate rewards over delayed rewards (Chung & Herrnstein, 1967). As a consequence of this preference, thus the results of gambling (losing money) become less influential on behaviour (Weatherly & Dixon, 2007).

Although operant conditioning is considered important, it has been argued that behavioural explanations of this nature are not as effective in explaining why people commence gambling (Walker, 1992a). Walker, for example, argued that apart from winning there may be other factors that shape and maintain gambling behaviour. Both Walker as well as Aasved (2002) criticised the operant conditioning explanation on the grounds that it could not really explain why gamblers continue to gamble when they typically lose more than they win. In defence of the operant explanation, Delfabbro and Winefield (1999) suggested that

gamblers may not necessarily process outcome information in a rational way and may instead focus more upon short-term goals. Long-term losses may not have the same salience or significance as the short-term goals and rewards that provide more immediate sources of reinforcement. These views are supported by clinical studies. For example, Blaszczynski and McConaghy (1988) found that more than 70% of treatment-seeking gamblers stated that the main reason they gambled was winning money. Furthermore, 63% of those who attended off-course betting reported that earning money was the most important reason they gambled (Dickerson, Walker, England, & Hinchy, 1990).

Another important concept with relevance to operant conditioning is the concept of a “near miss”. According to Griffiths (1991), a near miss refers to non-monetary reinforcers which encourage gamblers to continue gambling by encouraging them to believe that success will occur soon. Griffiths argued that near misses may act as secondary reinforcers by generating a form of anticipatory excitement. A number of studies have investigated this effect. For example, Kassinove and Schare (2001) conducted a study using 180 slot machine players to ascertain the role of near misses in the persistence of gambling behaviour. They found that near misses had significant impact on the number of trials played in an extinction condition. However, the relevance of these findings to real-life gambling has been questioned. In an Australian study in Sydney, Sharpe, Blaszczynski, and Walker (2005) compared three groups of people: pathological gamblers (n=59), social gamblers (n=57) and university students (n=92). They aimed to determine the role of the near miss concept in the maintenance of gambling. Participants were presented with photographs of different machine conditions and asked which of these conditions depicted losses, wins and near misses. Most participants failed to recognise near misses, with gamblers being no more accurate than students. Delfabbro (2010) has argued that any near miss effect is very likely overwhelmed by the range of other potential reinforcers (e.g., bonus sequences and structural characteristics) currently available on modern gaming machines.

1.5.2 Addiction theory

According to addiction models, PG is considered to be a type of addiction that shares similarities with alcohol and drug use disorders (DUDs), despite the fact that there is no clearly identifiable substance involved. Lesieur and Rosenthal (1991) asserted that all the diagnostic criteria in *DSM* for PG, apart from “chasing losses”, were similar to those for substance use disorders (SUDs). Pathological gamblers, according to Lesieur and Rosenthal,

exhibited euphoric states and arousal which were similar to the “highs” in other drug dependents. Like people with SUDs, they demonstrated frequent preoccupation; they gambled longer and spent more than they really wanted; like drug abusers demonstrating tolerance, they increased the size of bets to obtain desired levels of excitement; and gambling, like substance abuse, could have negative impacts on people’s performance. Similarly, Blaszczynski, Walker, Sharpe, and Hill (2005) believe that there are some similarities between SUD and PG that make gambling appear to be an addiction. These similarities include the repetitive nature of gambling, the negative consequences, as well as the role of dopamine, and neuro-adaptation. According to addiction theory, PG and SUDs are thought to share common psychological and physiological features. From a physiological perspective, gamblers are considered to experience tolerance (need to gamble more to reach the same level of excitement), withdrawal symptoms and craving (a psychological desire for gambling) similar to other addictions. Several studies have investigated the addiction symptoms among pathological gamblers. For example, a study conducted by de Castro, Fong, Rosenthal and Tavares (2007) using two groups of pathological gamblers (n=50) and AUD sufferers (n=42) and showed that gamblers exhibit higher scores on craving measures than alcohol dependents. Within each group, craving was significantly related to emotional states. Similarly, Castellani and Rugle (1995) conducted a study to compare craving, sensation-seeking and impulsivity among 843 gamblers and people with SUDs at an addiction recovery centre. They reported that gamblers demonstrated higher craving scores on psychometric measures when compared to individuals with AUDs and cocaine abusers. These findings are consistent with those of Wray and Dickerson (1981) who observed that one third of regular gamblers who stopped gambling exhibited mild irritability, dysphoria, poor concentration and restlessness. They suggested that the symptoms demonstrated by pathological gamblers were similar to withdrawal symptoms of alcohol abusers (Wray & Dickerson, 1981), although Walker (1992a) has suggested that these symptoms are more accurately seen as reflect negative emotional responses to losses, or broader anxiety caused by gambling.

Addiction theorists have been criticized for the way they have conceptualised PG as an addictive disorder (e.g., Blaszczynski & Nower, 2002; Petry, 2005). One major reason is that gamblers do not demonstrate the clear and specific physiological symptoms observed in other types of addiction. Plausibly, if gamblers increase their bets, it may primarily reflect loss-chasing or the intention to win more money, rather than the tolerance seen in substance dependence. (Blaszczynski et al., 2005). Delfabbro (2010) also maintained that even

pathological gamblers, like other gamblers, gamble to obtain pleasure and excitement – unlike people with SUDs who, once dependent, take substances to avoid pain and withdrawal symptoms or cravings. Dickerson et al's (1992) study found that there was little association between gamblers' arousal and their gambling outcomes. Blaszczynski et al. (2005) conducted a study to ascertain whether withdrawal and tolerance symptoms were common in slot-machine players. They found that although pathological gamblers reported that they gambled to obtain excitement, this was not related to physiological factors. Some pathological gamblers exhibited withdrawal-type symptoms such as headaches, anxiety and irritability – but these were mostly observed among those pathological gamblers who were also alcohol dependent. Reported withdrawal symptoms appeared largely to reflect cognitive rather than physiological factors.

Gambling has alternatively been conceptualised as a psychological addiction. For example, Blaszczynski and Nower (2002) propose that pathological gamblers use gambling as a coping strategy to avoid their problems and unpleasant feelings such as depression and anxiety. As they suggest in their pathways model (explained below), those gamblers who use the activity as a coping strategy typically report low self-esteem, elevated levels of stress and other life problems including aimlessness. Blaszczynski and Nower's proposal is very similar to Jacobs's (1986) General Theory of Addictions which proposed addiction as a state of dependence that helps an individual to get rid of distressful feelings. Jacobs did not mention withdrawal or tolerance but he did observe that individuals used gambling to satisfy their psychological needs. He also presented two crucial predisposing factors for the maintenance of addiction behaviours: the first being a unipolar physiological resting state which is either excessively depressive or excited, leading to hypo or hyper arousal. The second predisposing factor, based on childhood and adolescent experiences was a self- concept that he/she was inferior or unwanted. In support of this view, several Australian studies have demonstrated a high prevalence of depression and anxiety among female poker machine players, suggesting that they probably used gambling to avoid and escape from their dysphoria and other negative psychological states. (e.g., Di Dio & Ong, 1997; Scannell, Quirk, Smith, Maddern, & Dickerson, 2000).

1.5.3 Cognitive theories

There is a considerable amount of evidence to suggest that people possess many erroneous views about gambling and do not always base their gambling-related decisions on the objective odds of winning (Walker, 1992a). Cognitive factors, including the role of well-established heuristics and biases, are now recognised as being among the important factors that are likely to maintain gambling and also contribute to development of PG (Fortune & Goodie, 2012; Walker, 1992a).

A wide range of dysfunctional beliefs or cognitions have been identified as potential contributors to gambling-related problems and their severity. Such cognitions have been investigated in several ways. One early method was use of the so-called ‘thinking aloud method’ (Delfabbro & Winefield, 1999; Ladouceur & Gaboury, 1988) in which gamblers are asked to speak aloud about, or voice, their thoughts while they gamble. Walker (1992b) used this method with 9 slot-machine players in one of the NSW clubs. They found that 80% of participants in the study made erroneous statements. Similar findings were reported by Delfabbro and Winefield (1999) who used the same method with 20 slot machine players in an Adelaide hotel and found that more than 70% of participants produced irrational verbalisations while gambling. These two studies replicated Gaboury and Ladouceur’s (1989) finding that 70% of statements by gamblers in their study were irrational. There have been similar findings in studies of different gambling conditions (e.g., regular and non-regular gamblers; frequent and infrequent winning) and activities (e.g., roulette and black jack) (Coulombe, Ladouceur, Desharnais, & Jobin, 1992; Ladouceur & Dube, 1997; Ladouceur, Gaboury, Bujold, Lachance, & Tremblay, 1991).

Other more recent studies have tested cognitive theories using psychometric measures (e.g., Raylu & Oei, 2004; Wood & Clapham, 2005) to examine the various types of distorted or irrational belief. One very common cognitive distortion is the false linking of cause and effect; gamblers tend to conclude that when two events happens very closely together, they are highly likely to occur together again. This development of superstitious behaviour is highly evident among slot-machines player who engage in rituals such as tapping or rubbing the machines while they play. Another very prevalent irrational belief among pathological gamblers is the belief that they are personally exceptional, different and luckier than peers (‘personal luck’). For example, they can maintain the belief that they are personally lucky enough to win a lottery despite never having won, and having been told that their rational

chance of winning is 1 in 8 million. The illusion of control is also highly prevalent in this population. According to this cognitive distortion, gamblers contend that they can successfully apply strategies to win while undertaking completely chance-determined activities. The availability heuristic operates too. Because gamblers remember their wins much better than their losses, they think that their chances of winning are higher than they actually are, thus assessing their situation inaccurately and irrationally. Gamblers are also vulnerable to representative bias, believing that the short-term order of events determines the long-term order. Accordingly, if a particular gambling event (e.g. a head or tail when tossing a coin) does not occur for a long period of time, then it is increasingly anticipated that this is likely to happen soon (Lambos, Delfabbro, Pulgies, & DECS, 2007).

1.5.4 Dispositional approaches

Several studies have investigated the role of individual differences and how these might predispose some people to be more susceptible to problems associated with gambling. Some of the most well documented of these factors are summarised below.

“Impulsivity is defined as a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these re-actions to the impulsive individual or to others” (Moeller, Barratt, Dougherty, & Schmitz, 2001, p. 1784). Evidence from community and clinical samples shows that impulsivity is more common among pathological gamblers than among non-gamblers or recreational gamblers (e.g., Alessi & Petry, 2003; Steel & Blaszczynski, 1998). For example, in a community study of 756 adolescents, it was found that those who were met criteria for both SUD and disordered gambling exhibited higher impulsivity than participants who had only one of these problems (Vitaro, Ferland, Jacques, & Ladouceur, 1998). Blaszczynski and Steel (1998) conducted a study among 82 treatment-seeking gamblers in Sydney. They found high impulsivity among participants who had a dual diagnosis: personality disorder (PD) and PG. Similarly, Steel and Blaszczynski (1998) reported that disordered gamblers had higher impulsivity scores compared to normal population. Other studies have generated less convincing findings. For example, in a study among 226 samples from university and community, only a very weak association was found between PG and impulsivity scores (Cooper, Kennedy, & van Houten, 2003). Similar findings were obtained by Allcock and Grace (1988) who reported very little difference in impulsivity scores between pathological gamblers and other gamblers. In

another study these investigators reported that pathological gamblers' impulsivity rate was not different from that of their substance abuse control group and they inferred that impulsivity may not be specific to pathological gamblers (Allcock & Grace, 1988).

Other research has explored possible links between disordered gambling and attention-deficit hyperactivity disorder (ADHD): some symptoms such as inability to cease behaviour or acting without considering the consequences are common to both disorders (Blaszczynski et al., 2002). Although some studies suggested a relationship between PG and ADHD (e.g., Goldstein, Manowitz, Nora, Swartzburg, & Carlton, 1985; Rugle & Melamed, 1993) other studies, for example Blaszczynski et al. (2002), identified few links between these two disorders.

Sensation seeking is another important personality dimension in this context. This involves a desire for novel, different experiences and feelings (Coventry & Brown, 1993). Sensation seekers are susceptible to boredom and so undertake high-risk activities in search of stimulation. Several studies have investigated the relationship between sensation seeking and gambling, and some have revealed a significant relationship between PG and sensation seeking scores. For example, an Australian community study with 251 female respondents found that those who had elevated scores in the sensation-intensity scale were more likely to gamble (Burnett & Ong, 1997). Similarly, Burnett, Ong and Fuller (1999) surveyed 778 students in Melbourne. They reported that participants who scored higher on sensation seeking were more likely to gamble frequently compared to those scoring lower. Similarly, Steel and Blaszczynski (1996) found that 115 male and female pathological gamblers scored higher than their normative populations. Other studies have, however, yielded different results. For example, a clinical study by Blaszczynski, Wilson, and McConaghy (1986) found that male pathological gamblers did not display elevated sensation seeking scores. In a review of these findings, Delfabbro (2010) argued that sensation seeking appears to be a better predictor of the frequency of gambling rather than of PG. Others such as Coventry and Brown (1993) have argued that the nature of the relationship may vary with the type of gambling involved.

In addition to the studies of impulsivity and sensation seeking reviewed above, a number of studies have been undertaken to examine the relationship between extraversion, psychoticism, neuroticism and PG. One of these comparison studies was completed in Australia by Blaszczynski et al. (1986) who found that pathological gamblers scored higher

in psychoticism and neuroticism measures compared to the general population. The same authors also conducted a study among 51 help-seeking pathological gamblers, it was found that the gamblers exhibited higher psychoticism and neuroticism scores than the general population. Another similar study conducted in the United States showed that pathological gamblers had significantly higher scores in psychoticism or neuroticism than normative controls on the Eysenck Personality Questionnaire (Pietrzak, Molina, Ladd, Kerins, & Petry 2005; Roy, Custer, Lorenz, & Linnoila, 1989). Other consistent results have emerged in studies by Carroll and Huxley (1994) and Myrseth, Pallesen, Molde, Johnsen, and Lorvik (2009) and also Bagby et al. (2007). With respect to extraversion, the findings are generally less consistent. For example, whereas some studies (e.g., Bartussek, Diedrich, Naumann, & Collett, 1993) reported elevated scores of extraversion among pathological gamblers, other studies (e.g., Barnes & Parwani, 1987) did not find any evidence that pathological gamblers were any more extroverted than other gamblers.

1.5.5 Biological theories: genetics and neurophysiology

There is conflicting evidence concerning the extent to which PG may have a genetic basis. Comings et al. (1996) suggested that pathological gamblers may be more likely to carry a genetic variant, namely the A1 allele, related to the D2 dopamine receptor. Several twin studies have shown the impact of genetic factors in pathological gamblers (e.g., Eisen et al., 1998) and it has been suggested that up to 62% of variance in PG diagnosis can be accounted for by shared genetic factors (Eisen et al., 2001; Slutske et al., 2000). However in an Australian study by Slutske et al. (2009), in which data were collected from two groups of twins (identical and non-identical) born between 1964 and 1971, the authors reported that there was little evidence for a link between genetic factors and gambling. In another study by Winters and Rich (1998) of 155 twin pairs, they found no significant overall relationship between any kind of gambling involvement and genetic factors, but some evidence that genetic factors were predictive of gaming machine gambling amongst females. Winters and Rich also reported a longitudinal study of 155 young adult same-sex twin pairs and reported that for male twin pairs, heritability had a significant relationship with ‘high action’ gambling, namely casino cards and gambling machines in male twins, but not for those engaged in ‘low action’ gambling (sports events and bingo). No genetic association was reported for female twins either with low or high action gambling preferences.

Neurophysiological explanations are based on the results of several studies which have shown differences in the apparent activation of certain neurotransmitters among pathological gamblers. These differences have emerged in studies of the serotonergic, noradrenergic and dopaminergic neurotransmitter systems (e.g., Blanco, Ibanez, Saiz Ruiz, Blanco-Jerez, & Nunes, 2000; DeCaria et al., 1998). According to Carrasco, Saiz-Ruiz, Monero, Hollander, and Lopez-Ibor (1994), deficits in the serotonergic system may contribute to a range of psychiatric disorders characterised by impaired impulse control, including disordered gambling. Blanco, Ibanez, Saiz Ruiz, Blanco-Jerez, and Nunes (2000) suggest that the noradrenergic system may have an important role in moderating selective attention in disordered gamblers, linked to heightened arousal.

The dopaminergic system has also been studied in some depth. It is well-established that dopamine is related to reward mechanisms in the brain (e.g., Blum, Wood, Sheridan, Chen, & Comings, 1995). For example, in a study of 10 pathological gamblers and 7 controls, Bergh, Eklund, Soedersten, and Nordin (1997) found higher levels of dopamine among pathological gamblers. Furthermore, a number of studies have established the role of the D2 dopamine receptor gene in a number of addictive and compulsive disorders (Blum et al., 1995) and according to Comings et al. (1996) the D2 receptor has associations with PG.

1.5.6 Social and ethnographic theories

Social factors have been shown to be important in both the development and maintenance of PG. For example, the interaction between venue staff and regular poker players creates a friendly and positive environment for professional poker players, further supplemented by a provision of a range of services (Hayano, 1982). Ocean and Smith (1993) also investigated the relationship between gambling venues, regular gamblers and outside society. The authors revealed that social reinforcement of gambling venues (e.g., self-esteem, emotional and moral support and salient identity) and problems and difficulties with outside society (e.g., loss of outside social networks and values conflicts) play a decisive role in developing and maintenance of gambling-related problems. They concluded that both the casino environment and outside world of gamblers need to be taken into account as contributory factors to developing and maintenance of PG; and also to what extent gambling venues contribute to alienation of gamblers from society. Similarly, Rosecrance (1986) conducted a study in horse race gamblers and highlighted the social interaction between players as an important mechanism of gambling persistence. The author concluded that

binding social arrangements might help explain why gamblers continue gambling despite financial losses. Martinez (1983) also maintained that informal and formal norms in gambling venues can diminish the tension level during gambling activity. If gamblers break these norms, they may jeopardise their acceptance in gambling environment, with impact on their gambling activities.

Social theories of gambling have been criticised by several researchers. For example, Griffiths and Minton (1997) conducted a study among young people in England. They reported that although adolescents come to gambling venues in groups, they gamble alone. However, they concluded that social interaction may be important for some gamblers.

Socio-demographic variables have been shown to have a significant impact on gambling behaviour. For example, certain individuals appear more likely to be attracted to gambling and to experience problems associated with it, e.g., those with a lower socio-economic status (e.g., Blaszczynski, Steele, & McConaghy, 1997); unmarried people (e.g., Delfabbro & Winefield, 1996); younger people (e.g., Griffiths, 1995). Many studies have reported that being young, having low income, being single and male are risk factors for disordered gambling (e.g., Becona, 1996; Dickerson et al., 1996; Ladouceur, 1996). It has also been suggested that members of ethnic minorities and people from culturally and linguistically diverse (CALD) groups are predisposed to PG (e.g., Welte, Barnes, Wieczorek, Tidwell, & Parker, 2004), and another important factor in the development of PG may be cultural values and beliefs concerning the acceptability of gambling activities. For example, Tepperman and Korn (2004) conducted a study in Canada among six different ethnic minority groups and reported that cultural beliefs play a significant role in gambling involvement. Prevalence of gambling among parents, loved ones and colleagues can also be a risk factor for development and maintenance of disordered gambling (e.g., Abbott, 2001; Raylu & Oei, 2002; Winters, Bengston, Door, & Stinchfield, 1998).

On a broader social level, some social and ethnographic theorists have conceptualised problematic gambling as a reflection or manifestation of interacting social, structural and economic factors to which individuals respond in predictable ways. For example, gambling can be conceptualised as a commodity or form of social exchange, with attention directed towards the social and community acceptance of gambling and its accessibility based upon the nature of regulation, industry behaviour and advertising (e.g., McMillen, 1995). These social approaches assume that economically-driven characteristics of the gambling

environment (e.g., the features of gaming machines), including the continuity of play, speed of operation and cost of access can play important roles in influencing people's level of involvement (Griffiths & Delfabbro, 2001). Reporting on 15 years of ethnographic field research in the Las Vegas casino industry, Schüll (2012a) described business (casinos, machine designers) and citizens or consumers (gamblers) converging in the gambling environment with predictable results. As Schüll reports the objective of the gambling industry is to both increase the speed of gaming (e.g., by introducing credit cards instead of coins) and extend the duration of gambling sessions (e.g. by designing comfortable places for players to spend long periods, and providing all the players' requirements in order to keep them on their seats). For example, they can watch all their favourite TV programs while playing bingo, and noise cancellation technology is utilised to reduce interference. Meanwhile, Schüll posits, the primary objective of the pathological gamblers she observes and interviews is escape from reality: they seek to be alone and not to be interrupted in the gambling "zone" This is facilitated by the new video gaming technology, a solitary and absorptive environment in which all sense of time, space, social roles and monetary value dissolves. For example, in newer model gaming platforms such as video poker, players do not need coins. This minimises interruptions, contributing to even deeper absorption (Schüll, 2005): money loses its role as a way to facilitate exchanges with other people and instead becomes a way to disconnect from others. As one of Schüll's interviewees explained, the aim was not to win big money too often or too soon, but rather to obtain an uninterrupted and regular gambling condition in the zone (Schüll, 2012b). Schüll suggests that the interaction between the machine and the individual can be a contributory factor to the developing of addiction, observing that the structural characteristics of machines and venues can play an important role in triggering people to gamble more. In summary (Schüll, 2012a) depicts the gambling industry as a "human-machine encounter" (p.306) and describes the increasingly mechanisation and digitalisation of the human experience as problematic: in this context both problems (isolation, lack of meaning, PG) and solutions (PG, psychotherapy) are, increasingly, automated phenomena.

1.5.7 Integrated and pathways models

In response to the range of theories and evidence of the type summarised in this review, Griffiths and Delfabbro (2001) proposed that PG is best understood as a complex and

multidimensional phenomenon: many factors at different levels are involved in its development and maintenance. Consequently, no single theory can adequately explain the different aspects, and integration of multiple perspectives is essential (Griffiths & Delfabbro, 2001). For these reasons, they advocated a biopsychosocial approach to the study of gambling. Such theoretical approaches try to explain the aetiology of gambling and its maintenance by integrating a range of theories and explanations.

According to a biopsychosocial model, at the individual level, genetic and neurophysiological factors are thought to interact with the different psychological constructs described above, influenced in turn by social and structural factors. For example, using the learning principles described above, gambling persistence would be considered as a conditioned behaviour maintained by intermittent schedules of reinforcement. This would interact with other variables which might be individual, such as differences in sensation-seeking, emotional regulation or erroneous beliefs, or contextual, such as the social, cultural, economic and technological structure of gambling activities (Griffiths, 1993; Weinstein & Deitch, 1974).

