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The Relationship Between Problem Gambling and Mental Illness in Indigenous Populations: A Systematic Literature Review

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ABSTRACT

TITLE

The Relationship Between Problem Gambling and Mental Illness in Indigenous Populations: A Systematic Literature Review

BACKGROUND

Despite higher rates of mental illness and problem gambling in Indigenous Australians, few studies specifically examine the links between them or address possible underlying factors relevant to both. Given the lack of research in the Aboriginal and Torres Strait Islander communities, a systematic literature review was conducted of research into mental illness and problem gambling in international Indigenous populations.

OBJECTIVE

This systematic literature review aims to examine studies of the relationship between problem gambling and mental illness in Indigenous populations worldwide.

HYPOTHESIS

That Indigenous populations will experience higher rates of both problem gambling and mental illness compared to non-Indigenous populations, and these are inter-related.

METHODS

A systematic review was undertaken according to PRISMA guidelines [42]. Online, indexed databases were searched for relevant studies relating to the objective of this literature review. Only data-based empirical studies were included.

RESULTS

17 studies were identified. Study quality was variable, with high variation in methods, statistical reporting and control groups. Consistently found was a relationship between problem gambling and mental illness in Indigenous populations in several regions. In particular, problem gambling is frequently comorbid with other addictive disorders (notably alcohol and nicotine), anxiety disorders, and cluster B personality disorders.

CONCLUSION

Problem gambling and mental illness appears inter-related in several Indigenous populations worldwide, although the research is limited. The application of this to the Australian context has several important caveats. The nature of this relationship requires further research, with larger sample sizes and improved methodologies.

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BACKGROUND

Aboriginal and Torres Strait Islander Community Inequality

The Royal Australian and New Zealand College of Psychiatrists (RANZCP) position statement on constitutional recognition for the Indigenous people of Australia notes the inequality they suffer as an ongoing consequence of colonisation, resulting in 'discrimination, marginalisation, [and] disempowerment' [1].

At the last census count in 2016, Aboriginal and Torres Strait Islander people numbered 2.8% of the Australian population [2]. They are over-represented in statistical indices of deprivation and inequality, with poorer health and well-being reflected in a lower life expectancy compared to non-Indigenous people [3].

Mental Illness in Indigenous Australians

Indigenous Australians also experience a significantly higher prevalence of mental illness compared to the non-Indigenous population. Including common mental disorders like anxiety, mood and addiction disorders, measured using standardised tools such as the Structured Clinical Interview for DSM-IV (SCID-I) [4]. Major depressive disorder rates were confirmed as elevated using the Kimberly Indigenous Cognitive Assessment of Depression, a culturally validated measure [5]. In a self-report survey, 29% of Indigenous respondents indicated they had once been told by a doctor or nurse they had a mental health condition [8].

Furthermore, higher rates of Serious Mental Illness (SMI) such as psychosis (including substance-induced illness and schizophrenia) have been reported [6]. Mental illness and

substance use disorders were found to be the leading cause of disability-adjusted life years (DALYs) being higher for Indigenous Australians than non-Indigenous Australians [7].

Problem Gambling in Indigenous Australians

Similarly, rates of gambling and problem gambling have consistently been found to be elevated in Indigenous populations. Problem gambling is widely defined as: "characterised by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community" [9, 10, also see Appendix 1].

A 1996 study compared 222 Indigenous Australians to a control cohort of 1390 non-Indigenous Australians [11]. It found a problem gambling rate of 11%, around twenty times higher than non-Indigenous respondents. In addition, weekly spend on gambling was significantly higher, with a greater number of gambling sessions per week. Roughly five times as many Indigenous gamblers sought help for gambling related harms, with significantly higher levels of reported negative impacts from gambling [11].

The literature on gambling and problem gambling in Indigenous Australians was reviewed in 2013 [12]. Limitations of the few research studies available at that time included small sample sizes, non-representative samples, the lack of ability to generalise from the studies, and a lack of empirical evidence to guide policy [13, 14].

The largest study on gambling in Indigenous Australians to date followed this report. It involved 1259 Indigenous Australians who completed a survey in 2014. 19.5% were identified as problem gamblers. Key risk factors for problem gambling included: male sex,

divorcees, widowed gamblers, motivation as a form of therapy or escape, and more likely to drink or use drugs when gambling [15].

Thus, despite apparently higher rates of both mental illness and problem gambling in Indigenous Australians, few studies specifically examine the links between them or address possible underlying factors relevant to both. This is a crucial gap in the literature that underscores difficulty in informing policies aimed at addressing significant Indigenous health discrepancies.

Mental illness and Problem Gambling in Indigenous Australians

There is a body of research from general population studies that examines the known association between mental illness and problem gambling [22]. However, there are few studies in Aboriginal and Torres Strait Islander communities in which mental illness and problem gambling are considered together, with two notable exceptions: Dickerson et al. [11], and Hing et al. [15-18]. The findings of these studies will be presented in this literature review.

Mental illness and Problem Gambling in Indigenous Populations Worldwide

Given the lack of research on mental illness and problem gambling in the Aboriginal and Torres Strait Islander communities, a systematic literature review was conducted to include international Indigenous research, noting both the benefits and limitations of applying analogous research from Indigenous populations worldwide.

There is a shared history of colonisation affecting indigenous communities that may allow research to be considered applicable in some ways among each [19, 20]. Across the world,

Indigenous people are known to suffer disproportionately high burdens of mental illness, including depression, anxiety, substance abuse and suicide [19]. They also experience high rates of infectious disease, chronic illness and child mortality [20].