Similarly, in recognition of the diversity and complexity of the phenomenon of PG, Blazczynski and Nower (2002) have advanced a pathways model for PG which takes a variety of factors into account: including developmental, cognitive, learning theory, personality, biological and ecological determinants. According to Blazczynski and Nower, current behavioural, sociological, addictions and psychobiological theories share a number of similar elements. For example, the concept of reward in gambling originally derives from learning theory but is also recognised as an important factor in addiction and biological approaches to gambling. At the same time, Blazczynski and Nower suggest that because disordered gamblers are not a homogenous population, no single theory can or should be expected to explain all examples of PG. Accordingly they have proposed a ‘three pathways’ model of PG, with each of the three pathways comprising etiological processes, vulnerability factors, and demographic characteristics.

Pathway I: Behaviourally conditioned disordered gamblers

The first pathway refers to those pathological gamblers who are “behaviourally conditioned”. Although they meet the formal criteria for disordered gamblers, they do not exhibit any significant premorbid or predisposing characteristics such as psychopathology.

They initially utilised gambling for socialising and entertainment, but lost control of their gambling due to operant conditioning and erroneous beliefs about the probability of winning.

Pathway 2: Emotionally vulnerable gamblers

The second subgroup is characterised by a higher prevalence of premorbid issues: mental health disorders best conceptualised as emotional disturbance (commonly anxiety disorders and depression and borderline personality disorder); poor coping and problem solving skills; and histories of adverse experiences in childhood and adult life (for example, family breakdown, social disadvantage). Gambling is primarily a vehicle to escape from their problems and regulate negative emotions: unless these underlying issues are addressed.

Pathway 3: Antisocial impulsivists

The final subgroup of the pathways model comprises the ‘antisocial impulsivist’ disordered gamblers, who are highly disturbed and exhibit a variety of psychopathologies . They may also demonstrate neurological and neurochemical dysfunction. Antisocial impulsivist gamblers exhibit a wide range of historical problems with addiction, criminal activities, and suicidality reflecting problems with impulsivity.

Chapter 2: Co-morbidities, maladaptive cognitions and pathological gambling

2.1 Overview

Gambling treatment services in Australia only focus very specifically on the treatment of gambling problems. Several reports have commented on this or suggested that screening for mental health problems in problem gamblers needs to be improved (e.g., APS Gambling Working Group & Giese, 2010; Problem Gambling Research and Treatment Centre, 2011; Productivity Commission, 2010). Currently, screening or diagnostic assessment of other mental disorders is rarely conducted: not even for the common co-morbidities, such as personality disorders (PDs), substance problems, mood disorders or anxiety disorders. Clinicians are employed for their counselling skills; most being counsellors, nurses or social workers rather than psychologists or psychiatrists. Few are trained and competent in the administration of diagnostic measures which extend beyond the scope of problem gambling. It follows that clients' psychiatric co-morbidities are rarely identified or taken into account in treatment planning or evaluation. Both at the level of the individual client and counsellor and at the system level, there is under-recognition and under-estimation of the impact of mental health disorders on gambling severity, maintenance and development. This is the case despite a growing literature, reviewed below, suggesting that mental illness plays a decisive role in a wide range of gambling-related problems.

Pathological gambling (PG) is rarely an isolated disorder. Instead, it often coincides with a range of co-morbidities including other forms of addiction (e.g. substance misuse), personality problems and psychological difficulties (e.g., anxiety and mood disorders). The presence of these overlapping problems means that treatment is often challenging. Gamblers with these co-morbid problems are less adherent to treatment programs and have higher drop-out rates. Moreover, it is not always clear whether PG is the client's primary disorder or whether it is a reflection of other underlying difficulties. Given that much of the clinical work entailed the application of cognitive-behavioural therapy, specifically the treatment of gambling urges and erroneous cognitions, a question arises as to whether the 'drivers' of an individual's gambling disorder such as urges and cognitions could potentially be influenced and determined by other important underlying factors such as a mental illness or PD. For example, it is often assumed or accepted that PG is influenced by erroneous perceptions about events and causality, but these maladaptive cognitive styles are in turn a common

feature of many other comorbid mental health disorders including those described above (most notably, PDs and substance misuse).

The specific aim of the research project was, therefore, to explore the extent to which other mental health disorders might potentially contribute to people's susceptibility to – and to the development, severity and maintenance of – PG. What was the prevalence of mental disorders in regular and pathological gamblers; how were these clustered; and, to what extent might they be related to some of the elements of PG (e.g., elevated susceptibility to maladaptive or erroneous cognitions)? The project also sought to examine the prevalence of substance misuse within a community sample of regular gamblers, and the extent to which all these co-morbid disorders might relate to gambling-related beliefs. Did PG still predict scores on measures of erroneous beliefs once other co-morbid factors were controlled for? This chapter provides a brief review of current research into the links between pathological gambling and various Axis I and Axis II co-morbidities, along with implications for research into gambling-related beliefs and their relationship with more global categories such as maladaptive cognitions and erroneous beliefs.

2.2 Psychiatric disorders and PG

Many studies have shown that pathological gamblers present with a higher prevalence of psychiatric disorders than the general population (e.g., Petry, Stinson, & Grant, 2005). Such co-morbidities are evident in all samples of pathological gamblers irrespective of their age and gender, and are thought to exacerbate the severity of gambling-related problems (e.g., Ladd & Petry, 2003). The most significant and common of these psychiatric co-morbidities are discussed in the following sections.

2.2.1 Mood disorders

Mood disorders and in particular major depression are among the most commonly observed mental health disorders in pathological gamblers. For example, most surveys have shown rates of major depressive disorder that are two to three times higher among pathological gamblers than among non-gamblers (Petry & Weinstock, 2007). Prevalence rates of between 21 to 75% have been reported across a number of studies (Raylu & Oei, 2002; Roy, Custer, Lorenz, & Linnoila, 1989), although not all studies have shown consistent differences. For example, Bland, Newman, Orn, and Stebelsky (1993) reported a mood

disorder prevalence rate of 33.3% in pathological gamblers compared to 14.2% in non-pathological gamblers.

Some studies have reported only modest prevalence rates for other mood disorders such as bipolar disorder, whereas other studies have reported elevated rates. For example, in a study that examined a variety of disorders, Specker, Carlson, Edmonson, Johnson, and Marcotte (1996) found significant differences for major depressive disorder: 70% of pathological gamblers had depression compared to 23% of controls and in general at 77.5% of gamblers had at least one mood disorders. However, bipolar disorder was not significantly elevated in the pathological gambler group. Kausch (2003) also conducted a study among treatment-seeking pathological gamblers and reported that 50% of them had a lifetime history of mood disorder. Very similar figures were reported by Kessler et al. (2008) who conducted a study of 9282 household participants in the United States and revealed high rates of lifetime bipolar disorder and other psychiatric disorders amongst pathological gamblers in the general community. They also indicated that 38.6% of their respondents had depression or dysthymia and 55.6% exhibited at least one type of mood disorder. An American study of veterans by (Edens & Rosenheck, 2012) found that the severity of bipolar disorder and depression symptomology was positively correlated with PG.

2.2.3 Suicidality

Many studies have identified elevated levels of suicidality among pathological gamblers compared to the general population (e.g., Bland, Newman, Orn, & Stebelsky, 1993; Parker & Hartman, 2001). Prevalence rates of actual suicide attempts in samples of pathological gamblers have ranged from 12 to 24% (e.g., Frank, Lester, & Wexler, 1991). The Productivity Commission (1999) reported that 57.8% of pathological gamblers had suicidal thoughts. In Australia, Blaszczynski and MacCallum (1999) conducted a study among 53 treatment-seeking gamblers in NSW and found that 41% of the respondents had suicide ideation and 9% of respondents had scores in the extreme range of suicidality. Some researchers have suggested that the elevated rate of suicidality among pathological gamblers could, however, be explained by other common factors that are present in these populations. That is, given the high prevalence of substance use disorders (SUDs) and depression among pathological gamblers and the robust association of both these comorbidities with suicidality, there is a possibility that these other co-morbid conditions account for the link between suicidality and disordered gambling (Hodgins, Mansley, & Thygesen, 2006).

2.2.4 Anxiety disorders

Anxiety disorders have also been commonly observed amongst pathological gamblers. For example, Black and Moyer (1998) reported that 40% of treatment-seeking disordered gamblers exhibited anxiety disorders. Similar findings were reported by Petry (2005) and Lorains, Cowlshaw, and Thomas (2011). Kerber, Black, and Buckwalter (2008), in a study of older adults recovering from PG, found that 47.5% had lifetime anxiety disorders. In Spain, Ibanez et al. (2001) also conducted a study among 69 treatment-seeking pathological gamblers at a Madrid hospital and reported high rates of lifetime anxiety disorders (7.2%). Bland et al. (1993) conducted a study in Edmonton and report that agoraphobia and obsessive-compulsive disorder were three times higher in disordered gamblers than in non-gamblers. Furthermore, in a study among veterans who used mental health services in the United States, the authors found that all anxiety disorders other than post-traumatic stress disorder (PTSD) had positive associations with PG (Edens & Rosenheck, 2012). A study by Specker et al. (1996) found that pathological gamblers had a significant higher prevalence of lifetime anxiety disorders and current histories of panic disorder, simple phobia and PTSD. Prevalence rates for panic disorder, simple phobia and PTSD were: 20%, 12.5% and 12.5% for pathological gamblers. Overall, 37.5% of pathological gamblers exhibited at least one anxiety disorder.

2.2.5 Personality disorders

According to the *DSM-IV*, PDs are included in Axis II and generally categorised into three distinct clusters, each with specific features and characteristics (see Table 2.1). Some studies have found that Cluster B, comprising antisocial personality, borderline and narcissistic personality disorder, has the strongest association with PG (e.g., Blaszczynski & Steel, 1998; Fernandez-Montalvo & Echeburua, 2004), whereas other studies have reported higher rates for Cluster A or C PDs (Black & Moyer, 1988; Specker et al., 1996). Prevalence rates have also varied considerably with figures ranging from 25% (Specker et al., 1996), 42% (Ibanez et al., 2001) to 93% (Blaszczynski & Steel, 1998).

Specker et al. (1996) in Minnesota compared pathological gamblers (n=40) and a control group (non-psychiatric treatment general population group) (n=64). The authors reported that cluster C PDs, including avoidant personality disorder, were the most prevalent PDs in the sample. Black and Moyer (1998) reported that schizotypal and paranoid

personality disorders (Cluster A), antisocial personality disorder (cluster B) and from cluster C obsessive compulsive and avoidant personality disorders were the most prevalent PDs among pathological gamblers. Cunningham-Williams, Cottler, Compton, Spitznagel and Ben-Abdallah (2000) also studied a sample of 990 pathological gamblers in treatment settings and in the community and found that the most prevalent mental health disorder was antisocial personality disorder, with more than half of their sample diagnosed with this disorder.

A further study that compared two groups (non-pathological gamblers and non-treatment -seeking pathological gamblers) found that borderline personality disorder was highly prevalent and significantly more common among pathological gamblers – according to either self-report or structured measures. This difference was significant even after controlling for Axis I psychiatric disorders, however this study found no significant between-groups difference in the prevalence of antisocial personality disorder (Bagby, Vachon, Bulmash, & Quilty, 2008). Echeburua and Fernandez-Montalvo (2008) recruited from the general population and compared three groups: pathological gamblers, clinical patients who were non-gamblers but suffered from mental disorders, and normal controls. The authors found that 32% of their pathological gamblers, 16% of their clinical sample and 8% of their normative sample had indications of at least one PD. On the basis of structured interviews, the most prevalent PDs among the disordered gamblers were borderline personality disorder (16%), antisocial, paranoid, narcissistic and non- specified (8% each). The disordered gamblers' self-report measures, however, suggested that their most prevalent PDs were narcissistic personality disorder (32%), and antisocial and passive-aggressive disorders (16% each). Notwithstanding this, both methods confirmed that personality disorders were significantly more prevalent among pathological gamblers than in the other two groups.

Table 2.1.

Clusters of personality disorders

Disorder	Description
Cluster A	People who diagnosed as being odd/eccentric are categorised in this cluster. This cluster includes: Paranoid, Schizoid and Schizotypal PDs. (Durand, Barlow & Durand 2005)
Cluster B	The important characteristics of people who are diagnosed in this category are dramatic, emotional or erratic. This cluster comprises: Antisocial, Borderline, Histrionic and Narcissistic PDs(Durand et al., 2005)
Cluster C	PDs in this cluster are typically anxious and fearful. This cluster consists of Avoidant, dependent and Obsessive-compulsive PD (Durand et al., 2005)

2.2.6 Substance use disorders

Co-occurrence of SUDs and PG has been well-documented. Based on existing evidence and findings, it is reported that PG and substance dependence (e.g. alcohol dependence/abuse) have many similarities in terms of comorbidities, personality factors, family history and responses to the treatment (Grant, Potenza, Weinstein, & Gorelick, 2010). These views are also expressed by Wareham and Potenza (2010) who pointed out that PG and SUDs including alcohol use disorder(AUD) share genetic, clinical, and neurobiological commonalities. Studies conducted in both the general population and clinical settings have shown that the prevalence of SUDs is higher among pathological gamblers than in other populations. For example, prevalence rates for SUD among pathological gamblers in both community and clinical samples have ranged from 25 to 73% (e.g., Crockford & el-Guebaly, 1998; el-Guebaly et al., 2006; Feigelman, Wallisch, & Lesieur, 1998; Ladouceur, Dube, & Bujold, 1994; Petry et al., 2005).

Evidence in support of this view can found in a number of specific studies. For example, Specker et al. (1996) conducted a study among 40 patients in an outpatient setting and it was found that 50% of patients exhibited lifetime history of AUDs and 60% of them had lifetime history of some SUD. Alcohol was most commonly abused, followed by marijuana and stimulants. A recent systematic review by Lorains et al. (2011) indicated that nicotine dependence and SUDs tended to be the most prevalent substances. Similar results

were reported by Petry et al. (2005) based on data from the National Epidemiological Study of Alcohol and Related conditions (NESARC) in the United States (n=43,093). In another study involving 990 respondents from clinical population and community samples, Cunningham-Williams et al. (2000) found that the most of their sample had a lifetime history of polysubstance use, namely cigarettes (87%), nicotine dependence (73%), alcohol consumption (93%) and AUD (69%). They also reported higher use of alcohol by disordered gamblers (69%) compared to recreational gamblers (63%) and non-gamblers (55%). The 1999 NORC survey showed that pathological gamblers had seven times higher rates of alcohol dependence than non-gamblers or low-risk gamblers (National Opinion Research Center, 1999). In a telephone survey of 2016 Ontario adults, Smart and Ferris (1996) showed that alcohol dependency, along with age and duration of gambling, were the most significant predictors of PG. AUDs were twice as high in pathological gamblers than in non-pathological gamblers (Smart & Ferris, 1996).

Additionally, a number of studies have highlighted the negative effects of alcohol use on gamblers' impulsivity (Dougherty, Marsh, Moeller, Chokshi, & Rosen, 2000; Richards, Zhang, Mitchell, & de Wit, 1999) aggressive behaviour (Dougherty, Bjork, Bennett, & Moeller, 1999; Giancola et al., 2002) and risk taking behaviour (Kyngdon & Dickerson, 1999). Associations have also been found between alcohol abuse and increasing financial losses and the duration of gambling (Kyngdon & Dickerson, 1999); as well as increasing the frequency of urges for gambling (Baron & Dickerson, 1999). These studies have suggested that people who drank while gambling tended to gamble in more risky ways and experienced more negative consequences of gambling (Cronce & Corbin, 2010; Giacomassi, Stitt, & Vandiver, 1998). An association between alcohol use and severity of gambling problems has also been reported (French, MacLean, & Ettner, 2008).

2.3 Co-morbidities and maladaptive cognitions

A number of studies have shown that people who have psychiatric comorbidities exhibit a varied range of dysfunctional beliefs that contribute to the maintenance, development and severity of their problems. According to Bhar, Gregory, and Beck (2008), dysfunctional beliefs affect how people see themselves and others and can therefore influence their moods and behaviour. From a cognitive-behavioural point of view, irrational beliefs are a causative and maintaining factor for many psychiatric disorders (Beck & Emery, 1985; Ellis & Grieger, 1977). Similarly, Beck (1997) asserted that cognitive distortions can play a key

role in emotional disturbance and mental health problems. Ellis (1962) also postulated that irrational beliefs play a decisive role in mental health problems and believed that people who exhibited mental health problems can be helped by addressing their irrational beliefs.

Several studies have shown associations between PDs and dysfunctional beliefs (e.g., Beck et al., 2001; Gunderson, 1984; Lohr, Hamberger, & Bonge, 1988; Zetzel, 1971), particularly for people with borderline personality disorder (Beck, Freeman, & Davis, 2004; Butler, Brown, Beck, & Grisham, 2002; Chabrol, Chouicha, Montovany, & Callahan, 2001; Chopra & Beatson, 1986; George & Soloff, 1986; Jacobsberg, Hymowitz, Barasch, & Frances, 1986; Pope, Jonas, Hudson, Cohen, & Tohen, 1985; Pretzer, 1990; Tarnopolsky & Berelowitz, 1984; Wenzel, Chapman, Newman, Beck, & Brown, 2006; Widiger, Frances, Warner, & Bluhm, 1986; Zanarini, Gunderson, & Frankenburg, 1990). In a study conducted by Zanarini, Gunderson, Frankenburg, and Chauncey (1990) in outpatient and inpatient settings in the USA, the clinical features of 120 patients with borderline personality disorder and 103 patients with other PDs (as a control group) were assessed. The authors found that more than 35% of patients with borderline personality disorder had quasi-psychotic thoughts and 71% of them demonstrated odd thinking and unusual perceptions. The control participants with other PDs also exhibited odd thinking and unusual perceptual experiences, but fewer dysfunctional beliefs. It is also proposed that people with PDs manifest a range of cognitive distortions, namely inflexibility, overgeneralisation and resistance to change (e.g., Beck et al., 2004). Sternbach, Judd, Sabo, McGlashan, and Gunderson (1992) reported that samples with borderline and schizotypal personality disorder demonstrated cognitive distortions but that the types of beliefs tended to be different. Cognitive problems such as illogical reasoning, feeling of being controlled and magical thinking were more prevalent in schizotypal personality disorder. Kendall et al. (1995) also maintained that people with PDs were biologically predisposed to think in self-destructive ways. The authors further concluded that irrational beliefs were at the root of many of neurotic disorders. According to Beck et al.'s (2001) theory underpinning the cognitive therapy of people with PDs, patients' beliefs have a crucial influence on their disturbed behaviour and emotions. Similar views were expressed by Arntz, Dreessen, Schouten, and Weertman (2004) who argued that the beliefs held by those who suffer from PD play a significant role in their dysfunctional behaviour and emotions. Furthermore, the authors suggested that each PD involved a specific set of beliefs.

A number of studies have shown links between irrational beliefs and Axis I mental health disorders including depression (Cook & Peteron, 1986; LaPointe & Crandell, 1980; Lohr & Bonge, 1981) and anxiety disorders (Deffenbacher, Zwemer, Whisman, Hill & Sloan, 1986; Himle, Thyer, & Papsdorf, 1982; Lohr & Bonge, 1981). A study of 78 adolescents in a residential drug treatment program reported that irrational beliefs had an important role in the prediction of substance use in adolescents (Denoff, 1988). Muran and Motta (1993) conducted a study of 95 individuals with different mental health disorders. Their sample comprised three groups: patients with PTSD, another clinical sample (diagnosed primarily with anxiety disorders and depression); and a non-clinical group. The authors reported that the clinical group had significantly higher irrational beliefs than non-clinical group and PTSD group. Similar findings were found in an Iranian mental health outpatient service. The study compared 31 adult patients with generalised anxiety disorder, 29 adult patients who exhibited major depression disorder and 34 adult control participants. The patients with psychiatric disorders reported more irrational beliefs compared to control participants (Taghavi, Goodarzi, Kazemi, & Ghorbani, 2006). Riggs and Han (2009) concluded from a study of 330 American college students, that irrational beliefs appeared to be causative factors in anxiety and depression. Nieuwenhuijsen, Verbeek, de Boer, Blonk, and van Dijk (2010) found that participants diagnosed with both anxiety disorder and depression had the highest level of irrational beliefs, compared with participants who had either an anxiety disorder or depression but not both. In more recent study that was conducted in 156 chronic fatigue syndrome sufferers, it was found that the contents of patients' beliefs were significant predictors for depression (Noonan, Lindner, & Walker, 2010).

Many studies have found associations between AUD and cognitive deficits, For example, according to Rohsenow et al. (1989), some irrational beliefs covary with severity of AUD. In a study among 135 alcohol using college students, it was reported that irrational beliefs had significant correlation with alcohol problems (Camatta & Nagoshi, 1995). Hutchinson, Patock-Pekham, Cheong and Nagoshi (1998) also conducted a study among 249 American students in Arizona and found similar results. A question arises as to whether the use of alcohol itself (acutely and chronically) gives rise to a greater propensity for irrational thinking, or whether these cognitive differences existed before heavy alcohol use. There is significant neuropsychological literature concerning neurotoxicity and alcohol-related brain impairment (Adams & Victor, 1993; Fals-Stewart, Schaffer, Lucente, Rustine, & Brown, 1994; Grant et al., 1978; Miller, 1991; Parsons, 1987; Reitan & Wolfson, 1992). This is

beyond the scope of the current review and project. Nevertheless it appears reasonable to control for alcohol use in studies involving PG, given that some erroneous beliefs (particularly to do with causation, attributions or susceptibility to cognitive biases) may be more common in people with SUDs than in the general population.

It is clear from this review that many studies have acknowledged and tried to address different aspects of the links between SUDs, pathological gambling, irrational beliefs and psychiatric comorbidity. However, few researchers have considered all of these aspects in a single project, or measured them in the same sample. Another gap in the literature is that most studies were small, and few utilised structured diagnostic psychiatric interview or validated psychometric measures of the constructs being examined.

Accordingly, this project represents an attempt to confirm or disconfirm clinical observations by systematically measuring all the constructs of interest within a large sample, which was adequately powered for the conduct of sophisticated statistical analyses. Another strength of this project was the use of an appropriate control group, by the recruitment and comparison of two groups of regular gamblers (pathological gamblers and non-pathological gamblers) from the same general community. Community samples have their limitations, as will be canvassed below, but in this context they have advantages over clinical or student samples.