These disparities are greatest in poorer countries, but even in wealthier countries basic health care may not be accessed due to financial, geographic or cultural barriers. Indigenous people in rural areas especially suffer contamination of and displacement from their land due to industry and extraction of natural resources [20].

Significant differences in the impact and consequences of such colonisation also exist between Indigenous communities, such as The Treaty of Waitangi in New Zealand, compared to Australia where there exists no Indigenous constitutional recognition [21]; different health care systems between countries; and differing levels of rural compared to urban living [20].

Consideration will be given as to how the international literature may or may not apply in the Australian context.

OBJECTIVES

The aim of this literature review was to examine studies of the relationship between problem gambling and mental illness in Indigenous populations worldwide.

METHODOLOGY

Target Studies

This review was of original empirical research undertaken in Indigenous communities across the world, seeking to understand the relationship that exists between mental illness and problem gambling. In order to maximise the yield of studies for inclusion, there were no restrictions placed on sample size, control group methodology or quality of studies. The target population was Indigenous adults.

Inclusion Criteria

Any study based on original empirical data that addresses the objective of the review: Indigenous population; published research in peer-reviewed journal, English language; full text availability; original research study focusing on mental illness (including substance use disorders and personality disorders) and gambling in an Indigenous population.

Exclusion Criteria

Papers that do not address both problem gambling and mental illness in the target population: case studies; papers without empirical data (such as reviews, opinion pieces or editorials); papers published in a language other than English.

Search Strategy

The following databases were searched for relevant articles: PsychINFO, Ovid Medline, EMBASE, PubMed. Key search terms related to gambling, Indigenous, and mental disorders. The references of all studies resulting from the search were also checked for further studies. For the complete search strategy please see Appendix 2.

Selection of Relevant Studies

The author reviewed the electronic database references and removed duplicates and others where Indigenous gambling and mental health were not the primary focus. Abstracts of the remaining articles were read and any articles not relevant to the study were removed. For those studies in which inclusion criteria were met the full article was sourced and assessed for relevancy. The references of all full-text articles screened were searched for potential additional papers. Where uncertainty arose regarding inclusion an independent reviewer was consulted.

Data Extraction and Synthesis

The included articles were read and relevant data synthesised for the review and incorporated into tables where appropriate. A meta-analysis was not possible due to variability in statistical methods and reporting, with many papers not reporting effect sizes or estimates of precision.

RESULTS

Search Results

A search of electronic databases returned 235 references. After duplicates and studies where the primary focus was not relevant were removed 137 abstracts were screened. Of these, 67 full text articles were assessed for eligibility and 15 articles subsequently included.

Excluded studies did not include data on problem gambling, or alternatively mental illness, or did not address an Indigenous population.

Reviewing the references of included studies yielded 2 further article meeting inclusion criteria. A total of 17 studies were included in the final review.

Figure 1 is a search result summary flowchart.

Table 1 provides a summary of all studies included.

FIGURE 1

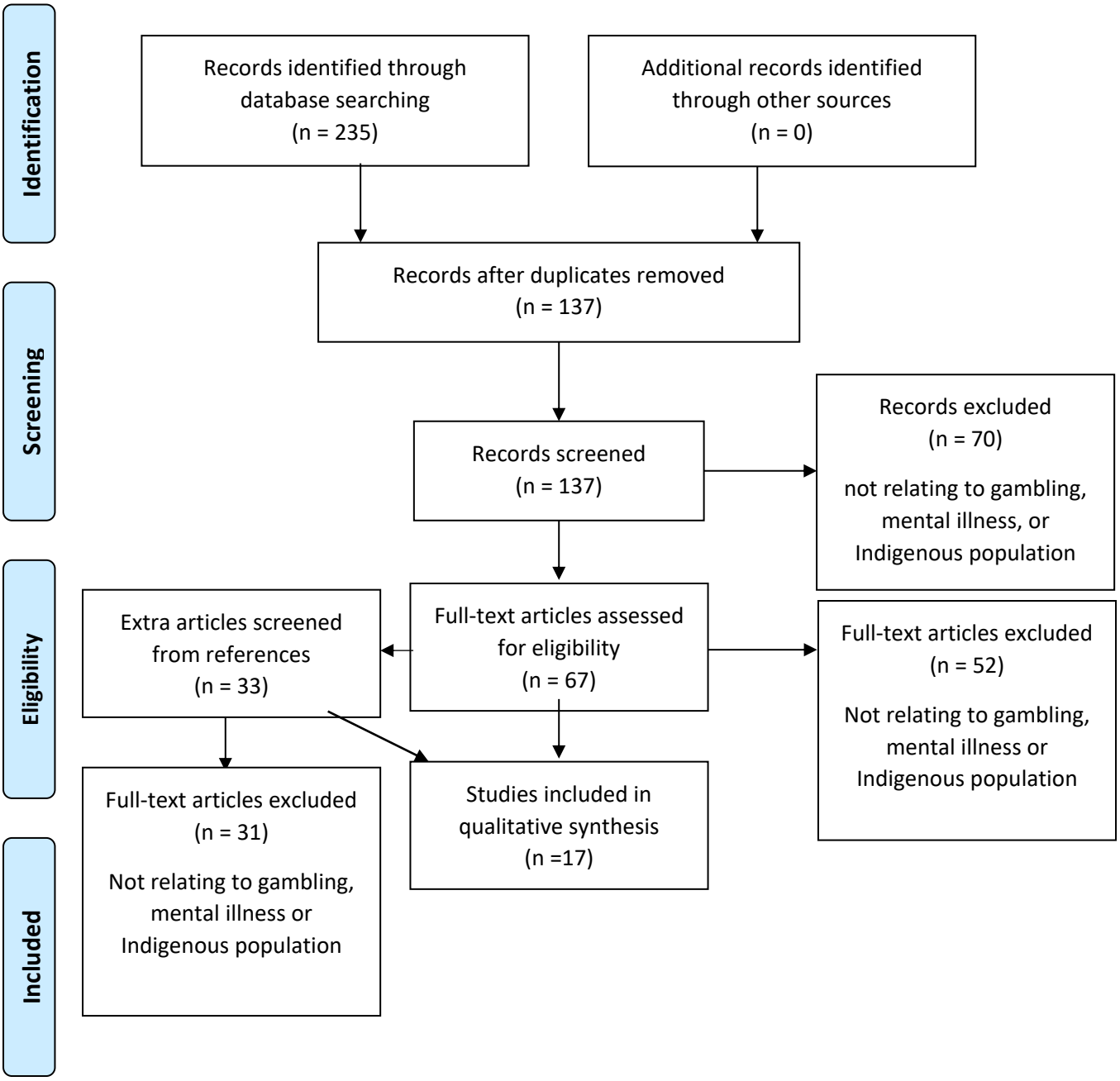
Identification
Screening
Eligibility
Included
Records identified through database searching (n = 235)
Additional records identified through other sources (n = 0)
Records after duplicates removed (n = 137)
Records screened (n = 137)
Records excluded (n = 70)
not relating to gambling, mental illness, or Indigenous population
Full-text articles assessed for eligibility (n = 67)
Full-text articles excluded (n = 52)
Not relating to gambling, mental illness or Indigenous population
Extra articles screened from references (n = 33)
Full-text articles excluded (n = 31)
Not relating to gambling, mental illness or Indigenous population
Studies included in qualitative synthesis (n =17)

TABLE 1

AUSTRALIAN STUDIES			
Study/Aim/Population	**Method**	**Key Findings**	**Limitations**
Hing et al 2014 [15-18] To examine gambling harms and gambling help-seeking among Indigenous Australians [15]. To examine risk factors for problem gambling among Indigenous Australians [16]. To examine gambling behaviour and risk factors for Indigenous women [17]. To examine for differences between Indigenous card gamblers and non-card gamblers [18]. N = 1'259, Indigenous men and women Subset N=687 women, N = 1'001 card gamblers	Cross-sectional self-report study, no non-Indigenous comparison group. Key measures included the Problem Gambling Severity Index (PGSI).	19.5% of the total group met criteria for problem gambling [15, 16]. Substantial proportions of problem gamblers reported harms to health, including depression (47.4%) [15]. A significantly higher percentage of problem gamblers cf. non-problem gamblers were motivated to gamble as a means of reducing 'stress, depression and anger' ($p < 0.001$) [16]. 20.2% of the women met criteria for problem gambling [17]. Among female problem gamblers the most commonly reported negative outcome from gambling was 'suffering from depression' (54%) [17]. Problem gambling was significantly higher for card gamblers (34.6%) cf. non-card gamblers (17.7%) ($p < 0.001$) [18]. Compared to non-card gamblers, a significantly higher proportion of card gamblers experienced harms relating to gambling, including depression [18].	Lack of representative sample. Lack of comparison cohort. Self-reported diagnoses. No valid measures of mental illness or diagnoses used. Unable to differentiate depression or anxiety from feelings of stress or anger.
Dickerson et al 1996 [11] To examine positive and negative aspects of gambling. N = 222, Indigenous Australians, 1390 non-Indigenous	Cross-sectional study, non-Indigenous comparison group. Key measures: Southern Oaks Gambling Screen (SOGS); General Health Questionnaire (GHQ12); Alcohol Use Disorder Identification Test (AUDIT).	11% met criteria for problem gambling A positive association was found between harmful drinking levels and gambling related problems (SOGS and AUDIT correlation coefficient 0.3470, $p < 0.001$).	Different sampling methods used in the different groups.

AMERICAN STUDIES			
Study/Aim/Population	**Method**	**Key Findings**	**Limitations**
Dickerson et al 2009 [23] To examine the association between nicotine dependence and mental illness. N = 480, American Indian Veterans	Cross-sectional study, no non-Indigenous comparison group. Key measures included the: Quick-Diagnostic Interview Schedule (Q-DIS).	23.3% met criteria for nicotine dependence, measured using the Q-DIS. Of those with nicotine dependence, 17.1% met criteria for pathological gambling, measured using the Q-DIS, with an odds ratio 2.72 (cf. non-nicotine dependent).	Non-generalisable sample (only men, war veterans). No consideration given to tobacco's traditional use in Native American culture for religious and ceremonial reasons.
Alegria et al 2009 [24] To examine ethnic differences among disordered and pathological gamblers. N = 43'093, Representative sample of adult Americans Subset N = 39 (<0.1%) Native American (15) & Asian (24)	Cross-sectional study, non-Indigenous comparison groups. Data was taken from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). This included measures such as the (Alcohol Use Disorder & Associated Disabilities (AUDADIS-IV); and the Short Form 12v2 (SF-12).	Lifetime prevalence of pathological gambling among Native Americans & Asians 0.56%, measured using the AUDADIS-IV. Native American pathological gamblers had lower scores on the Mental Health scale of the SF-12 compared to Asians ($p = 0.002$).	Small sample size, leading to the combination of Native American and Asian ethnic groups to increase statistical power and stability of estimates. No separate analysis of Indigenous cf. non-Indigenous when comparing variables except for one comparison on the SF-12, completed as a supplementary analysis.
Welte et al 2001 [25] To examine alcohol and gambling pathology among US adults. N = 2'638, General population Subset N = 18 Native Americans (weighted)	Cross-sectional study, non-Indigenous comparison groups Measures included the Diagnostic Interview Schedule (DIS); South Oaks Gambling Screen (SOGS-R).	Pathological or problem gambling rate of 10.5%, pathological gambling rate of 5.3%, measured using the SOGS-R and DIS. High rates of alcohol dependence or abuse, 8.8%, compared to other races.	The pathological gambling rates and alcohol dependence rates related to the entire cohort of Native Americans, there is no comparison between having either illness compared to the other. Small sample size.