The project outcomes reported in the four papers below highlight the potential importance of, and relationships between, psychiatric disorders, SUDs and irrational beliefs in the development, maintenance and severity of PG, as well as how prevalent they are among current pathological gamblers. The project has highlights how these factors may interact and as a consequence lead to gambling-related problems. Most importantly, the four studies which resulted from the project have underlined the potential significance of Axis I and II psychiatric comorbidities in the development, severity and maintenance of PG, and hence as barriers to successful treatment outcomes. These studies have the potential to significantly inform the development of services for the treatment of pathological gamblers.

2.4. Procedure and demographic information of the study

The sample comprised 140 (59 Males and 81 Females) gamblers with an at least fortnightly level of participation in continuous forms of gambling (e.g., poker machines, racing, sports, casino). The mean (SD) age of the sample was 47 years (SD = 12.4).

Fortnightly participation in continuous forms of gambling was considered an effective inclusion criterion to facilitate the recruitment of sample suitably powered to allow a comparison between pathological and non-pathological gamblers. A comparison between these groups follows Orford's (1985) suggestion that greater attention needs to be directed towards comparisons between pathological gamblers and regular non-pathological gamblers rather than the general community so as to avoid confusing differences due to the regularity of gambling as opposed to pathological status.

In this study, current gamblers were recruited from general community in South Australia by advertising in community newspapers. Participants were asked to contact the researchers and were administered a short screening interview via telephone. This interview included demographic questions, gambling participation questions, to ensure that they met the study criteria. A package of measures, a consent form and other related information were sent to them for self-completion. Once this was received back, they were again interviewed via phone to validate their responses and to finalise the data collection.

As table 2.2 indicates, 65% of Participants were more than 42 years old and ranged in age from 54 to 65 years old. Furthermore, most of participants were female (57.9%) and Australian. Married participants accounted for more than 30% and 27.9% were not married. More than half of participants had only completed secondary education and the majority of the remainder held trade or diploma qualifications. Full-time and part-time employees accounted for approximately half of participants and they followed by those who were unable to work (20.0%) and retired (12.9%). Low income earners also comprised more than half of participants (54.3%), with those earning \$80000 or more comprising 23.6% of participants.

Table 2.2

Demographic characteristics of participants

Variables	N (%)
<i>Age</i>	
18 to 29	13 (9.3)
30 to 41	36 (25.7)
42 to 53	40 (28.6)
54 to 65	51 (36.4)
<i>Gender</i>	
Female	59(42.1)
Male	81(57.9)
<i>Country</i>	
Australia	115 (82.1)
UK	10 (7.1)
Other	15 (10.8)
<i>Marital status</i>	
Never married	39 (27.9)
Divorced	28 (20.0)
Married	44 (31.4)
Living with a partner	17 (12.1)
Separated	9 (6.4)
Widowed	3 (2.2)
<i>Educational Status</i>	
12 and Under 12	73 (52.2)
Trade/diploma	38 (27.1)
Bachelor or higher	29 (20.7)
<i>Employment status</i>	
Full-time	37 (26.4)
Unemployed	15 (10.7)
Retired	18 (12.9)
Unable to work	28 (20.0)
Part-time/casual employment	31 (22.1)
Home duties	5 (3.6)
Student	4 (2.9)
Other	2 (1.4)
<i>Income</i>	
Under 40000 \$	76 (54.3)
40000\$ to 80000\$	29 (20.7)
More than 80000\$	33 (23.6)
Don't know	2 (1.4)

Table 2.3 shows that pokies were the most popular and frequent gambling activity that 84.3% of participants gambled at least fortnightly. The rest of gambling activities, namely racing, bingo, table games, internet gambling, scratches and lotteries were not as popular in this sample. Most of these activities were engaged in less than monthly or only monthly.

Table 2.3

Gambling participation by activity

Gambling activities	N (%)
<i>Pokies</i>	
Less than monthly or monthly	22 (15.7)
2 or 3 times per month	43 (30.7)
Weekly or more often	75 (53.6)
<i>Racing</i>	
Less than monthly or monthly	101 (72.1)
2 or 3 times per month	10 (7.2)
Weekly or more often	29 (20.7)
<i>Scratch tickets</i>	
Less than monthly or monthly	100 (71.4)
2 or 3 times per month	16 (11.4)
Weekly or more often	24 (17.2)
<i>Lottery</i>	
Less than monthly or monthly	71 (50.7)
2 or 3 times per month	18 (12.9)
Weekly or more often	51 (36.4)
<i>Keno</i>	
Less than monthly or monthly	121 (86.4)
2 or 3 times per month	4 (2.9)
Weekly or more often	15 (10.7)
<i>Table games at casino</i>	
Less than monthly or monthly	126 (90.0)
2 or 3 times per month	11 (7.9)
Weekly or more often	3 (2.1)
<i>Bingo</i>	
Less than monthly or monthly	134 (95.7)
2 or 3 times per month	1 (0.7)
Weekly or more often	5 (3.6)
<i>Sporting events</i>	
Less than monthly or monthly	123 (87.9)
2 or 3 times per month	6 (4.3)

Weekly or more often	11 (7.9)
<i>Internet gambling</i>	
Less than monthly or monthly	125 (89.3)
2 or 3 times per month	6 (4.3)
Weekly or more often	9 (6.4)

Most participants had gambled while they were younger (See Table 2.4). Only around a quarter reported having first gambled beyond 27 years of age.

Table 2.4

Years of gambling experience

<i>Duration of gambling</i>	N (%)
Less than 13 years	55 (39.3)
13 to 27 years	50 (35.7)
28 to 41 years	29 (20.7)
More than 41 years	6 (4.3)

Chapter 3: Study 1

The clustering of psychiatric disorders in high-risk gambling populations

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Statement of Contributions

Mohammadreza Abdollahnejad

I was responsible for the primary authorship of this paper. I conducted the literature, the data analysis and collected the data. I also prepared multiple drafts of the paper in collaboration with my fellow co-authors.

Signed:

Date:

Paul Delfabbro (Co-author)

I was the primary supervisor for the research programme that led to this manuscript. The candidate, Abdollahnejad, was responsible for aforementioned responsibilities; my role was to provide advice on statistical analysis and drafts, as well as make suggestions on the presentation and refinement of the material in the paper, and to provide editorial input. I also provided advice on responding to comments by the journal reviewers and editor.

I hereby give my permission for this paper to be included in Mohammadreza Abdollahnejad's thesis.

Signed:

Date:

Linley Denson (Co-author)

I was a contributing author to this paper. The candidate was responsible for writing this paper; my role was to edit the final version and providing feedback concerning editing and content changes.

I hereby give my permission for this paper to be included in Mohammadreza Abdollahnejad's thesis.

Signed:

Date:

Abstract

The aims of this study were to examine the associations between psychiatric disorders and pathological gambling and the clustering of psychiatric disorders in high risk gambler populations. The sample comprised 140 regular gamblers who were recruited from the general public. A variety of self-report and semi structured questionnaires was administered, including the Mini International Neuropsychiatric Interview, The Personality Diagnostic Questionnaire-4th Edition, NORC DSM-IV Screen for Gambling Problems Self-administered and Problem Gambling Severity Index. Axis I and Axis II psychiatric disorders and personality disturbances were found to be more prevalent amongst pathological gamblers than other gamblers with the strongest differences observed for mood and anxiety-related disorders. Almost two-thirds of pathological gamblers reported both an anxiety and mood disorder in conjunction with another type of disorder. These differences between the gambling groups existed even after controlling for gender. The results highlight the high rates of co-morbidity in pathological gamblers in the community and the extent to which anxiety and mood disorders co-existing with other forms of pathology. These results highlight the significant challenges facing treatment services in the treatment of PG and the extent to which this should be treated as the primary disorder.

Pathological gambling (PG) is recognised as a serious disorder which can place a significant burden upon mental health providers and welfare services. In Australia, it is estimated that at least 0.5–1.0 % of adults (80,000–160,000 people) experience problems associated with their gambling (Productivity commission, 2010). Problems commonly associated with pathological or problem gambling include: stress, poverty, legal problems, physical health problems, unemployment, family breakdown and finally mental health problems (Delfabbro, 2010; Productivity commission, 2010).

Although many of these problems are well-known to counselling services, it has also been increasingly recognised that pathological gamblers and, in particular, the types of people who seek help for gambling-problems, often have high levels of psychiatric co-morbidities as compared to the general population (Petry, Stinson, & Grant, 2005). Co-morbidities in PG create challenges both for the conceptual understanding of the disorder as well as for those providing interventions. At a conceptual level, it remains unclear to what extent some cases of PG are caused by and reflect the influence of underlying psychiatric co-morbidities, or to what extent PG gives rise to psychiatric problems. Similarly, from a treatment perspective, there may often be difficult to determine how to assess and treat clients whose gambling appears to co-exist with a range of other disorders, many of which may be interacting with or causing the problematic gambling behaviour. Indeed, the role of co-morbidities is recognised in several well-known typology (e.g., Moran, 1970), conceptual (Jacobs, 1986) and pathway models (Blaszczynski & Nower, 2002) as factors contributing to the development of PG.

In relation to the types of co-morbidity experienced by PG, the research evidence points to a range of problems, including mood disorders, anxiety disorders, substance use disorder, personality disorders (PD) and other forms of psychiatric disturbance (Blaszczynski & McConaghy, 1989; Blaszczynski, Steel, & McConaghy, 1997; Kerber, Black, & Buckwalter, 2008; Kim, Grant, Eckert, Faris, & Hartman, 2006; Lorains, Cowlshaw, & Thomas, 2011; Pietrzak, Morasco, Blanco, Grant, & Petry, 2007; Petry et al., 2005; Specker, Carlson, Edmoson, Johnson, & Marcotte, 1996; Taber, McCormick, & Ramirez, 1987). A recent systematic review by Lorains et al. (2011) indicated that nicotine dependence and substance use disorders tend to be most prevalent followed by any mood disorder and anxiety disorder.

Evidence in support of these conclusions has been drawn from studies conducted in both clinical as well as population samples. For example, using data drawn from the National Epidemiological Study on Alcohol and Related Conditions (NESARC) in the United States (n = 43, 0.93), Petry et al. (2005) reports a strong association between PG and substance use disorders as well as mood disorders. Similar results are reported in a study by Kessler et al. (2008) in a study of 9282 household participants in the United States which revealed high rates of panic disorder, bipolar disorder, and substance use disorder amongst pathological gamblers in the general community. Studies of clinical populations (e.g., Specker et al., 1996) similarly show a high prevalence of Axis I psychiatric disorders. For example, in a study at a treatment centre in Minneapolis, Specker et al. reported that 70 % of pathological gamblers had lifetime substance use disorder and 60 % had mood disorders. Similarly, Kerber et al. (2008), in a study of older adults recovering from PG, found that 82.5 % of the participants had a mood disorder and 47.5 % suffered from an anxiety disorder. In Spain, Ibanez et al. (2001) also conducted a study among 69 treatment- seeking pathological gamblers at one of the Madrid hospitals and reported high rates of alcohol abuse or dependency (34.8 %), mood disorders (15.9 %) and anxiety disorders (7.2 %).

Studies of pathological gamblers have also confirmed a high prevalence of PD (Bagby et al., 2008; Lorains et al., 2011). Community prevalence studies, e.g., the National Institute on Alcohol Abuse and Alcoholism survey, found significant relationships between Axis I and Axis II psychiatric disorders and PG. That is, psychiatric disorders were more prevalent in pathological gamblers compared to non-pathological gamblers or low-risk/at risk gamblers among both White and Hispanic respondents (Barry et al., 2011). In another prevalence study, conducted in the United States and which involved older adults (60 years and older), Pietrzak et al. (2007) revealed that pathological gamblers in comparison to non-regular gamblers had a higher than normal prevalence of PD, including antisocial PD (14.5 %) and other PDs (27.5). They also reported there was association between severity of PG and psychiatric disorders. Petry et al. (2005) similarly show significant associations between PG and all major PDs, in particular, dependent, paranoid, histrionic and antisocial PD in the NESARC study described above.

These associations also emerge strongly in studies of clinical populations. For example, in Kerber et al.'s (2008) study, it was found that 60 % of the participants had at least one PD and obsessive-compulsive PD (37.5 %) was the most common one, and

followed by avoidant PD (27.5 %) and depressive PD (25 %). In Australia, Blaszczynski et al. (1997) studied 115 pathological gamblers who were recruited from general hospital psychiatric unit and among Gamblers Anonymous and they found that 15.5 % of pathological gamblers accounted for antisocial PD and 35 % comprised borderline PD. In another study, Steel and Blaszczynski (1998) assessed 82 regular gamblers seeking treatment and found that Cluster B PDs were more prevalent within the sample compared to other PDs. They reported the following figures: antisocial 29 %, borderline 70 %, histrionic 66 %, narcissistic 57 %. A similar and more recent study in Spain by Echeburua and Fernandez-Montalvo (2008) compared PDs in treatment seeking pathological gamblers, psychiatric clients and also participants without any addiction problems from the general public. They revealed that 32 and 16 % of pathological gamblers and psychiatric clients had at least one type of PD, of which borderline PD was the most prevalent. They also suggested that PDs were more prevalent among pathological gamblers in comparison to psychiatric samples or participants from the general public.

Another study by Pelletier, Ladouceur, and Rheaume (2008) based on 100 pathological gamblers in four Canadian treatment centres screened gamblers using the structured clinical interview. They reported that 64 % of respondents were diagnosed with at least one type of PD and also 25 % of them had two PDs or more. The most prevalent PD within the sample was antisocial PD, although borderline or narcissistic PDs were also common. Blaszczynski and Steel (1998) studied 82 gamblers in treatment and found that 93 % of participants had at least one PD. Cluster B was the most prevalent cluster of PD compare to other clusters and borderline PD (69.5 %) was the most prevalent PD and followed by histrionic (65.9 %), and narcissistic PD (57.3 %) (Blaszczynski & Steel, 1998).

The Present Study

Although a number of studies have been conducted internationally to investigate the association between PG and psychiatric co-morbidity, relatively few recent studies have been conducted in Australia. Much of what is known about co-morbidity in Australian samples is derived from studies conducted in the 1980s which preceded the rapid expansion of gambling in the early 1990s. Before the mid-1990s, relatively few women gambled and electronic gambling machines, known to be the cause of at least 70 % of gambling-related problems (Productivity Commission, 2010) were not available in most part of Australia. Given a number of studies (e.g., McCormick, Delfabbro, & Denson, 2012) that have supported a link

between pathological EGM gambling and coping with mood disorders and trauma, it is value in continuing to investigate co-morbidities in PG given that the population of pathological gamblers may have changed over time. Of particular interest in this investigation was to examine the prevalence of psychiatric disorders after controlling for gender and also the clustering of disorder types. Based on previous international research, it was hypothesised that pathological gamblers, as compared to non-pathological gamblers would be found to have a significantly higher prevalence of several specific Axis I and Axis II psychiatric disorders: (a) mood-related disorders, (b) substance-use disorders, (c) antisocial and borderline PD and (d) Avoidant and dependent disorders. It was also hypothesised that there would be strong evidence of clustering of disorders with different types of psychiatric disorder found to co-occur within the same respondents.

Method

Participants

The sample comprised 140 (59 Males and 81 Females) gamblers with an at least fortnightly level of participation in continuous forms of gambling (e.g., poker machines, racing, sports, casino). The mean (SD) age of the sample was 47 years (SD = 12.4). The mean score on the NORC DSM-IV Screen for PG Self- administered (NODS-SA) was $M = 4.83$ (SD = 3.04) which indicates that a significant proportion of the participants were in the higher risk categories. At-risk gamblers accounted for 37 (26.4 %) of the sample; there were 30 (21.4 %) problem gamblers and 73 (52.1 %) pathological gamblers. The mean score on the Problem Gambling Severity Index (PGSI) was $M = 9.58$ (SD = 6.71). Based on the standard scoring, there were 9 (6.4 %) non-problem gamblers, 10 (7.1 %) low-risk gamblers, 44 (31.4 %) moderate risk gamblers and 77 (55.0 %) problem gamblers.

Procedure

The purpose of the study was not to assess the prevalence of co-morbidities in the general community, but to examine the co-morbidity patterns in a sample of people with a high risk of gambling-related problems. Fortnightly participation in continuous forms of gambling was considered an effective inclusion criterion to facilitate the recruitment of sample suitably powered to allow a comparison between pathological and non-pathological

gamblers. A comparison between these groups follows Orford's (1985) suggestion that greater attention needs to be directed towards comparisons between pathological gamblers and regular non-pathological gamblers rather than the general community so as to avoid confusing differences due to the regularity of gambling as opposed to pathological status. In this study, current gamblers were recruited from general community by advertising in community newspapers. Participants were asked to contact the researchers and were administered a short screening interview via telephone. This interview included demographic questions, gambling participation questions, to ensure that they met the study criteria. A package of measures, a consent form and other related information were sent to them for self-completion. Once this was received back, they were again interviewed via phone to validate their responses and to finalise the data collection.

Measures

Problem Gambling

Respondents completed the NODS-SA for gambling problem (Fager, 2007; Gerstein et al., 1999) which is based on the *DSM-IV* (American Psychiatric Association, 1994) criteria for PG. They also completed the PGSI (Ferris & Wynne, 2001). NODS-SA is self-administered form of original NODS, which was reported there was no significant difference with the early NODS (Fager, 2007). It consists of 19 questions about last year gambling participation. Response format is based on yes = 1 and no = 0, and the total score could be from 0 to 10. The respondents' scores divide into three categories: At-risk gambler 1–2; problem gambler 3–4; and pathological gambler 5–10. On the other hand, PGSI comprised 9 questions and each questions scores as following: “Never” = 0; “Sometimes” = 1; “most of the time” = 2; and “almost always” = 3. These scores fall into four categories: (1) 0 = non-problem gambler, (2) 1–2 = a low risk gambler; (3) 3–7 = a moderate risk gambler; and finally 8+ = a problem gambler (Ferris & Wynne, 2001).

Psychiatric Diagnosis

The Mini International Neuropsychiatric Interview is a structured diagnosis interview which was designed by psychiatrists and clinicians in USA and Europe for psychiatric disorders in *DSM* and *ICD-10* (Sheehan et al., 1998). MINI is short structured interview, which is consistent with *DSM* and *ID-10*. It is well suited for research and clinical work (Sheehan et al., 1998). It usually takes about 15 min. It comprises 17 Axis I mental health

disorders, in addition to Suicidality and antisocial PD. Time frame for disorders is based on current, past month, past 6 months, and past 12 months. Furthermore, in order to diagnose one disorder, respondent require to respond yes or no answer to the questions in each module, and at the end of the module, the interviewer based on yes and no answer is able to decide that interviewee has met diagnostic criteria or not.

Measure of Personality Disorders

The Personality Diagnostic Questionnaire-4th Edition (PDQ-4) (Hyler, 1994) is a self-report questionnaire that is based on *DSM-IV* for the axis II disorders. It consists of 99 questions and uses a true and false answer format. It measures ten PDs based on *DSM-IV* and two additional PDs; namely, negativistic PD and depressive PD. The total yes responses in each PD can be used to diagnose a PD or the total number of all PDs scores can be used to indicate overall personality disturbance. When a respondent's scores reach above threshold in each PD, he/she is interviewed to response some questions in Clinical Significance Scale. This would enable interviewer the review the respondent answers. PDQ-4 reported that is one of the most widely used PD assessment (Widiger & Coker, 2001).

Results

Gambling habits

The most commonly reported form of gambling was Poker/gaming Machines (94.3 %), followed by lotteries (82.9 %), scratch tickets (75 %), race betting (61.4 %), Keno (51.4 %), Casino table games (43.6 %) and sports-betting (30.0 %).

Prevalence of Psychopathology

Table 1 summarises the prevalence of MINI classifications within the sample. As indicated, pathological gamblers were significantly more likely to be screened as having psychiatric disorders. These included: Suicidality, bipolar disorder, panic disorder, social phobia, post-traumatic disorder (PTSD), generalised anxiety disorder, drug dependence and mood disorder with psychotic features.

Table 1.

Prevalence of MINI classified psychiatric disorders in pathological and non-pathological gamblers

	Non-pathological gamblers	Pathological gamblers	
	(n=67)	(n=73)	
Category	N (%)	N (%)	$\chi^2(1)$
<i>Mood Disorders</i>			
Depression	12 (18.0)	19 (26.0)	< 1
Bipolar I	3 (4.5)	15 (20.5)	8.0**
Bipolar II	2 (3.0)	7 (9.6)	2.5
Bipolar NOS	4 (6.0)	8 (11.0)	1.1
<i>Anxiety Disorders</i>			
Panic disorder	3 (4.5)	5 (6.8)	< 1
PDA [^]	5 (7.5)	24 (32.9)	13.7***
Agoraphobia	11 (16.4)	18 (24.7)	1.4
Social Phobia	3 (4.5)	15 (20.5)	8.0**
OCD ^{^^}	6 (9.0)	11 (15.1)	1.2
PTSD [#]	1 (1.5)	11 (15.1)	8.2**
GAD ^{##}	5 (7.5)	16 (21.9)	5.7*
<i>Substance Use Disorders</i>			
Alcohol Dependence	11 (16.4)	19 (26.0)	1.9
Alcohol Abuse	4 (6.0)	4 (5.5)	< 1

Drug Dependence	2 (3.0)	12 (16.4)	7.0*
Drug abuse	0 (0.0)	1 (1.4)	< 1
<i>Psychotic Disorders</i>			
Psychotic disorder	0 (0.0)	1 (1.4)	< 1
Mood disorders with psychotic features	1 (1.5)	12 (16.4)	9.2**
Anorexia	0 (0.0)	0 (0.0)	< 1
Bulimia	4 (6.0)	9 (13.7)	2.3
Suicidality	7 (10.4)	26 (35.6)	12.3****

*p<0.05; **p<0.01; **** p < .001

^ Panic disorder with Agoraphobia; # Post-traumatic Stress disorder

^^Obsessive-compulsive Disorder; ## Generalized Anxiety disorder

Since there are likely to be gender differences in relation to the prevalence of some disorders, logistic regression was undertaken to determine whether PG is associated with psychiatric disorders after controlling for gender (Table 2). As indicated, all differences remained significant even after gender had been controlled for.

Clustering of Disorders

A further analysis involved the calculation of the proportion of pathological gamblers and non-pathological gamblers who had specific types of MINI diagnosis. Participants were divided into four categories: (1) Depression and anxiety-related disorders only, (2) Disorders other than depression and anxiety, (3) Both anxiety/depression and other disorders, (4) No psychiatric disorder (Table 3).

Table 2.