AMERICAN STUDIES			
Study/Aim/Population	**Method**	**Key Findings**	**Limitations**
Moghaddam et al 2014 [26] To examine the comorbidity between nicotine dependence and lifetime mental illness. N = 43'093, Representative sample of adult Americans Subset N = 701, American Indians & Alaska Natives	Cross-sectional study, no non-Indigenous comparison group. Data was taken from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). This included the (Alcohol Use Disorder & Associated Disabilities (AUDADIS-IV).	Lifetime prevalence of nicotine dependence 29.5%, measured using the AUDADIS-IV. Of those with nicotine dependence a lifetime prevalence rate of pathological gambling of 1.9%, measured using the AUDADIS-IV.	No significant association, despite previous research indicating high comorbidity rates, likely due to low power as only 4 people met criteria for pathological gambling. No consideration given to tobacco's traditional use in Native American culture for religious and ceremonial reasons.
Kong et al 2016 [27] To examine the association between problem gambling severity and psychiatric disorders. N = 43'093, Representative sample of adult Americans Subset N = 679, American Indians & Alaska Natives	Cross-sectional study, non-Indigenous comparison groups. Data was taken from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). This included the (Alcohol Use Disorder & Associated Disabilities (AUDADIS-IV). Stratified into: non-gambling, low-risk gambling (LRG), at risk/problem gambling (ARPG).	Indigenous people were found to experience a higher problem gambling severity compared to the comparison groups, but this was for low-risk gambling (LRG), not problem gambling (ARPG). Problem gambling severity was statistically associated with a number of axis 1 & 2 disorders in Indigenous ARPG. The number of statistically significant associations between problem gambling severity and mental illness was greater among the comparison groups.	Compared to the other comparison groups the Indigenous group often had small sample sizes, affecting statistical significance. Broader concept of problem gambling, including at risk gamblers.

AMERICAN STUDIES

Study/Aim/Population	Method	Key Findings	Limitations
Westermeyer et al 2009 [28] A comparison of substance use disorder severity and course. N = 362, American Indian Veterans	Cross-sectional study, no non-Indigenous comparison group. Measures included the Q-DIS.	Pathological gambling rate of 15%, measured using the Q-DIS. High rates of alcohol and other drug use in the cohort.	No correlation between problem gambling and substance use.
Elias et al 1993 [29] Incidence of pathological gambling in those with alcohol dependence. N = 85, Native Americans (32) & Caucasian (53)	Case-control study, non-Indigenous comparison group. Measures included to South Oaks Gambling Screen (SOGS).	22% of Native Americans cf. 7.3% Caucasians with alcohol dependence met criteria for pathological gambling, measured using the SOGS.	Small sample size. No significance calculation.
Barnes et al 2017 [30] To examine risk factors for gambling and problem gambling among racial subgroups. N = 3'474 Representative sample of American adults Subset N = 549, Native Americans	Cross-sectional study, non-Indigenous comparison groups. Combined sample of two general population surveys: Survey of Gambling in the US (SOGUS2); Survey of Native American Gambling (SONAG). Measures used included the Diagnostic Interview Schedule (DIS-IV), the revised South Oaks Gambling Screen (SOGS-R), the Canadian Problem Gambling Index (CPGI).	18.2% of Native Americans classified as problem gamblers, measured using the SOGS-R. Among Native Americans classified as having alcohol abuse/dependence, measured using the DIS-IV, 38.3% are problem gamblers (compared to those without alcohol abuse/dependence, the rate was 17%) Among African-Americans with alcohol abuse/dependence the rate was 42.3%, and among Caucasians 23.6%	No statistical analysis made of increased rate of problem gambling in those with alcohol abuse/dependence, noted to be 'large'. The rates were similarly 'large' among the comparison groups.

CANADIAN STUDIES			
Study/Aim/Population	**Method**	**Key Findings**	**Limitations**

Williams et al 2016 [31] To assess the prevalence of gambling and problem gambling in urban Aboriginals N = 1'114 Aboriginal/Metis/Inuit/First Nation	Cross-sectional study, no non-Indigenous comparison group Measures included the Problem and Pathological Gambling Measure (PPGM)	17.2% met criteria for pathological gambling, measured using the PPGM. An additional 10% of the respondents met criteria for problem gambling, measured using the PPGM. For those with problem and pathological gambling, 65.9% reported mental health problems	No comparison cohort Self-recruited cohort Non-representative sample when compared to demographic details from the 2011 general Aboriginal population (e.g. 29.3% participants unemployed, cf 9.2% from general population)
Beaudette et al 2016 [32] To examine the prevalence rates of mental disorder among Canadian federal offenders N = 1'110, Participating federal offenders Subset N=230 Aboriginal	Cross-sectional study, non-Indigenous comparison group Measures included the Structured Clinical Interview for DSM Axis 1 (SCID-I), the Structured Clinical Interview for DSM Axis 2 (SCID-II), the Modified Global Assessment of Functioning – Revised (GAF)	Of the Indigenous respondents, 15.7% met criteria for lifetime of pathological gambling, and 10.9% met criteria for current pathological gambling, measured using the SCID-I, both results higher cf. non-indigenous The Indigenous respondents also had higher rates of alcohol, substance use, and personality disorders, cf. the non-Indigenous respondents	No direct examination of the relationship between problem gambling and mental illness in the Indigenous cohort
Gill et al 2016 [33] To examine the social and psychological impacts of gambling N = 506, Aboriginal/Cree	Cross-sectional study, no non-Indigenous comparison group Measures included the Canadian Problem Gambling Index (CPGI, stratified into non-gamblers, non/low-risk gamblers, moderate/high risk gamblers), PGSI, Addiction Severity Index (ASI), Beck Depression Inventory (BDI), the Computerised Diagnostic Interview Schedule (CDIS-IV)	3.2% of the sample population met criteria for problem gambling, measured using the PGSI. Moderate/high risk gamblers were statistically more likely to experience alcohol dependence, any substance abuse or dependence, have received treatment for drug abuse, and have higher ASI alcohol and drug scores (all $p < 0.05$, after correction for multiple comparisons)	Difficult to assess how representative the sample is