Logistic regression: PG scores (NODS) are predictors of MINI classifications after controlling for gender

Mental Disorders	Variable	Parameter	Wald	Odds-ratio/95% CI
Suicidality	NODS	.33	16.21*	1.40 (1.19-1.65)
	Gender	.66	1.54	1.78 (0.70-4.54)
80% cases correctly classified				
Bipolar I	NODS	.43	14.47***	1.54 (1.23-1.93)
	Gender	-1.83	9.06	0.16 (0.05-0.52)
88% cases correctly classified				
Bipolar II	NODS	.30	4.44*	1.31(1.01-1.69)
	Gender	-.10	1.56	0.41 (0.10-1.67)
93% cases correctly classified				
Panic disorders With Agoraphobia	NODS	.41	17.43***	1.45(1.21-1.72)
	Gender	-.40	0.72	0.67(0.26-1.73)
81% cases correctly classified				
Social Phobia	NODS	.25	6.90**	1.29 (1.07-1.56)
	Gender	.16	0.08	1.17 (0.30-3.47)

				87% cases correctly classified
OCD	NODS	.24	6.19*	1.27(1.05-1.53)
	Gender	-.23	0.19	0.79(0.27-2.31)
				88% cases correctly classified
PTSD	NODS	.53	11.27**	1.70(1.25-2.32)
	Gender	-.43	0.42	0.65 (0.17-2.41)
				91% cases correctly classified
Generalized Anxiety Disorder	NODS	.23	6.50**	1.25 (1.05-1.49)
	Gender	.19	1.34	1.21 (0.44-3.33)
				85% cases correctly classified
Drug Dependence	NODS	.37	9.51**	1.44 (1.14-1.82)
	Gender	-.42	0.48	0.66 (0.20-2.16)
				90% cases correctly classified
Mood disorders with Psychotic features	NODS	.20	6.48*	1.35 (1.11-1.74)
	Gender	.25	0.15	1.28 (0.36-4.59)
				91% cases correctly classified

* p < .05, ** p < .01, *** p < .001.

As indicated in Table 3, there was no difference between the two groups with respect to the presence of depression and anxiety or psychiatric disorders when these were considered on their own. However, when these disorders were considered in combination,

pathological gamblers were significantly more likely to have both anxiety/depression and at least one other disorder. Almost two-thirds of pathological gamblers fell into this category as compared with 20 % of regular non-pathological gamblers. When the results are considered as a whole, it is evident that around 50 % of regular gamblers have at least one form of psychiatric disorder and that this figure increases to 91 % in the pathological gamblers.

Table 3.

The proportion of pathological gamblers and non-pathological gamblers who were diagnosed by psychiatric disorders

	Non-pathological (n = 64)	Pathological (n = 76)	
Psychiatric diagnosis	N (%)	N (%)	$\chi^2(2)$
Depression or anxiety disorder only	12 (18.8)	12 (15.8)	< 1
Other psychiatric disorder only	7 (10.9)	8 (10.5)	< 1
Depression/ Anxiety and other disorder	13 (20.3)	49 (64.5)	27.3**
No psychiatric disorder	32 (50.0)	7 (9.2)	28.9**

*p<0.05; **p<0.01; ***p<0.001

Table 4.

Prevalence of PDs (PDQ-4) in pathological and non-pathological gamblers

	Non-pathological	Pathological	
	(n =67)	(n = 73)	
Disorder	N (%)	N (%)	$\chi^2(1)$
Cluster A PDs			
Paranoid	10 (14.9)	22 (30.1)	4.6*
Schizoid	4 (6.0)	13 (17.8)	4.6*
Schizotypal	5 (7.5)	14 (19.2)	4.1*
Cluster B PDs			
Antisocial	3 (4.5)	12 (16.4)	5.2*
Borderline	7 (10.4)	18 (24.7)	4.8*
Narcissistic	0 (0.0)	5 (6.8)	$p < .05^a$
Histrionic	0 (0.0)	6 (8.2)	$p < .05^a$
Cluster C PDs			
Avoidant	13 (19.4)	31 (42.5)	8.6**
Dependent	0 (0.0)	7 (9.6)	$p < .01^a$
Obsessive- compulsive PD	15 (22.4)	23 (31.5)	1.5
Other PDs			

Negativistic	4 (6.0)	14 (19.2)	5.4*
Depressive	10 (14.9)	20 (27.4)	3.2

*p<.05 **p< .01 a = Fisher Exact probability

PDs and PG

Table 4 indicates the prevalence of PDs in pathological gamblers. As indicated, PDs were significantly more prevalent in the sample of pathological gamblers, apart from depressive and obsessive–Compulsive PDs. The strongest differences were observed for avoidant and dependent PDs. Once again, because there are known to be gender differences in the prevalence of these PDs, a logistic regression was undertaken to confirm whether gambler status predicted the presence of the disorder after gender had been controlled for in the analysis (Table 5). These results showed that PG status was still a significant predictor for some PDs after controlling for gender. These included: schizotypal, antisocial, borderline, narcissistic, histrionic, avoidant, dependent and negativistic disorders.

Table 5.

Logistic regression: PG and PDs after controlling for gender

<i>PDs</i>	<i>Variable</i>	<i>Parameter</i>	<i>Wald</i>	<i>Odds-ratio/95%CI</i>
<i>Cluster A PDs</i>				
Paranoid PD	NODS	.11	2.61	1.12(0.98-1.28)
	Gender	-.23	0.31	0.79(0.35-1.80)
77% of cases correctly classified				
Schizoid PD	NODS	.19	4.06	1.20 (1.00-1.44)
	Gender	-.18	0.11	0.83 (0.29-2.42)
88% of cases correctly classified				
Schizotypal	NODS	.15	3.09	1.16(0.98-1.38)
	Gender	-.44	0.74	0.64(0.23-1.75)
86% of cases correctly classified				
<i>Cluster B PDS</i>				
ASP#	NODS	.36	10.11***	1.43 (1.15-1.80)
	Gender	-.95	2.56	0.39 (0.12-1.24)
89% of cases correctly classified				

BPD##	NODS	.23	8.15**	1.33 (1.08-1.52)
	Gender	-.39	0.68	0.68 (0.27-1.71)
82% of cases correctly classified				
Narcissistic PD	NODS	.44	4.51*	1.55(1.03-2.31)
	Gender	-1.16	1.46	0.31(0.05-2.06)
96% of cases correctly classified				
Histrionic PD	NODS	.37	4.45*	1.45(1.03-2.05)
	Gender	-.60	0.65	0.40(0.92-2.60)
96% of cases correctly classified				
<i>Cluster C PDs</i>				
Avoidant PD	NODS	.18	7.68**	1.10(1.05-1.36)
	Gender	.13	0.11	1.14(0.53-2.46)
67% of cases correctly classified				
Dependent PD	NODS	.32	4.64*	1.38(1.02-1.84)
	Gender	-1.68	3.61	0.19(0.03-1.05)
95% of cases correctly classified				
OCPD^	NODS	.93	2.03	1.00(0.97-1.25)
	Gender	-.57	2.05	0.57(0.26-1.23)
73% of cases correctly classified				

Other PDs

Negativistic PD	NODS	.25	6.90**	1.28 (1.06-1.53)
	Gender	-.95	3.12	0.39(0.13-1.11)

87% of cases correctly classified

Depressive PD	NODS	.12	2.65	1.12(0.98-1.34)
	Gender	.33	0.56	1.42(0.64-3.32)

79% of cases correctly classified

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; #Antisocial PD; ##Borderline PD; ^Obsessive-compulsive PD

An independent samples t test was conducted to compare the personality disturbance scores for pathological gamblers and non-pathological gamblers. There was significant difference in scores for non-pathological gamblers ($M = 24.08$, $SD = 1.56$) and pathological gamblers, $M = 37.04$, $SD = 1.83$; $t(138) = 5.32$, $p < 0.001$ (two-tailed). There was a moderate positive correlation between PGSI scores and the overall personality disorder rating, $r(140) = 0.55$, $p < 0.001$. A similar result was obtained for the NODS, $r(140) = 0.49$, $p < 0.001$.

Discussion

The aim of this study was to investigate the prevalence of psychiatric co-morbidity amongst regular gamblers in the Australian community. This work builds upon similar studies conducted over a decade ago (e.g., Blaszczynski & Steel, 1998) that focused specifically on clinical samples. All of the principal hypotheses were supported. The prevalence of mood disorders, substance use disorder, and PD was found to be significantly higher in pathological gamblers and mood-related disorders commonly coincided with other

disorders. On the whole, the prevalence of PD was considerably lower than reported by Blaszczynski and Steel. For example, in the earlier study, 29 % of the samples were diagnosed as having antisocial PD, 70 % had borderline, and 37 % were avoidant. These differences are very likely due to sampling differences in that the Blaszczynski and Steel study involved a treatment population. The gamblers in their sample had gambling-related problems that were severe enough to motivate people to seek help, whereas the present sample involved gamblers in the community who had not sought treatment. Given that the severity of PG is related to the prevalence of disorders (observed by both Blaszczynski & Steel and in this study), it is possible that the current sample would not have sampled people with the same level of gambling severity. It is well-established, for example, that people most commonly seek assistance for gambling problems when the harms or consequences are severe (Evans & Delfabbro, 2005; Pulford et al., 2009) and that the presence of other serious co-morbidities very likely increases people's level of desperation to obtain professional help. Thus, the differences between the two sets of results could be due to both selection and exposure effects. Those with more severe psychiatric comorbidities and more severe gambling problems may be more likely to seek help (selection). At the same time, experiencing greater gambling-related harm can exacerbate psychiatric symptomology (e.g., level of depression and/or mood disturbance) so that one will tend to observe more severe psychiatric problems in samples of people who had chosen to seek professional help.

Despite uncertainties about establishing the precise prevalence of comorbidities in PG samples, the findings here relating to the link between psychiatric disorders and PG are consistent with other international studies (e.g., Alegria et al., 2009; Echeburua & Fernandez-Montalvo, 2008; Ibanez et al., 2001; Kessler et al., 2008; Kim et al., 2006; Lorains et al., 2011; Pelletier et al., 2008; Petry et al., 2005; Pietrzak et al., 2007). When compared to non-pathological regular gamblers, pathological gamblers had a significantly higher prevalence of Axis I and Axis II psychiatric disorders. Over a quarter were classified as having alcohol dependence and over 20 % had at least one serious form of anxiety-related disorder. With respect to their personalities, almost a third of pathological gamblers had paranoid PD, almost 20 % had schizoid or schizotypal PD, 25 % had borderline PD, 40 % were avoidant and almost a third had obsessive-compulsive PD. A number of these PDs were elevated in the non-pathological group as well which reflects the fact that many of these people were moderate risk gamblers, but cluster A and B disorders (see Table 4) were generally lower. Consistent with the number of differences observed, it was found that scores on the measures

of pathological and problem gambling were positively associated with the overall severity of personality disturbance.

Axis I Psychiatric Disorders

The strong association between pathological gamblers and mood-related disorders is well-established in the literature, although evidence suggests that these factors may both give rise to PG as well as be a symptom of it. Although Axis I psychiatric disorders (as classified using the MINI) were assessed using a life-time frame of reference so that it is not possible to differentiate the significant of current as opposed to long-term symptomology, research suggests that current and long-term problems are likely to be associated. For example, as pointed out a by Jacobs (1986) and McCormick et al. (2012), there is evidence showing a link between early trauma and abuse and subsequent psychological distress which appears to make some individuals more vulnerable to addictive behaviours (e.g., Felsher, Derevensky, & Gupta, 2010; Jacobs, 1986; Kaush, Rugle, & Rowland, 2006; Ledgerwood & Petry, 2006; Scherrer et al., 2007; Wood & Griffiths, 2007). Consistent with Blaszczynski and Nower's (2002) conceptualisations, psychological vulnerability and the resultant need to find ways to alleviate distress or regulate mood-states, can lead to a form of psychological dependence (see Walker, 1989). Gamblers report using gambling as a form of avoidance or emotion-based coping to deal with dysphoric states so that conditioned urges to gamble may result from the anticipated negative reinforcement associated with gambling. Such motivations are known to be very strong amongst people who gamble on electronic gaming machines in Australia (Rodda, Brown, & Philips, 2004; Scannell, Quirk, Smith, Maddern, & Dickerson, 2000).

Such longer term vulnerabilities, including fluctuations in mood and feelings of despair (Delfabbro, King, & Griffiths, 2012; Griffiths, 2005), are likely to interact with more immediate gambling experiences to compound existing problems. For example, suicide attempts associated with PG are well documented and are often preceded by significant life-events associated with gambling (e.g., large financial losses, relationship breakdowns and job losses) (Phillips, Welty, & Smith, 1997). Thus, while it is not always possible to disentangle the extent to which longer term vulnerabilities as opposed to recent events contribute to elevated suicide risk, it is reasonable to assume that both longer-term and short-term risk factors are likely to interact. In other words, those with a longer-term history of mood disorders and suicide risk may be particularly likely to consider suicide or turn to alcohol or drugs when faced with negative events resulting from gambling. This is evident when one

considers the considerable overlap between different disorders. Although mood disorders were prominent in the sample, the results also showed that it was relatively uncommon for mood-related problems to be the only type of psychiatric disturbance present in pathological gamblers. Only 15 % were affected by mood disorders alone and only 10 % had some other form of disorder (without a mood-related disorder). Two-thirds experienced mood disorders and at least one other form of psychiatric disorder, with substance use disorder found to be one of the common co-occurring problems.

Axis II Psychiatric Disorders

Although severe overall personality problems were present in less than 20 % of the sample of pathological gamblers, the samples nonetheless differed significantly in relation to the prevalence of a number of personality traits. Consistent with the findings relating to mood disturbance and emotional vulnerability, pathological gamblers were significantly more likely to have avoidant and borderline personality types, both of which are associated with maladaptive emotional regulation. Paranoia was also prevalent in a third in the sample and this is consistent with a number of traits known to be common in this sample; namely, the tendency to avoid social contacts in venues; attempts to hide signs of their gambling; or a tendency to disconnect their telephones or not respond honestly (or at all) to surveys about gambling (Productivity Commission, 1999).

Pathological gambling is not, by classification an obsessive compulsive disorder (OCD) because, as Blaszczynski and Nower (2002) point out, gamblers often gamble to obtain positive reinforcement rather than solely to relieve dysphoria (the common basis of OCD behaviours). However, gambling does have compulsive elements in the form of strong urges to gamble which can often be difficult to resist (Raylu & Oei, 2004). It is also a repetitive behaviour which can be driven by the desire to recover losses (O'Connor & Dickerson, 2003) or to achieve unsatisfied goals (McConaghy, 1980). Thus, while PG is unlikely to be equivalent to an OCD disorder, having longer term OCD traits is likely to make people more vulnerable to developing problems with gambling. Such people are more likely to be influenced by urges and to find it difficult to stop gambling once they have started.

Finally, the observation that pathological gamblers score higher on schizotypal traits are consistent with observations concerning the problems of social functioning common in this group. Pathological gamblers typically score higher on antisocial traits (Blaszczynski & McConaghy, 1997), shun social contact in venues, can often be rude and dismissive to venue staff, often gamble alone and resist attempts by others to help them come to terms with their behaviour (Delfabbro, Osborn, Nevile, Skelt, & McMillen, 2007).

Methodological Considerations

The design used in this study had a number of strengths. It used a sample sufficiently large to allow statistically meaningful comparisons between pathological and non-pathological gamblers; it used well-established standardised assessments; and, all respondents had to participate in gamble at a criterion level before being included in the study. However, as with studies conducted using clinical populations, a problem with community solicited samples is that the base-rate of psychiatric disorder may often be higher in these samples than others in the community. Those who are willing to read advertisements in newspapers and take part in studies will usually have a higher prevalence of problem gambling and other problems (see Ladouceur, Arsenault, Dube, Freeston, & Jacques, 1997). For this reason, it is not possible to generalise these findings to all problem gamblers in the community, although the sample may share many traits with the sorts of people who seek help from treatment services (i.e., who respond to helpline services or TV problem gambling advertisements).

Despite these problems, the study allows comparisons between regular pathological and non-pathological gamblers because these two groups were recruited the same way and are likely to have been influenced by similar sampling biases. In future research into the clustering and prevalence of psychiatric disorders it would be useful to extend this work to respondents recruited using more probabilistic methods, e.g., via telephone surveys.

Conclusions and Implications

Given the likely similarity between this sample and the types of people who seek help from treatment services, the results of this study suggest that treatment services face many challenges when treating pathological gamblers. Although PG is a disorder in its own right, it is also likely that, for many people, gambling problems arise from other long-term pathologies which need to be assessed and treated concurrently. At the bare minimum, all

assessments of PG should include some measures of mood-related disorders, suicidality, and co-morbid substance use. Wherever possible, these assessments should be extended to test for the likely presence of other underlying disorders, most notably OCD. Therapists should be aware of the likely presence of personality problems in this population and the extent to which these disorders contribute to PG, withdrawals from social interactions, a reluctance to seek help from others, as well as problems in establishing an effective therapeutic alliance.

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Chapter 4: Study 2

Personality disorders and erroneous beliefs in pathological gambling

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Submitted for Publication

Statement of Contributions

Mohammadreza Abdollahnejad

I was responsible for the primary authorship of this paper. I conducted the literature, the data analysis and collected the data. I also prepared multiple drafts of the paper in collaboration with my fellow co-authors.

Signed:

Date:

Paul Delfabbro (Co-author)

I was the primary supervisor for the research programme that led to this manuscript. The candidate, Abdollahnejad, was responsible for aforementioned responsibilities; my role was to provide advice on statistical analysis and drafts, as well as make suggestions on the presentation and refinement of the material in the paper, and to provide editorial input. I also provided advice on responding to comments by the journal reviewers and editor.

I hereby give my permission for this paper to be included in Mohammadreza Abdollahnejad's thesis.

Signed:

Date:

Linley Denson (Co-author)

I was a contributing author to this paper. The candidate was responsible for writing this paper; my role was to edit the final version and providing feedback concerning editing and content changes.

I hereby give my permission for this paper to be included in Mohammadreza Abdollahnejad's thesis.

Signed:

Date:

Abstract

Objectives: This study investigated the extent to which pathological gambling and gambling-related erroneous beliefs are related to personality disorders and the general dysfunctional beliefs that are common to these disorders.

Design: Respondents were recruited from the general community by advertising in community newspapers in southern Australia. Participants were asked to contact the researchers and were administered a short screening telephone interview to ensure that volunteers met study criteria. A package of measures, a consent form and other related information were mailed to them for self-completion. Once this was returned, participants were again interviewed by phone to validate their responses and finalise data collection.

Methods: The sample comprised 140 regular gamblers who were recruited from the general public. A variety of self-report and semi structured questionnaires were administered, including the NORC DSM-IV Screen for Gambling Problems, The 21-item PDI (Peters et al. Delusions Inventory), the PAI-BOR measure of borderline personality disorder and the Gambling Related Cognition Scale (GRCS).

Results: Pathological gambling scores were strongly related to scores on borderline personality disorder measure as well as gambling-specific belief scores. A path analysis showed that borderline personality was only weakly related to gambling-related belief after controlling for delusion-proneness. In other words, there is evidence of a pathway between personality disorder scores, delusion-proneness scores and Gambling Related Cognition Scale scores which, in turn, are positively associated with pathological gambling scores.

Conclusions: Dysfunctional beliefs associated with common personality disorders such as borderline personality may make people more susceptible to the gambling-related erroneous cognitions commonly held by pathological gamblers.

Key words: Personality disorders; erroneous beliefs; pathological gambling

In most forms of gambling, the outcomes of events are largely chance-determined. Although the choice of bets, the amount wagered and odds of winning are often at players' discretion, players usually have little control over the outcomes, and practice (with few exceptions) cannot improve performance (Delfabbro, 2004; Walker, 1992). As a result, the financial return to players associated with most gambling activities is negative and players should expect to lose money if they gamble over a protracted period. For example, on modern electronic gaming machines, return to player (RTF) of 85-90% mean that each investment of a given amount would be expected, on average, to yield a loss of 10-15% of the money staked (Productivity Commission, 1999).

Despite these facts, many people continue to gamble, often in the expectation that they can win money from gambling. This observation has led to the understanding that gamblers often do not base their decision-making on the objective odds of winning (Walker, 1992). Cognitive factors, including the role of well-established heuristics and biases, are now recognised as being among the important factors that are likely to maintain gambling and also contribute to pathological gambling (PG) (Blaszczynski & Nower, 2002; Fortune & Goodie, 2012; Griffiths, 1995; Petry, 2005; Walker, 1992). Early evidence in support of this view emerged in studies involving the so-called 'speaking aloud' method (Gaboury & Ladouceur, 1989) that asked occasional and regular players either in the laboratory (Gaboury & Ladouceur, 1988) or field (Delfabbro & Winefield, 2000; Griffiths, 1994; Ladouceur, Gaboury, Bujold, Lachance, & Tremblay, 1991; Walker, 1992) to elucidate their thoughts while gambling. The results revealed that 70-80% of gambling-related cognitions were erroneous and this tendency was stronger in more regular players (Griffiths, 1994). Common biases identified in this study included the gambler's fallacy or representation heuristic; availability heuristic (Wagenaar, 1988); biased attributions (Gilovich, 1983; Gilovich & Douglas, 1986); and the illusion of control (Conventry & Norman, 1998; Dixon, 2000; Ejova, Delfabbro, & Navarro, 2010; Wohl & Enzle, 2002). Players would, for example, report that events (e.g., wins) were more probable if they had not occurred for some time (gambler's fallacy); and they would base their expectations on more salient events or wins (availability heuristic); or believe that they could influence outcomes by applying skill or strategy, or appealing to various lucky charms and superstitions.

A limitation of this early work was that it did not appear that these erroneous beliefs were necessarily a distinct feature of PG. However, subsequent research using several psychometric belief scales (e.g., Jefferson & Nicki, 2003; Joukhador, Blaszczynski, &

Maccallum, 2004; Raylu & Oei, 2004; Steenbergh, Meyers, May & Whelan, 2002; Wood & Clapham, 2005) and experimental tasks (e.g., Toplak, Liu, MacPherson, Toneatto, & Stanovich, 2007) suggests that endorsement of these beliefs does appear to covary with the severity of pathological or problem gamblers (Emond & Marmurek, 2010; Miller & Currie, 2008; Myrseth, Brunborg, & Eidem, 2010; Toneatto, Blitz-Miller, Calderwood, Dragonetti, & Tsanos, 1997; Xian et al., 2008). In general, it has been found that pathological or problem gamblers typically endorse a wider range of erroneous beliefs (Kallmen, Andersson, & Andren, 2008) and also express greater conviction in their endorsements (Sevigny & Ladouceur, 2004). Although it does not necessarily follow that such beliefs are always causally related to problems associated with gambling (some may arise from the experience of gambling itself), erroneous beliefs are thought to be (at the very least) an exacerbating factor. Support for this contention is, for example, provided in studies that have confirmed the effectiveness of cognitive therapies that specifically address and restructure erroneous beliefs such as those relating to chance, probabilities, randomness and perceptions of controllability (Blaszczynski & Silove, 1995; Ferland, Ladouceur, & Vitaro, 2002; Ladouceur & Sylvain, 1999; Ladouceur et al., 2003; Toneatto, 1999).