GREENLAND STUDY

Study/Aim/Population	Method	Key Findings	Limitations
Larsen et al 2012 [34] To examine the association between lifetime problem gambling and harmful alcohol and frequent cannabis use. N = 2'189 Greenland Inuit	Cross-sectional study, no comparison group. Measures included the Lie/Bet Questionnaire; CAGE.	12.7% met criteria for problem gambling, measured using the Lie/Bet questionnaire. Lifetime problem gambling was significantly associated with a harmful use of alcohol among men ($p = 0.001$). Lifetime problem gambling was significantly associated with a frequent use of cannabis (men, $p < 0.0001$; women, $p = 0.001$).	Lack of instruments to assess for mental illness, reliance on questionnaire self-report of consumption. No non-Indigenous comparison group.

Overview of Included Studies

PROBLEM GAMBLING AND ADDICTIVE DISORDERS

The majority of studies found elevated rates of both disorders of addiction and problem gambling, though most studies did not formally examine this relationship or report statistical significances of difference.

Alcohol

In Indigenous people with alcohol abuse or dependency, two studies found an association with problem or pathological gambling.

Elias et al. studied a group of 32 Native Americans and 53 Caucasians with alcohol dependence and found higher rates of pathological gambling in the Native American (22%) compared to the Caucasian participants (7.3%) [29]. There was no measure of statistical significance between the two groups.

Barnes et al. studied a group of 549 Native Americans, 363 African Americans, and 2562 Caucasians and others. Among those Native Americans classified as having alcohol abuse or dependence, 38.3% were also classified as problem gamblers, cf. 17% in those without alcohol abuse or dependence [30]. There was no direct correlational analysis or measures of statistical significance between these groups.

In Indigenous people with problem gambling, three studies found an association with harmful alcohol use, abuse or dependency.

Gill et al. studied a group of 506 Aboriginal Cree people from Canada and found moderate to high risk gamblers were more likely to experience alcohol dependency ($p = 0.001$, $p < 0.05$ after correction for multiple comparisons) [33].

Kong et al. studied a group of 679 American-Indian and Alaska-Native people as part of a larger group of 43'093 other American adults of different races. Those Indigenous people classified as 'at risk problem or pathological gamblers' were statistically more likely to meet criteria for alcohol abuse or dependence (33.85%) cf. non-gamblers (9.37%) or low risk gamblers (14.84%) (bivariate analysis, mental illness cf. gambling severity, $p = 0.003$) [27].

Larsen et al. studied a group of 2189 Greenland Inuit and found lifetime problem gambling was associated with a harmful use of alcohol among men, compared to non-problem or non-gamblers (49.6% cf. 34.4%, $p = 0.001$) [34].

In several studies high rates of problem gambling and alcohol dependency were found within the group.

Dickerson et al. studied a group of 222 Indigenous Australians and found a medium effect size correlation between harmful levels of drinking measured using the Alcohol Use Disorder Identification Test (AUDIT) and gambling related problems measured using the Southern Oaks Gambling Screen (SOGS) ($r = 0.3470$, $p < 0.001$) [11].

Westermeyer et al. studied a group of 362 Native American veterans and found high rates of both pathological gambling (15%) and alcohol abuse or dependence (86%) among many other outcomes that were assessed [28]. No correlation was reported between these two measures and no comparisons between a control group were reported

Welte et al. studied a group of 18 Native Americans as part of a larger group of 2638 other adults of different races. Among the Indigenous sample there was a pathological or problem gambling rate of 10.5% (Asian 6.5%, Hispanic 7.9%, African-American 7.7%, Caucasian 1.8%), and current alcohol abuse or dependence rate of 8.8% (Asian 0%, Hispanic 4.9%, African-American 2.7%, Caucasian 2.2%) [25]. There was no reported formal statistical comparison between the groups, and no correlation between the two measures.

Beaudette et al. studied a group of 230 Aboriginal Canadian adults in a forensic setting as part of a larger group of 1110 other offenders of different races. Among the Indigenous participants 15.7% met criteria for lifetime pathological gambling (cf. 8.4% non-Indigenous, X^2 10.72, $p < 0.01$), with 10.9% meeting current criteria (cf. 4.5% non-Indigenous, X^2 13.23, $p < 0.001$). In addition, 85.2% met lifetime criteria for alcohol or other substance use disorders (cf. 61% non-Indigenous, X^2 47.59, $p < 0.001$), with 76.5% meeting current criteria (cf. 42.6% non-Indigenous, X^2 83.86, $p < 0.001$) [32]. There was no correlation between the two measures.

Nicotine

In Indigenous people with nicotine dependence, one study found an association with pathological gambling, while another did not.