Despite the consistency of findings, relatively little research has investigated why pathological gamblers might be more prone to erroneous beliefs than other gamblers, although several theoretical explanations have been advanced. Sharpe and Tarrier (1993), for example, proposed a cognitive-behavioural model that associated erroneous reasoning with the strong emotional need states associated with PG. Similar views are articulated by Benhsain and Ladouceur (2004) who argued that pathological gamblers engaged in a form of ‘cognitive switching’ in which they vacillate between two cognitive states: one that is focussed on an objective and rational assessment of the odds (what they term ‘cold information’), and another that is more primarily focused on information relevant to the activity and outcomes (termed ‘hot cognitions’). In this latter state, it is argued that gamblers are more likely to eschew rational processing and become susceptible to various cognitive biases. Similarly, Toplak et al. (2007), applying Stanovich and West’s (2000) dual-processing model, found that pathological gamblers show deficits in executive or ‘systematic processing’ and a tendency to base their decisions on lower-level heuristic-based (or Type 1) processing. Neurophysiological explanations for these effects remain an ongoing topic for investigation, but consistent with Sharpe and Tarrier, and Benhsain and Ladouceur, some of these problems have been attributed to variations in how behaviour is regulated and controlled by the

ventromedial frontal cortex (Damasio, 1994, 1996). Other simpler and more parsimonious explanations (e.g., Delfabbro, 2004; Dixon, 2000) argue that some of these findings could be environmentally determined and result from simple operant learning processes. Exposure to sequences of outcomes combined with higher response rates leads to an increasing probability of co-incidental associations being drawn between responses and outcomes. Over time, gamblers develop an increasingly complex array of ‘verbal rules’ to explain and justify their behaviour and the sequence of events in gambling (Delfabbro & Winefield, 1999). Such tendencies are likely be stronger when gamblers have strong motivations for outcomes and this is supported by general laboratory research (e.g., Thompson, Thomas, & Armstrong, 1998) that shows that perceptions of control in chance-determined tasks are elevated under conditions when people have a strong desire for outcomes.

Personality Disorders and Erroneous Cognitions

All these explanations appear to offer valid insights into why differences might be observed between pathological gamblers and other gamblers, but do not fully explain why these differences might develop. Not all regular gamblers develop erroneous views about gambling outcomes, and few studies have examined what individual characteristics of pathological gamblers might make them more vulnerable to such beliefs. In this paper, we argue that a potential avenue of research may be to examine the clinical pathologies known to be common in PG in order to inform cognitive research into gambling. In particular, we draw attention to a significant body of research into the nature of personality disorders in PG indicating that these are often associated with dysfunctions in emotional regulation as well as a tendency towards cognitive distortions. Based on the theoretical models described above, both of these factors could potentially influence the likelihood of people developing erroneous beliefs. It is these beliefs which, in turn, are thought to be influential in the onset and maintenance of PG.

Existing research suggests that personality disorders are highly prevalent in pathological gamblers (Milosevic & Ledgerwood, 2010; Odlaug, Schreiber, & Grant, 2012; Vachon & Bagby, 2009). A review by Bagby, Vachon, Bulmans and Quilty (2008) suggested that between 23 to 92% of pathological gamblers suffer from at least one personality disorder, whereas Petry, Stinson and Grant (2005) report a figure of 60% based on a national US mental health survey. These figures compare with a population average of

9.1% (Lenzenweger, Lane, Loranger, & Kessler, 2007). Differences have been on all different personality disorders recognised in the DSM-IV, but differences on Cluster B categories (e.g., Narcissistic, Borderline, Histrionic and Antisocial personality disorders) have been most consistently documented in studies conducted in multiple countries (Barry, Stefanovics, Desai & Potenza, 2010; Barry, Stefanovics, Desai & Potenza, 2011; Bewer, Potenza, & Desai, 2010; Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998; Ledgerwood & Petry, 2010; Lorains, Cowlshaw, & Thomas, 2011).

Personality disorders and, in particular, borderline personality disorder (BPD), often feature unusual perceptions, delusions, and cognitive deficits (Beck et al., 2001; Moritz et al., 2011; Pretzer, 1990). Such beliefs often involve inflexibility, a tendency to over-generalise, black-and-white thinking, resistance to change and errors in inferences of causality. Similar views are expressed by Ellis (1994) who asserted that patients with BPD often possess various cognitive deficits and dysfunctions that serve to maintain their obsessions, delusions and other disturbances. For example, according to Ellis, BPD patients often develop perfectionistic and obsessional characteristics that can lead to unrealistic expectations about their need to maintain control and success in every aspect of their life, when this is clearly not realistic. Similar views are articulated in a number of studies of personality disorders that report a high prevalence of unusual, magical or dysfunctional beliefs (Butler, Brown, Beck, & Grisham, 2002; Chabrol, Chouicha, Montovany, & Callahan, 2001; George & Soloff, 1986; Gunderson, 1984; Jacobsberg, Hymowitz, Barasch, & Frances, 1986; Spitzer, Endicott, & Gibbon, 1979; Tarnopolsky & Berelowitz, 1984; Widiger, Frances, Warner & Bluhm, 1986; Zetzel, 1971), or unusual perceptual experiences (Chopra & Beaston, 1986; Frances, Clarkin, & Gilmore, 1984; Gunderson, Carpenter, & Strauss, 1975; Spitzer et al., 1979; Widiger et al., 1986). Another study by Lenzenweger and Loranger (1989) conducted using psychiatric patients in a New York hospital found that some personality disorders, namely schizotypal, schizoid, obsessive-compulsive, dependent, avoidant and BPD, were associated with significantly higher scores on a Perceptual Aberration Scale (PAS). Typical prevalence rates for disturbed and 'odd' thinking for BPD sufferers have been estimated at over 60% (Chabrol et al., 2001; Zanarini, Gunderson & Frankenburg, 1990).

The Present study

A review of these two areas of literature suggest that pathological gamblers score significantly higher on measures of gambling-related erroneous cognitions and also are significantly more prone to personality disorders such as BPD. Given that general cognitive dysfunction is a feature of BPD and related disorders, a question arises as to what extent erroneous beliefs observed in PG reflect gambling pathology *per se* as opposed to the underlying belief structures and decision-making styles that are characteristic of personality disorders. Many beliefs commonly observed in personality disorders, including errors in causality; over-generalisation; expectations of predictability; and control, could make people more vulnerable to developing gambling-related beliefs of this nature. In this paper, our aim was to test several hypotheses that appear to follow from our review: (a) the severity of BPD would be positively related to scores on measures of erroneous gambling-related cognitions, (b) scores on dysfunctional thinking or delusion proneness (a general measure) would be positively related to gambling-related erroneous beliefs, and (c) all of these measures (personality, general dysfunctional beliefs and gambling-related erroneous beliefs) would be positively related to PG. Another aim of our study (d) was to examine to what extent gambling-related erroneous beliefs would be related to PG after controlling for borderline personality disorder scores and to compare the strength of the pathways linking borderline personality disorder, delusion proneness, gambling-related erroneous beliefs and PG.

Method

Participants

The sample comprised 140 (59 male and 81 female) gamblers. The mean age of the sample was 47 years ($SD = 12.4$ years). Based on the NORC DSM-IV Screen Self-Administered (NODS-SA) DSM-IV criteria, at-risk gamblers accounted for 37 (26.4%) of the sample, 30 (21.4%) were problem gamblers and 73 (52.1%) pathological gamblers. The mean score on the NODS-SA was $M=4.83$ ($SD=3.04$) indicating that a significant proportion of the participants were in higher risk categories.

Procedure

All participants were recruited based on the basis that they reported gambling at least fortnightly on at least one continuous form of gambling (e.g., EGMs, casino games). This

inclusion criterion was employed in order to: (a) provide sufficient statistical power for comparisons between pathological gamblers and other gamblers, and (b) follow Orford's (1985) suggestion that greater attention needs to be directed towards comparisons between pathological gamblers and regular non-pathological gamblers. Having regular gambling as an inclusion criterion, made it less likely that differences in status (i.e., non-pathological and pathological) would be confounded with the effects of differences in gambling frequency.

All respondents were recruited from the general community by advertising in urban and rural community newspapers in southern Australia. Participants were asked to contact the researchers and were administered a short screening telephone interview. This included demographic questions and gambling participation questions, to ensure that volunteers met study criteria. A package of measures, a consent form and other related information were mailed to them for self-completion. Once this was returned, participants were again interviewed by phone to validate their responses and finalise data collection. Finally, upon completion of all study requirements, each participant was mailed a \$50 gift voucher. Study design and procedures were approved by the University of Adelaide Human Research Ethics Committee. All those who made contact with the researchers completed every stage of the screening and assessment.

Measures

(a) Pathological/ problem gambling

Respondents completed the NODS-SA for gambling problems (Fager, 2007; Gerstein et al., 1999) which is based on DSM-IV (American Psychiatric Association, 1994) criteria for PG. NODS-SA is a self-administered form of the original NODS, producing similar results (Fager, 2007). The assessment of PG is based on binary scoring for each indicator (yes=1 and no=0) to generate a total score between 0 and 10. These scores yield three categories: At-risk gamblers (1-2); problem gamblers (3-4) and pathological gamblers (5-10).

(b) Borderline Personality Disorder

BPD features were measured using the Personality Assessment Inventory for Borderlines (Morey, 1991), a measure developed specifically to measure BPD features. The PAI-BOR comprises four subscales with a total of 24 items. Subscales include Affective Instability, Identity Problems, Negative Relationships, and Self-Harm, summed to provide a

total BPD features score. The items have a four point- scale (0-3; false, slightly true, mainly true and very true). According to Morey (1991), a total raw score above 38 on the PAI-BOR indicates the presence of clinically significant BPD features; a score above 60 is typical of people with BPD diagnoses. Many studies have indicated the strong validity and reliability of PAI-BOR for assessing borderline features in general and clinical populations (e.g., BellPringle, Pate, & Brown, 1997; Stein, Pinkster-Aspen, & Hilsenroth, 2007; Trull, 1995).

(c) Delusion Proneness

The Peters et al. Delusions Inventory (Peters, Joseph & Garety, 1999) PDI has 21 items to assess delusional ideation in the normal population. It was designed to examine unusual thinking in non-psychotic populations. The PDI comprises 21 items about unusual beliefs. These beliefs include thought disturbances (e.g., thought reading, insertion, echo and broadcast); paranormal beliefs (e.g., magical thinking and superstition) which are similar to some beliefs commonly observed in gamblers in that they relate to false attributions relating to the relationships between causes and outcomes or erroneous sources of influence over events (e.g., Langer, 1975). Examples include: “Do you ever think people can communicate telepathically?”, “Do you ever feel as if you are, or destined to be someone very important?” and “Do you ever feel as if electrical devices such as computers can influence the way you think?”. For each item the respondents need to rate whether they endorse the belief: “yes” or “no”. For each endorsed item, participants are then asked to rate (on a scale 1-5) the degree of distress caused by the belief; how much he/she is preoccupied with this thought; and, finally how much he/she believes that this thought is true.

(d) Gambling-related Cognitions Scale (GRCS)

The GRCS (Raylu & Oei, 2004) is a 23-item self-report measure assessing a variety of gambling-related cognitions that occur in the general population as well as in PG. Items are seven-point Likert scale: 1=‘strongly disagree’ to 7 =‘strongly agree’. The GRCS has five subscales: (a) interpretative bias (e.g., “Relating my winnings to my skill and ability makes me continue gambling”), (b) illusion of control (e.g., I have specific rituals and behaviours that increase my chances of winning”), (c) predictive control(e.g., “Losses when gambling are bound to be followed by a series of wins”), (d) gambling-related expectancies (e.g., “Having a gamble helps reduce tension and stress”), and (e) perceived inability to stop gambling(e.g., “ I am not strong enough to stop gambling”).

Statistical approach

The principal hypotheses were investigated using a combination of correlation and multiple regression. Path analysis was undertaken using multiple regression to examine the relative magnitude of the direct and indirect pathways between personality scores, erroneous beliefs and PG. Structural equation modelling was not used for this analysis because the sample size was insufficient given the number of proposed variables.

Results

A summary of the descriptive statistics for the principal measures is provided in Table 1. As indicated, pathological gamblers scored significantly higher on borderline personality disorder measure and the three belief scales. All effect sizes were moderate to large (many had a Cohen's $d > .60$)

Table 1.

Comparison of cognitive belief scores and borderline personality disorder scores among pathological gamblers and non-pathological gamblers

	Pathological gambling ($n=73$)		Non-pathological gambling ($n=67$)		
<i>Variables</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>
GRCS#	18.52	5.38	13.55	4.48	-5.91***
PDI^	78.48	50.85	44.59	34.27	-4.67***
PAI-BOR##	38.11	13.23	22.79	11.58	-7.26***

*** $p < .001$ (two-tailed); # Gambling-Related Cognition Scales; ^ The 21-item PDI (Peters et al. Delusions Inventory); ## measure for BPD;

Correlation analysis

Table 2 summarises correlations between borderline personality scores, problem gambling and the two belief measures. As indicated, all relationships were significant. Consistent with hypothesis (a), higher scores on borderline personality disorder scores (PAI-BOR) were associated with stronger endorsement of gambling-related beliefs (GRCS) and higher scores on delusion proneness. Scores on the measures delusional beliefs were positively associated with gambling-related erroneous beliefs (Hypothesis (b)). Problem gambling or PG was positively associated with stronger endorsement of total erroneous belief and delusion proneness scores and borderline personality (consistent with Hypothesis (c)).

Table 2.

Correlation of borderline personality, gambling and belief measures

	PDI	PAI-BOR	NODS
GRCS#	.46	.36	.54
PDI##		.63	.39
PAI-BOR^			.57

All results significant at least $p < .05$ (two-tailed); # Gambling-Related Cognition Scale; ## The 21-item PDI (Peters et al. Delusions Inventory); ^ Measure for BPD

Path Analysis

To investigate the relationship between these variables and the final aim of the study (d), a path analysis was conducted using standard multiple regression. Borderline personality scores were considered antecedent to higher scores on measures of delusion-proneness and gambling-related cognition scores and these scores were considered to be related to pathological gambling (NODS). The path model described in Figure 1 was analysed in a series of steps. In the first analysis, NODS (PG) was set as the dependent measure and GRCS and PAI-BOR scores were used as predictors. In analysis 2, GRCS scores were the dependent measure and delusion proneness and PAI-BOR scores were the independent measures. In analysis 3, delusion proneness scores were predicted by PAI-BOR scores. A summary of analyses is provided in Table 3.

Table 3.

Regression analyses used to determine path coefficients

	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t-value</i>
<i>Regression 1 (Dept: NODS)</i>				
Constant	-1.39			
PAI-BOR#	.09	.01	.43	6.46***
GRCS##	.21	.04	.39	5.78***
<i>Regression 2 (Dept: GRCS)</i>				
Constant	11.94			
PAI-BOR	.04	.04	.11	1.17
PDI^	.05	.01	.39	4.06***
<i>Regression 3 (Dept: PDI)</i>				
Constant	.67			
PAI-BOR	.2	.21	.63	9.39***

***p<0.001(two-tailed); # Measure for BPD; ##Gambling-Related Cognition Scales; ^ The 21-item PDI (Peters et al. Delusions Inventory).

The standardised coefficients from the regression analysis are summarised in Figure 1 and this shows that BPD scores (as measured by the PAI-BOR) are directly associated with PG scores. PAI-BOR scores are also strongly related to delusion-proneness. However, PAI-BOR scores have only a weak relationship with scores on the Gambling Related Cognitions Scale, whereas delusion proneness scores are significantly and positively associated with GRCS scores. In other words, there is evidence of a pathway between personality disorder scores, delusion proneness scores and GRCS scores, which in turn, are positively associated with PG scores.

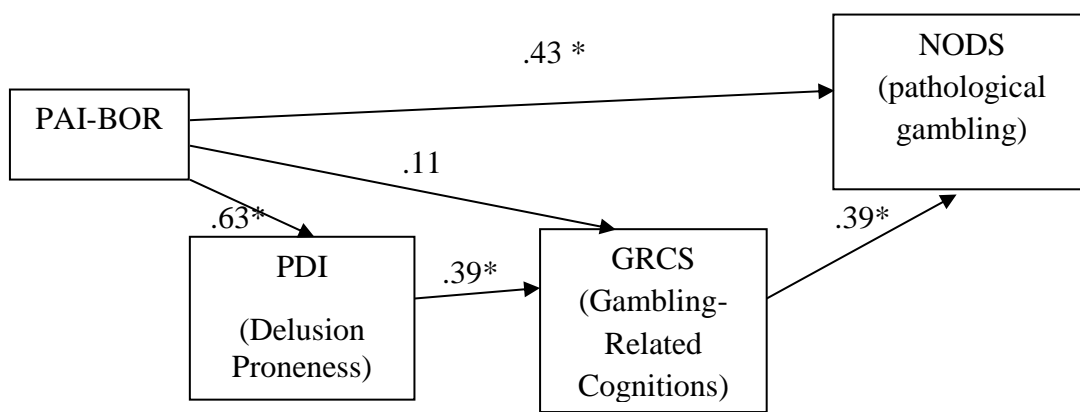


Figure 1.

Path model: BPD, beliefs and pathological gambling (standardised coefficients) * $p < .05$

The results in Figure 1 show that BPD scores have a direct relationship with PG. They are also strongly related to delusion proneness scores. Delusion proneness scores are also moderately related to gambling-related cognition scores which, in turn, have a moderate relationship with PG. In other words, as predicted, BPD is not directly related to erroneous beliefs about gambling, but this relationship is mediated by dysfunctional belief scores. BPD is associated with belief patterns which are related to erroneous beliefs about gambling. These gambling-related beliefs are, in turn, related to PG.

Discussion

Although it is well-established that pathological gamblers have a higher propensity than other gamblers to develop erroneous beliefs about gambling (Blaszczynski & Nower, 2002; Fortune & Goodie, 2012; Gaboury & Ladouceur, 1989; Griffiths, 1994; Griffiths,

1995; Ladouceur et al., 1991; Petry, 2005; Walker, 1992), relatively little research has investigated potential causes of this difference. Our study supports the importance, in this context, of further investigating personality disturbances and the broad cognitive dysfunctions associated with personality disorders. As predicted, our results showed that general cognitive functions related to BPD were positively associated with scores on measures relating to gambling-related erroneous beliefs. Given that BPD is very prevalent in pathological gamblers in clinical settings, these findings suggest that borderline personality disorders may be a significant risk factor for the development of dysfunctional beliefs about gambling. Moreover, consistent with the findings of Toplak et al. (2007) and Fortune and Goodie (2012), these findings support the view that broader dysfunctions in cognitive processing may be influential in the development and maintenance of PG.

The current study also provides additional support for the association between PG and erroneous beliefs (Conventry & Norman, 1998; Dixon, 2000; Ejova et al., 2010; Wagenaar, 1988; Wohl & Enzle, 2002), BPD and irrational beliefs (Beck et al., 2001; Beck & Freeman, 1990; Moritz et al., 2011; Pretzer, 1990) as well as between borderline personality disorder and PG (Bagby et al., 2008; Barry et al., 2010; Barry et al., 2011; Bewer et al., 2010; Cunningham-Williams et al., 1998; Ledgerwood & Petry, 2010; Lorains et al., 2011). Although caution must be used when interpreting correlational relationships of this nature, there are reasons why personality disorders might make people more prone to the cognitive distortions commonly observed in gambling. Existing research suggests that disorders such as BPD are often associated with a range of deficits in reasoning and that a number of these beliefs are similar to those observed in pathological gamblers. These cognitive deficits include: perceptual distortions or unusual perceptions (Chabrol et al., 2001; George & Soloff, 1986; Gunderson, 1984; Jacobsberg et al., 1986; Spitzer et al., 1979; Sternbach, Judd, Sabo, McGlashan, & Gunderson, 1992; Tarnopolsky & Berelowitz, 1984; Widiger et al., 1986; Zanarini, Gunderson, & Frankenburg, 1990; Zanarini, Gunderson, Frankenburg, Chauncey, 1990), odd thinking or beliefs (Chabrol et al., 2001; George & Soloff, 1986; Jacobsberg et al., 1986; Spitzer et al., 1979; Tarnopolsky & Berelowitz, 1984; Widiger et al., 1986; Zanarini, Gunderson, & Frankenburg, 1990; Zanarini, Gunderson, Frankenburg, Chauncey, 1990), over-generalisations (e.g., Beck & Freeman, 1990), resistance to change (Beck & Freeman, 1990; Wenzel, Chapman, Newman, Beck, & Brown, 2006), magical thinking (e.g., Chabrol et al., 2001; Sternbach et al., 1992), dichotomous thinking (Arntz, Dreessen, Schouten, & Weertman, 2004; Butler et al., 2002), odd or illogical reasoning (e.g., Sternbach

et al., 1992), jumping to conclusions (Fine, Gardner, Craigie, & Gold, 2007; Moritz et al., 2011; Moritz & Woodward, 2005), and delusions (Sternbach et al., 1992; Zanarini, Gunderson, & Frankenburg, 1990).

Many common treatment approaches to borderline personality disorders (e.g., rational-emotive behavioural therapy, cognitive therapy and dialectical behaviour therapy) place a strong emphasis on challenging and restructuring cognitions of the nature described above. For example, Beck et al. (2001) believed that dysfunctional beliefs are key concepts of phenomenology of BPD, in that they shape how people see themselves and others and often have a significant influence on their moods and behaviour (Bhar, Gregory & Beck, 2008). Beck and Freeman (1990) argued that the inflexibility of these beliefs and their resistance to change is particularly important. BPD sufferers will often develop strong inferences about how events or behaviours are causally related, will maintain these beliefs despite contrary evidence, and over-generalise these belief structures to different situations or social interactions. For example, a person might be very quick to infer that something ostensibly random that happens to them is due to their actions (e.g., X is unfriendly, because I said Y to them) and then believe that his or her actions are leading to similar responses in others. Very similar patterns of behaviour and cognition are observed in PG and are addressed in established treatment protocols (Ferland et al., 2002; Ladouceur & Sylvain, 1999; Ladouceur et al., 2003; Toneatto, 1999). Commonalities observed between PG and BPD are unsurprising: the conditions share developmental risk factors including childhood adversity, trauma and attachment issues (Choi-Kain, Fitzmaurice, Zanarini, Laverdiere & Gunderson, 2009). Moreover, BPD predisposes to intolerance of negative emotions, while gambling, especially Electronic Gambling Machine (EGM), offers potential short-term solutions including distraction, dissociation and “a zone of reliability, safety and affective calm that removes [gamblers] from the volatility they experience in their social, financial and personal lives” (Schüll, 2012, p.208).