Dickerson et al. studied a group of 480 Indigenous Australian veterans and found that of those with nicotine dependence, 17.1% met criteria for pathological gambling. Those with nicotine dependence were 2.72 times more likely to have pathological gambling than non-nicotine dependent participants [23].

However, Moghaddam et al. studied a group of 701 American Indian and Native Alaskan people as part of a larger study of 43'093 other adults of different races, and found that among those Indigenous people with nicotine dependence, the lifetime prevalence rate of pathological gambling was 1.9%. The authors postulated a lack of significant association due to low power in the study as only 4 Indigenous people met criteria for pathological gambling [26].

Other studies also commented on nicotine dependence.

Kong et al. found that of those American Indians and Alaska Native people classified as 'at risk, problem or pathological gamblers' 56.14% met criteria for nicotine dependence (cf. 17.99% non-gamblers and 32.99% low-risk gamblers, $p < 0.001$) [27].

Westermeyer et al found rates of tobacco dependence of 33% [28].

Other drug abuse or dependence

Study findings were conflicting regarding Indigenous people with other drug abuse or dependence and problem gambling.

Larsen et al. also found lifetime problem gambling (cf. non-problem/non-gamblers) was associated with a frequent use of cannabis in the past year (men, 40.3% cf. 15.2%, $p < 0.0001$, women, 28% cf. 11.9%, $p = 0.001$) [34].

Gill et al. found moderate to high risk gamblers (cf. non-gamblers or no/low-risk gamblers) were more likely to experience any substance abuse or dependence (X^2 0.17, $p = 0.007^a$),

have received treatment for drug abuse (X^2 0.17, p = 0.002[a]), and have higher Addiction Severity Index alcohol (n^2 0.04, p = 0.0001[a]), and drug scores (n^2 0.03, p = 0.002[a]) ([a] $p < 0.05$ after correction for multiple comparisons) [33].

In the Kong et al. study 10.85% met criteria for drug abuse or dependence (cf. 2.93% non-gamblers and 3.17% low-risk gamblers, p = 0.108) [27].

Westermeyer et al. found rates of any drug abuse or dependence of 40% [28].

PROBLEM GAMBLING AND AFFECTIVE DISORDERS

Depression

In Indigenous people with problem gambling, several studies found an association with depression, whilst another did not.

Hing et al. studied 1259 Indigenous Australians using a self-report survey, alongside the Problem Gambling Severity Index (PGSI) to ascertain problem gambling [15-18]. 19.5% met criteria for problem gambling, 47.4% of problem gamblers reported 'suffering from depression' as a gambling related harm [15]. Further, 45.9% of problem gamblers (cf. 12,7% non-problem gamblers, 22.4% low risk gamblers, 30.7 moderate risk gamblers) reported a motivation to gamble as a means of reducing 'stress, depression and anger' [16]. Among the 687 Indigenous women, 20.2% had problem gambling, with the most commonly reported negative outcome from gambling 'suffering from depression' [17]. Rates of problem gambling and gambling related harms, including 'depression', were also higher in card gamblers cf. non-card gamblers [18].

The Kong et al. study found 17.81% met criteria for depression (cf. 11.23% non-gamblers, 15.25% low-risk gamblers, p = 0.083), and 4.81% met criteria for dysthymia (cf. 3.51% non-gamblers, 1.43 low-risk gamblers, p = 0.018) [27].

Other affective illness

Studies also reported on several other findings relating to affective illness.

Kong et al. in also found a statistically significant association with hypomania (cf. non-gamblers and low-risk gamblers, p < 0.001), and insignificant associations with any mood disorder or mania (cf. non-gamblers and low-risk gamblers, p = 0.083 and p = 0.602 respectively). DSM-IV measures from the AUDADIS-IV tool, see table [27].

Westermeyer et al. found rates of 15% for any affective disorder (24%) [28].

Beaudette et al. also found of the Indigenous sample 30% met lifetime criteria for mood disorders (cf. 30.2% non-Indigenous, $X^2 = 0.004$, p value not calculated), with 17.8% meeting current criteria (cf. 16.7% non-Indigenous, $X^2 = 0.16$, p value not calculated) DSM-IV measures from the SCID-1, see table [32].

PROBLEM GAMBLING AND ANXIETY DISORDERS

Some studies found associations with anxiety disorders.

Kong et al. found a statistically significant number met criteria for any anxiety disorder (p = 0.046), specific phobia (p = 0.011), and generalised anxiety disorder (p < 0.001). There were no differences for panic disorder (p = 0.736), or social phobia (p = 0.087) [27].

Westermeyer et al. found rates of anxiety disorder of 43% [28].

Beaudette et al. also found of the Indigenous sample 34.8% met lifetime criteria for anxiety disorders ($X^2 = 0.07$, no p value reported), with 32.2% meeting current criteria ($X^2 = 0.96$, no p value reported) [32].

PROBLEM GAMBLING AND PERSONALITY DISORDERS

In Indigenous people with 'at risk problem or pathological gambling', one study found an association with personality disorders.

The Kong et al. study reported a statistically significant number met criteria for any axis 2 disorder ($p < 0.001$), cluster B personality disorder (PD) ($p < 0.001$), antisocial PD ($p < 0.001$), histrionic PD ($p < 0.001$) and dependent PD ($p = 0.004$), but not other PDs [27].

Beaudette et al. also found of the Indigenous sample 63% met criteria for any axis 2 disorder (cf. non-Indigenous sample, $X^2 = 26.24$, $p < 0.001$), 21.7% met lifetime criteria for borderline PD (cf. non-Indigenous sample, $X^2 = 7.53$, $p < 0.01$), 60.4% met lifetime criteria for antisocial PD (cf. non-Indigenous sample, $X^2 = 31.23$, $p < 0.001$) [32].

Westermeyer et al. found rates of antisocial PD of 29% [28].

PROBLEM GAMBLING AND OTHER DISORDERS

Kong et al. found a statistically significant association was found with any psychiatric disorder ($p < 0.001$) [27].

Beaudette et al. further found of the Indigenous sample 93.5% met lifetime criteria for any mental disorder (cf. non-Indigenous sample, $X^2 = 29.38$, $p < 0.001$), and 89.6% met lifetime criteria for any axis 1 disorder (cf. non-Indigenous sample, $X^2 = 27.29$, $p < 0.001$), These rates were statistically higher than the non-Indigenous comparison group. 2.6% met criteria for eating disorders (cf. non-Indigenous sample, $X^2 = 2.35$, no p value provided), and 2.6% for psychotic disorders (cf. non-Indigenous sample, $X^2 = 2.8$, no p value provided). These results were not significantly different to the non-Indigenous comparison group [32].

There were also findings of high self-reported mental health problems [31], in contrast to low scores on a Mental Health Scale [24]. Although the latter study had inadequate sample size.

DISCUSSION

Main Findings

Although the literature is variable and of limited size and quality, there is support for a relationship between elevated rates of mental illness and problem gambling in Indigenous populations.

Addictive Disorders

There is solid evidence of an association between alcohol abuse or dependency and problem gambling that has grown since the first paper on this topic by Elias et al. in 1993 [29]. This finding was reported by four studies with reasonable sample sizes and statistical analysis, namely Gill et al. [33], Kong et al. [27], Larsen et al. [34] and Dickerson et al. [11]. In contrast, several studies reported high rates of alcohol abuse and dependency, and also problem gambling, such as Westermeyer et al. [28], but no comparison was made between the two. Welte et al. [25] and Beaudette et al. [32] also reported higher rates compared to non-Indigenous comparison groups.

There is also strong evidence of a link between nicotine dependence and problem gambling. Again, the larger studies by Dickerson et al. [23] and Kong et al. [27] provide persuasive evidence for this. In contrast, Moghaddam et al. [26] found no significant association, but the authors noted the limitation of the small number of pathological gamblers in their sample. Despite using the same study source, Kong et al. [27] used a broader definition of problem gambling compared to Moghaddam et al. [26]. Westermeyer et al. [28] again

suggested high rates of both nicotine dependence and problem gambling but did not examine the correlation.

Regarding other addictive disorders, the most significant finding was from Larsen et al. [34] who reported an association between problem gambling and frequent cannabis use. Although the finding is weakened by the lack of a valid diagnostic measure. In addition, Gill et al. [33] reported an association with any substance abuse or dependence, but this was in contrast to Kong et al. [27] who did not.

Affective Disorders

There was no convincing evidence from the studies to link problem gambling with depression. Hing et al. [15-18] found repeated self-report to depression, but the research was lacking validated measures, any statistical analysis, or attempts to reduce bias in the sample selection. Furthermore, the larger study by Kong et al. [27] found no link to depression, but it did to dysthymia.

Regarding other affective illness, Kong et al. [27] found evidence of a link between problem gambling and hypomania, but this finding is without support from other research. Beaudette et al. [32] and Westermeyer et al. [28] were again limited in their contribution beyond reporting high rates of affective illness and problem gambling in Indigenous populations.

Anxiety Disorders

The evidence for a link between problem gambling and anxiety disorders comes again from Kong et al. [27], who reported links to any anxiety disorder, specific phobia, and generalised anxiety disorder. Other research by Westermeyer et al. [28] and Beaudette et al. [32] has the same limitations as discussed before. The lack of any supporting research highlights a limitation of the Kong et al. [27] paper, namely its broader concept of problem gambling, including at risk gamblers compared to other measures. This limits the generalisabilty of the findings when viewed alone.

Personality Disorders

This pattern repeats itself in relation to the personality disorders. Kong et al. [27] found evidence of an association between problem gambling and any personality disorder, notably the cluster B personality disorders antisocial and histrionic. Oddly, all the personality disorders were assessed for except borderline and narcissistic. Other studies, such as Westermeyer et al. [28] and Beaudette et al. [32] did not provide strong evidence for an association.

Other Disorders

In general, Kong et al. [27] reported a link between problem gambling and any psychiatric disorder. Beaudette et al. [32] also reported high lifetime rates of mental illness, but again without comparison to problem gambling.

Summary of Findings

In the Context of Prior Reviews in Non-Indigenous Populations

This study found similar results to previous research by Dowling et al. who completed a systematic review and meta-analysis of 36 studies exploring the prevalence of psychiatric comorbidity in problem gamblers in the general population [35]. They reported high rates of current mood disorders (23.1%), alcohol use disorders (21.2%), anxiety disorders (17.6%) and non-alcohol substance disorders (7%). The highest mean prevalence was for current nicotine dependence (56.4%) and major depressive disorder (29.9%). There were smaller estimates for alcohol abuse (18.2%), alcohol dependence (15.2%) and different anxiety disorders. This study further estimated that half the sample had personality disorders, narcissistic and antisocial being the two most common [35].

Further research by Lubman et al. in the Victorian general population found high rates of problem gambling in patients presenting to mental health services [22]. Their recommended further research in understanding why patients with a mental illness are at higher risk, and the most effective strategies to minimise harm [22].

Potential Implications

There appears to be a link between problem gambling and other addictive disorders, depression and anxiety, and personality disorders, notably cluster B. It is possible that the trait of impulsivity is a common factor across these diagnoses.