Gamblers often need to be taught to understand the concept of chance and randomness; how to avoid developing false ascriptions of contingency between behaviours, situations and outcomes (e.g., rubbing the machine or playing it a certain way does not influence outcomes, or the presence of a certain person does not change one's luck), and to avoid biased attributions that lead chance outcomes to be attributed to personal action or strategy. The presence of personality disorders that potentially predispose people to irrational

thinking creates additional challenges for gambling treatment services. The implication is that reducing cognitive biases may require therapeutic approaches that address broader cognitive, behavioural and affective processes, beyond gambling-specific beliefs. Specifically, the results suggest the need for specialist clinicians to address underlying clinical pathologies, potentially using Third Wave therapies such as dialectical behaviour therapy, ACT and mindfulness-rather than using counselling approaches limited to providing “rational” information about the nature of gambling odds and false beliefs.

Methodological considerations

A strength of this study was that it was based on a sample of gamblers with sufficient representation of pathological gamblers to allow valid statistical comparisons. It avoided drawing samples from student populations, those who already were in treatment, or those who gambled at a low frequency. The study was rigorous in combining well established standardised psychometric measures and combined psychometric measurement with clinical interviewing and follow-up questions. Despite these strengths, there are a number of caveats that need to be taken into account when interpreting the results from this study. The first is that the sample was drawn from a volunteer sample in the community, and it is possible that gamblers who are willing to respond to advertisement for research participation may differ from others in the community. Although similar problems apply- albeit arguably to a greater extent in many published studies using treatment populations- this sample is also likely to be biased towards an over-representation of people with both PG and other co-morbidities. Such biases do not obviate the capacity to undertake research examining the relationship between variables, but caution must be applied when generalising the findings to other gamblers in the community. In general, the prevalence of morbidities will be lower and correlations may actually be stronger than we report if there is less attenuation of scores on the scales which we used.

A second issue is that this study did not have a sufficiently large sample of gamblers to allow more formal testing of the relationships using methods such as structural equation modelling (SEM). SEM would have allowed additional testing of competing models that assigned different structural relationships between the variables. For example, it would be possible to test a model that locates problem gambling as the left-most variable in Figure 1 to examine the differences that arise when problem gambling is considered as a possible factor that gives rise to erroneous beliefs, rather than these erroneous beliefs being considered an

antecedent to problem gambling. In another model, a bi-directional relationship could have been tested.

In this study, the lower than desired sample size was due merely to the practical difficulties associated with recruiting a large pool of high intensity gamblers within a relatively small urban population, in addition to constraints on both time and resources. However, the sample size was more than adequate to detect moderate effect sizes with a high degree of statistical power ($> .80$). As it stands, the principal contribution of the analyses in this paper is to show that the relationship between personality disorders and gambling-related beliefs that is observed in univariate analyses may not hold once other beliefs have been controlled.

Conclusions and implications

In conclusion, the findings of this study suggest that greater attention could be directed towards understanding the potential role of clinical pathology, particularly in regards to personality disorders in the aetiology of PG. Many cognitive beliefs or ‘thinking styles’ known to be highly prevalent in these clinical disorders may make people more prone to the types of erroneous beliefs thought to maintain PG. The findings suggest the need for treatment approaches that include: (a) systematic assessments of clinical pathologies including personality disorders, and (b) treatment providers who have the necessary expertise to address the underlying pathologies, broader erroneous or delusional thought patterns, in addition to beliefs that are specific to gambling.

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Chapter 5: Study 3

Psychiatric co-morbidity in problem and pathological gamblers: Investigating the confounding influence of alcohol use disorder

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Statement of Contributions

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I was responsible for the primary authorship of this paper. I conducted the literature, the data analysis and collected the data. I also prepared multiple drafts of the paper in collaboration with my fellow co-authors.

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Paul Delfabbro (Co-author)

I was the primary supervisor for the research programme that led to this manuscript. The candidate, Abdollahnejad, was responsible for aforementioned responsibilities; my role was to provide advice on statistical analysis and drafts, as well as make suggestions on the presentation and refinement of the material in the paper, and to provide editorial input. I also provided advice on responding to comments by the journal reviewers and editor.

I hereby give my permission for this paper to be included in Mohammadreza Abdollahnejad's thesis.

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I was a contributing author to this paper. The candidate was responsible for writing this paper; my role was to edit the final version and providing feedback concerning editing and content changes.

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Abstract

Pathological gambling is known to be associated with a higher than average prevalence of psychological co-morbidities including a range of psychiatric conditions. A problem with much of this literature, however, is that such problems are also frequently found in populations affected by alcohol use disorder, which is common in populations of pathological gamblers. Accordingly, the principal aim of this study was to profile the comorbidities present in a sample of pathological gamblers, comparing those who did, and did not, additionally meet criteria for alcohol use disorder. A sample of 140 community-recruited regular gamblers completed a number of measures including the Mini International Neuropsychiatric Interview, the Personality Diagnostic Questionnaire, NORC DSM-IV Screen Self-Administered and the Alcohol Use Disorders Identification Test. Comparisons showed that most psychiatric conditions (and in particular personality disorders were significantly more prevalent in those with a dual diagnosis, followed by problem gamblers and then by those with neither disorder. This suggests that high rates of psychiatric illness in pathological gambling may be strongly influenced by co-occurring alcohol problems.

Despite being recognised as a separate clinical disorder in DSM-IV, pathological gambling (PG) rarely occurs alone (Lorains, Cowlshaw, & Thomas, 2011). People afflicted by this disorder also typically display a range of other co-morbid conditions, with higher prevalence of psychiatric symptomatology, personality disorder (PD) and cross-addictions (Blaszczynski & McConaghy, 1989; Blaszczynski, Steel, & McConaghy, 1997; Crockford & el Guebaly, 1998; Kerber, Black, & Buckwalter, 2008; Kim, Grant, Eckert, Faris & Hartman, 2006; Lorains et al., 2011; Petry, Stinson, & Grant, 2005; Specker, Carlson, Edmonson, Johnson, & Marcotte, 1996; Taber, McCormick, & Ramirez, 1987). The commonest of these problems are mood (depression) and anxiety disorders, suicidality and either borderline or antisocial PDs (Lorains et al.). Accordingly, psychiatric co-morbidity is considered a major risk factor for PG, with several well-known typology or schematic models (e.g., Blaszczynski & Nower, 2002; Jacobs, 1986; Moran, 1970) identifying co-morbid factors as a significant factor in the progression to PG. Elevated levels of anxiety and depression, for example, arising from experiences of trauma, abuse, and family dysfunction, can lead to a dependence on gambling to regulate or escape from intolerable mood states (McCormick, Delfabbro, & Denson, 2012). In a parallel pathway, Blaszczynski and Nower suggest that the high levels of impulsivity, reduced delay of gratification and tolerance of punishment often observed in people with antisocial PDs may predispose them to developing problems when gambling.

Observations of this nature have led to discussions concerning the extent to which PG is, at least in some individuals, a secondary disorder. Such work also encourages a greater focus on whether, and to what extent, the problems associated with gambling can always be attributed to the disorder itself rather than to underlying pathologies. An important condition in this regard is substance misuse. Like PG, substance use disorder (and in particular, excessive alcohol use) is recognised as a significant predictor of a range of co-morbid psychiatric conditions: significantly overlapping with those identified for PG. Consequently, given that substance use disorders are prevalent among pathological gamblers (see Brunelle, Assaad, Pihl, Tremblay, & Vitaro, 2003; Vitaro, Brendgen, Ladouceur, & Tremblay, 2001; Westermeyer, Canvine, Garrard, Thuras, & Thompson, 2005; Winters & Kushner, 2003), the question arises as to whether it is PG, substance abuse or a combination of these conditions (dual diagnosis) that is most strongly associated with the range of psychiatric conditions documented in studies of pathological gamblers.

Evidence supporting an association between PG and increased risk of alcohol problems has emerged in a number of studies (Abbott & Volberg, 1992; Becona, 1992;

Crockford & el- Guebaly, 1998; Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998; Dickerson, Baron, Hong & Cottrell, 1996; Feigelman, Wallisch, & Lesieur, 1998; Lesieur, Blume, & Zoppa, 1986; National Gambling Impact Study Commission Report, 1999; Spunt, Lesieur, Hunt, & Cahill, 1995; Welte, Barnes, Wieczorek, Tidwell, & Parker, 2001). The co-incidence of PG and alcohol problems has been reported to be 10-15% in some studies (Elia & Jacobs, 1993), or between 9 and 33% (Daghestani, Elenz, & Crayton, 1996; Giacomassi, Stitt, & Vandiver, 1998; Lejoyeux, Feuche, Loi, Solomon, & Ades, 1999). In general, the figures obtained are lower in community surveys and highest in clinical samples. For example, in an investigation involving a clinical sample, Maccallum and Blaszczyński (2002) found that of 75 treatment-seeking gamblers in Australia, 73% had an alcohol use disorder (AUD). Men were more likely to report these problems than women.

As with gambling, there is robust evidence supporting an association between AUDs and psychiatric disorders (Regier et al., 1990; Sheehan, 1993). Alcohol dependence has been found to be associated with clinical depression, anxiety and general mood disorders (Allan, 1995; Farrell et al., 1998; Grant, Hasin, Chou, Stinson, Dawson, 2004; Grant et al., 2004; Kessler et al., 2003; McCusker & Brown, 1991; Merikangas, et al., 1998; Schuckit & Hesselbrock, 1994; Stockwell & Bolderston, 1987); or elevated suicide risk (Weissman, Myers, & Harding, 1980). AUDs are also a strong predictor of *DSM-IV* classified PDs (Compton, Thomas, Stinson, & Grant, 2007; Grant et al., 2008; Hasin, Stinson, Ogburn, & Grant, 2007; Pulay et al., 2009, 2010; Stinson et al., 2008).

In addition to having correlates in common, alcohol use is also known to have an influence on gambling and its potential harms. Alcohol use is known to increase impulsive decision-making (Dougherty, Marsh, Moeller, Chokshi, & Rosen, 2000; Richards, Zhang, Mitchell, & de Wit, 1999) and it may also increase risk-taking and duration of gambling (e.g., Kyngdon & Dickerson, 1999).

Present study

The aim of this study was to examine the prevalence of DSM Axis I and II psychiatric disorders among individuals with single and dual diagnoses as how these compared to people with no addiction diagnoses. Despite evidence that psychiatric disorders are more prevalent in problem/ pathological gamblers than non-problem/ pathological gamblers, it remains

unclear whether it is the PG *per se* or the co-occurring presence of alcohol problems in pathological gamblers that best explains this difference. If alcohol misuse is also related to psychiatric problems, we hypothesised that the following differences would be detected. Comorbidity would be: (a) higher in people with a dual diagnosis (problem gambling and alcohol misuse) than those with only a single or neither diagnosis, (b) higher in problem gamblers than those with no diagnosis.¹

Method

Participants

The sample comprised 140 (59 male and 81 female) gamblers who reported participating at least fortnightly in continuous forms of gambling (e.g., poker machines, racing, sports, or casino). The mean age of the sample was 47 years ($SD = 12.4$ years).

Procedure

The procedure for this study has been reported previously (Abdollahnejad, Delfabbro, & Denson, 2013) and is summarised here for convenience. The fortnightly gambling frequency criterion was employed for two reasons. The first was to ensure sufficient statistical power for comparisons between problem gamblers and other gamblers. The second was to follow Orford's (1985) suggestion that greater attention needs to be directed towards comparisons between problem gamblers and regular but non-problem gamblers. Specifying regular gambling as an inclusion criterion made it less likely that differences in gambling status (i.e., non-problem versus problem) would be confounded with the effects of differences in gambling frequency.

Participants were recruited from the general community by advertising in urban and rural community newspapers in southern Australia. Participants were asked to contact the first author, a graduate student with considerable mental health experience, who administered a short screening telephone interview. This included demographic questions and gambling participation questions, to ensure that volunteers met study criteria. A package of measures, a consent form and other related information was then mailed out for self-completion. Once this was returned, the first author conducted a second telephone interview to check and

¹ Insufficient numbers were available to compare those with alcohol misuse only vs. neither diagnosis.

validate responses and finalise data collection. Finally, upon completion of all study requirements, each participant was mailed a \$50 gift voucher. Study design and procedures were approved by the University of Adelaide Human Research Ethics Committee.

Measures

(a) Problem/ Pathological Gambling

Respondents completed the NODS-SA for gambling problems (Fager, 2007; Gerstein et al., 1999) which is based on DSM-IV (American Psychiatric Association, 1994) criteria for PG. NODS-SA is a self-administered form of the original NODS, producing similar results (Fager, 2007). It contains 19 questions about gambling participation in the previous year. The response format, based on yes=1 and no=0, generates a total score between 0 and 10. Respondents' scores divide them into three categories: At-risk gamblers (1-2); problem gamblers (3-4) and pathological gamblers (5-10). In this study, those with scores of 3 or more problem or pathological gamblers were combined to allow group comparisons with adequate statistical power. This focus on problem as opposed to just pathological gambling is consistent with other Australian approaches to studying the disorder (Productivity Commission, 2010).

(b) Alcohol Use Disorders

The Alcohol Use Disorders Identification Test (AUDIT) (Babor, Higgins-Biddle, Saunders, & Monterio, 2001) consists of 10 questions screening for hazardous and harmful alcohol consumption. Every AUDIT question is scored from 0 to 4, with an overall score ranging from 0 to 40. The suggested cut-offs are 1–7 for low risk drinking, 8–15 suggesting hazardous drinking, 16- 19 suggesting harmful drinking, and scores of 20 or more indicating alcohol dependence (Babor et al., 2001). According to Reinert and Allen (2007), the scale has high reliability and validity.

(c) Psychiatric Diagnosis

The Mini International Neuropsychiatric Interview (MINI) is usually administered as a short structured diagnostic interview for psychiatric disorders in DSM and ICD-10 (Sheehan et al., 1998), that is designed for research and clinical practice (Sheehan et al., 1998). It assesses 17 Axis I mental health disorders, suicidality and antisocial PD. Time

frames are: current, past month, past 6 months, and past year: we utilised the ‘current’ and past year responses for this study. The respondent provides Yes or No answers, and at the end of each diagnostic module, the interviewer determines whether the interviewee has met diagnostic criteria or not. This interview was completed over the phone in around 15 minutes. Although this measure contains questions relating to anti-social personality disorder, we report the findings relating to this disorder using the more specialist PDQ-4 (below). It is reported that MINI has acceptable high validity and reliability (Sheehan & Lecrubriar, 2005). Test –retest reliability Kappa scores are shown to be around 0.89 and 0.79, whereas estimates of inter-rater Kappa scores have been excellent (0.97) (Sheehan et al., 1998).

(d) Personality Disorders (PDQ-4)

One of the most widely used PD assessments according to Widiger and Coker (2001), the Personality Diagnostic Questionnaire-4th Edition (Hyler, 1994) is a self-report questionnaire based on DSM-IV criteria for Axis II PDs. It measures ten PDs based on DSM-IV and two additional PDs; namely, Negativistic PD and Depressive PD. The instrument comprises 99 questions using a ‘true /false’ format in which respondents respond Yes or No to each item. The total number of Yes responses for each PD are used to diagnose that PD; and the total number of all Yes responses can be used to indicate overall personality disturbance. Responses can initially be completed using a self-report method and then, if a respondent scores above threshold for any PD, he/she is interviewed using additional questions from the Clinical Significance Scale. This enables the interviewer to critically evaluate the respondent’s answers. In this study, the follow ups were conducted using a short telephone interview. The PDQ-4 has been found to have very successful in detecting or presence of personality disorders (Davison, Leese, & Taylor, 2001) and very good reliability and validity (Dubro, Wetzler, & Kahn, 1988). It has also found to have high sensitivity and high negative predictive power compared to other interview based diagnoses (Hyler, Skodol, Kellman, Oldham & Rosnick, 1990).

(e) Psychological Distress

The Kessler Psychological Distress Scale (K10) is a widely-utilised 10-item self-rated screening measure for non-specific psychological distress including fatigue, nervousness, hopelessness, restlessness, depression, loss of energy, and worthlessness (Kessler et al., 2002; Slade, Grove, & Burgess, 2011). Scores range from 10 to 50, with scores from 0-20 indicating no significant psychological distress; scores 20-24 suggesting a mild mental

disorder; scores 25-29 suggesting a moderate mental distress; and scores above 30 indicating the likelihood of severe mental distress. The K10 has Australian normative data (Slade et al., 2011) and high internal consistency and reliability, with Cronbach's alpha = 0.90. (Kessler et al., 2002).

Analytical Strategy

Respondents were classified into four groups. The first group ('Dual diagnosis') comprised those who were classified as pathological gamblers (NODs) and also had an AUD (AUDIT) ($n=41$). A second group were classified as having neither of these problems ($n=31$), whereas a third group contained those who were classified as pathological gamblers without the presence of an AUD ($n=62$). The potential fourth group (AUD but no PG) was so small that it had to be excluded from statistical group comparisons

Univariate comparisons using F-tests were conducted to compare the prevalence or count of psychiatric disorders in the three groups. For the first analysis, the total number of disorders present in each category (e.g., mood, anxiety) was calculated for each individual to yield a metric score. A similar process was undertaken for the four PDQ-4 classifications. A final series of multiple regressions then examined the extent to which group membership (PG only vs. dual diagnosis) predicted the presence of disorders after controlling for gender (a variable which is known to correlate with the presence of disorders).

Results

(a) Pathological gambling

Based on the NORC DSM-IV Screen Self-Administered (NODS-SA) DSM-IV criteria, at-risk gamblers accounted for 37 (26.4%) of the sample, 30 (21.4%) were problem gamblers and 73 (52.1%) pathological gamblers. The mean score on the NODS-SA was $M=4.83$ ($SD=3.04$).

(b) Differences in co-morbidity

Table 1 summarises and compares the prevalence of Axis I psychiatric disorders among problem gamblers without AUD, participants who exhibited dual diagnosis, and those who did not meet criteria for either disorder. A comparison of the groups showed that those with either a dual diagnosis or only pathological gambling were generally more likely to be

classified as having disorders compared with those with neither PG or AUD. The only exception was for substance abuse (where the dual group was highest), but this is to be expected given the nature of the group comparisons.

Table 1.

Prevalence of Axis I psychiatric disorders in problem gamblers, dual diagnosis sufferers and those who did not exhibit AUD and PG

	Dual diagnosis N=41	Problem gambling but not AUD N=62	Neither AUD nor problem gambling N=31			
Category	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>F</i>	η^2	<i>p</i> -value
Mood	0.68 (0.47)	0.56 (0.50)	0.23 (0.43)	8.63	.12	.001
Anxiety	1.46 (1.48)	0.98 (0.93)	0.39 (0.84)	8.25	.11	.001
Substance Use	0.93 (0.72)	0.13 (0.34)	0.06 (0.25)	42.43	.39	.001
Psychotic ^	0.17 (0.38)	0.11 (0.31)	0.00 (0.00)	2.85	.04	.06
Eating ^^	0.12 (0.33)	0.11 (0.32)	0.06 (0.25)	< 1	.005	.70
Suicidality	0.24 (0.43)	0.35 (0.48)	0.03 (0.18)	6.20	.09	.003

^ Psychotic disorders and Mood disorders with psychotic features

^^ Anorexia Nervosa and Bulimia Nervosa

Table 2 shows the prevalence of PDs among the same three groups. Once again, both the dual group and the PG were more likely to be classified as having disorders than the ‘neither’ group. Significant differences were observed for Cluster A, B and C. For cluster A and B disorders, there was also evidence that those with a dual diagnosis had more problems than those with just pathological gambling.

Table 2.

Prevalence of PDs (PDQ-4) in problem gamblers, dual diagnosis sufferers and those who did not exhibit AUD and PG

	Dual diagnosis N=41	Problem gambling but not AUD N=62	Neither AUD nor problem gambling N=31			
Disorders	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>F</i>	η^2	p-value
Personality Disorders	2.68 (3.05)	1.82 (2.15)	0.90 (1.72)	4.94	.07	.01
Cluster A [^]	0.68 (0.85)	0.48 (0.86)	0.32 (0.74)	1.69	.03	.19
Cluster B ^{^^}	0.76 (1.06)	0.29 (0.61)	0.03 (0.17)	9.49	.13	.001
Cluster C [#]	0.76 (1.01)	0.71 (0.76)	0.39 (0.62)	2.11	.03	.13
Other ^{##}	0.49 (0.78)	0.34 (0.60)	0.16 (0.45)	2.36	.04	.01

[^] Paranoid, schizoid and schizotypal personality disorders

^{^^} Antisocial, borderline, histrionic, narcissistic personality disorders

[#] Avoidant, dependant and obsessive-compulsive personality disorders

^{##} Negativistic and depressive personality disorders

In this sample, gender was significantly associated with the likelihood of having an AUD (higher for men) or being classified as a pathological gambler (higher for women). Women were also more likely to meet criteria for anxiety disorders and depression (Abdollahnejad et al., 2013). Given these differences, it was important to determine to what extent a dual diagnosis still predicted co-morbid psychiatric disorders after controlling for gender. Hierarchical multiple regression analyses were undertaken with gender entered on the first step and dual or PG only status entered on Step 2. Tables 3 and 4 indicate that most relationships remained significant after controlling for gender differences. Table 3 shows that participants who exhibited dual diagnosis or pathological gambling only were more likely to

be classified as having very type of disorder (except for substance misuse). Table 4 indicates that having a dual diagnosis was associated with a greater likelihood of almost all the different clusters of personality disorders, but that pathological gambling alone also predicted the overall number of personality disorders detected.

Table 3.

Hierarchical regression analysis: predictors of Axis I psychiatric disorders

	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t-value</i>	<i>p-value</i>
<i>Mood disorders</i>					
Constant	.16				
Dual diagnosis	.49	.11	.44	4.57	.001
PG not AUD	.35	.10	.35	3.41	.001
<i>Anxiety disorders</i>					
Constant	.28				
Dual diagnosis	1.10	.25	.43	4.39	.001
PG not AUD	.56	.24	.24	2.35	.02
<i>Substance Use Disorders</i>					
Constant	.20				
Dual diagnosis	.74	.11	.56	6.58	.001
PG not AUD	-.05	.10	-.04	-.41	.68
<i>Suicidality</i>					
Constant	.001				
Dual diagnosis	.21	.09	.23	2.26	.03
PG not AUD	.30	.09	.35	3.39	.001

Table 4.