The Indigenous population research results mirror that done in the general population, with evidence of increased rates of problem gambling and mental illness. Some contrary findings,

such as no strong association between problem gambling and depression, are perhaps due to methodological reasons.

The reasons behind the higher rates of problem gambling and mental illness in Indigenous populations is likely complex, including sociocultural and historical factors such as the ongoing trauma of colonisation [19, 20].

Strengths and Limitations of This Review

Quality of Evidence

Most of the studies were cross-sectional surveys. This limits the ability to draw conclusions about the direction of causality in the relationship between problem gambling and mental illness, or to determine factors such as age of onset or the course of the illness in this population. Longitudinal studies would be better placed to answer such questions.

The sample size of many of the studies was large with hundreds of participants in most studies, allowing for appropriately powered statistical analysis to be performed. However, in some studies such as Westermeyer et al, no correlational analysis was made between problem gambling and mental illness in the Indigenous population.

A further limitation was bias in the sample selection of the studies. Often the sample was self-selecting and asked to complete a survey. The representability of the study sample is then uncertain.

There were a variety of different measurement tools used in the studies which makes comparison between them difficult. For example, some studies included measures for

'pathological gambling', while others measured 'problem gambling'. Whilst there is significant overlap between the relevant definitions, there are also differences.

In addition, although some measures were standardised, some were not. For example, Hing et al asked patients to self-report 'depression' and 'anxiety', without definitions for what this would constitute (such as previous diagnosis made by a health professional).

A further limitation of this study the relevancy of international research findings in the Australian context. For example, all the studies of nicotine dependence and problem gambling were from Native American Indigenous populations. The studies did not consider the long history and current use of tobacco in religious and cultural ceremonies in these communities. Although Australian Indigenous people have higher rates of smoking than the non-Indigenous population [36], the history of their relationship with nicotine is more complicated. For example, the widespread practice of smoking was not introduced until the 18th century, and is not part of traditional smoking ceremonies [36]. This highlights the complexity of generalising from studies between Indigenous groups and would caution against making generalisations to the Australian context.

A limitation of this review was that the populations studied were mostly North American. However, the gap between Indigenous populations is greatest between those living in wealthy countries and those living in poorer countries. As Australia is similar to America and Canada in terms of politics and wealth, perhaps the results are applicable in Australia.

Recommendations

Implications for research

Gaps in the literature include culturally validated measures of mental illness in Indigenous populations. The use of such culturally standardised tools would be preferable in future research.

Further research is needed in Australian Indigenous communities, to allow for cultural differences between Indigenous populations worldwide despite any apparent similarities. In addition, larger research studies, with fully representative samples are needed. It would also be beneficial for different Indigenous groups to be examined due to presumed differences between them: for example, Indigenous people living in rural areas, urban areas, or living with a mental illness. Longitudinal studies would allow for consideration to be given towards any temporal relationship between problem gambling and mental illness, and the course and prognosis of such comorbidity.

Implications for clinicians and policy-makers

The difficulty in undertaking research in a population who live mostly in rural or very remote regions of Australia also highlights the importance for policy makers to consider the available health resources in these areas and how they can be developed further to ensure adequate physical and mental health care provision for the Indigenous population.

For clinicians, the evidence available confirms high rates of problem gambling in Indigenous populations, with a positive association between this and other forms of mental illness. It is important for clinicians to consider problem gambling as a potential issue in those

individuals presenting for other mental health needs. This will require knowledge of problem gambling or gambling disorder in order to make a clinical assessment, and provide ongoing support or referral for treatment.

CONCLUSION

In conclusion the current research literature provides evidence for a relationship between problem gambling and mental illness in Indigenous populations. In particular, problem gambling is frequently comorbid with other addictive disorders (notably alcohol and nicotine), anxiety disorders, and cluster B personality disorders.

Further research is needed to investigate the nature of this relationship, with larger studies and thorough methodologies. This is not only of importance in Australia where 'closing the gap' of inequality is a federal government priority [37], but for Indigenous communities worldwide.

APPENDIX 1

Gambling Terms Used in the Research Studies

Gambling disorder (previously **pathological gambling**) is a mental illness classified as an addiction in the American Psychiatric Association Diagnostic and Statistical Manual 5 (APA, DSM-5) [38].

Problem gambling is a term given the following operational definition by gambling researchers [39]:

"**Problem gambling** is characterised by difficulties in limiting money and/or time spent on gambling which leads to adverse consequences for the gambler, others, or for the community."

Gambling Measurement Tools Used in the Research Studies

A common measure of problem gambling is **The Problem Gambling Severity Index (PGSI).** This was developed by researchers as a means of measuring the construct labelled "problem gambling" in the general population. It stratifies gamblers into: non-problem gamblers, low-risk gamblers, moderate-risk gamblers, and problem gamblers. It is intended to encompass a continuum of severity that includes the diagnostic classification of pathological gambling or gambling disorder [41]. It was found to have good validity, with high correlation between the American Psychiatric Association Diagnostic and Statistical Manual IV (APA, DSM-IV) criteria of pathological gambling, and a gold standard clinical assessment interview. [39, 40].

APPENDIX 2

#1 (gambling or (gamb* adj2 disord*) or (gamb* adj2 prob*) or (gamb* adj2 addict*) or (pathological* adj2 gamb*))

#2 (aborig* or Indigenous* or torres or (first adj2 nation*) or maori or inuit or maori or (pacific* adj2 island) or (alaska* adj2 native*) or (americ* adj2 Indian*))

#3 ("mental disorders" or (ment* adj2 illness*) or (ment* adj2 disord*) or depress* or anxi* or psycho* or substance* or personalit* or (PTSD or post traumatic stress disorder))

#4 #1 AND #2 AND #3

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