Hierarchical regression analysis: predictors of personality disorders

	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t-value</i>	<i>p-value</i>
<i>Personality disorders</i>					
Constant	1.03				
Dual diagnosis	1.83	.54	.34	3.42	.001
PG not AUD	1.07	.52	.22	2.07	.04
<i>Cluster B[^]</i>					
Constant	.10				
Dual diagnosis	.72	.16	.43	4.38	.001
PG not AUD	.28	.16	.18	1.79	.08
<i>Other personality disorders^{^^}</i>					
Constant	.19				
Dual Diagnosis	.30	.15	.21	2.06	.04
PG not AUD	.15	.14	.12	1.10	.28

[^] Antisocial, borderline, histrionic, narcissistic personality disorders

^{^^} Negativistic and depressive personality disorder

One-way between-groups analysis of variance explored the impact of PG and AUD on psychological distress (K10 score). Participants were divided into 3 groups – (1) participants who had dual diagnosis of AUD and PG (2) participants without PG, and (3) participants who only had PG. There was a statistically significant difference at the $p < .001$ in psychological distress for three groups of participants: $F(2, 131) = 17.01, p < .001$. The eta-squared effect size was large (.20). Tukey HSD post-hoc tests indicated that the mean score for Group 1 (with dual diagnosis) ($M = 28.27, SD = 10.09$) was significantly higher than the second Group 2 (neither AUD nor PG) ($M = 16.80, SD = 5.87$) but did not differ from the PG only Group 3

($M=26.14$, $SD=8.90$). Group 2 (neither PG or AUD) had significantly lower scores than groups 1 and 3, and generally consistent with the Australian K10 population norms reported by Slade et al. (2011).

Discussion

The principal aim of this study was to investigate the extent to which the high prevalence of psychiatric co-morbidity often observed in problem gambler populations is influenced by the common co-occurrence of AUD. The results of this paper clearly show that, although problem gamblers typically present with a higher prevalence of psychiatric disorders than non-pathological regular gamblers (consistent with: Farrell et al., 1998; Grant, Hasin, Chou, Stinson, Dawson, 2004; Grant, Stinson, Dawson, Chou, Ruan, Pickering, 2004; Kessler et al., 2003; Merikangas, et al., 1998), it is gamblers with a dual diagnosis that have the highest prevalence of many common forms of personality disorder. These differences persisted even after controlling for gender. Regular gamblers with dual diagnosis were particularly likely to have experience Cluster B personality disorders. Those who met criteria for PG but not AUD were generally more similar in relation to symptomatology consistent with depressive, avoidant or obsessive personality characteristics (based on the MINI, PDQ-4 and Kessler-10).

These findings suggest that substance use disorder, in this case AUD, may play an important role in explaining why psychiatric disorders are so prevalent in problem gambler populations. AUD and other forms of substance misuse are not always assessed in studies of PG – or in treatment services specifically funded and directed towards providing gambling specific assessments and interventions. Thus, it remains unclear to what extent some previous results can be relied on, given that multivariate analyses were not always conducted to rule out other potential cross-addictions. Although our cross-sectional findings do not allow causal inferences to be drawn, it seems safe to conclude that the relationship between PG and AUD is likely to be complex. In this sense, our findings mirror the conclusions of Stewart and Kushner (2005) who argue that there are at least three possible ways to explain the correlation between PG and AUD. The first is that alcohol problems may contribute to PG. Evidence in support of this view has emerged from some studies of gambling behaviour conducted while people are under the influence of alcohol (Kyngdon & Dickerson, 1999) as

well as some self-report studies (Potenza, Steinberg, & Wu, 2005). In both types of study, it has been reported that when gambling under the influence of alcohol people are generally less inhibited, and display greater risk-taking and persistence: drinking may increase the risk the likelihood of people spending more than they intended. A second possibility is that PG causes alcohol problems. The arguments here would be that gambling exposes people to environments where alcohol is readily available, and that stress associated with gambling-related losses might encourage excessive drinking as a coping mechanism. A third explanation is that there are some underlying factors (or ‘third variables’) that explain why some people are more likely to display both disorders.

Despite some inherent truth in each of these arguments, current neurological, genetic and other psychiatric evidence in the literature provide the most conceptual support for the third argument. For example, according to Grant, Kushner and Kim (2002), there is evidence to suggest that problem gambling and AUD may share similar “underlying biological mechanisms”. In particular, it is proposed that a specific brain area (the ventral tegmental area or VTA) contributes to urge or cravings as a result of imbalances in dopamine and serotonin (Comings et al., 1996). Other research using both males and females has shown that approximately from one-half to two-third of the correlation between PG and alcoholism can be accounted for by shared genetic vulnerability (e.g., Slutske, Ellingson, Richmond-Rakerd, Zhu, & Martin, 2013). Moreover, Cunningham-Williams et al. (1998) argue, considering the high prevalence of personality disturbance (e.g., antisocial or borderline PD) in both disorders it seems difficult to argue that the addictive behaviour somehow gives rise to personality problems. Similarly, the evidence supporting the link between early trauma, abuse and subsequent problems with addiction (Jacobs, 1986; McCormick et al., 2012), suggests a range of developmental risk factors predating addictions. These views are generally in line with recognised pathway or typology models (Blaszczynski & Nower, 2002). In these models, it is argued that both psychological vulnerability and psychiatric problems (most notably antisocial personality and impulsivity traits) are significant risk factors for PG. Central to these models is a perspective of PG as one component of a larger constellation of co-morbid conditions. Such viewpoints anticipate the likelihood that the causative factors identified may make individuals vulnerable, to not just PG but to other related addictive disorders, very likely because of common genetic, neurological and psychosocial antecedents.

Our results demonstrate that when separately considering problem gamblers with and without AUD it becomes easier to distinguish which co-morbidities are more characteristic of PG vs. those with dual diagnoses. In general, those with pathological gambling only tend to be similar to individuals with a dual diagnoses in relation to indicators of mood disturbance (anxiety, depression and suicidality), but tend to display lower prevalence of other disorders. These observations are generally consistent with other findings (see Lorains et al., 2011 for a recent review). Most of our participants gambled regularly on EGMs, a recognised ‘escape’ form of gambling that appeals to people with mood disturbances or the need to regulate dysphoric states. Losing money through gambling can be a highly traumatic experience so it was also noteworthy that suicidality symptoms were highest in the PG group. AUD requires many years of chronic excessive consumption before significant damage becomes evident, whereas PG, particularly on EGMs, can rapidly progress to an acute problem with serious consequences, and within a short time, large losses can destroy gamblers’ and families’ financial well-being. When a person is faced with seemingly overwhelming levels of debt that cannot easily be addressed in the short term, suicide appears as a potential exit.

Methodological considerations

The study had a number of strengths including sufficient statistical power to detect the effect sizes observed; it used well-established standardised measures and focused on a population that enabled comparisons to be drawn between people positioned at different levels of gambling risk. However, several caveats need to be taken into account when interpreting the findings. All of the findings in this study were based on self-report measures so that it is not clear that the reported behaviours entirely correspond with actual behaviour. Community recruited samples, although arguably superior to treatment populations because they capture people who are still gambling, are likely to be biased towards the selection of people with high levels of co-morbidity. This is because people with problems are often more likely to be at home and therefore able to respond to study advertising and motivated to report their problems. It should also be acknowledged that the final study sample was not sufficiently large for statistical analysis to include our fourth subgroup, regular gamblers with AUD but not PG. Methodologically, this is frustrating; conceptually it highlights the strong relationships between the variables of interest. The study also includes a large number of statistical comparisons often with many low cell sizes and wide confidence intervals for statistical estimates. Although such issues do not necessary detract from the overall

conclusions, caution must be applied when interpreting the results of any single significance test.

Conclusions and implications

Despite its limitations, this study builds upon an existing body of knowledge concerning links between PG, psychiatric co-morbidity and AUD. It shows that caution may need to be applied when interpreting previous studies that reported an association between PG and co-morbidity but did not also control for the confounding influence of AUDs. The study should be extended to include a more detailed assessment of other forms of substance misuse and to replicate the findings using other populations, including those drawn from large epidemiological studies that have sample sizes to capture sufficient numbers of each group of interest. In this connection, it may be possible for some existing data-bases to be re-analysed, investigating the role of substance abuse in PG-related co-morbidities.

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Chapter 6: Study 4

Understanding the relationship between pathological gambling and gambling-related cognition scores: the role of alcohol use disorder and delusion proneness

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Statement of Contributions

Mohammadreza Abdollahnejad

I was responsible for the primary authorship of this paper. I conducted the literature, the data analysis and collected the data. I also prepared multiple drafts of the paper in collaboration with my fellow co-authors.

Signed:

Date:

Paul Delfabbro (Co-author)

I was the primary supervisor for the research programme that led to this manuscript. The candidate, Abdollahnejad, was responsible for aforementioned responsibilities; my role was to provide advice on statistical analysis and drafts, as well as make suggestions on the presentation and refinement of the material in the paper, and to provide editorial input. I also provided advice on responding to comments by the journal reviewers and editor.

I hereby give my permission for this paper to be incorporated in Mohammadreza Abdollahnejad's thesis.

Signed:

Date:

Linley Denson (Co-author)

I was a contributing author to this paper. The candidate was responsible for writing this paper; my role was to edit the final version and providing feedback concerning editing and content changes.

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Date:

Abstract

There is considerable evidence for an association between pathological gambling and scores on validated psychometric measures of erroneous gambling-related cognitions. However, a potential problem with this literature is that samples of pathological gamblers score higher on indicators of co-morbidity (e.g. substance misuse) that are also associated with poorer decision-making and reasoning abilities. We aimed to examine the relationship between pathological gambling and gambling-related erroneous beliefs after controlling for alcohol misuse. A sample of 140 regular gamblers completed a detailed psychological assessment including measures of pathological gambling (NORC DSM-IV Screen Self-Administered), delusion proneness (the Peters et al. Delusions Inventory), alcohol use (the Alcohol Use Disorders Identification Test) and gambling beliefs (Gambling-Related Cognitions Scale). Pathological gamblers scored higher than other regular gamblers on all these measures. Although alcohol use disorder was not directly related to delusion proneness, a combination of higher alcohol use disorder and delusion proneness was associated with higher gambling-related cognition scores. Our findings confirm previous evidence supporting an association between pathological gambling and greater endorsement of erroneous gambling-related cognitions. Alcohol misuse and delusion proneness may be factors that strengthen this association.

Keywords: alcohol; pathological gambling; erroneous beliefs; substance abuse; addiction

It is well established that cognitive factors play an important role in both gambling and problem gambling. Since the mid-1980s, studies have shown that people who gamble also demonstrate a range of well-documented decision-making biases and that erroneous beliefs about the roles of chance, randomness and luck are very common (for reviews, see Fortune & Goodie, 2012; Petry, 2005; Walker, 1992). This evidence emerges from a range of experimental studies where people have been asked to ‘speak aloud’ their beliefs while gambling (e.g. Delfabbro & Winefeld, 2000; Griffiths, 1994; Ladouceur, Gaboury, Bujold, Lachance, & Tremblay, 1991) and also from studies using validated self-report instruments (Jefferson & Nicki, 2003; Joukhador, Blaszczynski, & Maccallum, 2004; Raylu & Oei, 2004; Steenbergh, Meyers, May, & Whelan, 2002; Wood & Clapham, 2005). Although early studies showed that these beliefs were common, irrespective of whether a person gambled, more recent studies have shown that the prevalence and endorsement of erroneous beliefs covaries with the level of gambling problems (Emond & Marmurek, 2010; Miller & Currie, 2008; Myrseth, Brunborg, & Eidem, 2010; Toneatto, Blitz-Miller, Calderwood, Dragonetti, & Tsanos, 1997; Xian et al., 2008). Typically, people who are classified as ‘pathological’ or ‘problem’ gamblers endorse a wider range of erroneous beliefs, and hold them more strongly, than do non-problem gamblers (Sevigny & Ladouceur, 2004).

The most common beliefs investigated in these studies relate to how people perceive the causes of gambling-related outcomes and the sequence of events. Studies have shown that problem gamblers are more likely than other gamblers to overestimate the extent to which personal action can influence outcomes (the illusion of control: Coventry & Norman, 1998; Dixon, 2000; Ejova, Delfabbro, & Navarro, 2010; Wohl & Enzle, 2002); the role of luck (Wohl & Enzle, 2002); and the extent to which outcomes are predictable based on previous sequences of events (the gambler’s fallacy) (Ejova et al., 2010; Griffiths, 1994; Raylu & Oei, 2004; Wagenaar, 1988). At the same time, gamblers are also vulnerable to self-serving biases (Gilovich, 1983), leading them to make internal attributions for successful outcomes and external ones for unsuccessful outcomes. These factors combine to make gamblers, and in particular pathological gamblers, more likely to overestimate both past and future successes (Delfabbro, 2004).

A number of explanations have been advanced for pathological gamblers’ greater vulnerability to cognitive biases and erroneous beliefs. One view, articulated by Sharpe and Tarrier (1993), is that problem gamblers have a stronger emotional or motivational desire to

succeed when they gamble and this state of arousal makes them more prone to processing information in a selective or biased manner. Pathological gamblers may not, in reality, possess any beliefs that are not otherwise common in the general population, but they are simply more likely to apply heuristics in a maladaptive way (Delfabbro, 2004; Fortune & Goodie, 2012). Similar views are expressed by Benhsain and Ladouceur (2004) who argue that pathological gamblers may engage in a form of ‘cognitive switching’ depending on the context. In some situations they focus on an objective and rational assessment of the odds (what they term ‘cold information’), whereas in others their beliefs appear more strongly influenced by cognitions relating to the outcomes (termed ‘hot cognitions’). In this latter state, it is argued that gamblers are more likely to eschew rational processing and become susceptible to various cognitive biases. Other researchers (e.g. Cavedini, Riboldi, Keller, D’Annunzi, & Bellodi, 2002; Toplak, Liu, Macpherson, Toneatto, & Stanovich, 2007) have highlighted pathological gamblers’ deficits in executive or ‘systematic processing’ and their tendency to base decisions on lower-level heuristic-based processing. Such deficits are thought to be influenced by neurophysiological differences, particularly in relation to how attention and behaviour are regulated and controlled by the ventromedial frontal cortex (Cavedini et al., 2002; Damasio, 1994; Damasio, Everitt, & Bishop, 1996).

A difficulty with much of the existing literature, however, is that research samples of people who meet criteria for classification as pathological gamblers often have high comorbidity rates and such research participants are more likely than the average person to meet criteria for other psychiatric/mental health problems and personality disorders (see Lorains, Cowlshaw, & Thomas, 2011 for a recent systematic review). As pointed out by Abdollahnejad, Delfabbro, and Denson (2013, submitted), this raises conceptual issues because personality disorders and some psychiatric illnesses (e.g. bipolar, schizotypal symptoms) are themselves associated with cognitive distortions. For example, within a sample of regular gamblers, Abdollahnejad et al. found that the severity of personality disorder symptoms was related to delusion-proneness scores, and that delusion-proneness mediated the relationship between personality disorder scores and gambling-related erroneous beliefs (which, in turn, were highly correlated with problem gambling scores). Thus it remains unclear to what extent an association between pathological gambling (PG) and gambling-erroneous beliefs can be explained by the presence of these other comorbidities.

Another potentially confounding variable is substance misuse. Existing evidence shows that there is a high prevalence of substance use disorders among pathological gamblers (Abbott & Volberg, 1991; Becona, 1993; Ciarrocchi & Richardson, 1989; Dickerson et al., 1995; Ladouceur, Dube, & Bujold, 1994; Lesieur & Blume, 1991; Ramirez, McCormick, Russo, & Taber, 1983). For example, a study of 75 treatment-seeking Australian gamblers, by Maccallum and Blaszczynski (2002), revealed that the rate of substance use disorder was higher for pathological gamblers than for the general population. Another study, by Abbott, Williams, and Volberg (2004), showed that risky alcohol consumption was a strong predictor of PG and that this relationship needed to be taken into account in treatment programmes. A Canadian study by Smart and Ferris (1996) who conducted a community telephone survey of 2016 participants in Ontario revealed that alcohol dependency, age and time spent on gambling were the three most significant predictors of pathological gambling.

In several studies, it has been found that substance use (in particular, excessive alcohol use) leads to cognitive deficits (Adams & Victor, 1993; Bates, Labouvie, & Voelbel, 2002; Bolla, Funderburk, & Cadet, 2000; Carlin & O'Malley, 1996; Fals-Stewart & Bates, 2003; Grant, 1987; Kalechstein, Newton, & Green, 2003; Robinson, Heaton, & O'Malley, 1999; Rogers & Robbins, 2001; Rosenberg, Grigsby, Dreisbach, Busenbark, & Grigsby, 2002; Rourke & Loberg, 1996; Solowij et al., 2002). Alcohol use disorders (AUD) have been shown to be associated with impaired decision-making and reasoning (Grant, 1987; Rourke & Loberg, 1996; Tan, Springate, & Tremont, 2012) as well as a greater susceptibility to some forms of irrational belief (Camatta & Nagoshi, 1995; Hutchinson, Patock-Peckham, Cheong, & Nagoshi, 1998; Rohsenow et al., 1989).

Present study

Existing evidence suggests that pathological gamblers are likely to score significantly higher on measures of erroneous gambling-related cognitions than non-pathological gamblers. However, PG has also been found to be positively related to a higher prevalence of alcohol misuse and other related disorders which themselves are associated with a greater susceptibility to irrational thinking. Given these findings, the purpose of this study was to investigate the association between PG, substance misuse and erroneous beliefs. In particular, the aim was to determine to what extent PG is related to gambling-related erroneous beliefs after controlling for the influence of the severity of alcohol misuse reported.

Method

Participants

The sample comprised 140 (59 male and 81 female) gamblers who reported participating at least fortnightly in continuous forms of gambling (e.g. poker machines, racing, sports or casino). The mean age of the sample was 47 years (SD $\frac{1}{4}$ 12.4 years). Their mean score on the NORC DSM-IV Screen Self-Administered (NODS-SA: see below for more details) was $M \frac{1}{4}$ 4.83 (SD $\frac{1}{4}$ 3.04), reflecting the fact that most participants were in the higher risk categories: 73 (52.1% of the sample) were pathological gamblers, 30 (21.4%) were problem gamblers and the remaining 37 (26.4%) were classified as at-risk gamblers.

Procedure

The study procedure has been reported previously by the authors and is summarized here for convenience. Regular (at least fortnightly) gambling was employed as an inclusion criterion for two reasons. The first was to ensure sufficient statistical power for comparisons between pathological gamblers and other gamblers. The second was to follow Orford's (1985) suggestion that greater attention needs to be directed towards comparisons between pathological gamblers and regular but non-pathological gamblers. Specifying regular gambling as an inclusion criterion made it less likely that differences in gambling status (i.e. non-pathological versus pathological) would be confounded with the effects of differences in gambling frequency.

Participants were recruited from the general community by advertising in urban and rural community newspapers in southern Australia. Participants were asked to contact the first author, a graduate student with considerable mental health experience, who administered a short screening telephone interview. This included demographic questions and gambling participation questions, to ensure that volunteers met the study criteria. A package of measures, a consent form and other related information were then mailed out for self-completion. Once this was returned, the first author conducted a second telephone interview to check and validate responses and finalize data collection. Finally, upon completion of all study requirements, each participant was mailed a \$50 gift voucher. Study design and procedures were approved by the University of Adelaide Human Research Ethics Committee.

Measures

Pathological gambling

Respondents completed the NODS-SA for gambling problems (Fager, 2007; Gerstein et al., 1999) which is based on DSM-IV (American Psychiatric Association, 1994) criteria for PG. NODS-SA is a self-administered form of the original NODS, producing similar results (Fager, 2007). The response format, based on yes $\frac{1}{4}$ 1 and no $\frac{1}{4}$ 0, generates a total score between 0 and 10. Respondents' scores divided them into three categories: at risk gamblers (1–2), problem gamblers (3–4) and pathological gamblers (5–10). The Cronbach's alpha coefficient for this measure was .84 in the current study.

Belief Scale

The Belief Scale (Malouff & Schutte, 1986) is a 20-item self-report measure of irrational belief based on Ellis' theory. This measure has demonstrated strong internal consistency, high test-retest reliability and good discriminant validity from negative affectivity (Solomon & Haaga, 1995). The scale examines beliefs and cognitive styles that are common in psychological disorders. These include catastrophizing, black-and-white (all-or-nothing) thinking, low tolerance of uncertainty, and irrational inferences about other people's emotional states or intentions. In the current study, the Cronbach's alpha value for this scale was .80.

The Drake Beliefs about Chance inventory

The Drake Beliefs about Chance (DBC) inventory (Wood & Clapham, 2005) is a 22-item self-report questionnaire measuring erroneous cognitions about chance-based events. It has 2 parts or dimensions, illusion of control and superstitious beliefs, each with 11 items. Each dimension can score 11–55; thus total DBC scores can range from 22 to 110. According to Wood and Clapham (2005), the DBC measure has good internal reliability and its two dimensions are strongly related to higher frequency of gambling participation, in samples drawn either from gambling treatment centres or from the general population. In the current study, the overall Cronbach's alpha was .79.

Delusion proneness

The Peters et al. Delusions Inventory (PDI; Peters, Joseph, & Garety, 1999) assesses delusional ideation in the normal population. It was designed to examine unusual thinking in

non-psychotic populations and comprises 21 items about unusual beliefs. For each item, the respondents need to rate whether they endorse the belief: 'yes' or 'no'. For each endorsed item, participants are then asked to rate (on a scale of 1 to 5) the degree of distress caused by the belief; then how much he/she is preoccupied with this thought; and, finally, how much he/she believes that this thought is true. The Cronbach's alpha for this study was .85.

Gambling-Related Cognitions Scale (GRCS)

The GRCS (Raylu & Oei, 2004) is a 23-item self-report measure assessing a variety of gambling-related cognitions that occur in the general population as well as in PG. Items are on a 7-point Likert scale: 1 ¼ 'strongly disagree' to 7 ¼ 'strongly agree'. The GRCS has five sub-scales: (a) interpretative bias (e.g. 'Relating my winnings to my skill and ability makes me continue gambling'); (b) illusion of control (e.g. 'I have specific rituals and behaviours that increase my chances of winning'); (c) predictive control (e.g. 'Losses when gambling are bound to be followed by a series of wins'); (d) gambling-related expectancies (e.g. 'Having a gamble helps reduce tension and stress'); and (e) perceived inability to stop gambling (e.g. 'I am not strong enough to stop gambling'). In the current study, the Cronbach alpha coefficient was .84.

Alcohol use disorders

The Alcohol Use Disorders Identification Test (AUDIT) (Babor, Higgins-Biddle, Saunders, & Monterio, 2001) consists of 10 questions screening for hazardous and harmful alcohol consumption. Every AUDIT question is scored from 0 to 4, with an overall score ranging from 0 to 40. The suggested cut-offs are 1–7 for low risk drinking, 8–15 for hazardous drinking, 16–19 for harmful drinking, and scores of 20 or more indicating alcohol dependence (Babor et al., 2001). In this study, a cut-off score of 8 (indicating hazardous drinking) was used as the basis for differentiating between different alcohol consumption groups. The Cronbach's alpha for this measure was .89 in the current study.

Results

(a) Correlation analysis

As Table 1 indicates, all cognitive measures were generally positively related, with effect sizes being moderate to large. Consistent with the group comparisons, higher scores on the NODS were generally associated with higher scores on the cognitive measures, whereas

relationships between the AUD scores and the cognitive scores were less consistent. AUD was positively associated with belief scores, but not the other measures. Higher pathological gambling scores were associated with higher AUD scores (although this relationship was small).

Table 1.

Correlation of pathological gambling, belief scales and alcohol used disorder scores

	<i>Belief scale</i>	<i>PDI</i>	<i>AUD</i>	<i>Drake</i>	<i>NODS</i>
GRCS#	.60***	.46***	.14	.70***	.54***
Belief scale		.60***	.25**	.50***	.48***
PDI##			.13	.48***	.40***
AUD###				.07	.20*
Drake^					.40***

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed); # Gambling-related Cognitions Scale; ## The 21-item PDI (Peters et al. Delusions Inventory); ### Alcohol Use Disorder; ^The Drake about Chance Inventory.

(c) Hierarchical regression

An analysis was conducted to determine whether: (a) participants with a combination of the two disorders (AUD and PG) had higher GRCS scores than those who were classified only as pathological gamblers; and (b) whether a combination of PG, AUD and higher delusion proneness was associated with higher GRCS scores. These hypotheses were tested by creating two-way and three-way interaction terms and entering these after having controlled for the individual or main effect of these variables on earlier steps. All variables were centred prior to the creation of the respective product terms. As indicated in Table 2, the main effects were entered in Step 1, the two-way interactions in Step 2 and the three-way interaction in Step 3. The results revealed no significant two-way interactions, but a significant three-way interaction. This three-way interaction was broken down systematically to investigate its source. The sample was divided into low and high AUD score subgroups based on scores above and below 8 (the cut-off for hazardous drinking). This analysis revealed that the 2-way interaction between PDI scores \times NODS was significant at high

levels of alcohol misuse ($\beta = .35$) ($t = 2.46, p < .05$), but not at low levels of alcohol misuse ($\beta = -.08, t < 1$). A second analysis then examined this two-way interaction by examining the association between the NODS and GRCS scores at high and low levels of PDI based on a median split. This showed that NODS scores were highly correlated (.49) with GRCS scores when PDI scores were high but not when they were lower ($r = .12$). In other words, the analysis of the three-way interaction indicated that the NODS–GRCS relationship was strongest when people scored highest on the measure of delusion-proneness and also had hazardous alcohol misuse scores.

Table 2.

Hierarchical regression analysis: predictors of gambling-related cognition scores (GRCS)

Variables	Model 1				Model 2				Model 3			
	B	SE	Beta	t-value	B	SE	Beta	t-value	B	SE	Beta	t-value
<i>Step 1</i>												
AUD [^]	1.08	1.96	.07	<1	1.97	2.78	.12	<1	.76	2.71	.05	<1
PG ^{^^}	3.36	.86	.30	3.90***	3.47	.91	.31	3.80***	3.23	.89	.29	3.65***
PDI [#]	.04	.01	.34	4.37***	.04	.01	.31	3.77***	.03	.01	.27	3.33**
<i>Step 2</i>												
PG × AUD					-1.70	3.95	-.09	<1	-.58	3.83	-.03	<1
PG × PDI					.34	.45	.06	<1	-.12	.46	-.02	<1
<i>Step 3</i>												
PG × AUD × PDI									.98	.30	.25	3.20**
F-value				(4, 135) 15.57***				(7, 132) 8.90***				(8, 131) 9.61***
R ²				.32				.32				.37
ΔR ²				.32				.005				.05

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed); [^] Alcohol Use Disorder; ^{^^} Pathological gambling; [#] The 21-item PDI (Peters et al. Delusions Inventory)

Discussion

Although several studies have revealed an association between PG and erroneous gambling-related cognitions, it has been unclear to what extent this effect might be explained by other co-morbid problems, including substance misuse that can impair neuropsychological functioning (e.g. a more general proneness to delusions). This study showed that alcohol misuse was indeed positively related to PG and that pathological gamblers had higher scores on delusion proneness. However, contrary to predictions, there was no significant association between alcohol misuse scores and GRCS scores, and the relationship between PG (NODS) and GRCS scores remained significant after controlling for alcohol misuse scores. We also found no significant relationship between AUD scores and delusion proneness scores, although higher AUD scores were associated with elevated scores on the Belief Scale (a measure of dysfunctional thinking often common in psychological disorders such as depression and anxiety). On the other hand, our results found some evidence of a three-way interaction: that being more delusion prone and having higher alcohol misuse in combination with higher PG scores was associated with the highest GRCS scores.

In broad terms, our results are consistent with other studies that have shown an association between PG and irrational beliefs (Emond & Marmurek, 2010; Miller & Currie, 2008; Myrseth et al., 2010; Toneatto et al., 1997; Xian et al., 2008) and substance use disorders (Becona, 1993; Ciarrocchi & Richardson, 1989; Dickerson et al., 1995; Ladouceur et al., 1994; Lesieur & Blume, 1991; Ramirez et al., 1983). Our results also support previous findings (e.g. Adams & Victor, 1993; Bates et al., 2002; Bolla et al., 2000; Carlin & O'Malley, 1996; Fals-Stewart & Bates, 2003; Grant, 1987; Kalechstein et al., 2003; Robinson et al., 1999) that substance misuse is related to higher scores on general measures of dysfunctional thinking (in this case, the Belief Scale). PDI scores were also positively related to both PG and GRCS scores, which suggests that pathological gamblers are more prone to general delusional beliefs than other people, and that having more delusional beliefs may be a risk factor for erroneous beliefs specifically related to gambling. In this sense, these findings support the broad conclusions of Toplak et al. (2007) who argued that the decision-making and belief structures observed in PG might reflect broader underlying differences in cognitive functioning. In their study, pathological gamblers scored worse, not only on cognitive measures related to gambling beliefs, and self-reported impulsivity, but also on measures of superstitious reasoning and irrational beliefs about causality.

Although alcohol misuse was found to be related to PG, it appears that it may only have an indirect effect on gambling-related erroneous cognitions. Rather than elevated drinking being directly related to elevated delusional thinking, the evidence from the interaction analysis suggests instead that alcohol misuse may serve as a moderator. If pathological gamblers also experience problems associated with alcohol then this may be an additional factor that may increase their vulnerability for developing erroneous beliefs related to gambling. This observation is consistent with a small number of studies which have shown that people's gambling behaviour can be influenced if they consume alcohol while gambling (e.g. Baron & Dickerson, 1999; Giacomassi, Stitt, & Vandiver, 1998; Kyngdon & Dickerson, 1999). For example, in a study of 44 video lottery terminal players who were either non-pathological or probable pathological gamblers, Ellery, Stewart, and Loba (2005) found that alcohol consumption increased duration of gambling and amounts lost, particularly among probable problem gamblers. Similarly, Crance and Corbin (2010) conducted an experimental study among 130 young adults and found that alcohol use was associated with large average bets and the loss of all available funds. In the current study, we did not measure the extent to which alcohol consumption might affect cognitions during gambling sessions, but this would be another potentially useful avenue of investigation. Gamblers could, for example, be interviewed while gambling and blood alcohol readings could be taken to examine to what extent intoxication influences cognitive processes.

Methodological considerations

A strength of this study was its community sample of regular gamblers, including sufficient representation of pathological gamblers to allow valid statistical comparisons. It avoided recruitment of student populations, those already in treatment or those who gambled at a low frequency. The study was rigorous in utilizing well-established and standardized psychometric measures, and combining psychometric measurement with clinical interviewing and follow-up questions. Despite these strengths, there are a number of caveats that need to be taken into account when interpreting the results from this study. The first is that the sample was drawn from volunteers in the community, and it is possible that gamblers who are willing to respond to advertisements for research participation may differ from others. Although similar issues apply – and arguably to a greater extent – in many published studies using treatment populations, this sample is also likely to be biased towards an over-representation of people with both PG problems and other co-morbidities. Such biases do not obviate the capacity to undertake research examining the relationship between variables, but

caution must be applied when generalizing the findings to gamblers in the community. In general, the prevalence of morbidities will be lower and correlations may actually be stronger than we report if there is less attenuation of scores on the scales which we used.

Conclusions and implications

This study confirmed that PG is associated with a higher prevalence of delusional beliefs, erroneous beliefs about gambling and alcohol misuse. However, the relationship between PG and erroneous beliefs does not appear to be confounded by the co-occurrence of AUD. Instead, the evidence points to alcohol misuse being an additional risk factor that increases the likelihood of erroneous beliefs emerging in pathological gamblers. These findings underscore the importance of assessing co-morbidities in the treatment and assessment of PG and the extent to which these factors make people more likely to developing gambling-related problems. They suggest the need for multidisciplinary treatment approaches that address the principal manifestations of PG (namely, the problematic behaviours and cognitions), but which also extend their focus to underlying social, psychiatric and neuropsychological vulnerabilities that may have predated the gambling behaviour – and, specifically, problematic substance use.

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Chapter 7: General Conclusion

Overview of Thesis Aims

The broad aim of the present thesis was to explore and illuminate relationships between dysfunctional beliefs, Axis I and II psychiatric disorders, and pathological gambling (PG), with potential implications for the development, maintenance and treatment of gambling problems. Several different sets of analyses were undertaken and these resulted in submission of four separate research articles which are summarised below.

In brief, the first paper focussed on the prevalence of psychiatric co-morbidities in a community sample of regular gamblers and the extent to which these clustered in pathological gamblers. A second paper then examined the link between PG and gambling-related dysfunctional beliefs after controlling for borderline personality disorder (BPD) and compared the strength of the pathways linking BPD, general irrational beliefs, gambling-related erroneous beliefs and PG. A third paper investigated whether the prevalence of psychiatric comorbidities was higher amongst pathological gamblers or those who exhibited a dual diagnosis; namely, a co-existing alcohol use disorder (AUD). The fourth paper examined the links between substance use disorder (SUD), PG and dysfunctional beliefs: specifically, the degree of association between gambling-related erroneous beliefs and PG after controlling for the severity of alcohol use.

Summary of Papers

Paper 1

This paper examined psychiatric disorders amongst a large sample of regular (either pathological or non-pathological) gamblers recruited from the South Australian community and found that 50% of the non-pathological gamblers and 91% of the pathological gamblers met criteria for at least one mental health disorder. Notably, over 25% of participants had alcohol dependence and 20% exhibited at least one anxiety disorder. Furthermore, two-thirds had a mood or anxiety disorder plus at least one other psychological disorder. SUD, PDs and mood disorder were all significantly more prevalent in pathological gamblers than in non-pathological regular gamblers. Avoidant, paranoid, obsessive-compulsive and borderline

personality disorder were the commonest PDs among the pathological gamblers within our sample.

This study suggests that, given the elevated prevalence of psychiatric disorders among pathological gamblers, clinicians are likely to encounter many challenges when treating these clients for their gambling problems. It follows that for gambling treatment services to be effective, at least some of their staff must be suitably qualified to conduct formal mental health diagnostic interviews, and to administer and interpret a variety of psychometric diagnostic measures relating to co-morbidities. When planning interventions, therapists need to take into account the extent to which Axis I and II co-morbidities may contribute to the maintenance, development and severity of the client's problematic gambling. Some co-morbidities mandate additional psychological support and possible referral to other professions or services, and have significant implications for treatment adherence and outcomes. For example anxiety, depression and PDs may make it more difficult for clients to engage with therapists and to accept any form of assistance which involves much social interaction. Another possible implication is that clinicians or services who are treating people for other mental health problems (e.g., in a dedicated mental health service) may be well-advised to screen their clients for PG.

Paper 2

This paper explored a potential cause of, or contributor to, the development of irrational beliefs among pathological gamblers. The paper found that general maladaptive or dysfunctional beliefs commonly found among people with BPD appear to be related to elevated scores on gambling-specific belief scales. These results suggest that there may be a link between BPD and the extent to which a person is vulnerable to developing erroneous cognitions associated with gambling. More broadly, the findings of this study support the existing evidence regarding the role of cognitive distortions in development and maintenance of PG.

These findings further support the need for clinicians to conduct thorough assessments in order to exclude or address underlying psychiatric problems and disorders that potentially influence people's susceptibility to PG. It may be that many existing treatment services that

rely heavily on social work and counselling approaches are unsuitable for assessing or treating some clients. Thus referrals are needed to other professionals with suitable training.

It is likely that clients with significant comorbidities, especially those meeting Axis II criteria, may need and benefit from therapies with demonstrated effectiveness in the treatment of PDs and in particular borderline personality disorder: for example, the emergent ‘third-wave’ therapies such as Acceptance and Commitment Therapy (ACT) (e.g., Gratz & Gunderson, 2006) or Dialectical Behaviour Therapy (DBT) (e.g., Linehan, 1993), which are an important contemporary development in psychotherapy.

According to Hayes, Follette, and Linehan (2004) the various “third-wave” therapies have a shared focus on mindfulness, the relationships between the client and therapist, defusion and acceptance. The third wave has been variously described as a dramatic change in behaviour therapy (Hayes, Luoma, Bond, Masuda, & Lillis, 2006); as a significant enhancement to traditional CBT approaches (Hayes et al., 2004); and as an incorporation of Eastern beliefs about the mind and body into the frame-work of cognitive-behavioural approaches (Williams & Swales, 2004). The recent and rapidly accumulating evidence for this new wave of therapies in a number of psychological disorders– and in particular for people with PDs, depression or anxiety disorders – suggests they may have potential for the treatment of PG and PDs.

Mindfulness, for example, has recently been shown to have a negative correlation with impulsivity and accordingly may be an effective way to regulate the negative urgency among pathological gamblers (Peters, Erisman, Upton, Baer, & Roemer, 2011). Mindfulness could help pathological gamblers to focus on the here and now, and be more aware of what they are doing, leading to better regulation of behaviour and emotions when distressed. Furthermore, as Peters et al. (2011) suggest, maintaining a non-judgmental stance is another mindfulness practice that can contribute to people’s accepting and tolerating strong emotions, rather than negatively evaluating them and seeking to avoid them (e.g. by gambling more or using substances). With regard to cognitions, Toneatto, Vettese, and Nguyen (2007) suggest that mindfulness may contribute to changing gamblers’ behaviour by altering the way they relate to their gambling-related cognitions. Mindfulness techniques could potentially make pathological gamblers more attuned to maladaptive or erroneous patterns of thought. As a result, this may assist gamblers to develop greater self-awareness and control over their behaviour.

Paper 3

The third paper in this project compared the incidence of psychiatric co-morbidity between participants with single and dual diagnoses (PG alone versus PG with an AUD). Within our sample of regular gamblers, the pathological gamblers (either with or without the dual diagnosis that included an alcohol problem) generally exhibited more psychiatric disorders than those gamblers who did not meet criteria for either gambling or alcohol problems. These differences were most evident in relation to cluster A and B personality disorders. People with a dual diagnosis generally reported more problems than those in the other two categories: these relationships remained significant after controlling for gender. These findings suggest that AUD may provide some explanation for the higher prevalence of psychiatric comorbidity among pathological gamblers, compared with other regular gamblers. It supports a need to take AUD into account as an important and potentially confounding factor, both in research and in clinical practice.

Paper 4

The purpose of this fourth study was to examine the association between PG, AUD and dysfunctional beliefs. Specifically, the study sought to determine to what extent PG was related to irrational beliefs after controlling for the severity of AUD. As expected, the relationship between PG and gambling related-cognition scores remained significant even after controlling for AUD scores. It was also found that AUD was positively associated with delusion proneness and PG, but that, contrary to expectations, alcohol misuse was not significantly related to gambling-related erroneous beliefs. Nevertheless there was some evidence, in the form of a 3-way interaction, to suggest that a combination of higher PG, higher delusion proneness and alcohol misuse was linked with higher gambling-related erroneous beliefs.

Methodological Limitations

As with other research projects, there are a number of methodological factors that must be acknowledged when assessing the validity of the findings in the four papers. The first limitation is that although the findings in this project are derived from a large sample of

regular gamblers, they were all volunteers recruited from the community. It is likely that these people were not entirely representative of the wider population of regular and problem gamblers in the community. Typically, volunteer samples of this kind contain an over-representation of younger people and of people with other co-morbidities. People in these categories are more likely to be at home during the day, to read advertisements for studies in community newspapers, and to have time available for research participation.

Notwithstanding this, the study sample had sufficient variability and power to permit most of the planned analyses to be undertaken. Moreover, using this recruitment method allowed us to avoid the potentially more severe biases that might have resulted from using a clinical population, or recruiting through a telephone survey.

A second limitation was the choice of measures. The majority were self-report instruments. Such measures are subject to recall and availability biases as well as socially desirable responding. Ideally, we would have conducted the structured psychiatric interviews face-to-face, which would have allowed for more elaboration and clarification of verbal and non-verbal responses. However because of the inconvenience of this option for participants, particularly those with mental health disorders, electing to interview face-to-face would have likely reduced the sample size and diversity and also the geographic range of available participants. Telephone interviewing was selected as the next best option, still providing the opportunity to check and validate any ambiguous responses to the interview questions and the mailed-out questionnaires.

Future Research Directions

There are a number of ways in which this project can potentially be extended and improved in future research studies. The first is that it will be important to examine to what extent these findings generalise to the wider population of gamblers. In this project, participants with a very high prevalence of co-morbidity were recruited by focusing on regular gamblers and those who were receptive to being sampled from the community using advertisements. Although recruitment techniques of this nature are effective when seeking to recruit problem gamblers, the degree of variability in the sample and therefore the strength of potential statistical effects may have been greater if a broader sample had been recruited. It is likely, for example, that if a sample was recruited from the community through more randomised methods (e.g. the electoral roll) there would not necessarily be the same high

levels of co-morbidity throughout, making it easier to discern clear differences between problem and non-problem gamblers. Second, a larger total sample size may have made it possible in paper 3 to conduct four-way comparisons, additionally including data from a fourth subgroup: regular gamblers who had AUDs but were not pathological gamblers. The current study sample did not contain enough of these gamblers for their data to be meaningfully included in study 3. Such four-way analyses may provide clearer insights into the differences between pathological gamblers and other regular (but non-pathological) gamblers who have SUDs.

Another important extension of this study would be to expand the focus beyond analysis of self-report measures, by additionally adopting research strategies that enable gambling behaviour, beliefs and cognitive processes to be observed *in situ*. For example, it would be useful to compare the responses of pathological gamblers and non-pathological gamblers on tasks designed to measure specific heuristics and biases. Such methods have previously been used by Toplak, Liu, Macpherson, Toneatto and Stanovich (2007). Important information-processing biases that could be examined include: the illusion of control; illusory correlation tasks and confirmation bias. Some of these tasks could involve exposure to sequences of gambling events that imply relationships between actions and outcomes or which imply particular interpretations, but where there is disconfirmatory information. It would be hypothesised that pathological gamblers would more susceptible to these biases than other gamblers and that the results obtained using these experimental tasks would be correlated with scores on gambling-related belief scales. In other words, it would be possible to validate existing gambling-related belief scores to examine to what extent they predict actual differences in decision-making in pathological gamblers.

Another productive extension of this research would be to include a more comprehensive set of belief measures, targeting specific co-morbid conditions. In the current project, general clinical belief scales were used to examine the presence of beliefs common in clinical populations. It would be useful to capture and measure the particular cognitions that are thought to be specific to individual disorders such as borderline personality disorder. The models in paper 2 could then be examined in more detail with a focus on particular disorders and how these might influence people's susceptibility to information processing biases as well as erroneous beliefs about chance, probability and the causal relationship between behaviour and outcomes. As mentioned above, recent theoretical and therapeutic

developments suggest that it could also be useful to include some third wave meta-cognitive measures, for example of mindfulness and defusion.

Future Clinical Directions

As this project demonstrates, many pathological gamblers also meet criteria for a variety of mental illnesses that may maintain and exacerbate problems, complicate treatment and elevate drop-out rates among pathological gamblers in treatment. It follows that a thorough initial assessment including comorbid mental disorders is essential in gambling treatment services.

It also follows that counsellors and therapists in gambling services need to be competent not only in the treatment of PG, but also in at least one evidence-based intervention for the treatment of the psychiatric comorbidities that are prevalent among their clients. For example, third-wave therapies have been shown to be effective for a wide range of psychological disorders common among pathological gamblers such as PDs, depression, anxiety disorders and SUD. Effective treatment of substance abuse, particularly alcohol abuse, is crucially important because it has such a detrimental role: compounding the pathological gambling and complicating gambling-related problems.

Another recommendation for the improvement of treatment services for pathological gamblers in Australia, particularly in South Australia, is that on a policy and staffing level, services need to commit to evidence-based and multi-disciplinary approaches. Assessments and interventions need to be based on the best available evidence, so staff teams must be trained and credentialed in conducting and utilising evidence-based assessments and therapies, including third-wave therapies. Best practice would therefore require the routine involvement of multidisciplinary teams: for example a psychiatrist, a psychologist, a financial counsellor and a social worker. Such teams could offer better and more multifaceted initial evaluations of clients, and also deliver and monitor a broader range of evidence-based interventions. Costs might be offset by obtaining reducing treatment drop-outs, improving adherence, and delivering better and faster client outcomes: thus reducing gambling-related harm to clients, their families and the community.

As mentioned in Chapter 2, the initial choice of thesis topic was based on clinical experience as a counsellor in a service for pathological gamblers. By clarifying the links

between dysfunctional beliefs, Axis I and II psychiatric disorders, and PG, and suggesting new directions for research and practice, this project potentially contributes to better research and outcomes for pathological gamblers, clinicians, families and communities.

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