

**Title**

Sense of coherence and gambling: Exploring the relationship between sense of coherence, gambling behaviour and gambling-related harm

**Citation**

Langham, E., Russell, A. M. T., Hing, N., & Gainsbury, S. M. (2017). Sense of coherence and gambling: Exploring the relationship between sense of coherence, gambling behaviour and gambling-related harm. *Journal of Gambling Studies*, 33(1), 661-684. <https://dx.doi.org/10.1007/s10899-016-9640-8>

This is a post-peer-review, pre-copyedit version of an article published in *Journal of Gambling Studies*. The final authenticated version is available online at: <http://dx.doi.org/10.1007/s10899-016-9640-8>

**Abstract**

Understanding why some people experience problems with gambling whilst others are able to restrict gambling to recreational levels is still largely unexplained. This paper examined the influence of individual's sense of coherence on their gambling behaviour and experience of gambling related harm. Sense of coherence is central to Antonovsky's theory of salutogenesis which seeks to understand why some individuals move towards health rather than disease when exposed to the same life circumstances. This exploratory study utilised an archival dataset (n=1236) from an online, cross sectional survey of people who had experienced negative consequences from gambling. In general, a stronger sense of coherence was correlated with gambling behaviour and problem gambling severity. When gambling behaviour was controlled for, sense of coherence was significantly related to the experience of individual gambling harms. A strong sense of coherence can be seen as a protective factor against problematic gambling behaviour, and subsequent gambling related harms. These findings support the value of both primary and tertiary prevention strategies that strengthen sense of coherence as a harm minimisation strategy. The present study has demonstrated the potential value of, and provides clear direction for, considering sense of coherence to understand gambling related issues.

**Keywords**

Problem gambling, gambling harm, salutogenesis, determinants of health, risk factors, protective factors

## Introduction

Gambling is a popular recreational activity; however increasing concern has been expressed about the potential for negative consequences for people who gamble, their affected others and the broader community. Understanding why some people experience problems with gambling whilst others are able to restrict gambling to recreational levels is still largely unexplained. A public health approach to gambling (Korn and Shaffer 1999) incorporates population health approaches of identifying differences in the distribution of gambling problems and associated harms across the population, including the relationship with various determinants of (Kindig and Stoddart 2003). Previous investigations have focussed on either the individual characteristics of the person who gambles, or the contribution of broad socio-ecological determinants to differences in patterns of gambling behaviour and experiences of harm. The present study explores the relationship between these two levels of determinants, that is, how the individual responds to the broader environmental determinants, utilising Antonovsky's (1979, 1987) sense of coherence theory to explain differences in gambling behaviour and experiences of harm.

### *Sense of coherence*

Salutogenesis is an approach to understanding the origins of health, developed by Antonovsky (1979, 1987) who sought to understand why some individuals move towards health rather than disease when exposed to the same stressful life circumstances. Underpinning this approach, Antonovsky posited that individuals each have generalised resilience resources (GRR), which consist of those resources and factors that support the perception of life as consistent, structured and understandable (Antonovsky 1979, 1987). Typical GRRs include economic resources, knowledge, experience, self-esteem, social capital, traditions and education. These GRRs are developed within a broad socio-cultural environment, but are not sufficient on their own in explaining differences in health outcomes within a population. More important than the GRRs in influencing health, is the individual's SOC. Sense of coherence (SOC) is central to salutogenesis, and has been described as being a part of an individual's resilience (Olsson et al. 2006).

An individual's SOC is their ability to operationalise their GRRs to manage the multitude of complex stressors encountered during life and move toward rather than away from health. SOC is an orientation to life that has three components: comprehensibility; manageability; and meaningfulness (Antonovsky 1979, 1987). Comprehensibility, the cognitive component, refers to an individual's ability to make sense of the various internal and external stimuli they encounter, seeing them as coherent, ordered, structured, clear and cohesive (Antonovsky 1979, 1987; Olsson et al. 2006). Manageability, the behavioural component, refers to an individual's belief that the resources needed to respond to the stimuli are available to them, and able to be used (Antonovsky 1979, 1987; Olsson et al. 2006). Meaningfulness, the motivational component, refers to whether an individual perceives the stimuli to be worthy of investing resources (Antonovsky 1979, 1987; Olsson et al. 2006). These components offer intuitive value to understanding differences in gambling behaviour and experiences of gambling-related harm, based on current sociological, economic and cultural theory around motivations for gambling (Binde 2009) and the heterogeneity of gambling harm experiences (reference anonymised for review). For example, there might be a relationship between low levels of comprehensibility and escape from stress as a motivation to gamble, whilst differences in treatment-seeking may be more related to the component of meaningfulness. Whilst Antonovsky's position was that SOC should be measured as a global construct (treating the scale as unidimensional) rather than as component factors (Antonovsky 1993), validation studies since his death have identified factors based on these components in a tridimensional hierarchical model (Feldt et al. 2000, 2007; Gana and Garnier 2001; Sandell et al. 1998). Thus, it may be beneficial to consider not only the influence of overall SOC, but also the potential influence of each component in explaining gambling behaviour and outcomes.

### *Explanations for gambling behaviour and harm*

A large body of research has examined why people gamble, factors that influence patterns of gambling behaviours, and factors that may contribute to gambling at problematic levels. From a population health perspective, engaging in gambling is a behavioural determinant of health, whilst any subsequent harms are health outcomes (Langham et al. 2016). In examining gambling as a behavioural determinant of health, the literature has focussed on the reasons why people gamble (Binde 2012; Breen et al. 2011; Lee et al. 2009; Lloyd et al. 2010), including motivations by specific player groups (Oei and Raylu 2010; Stewart et al. 2008; Tarras et al. 2000) and for specific gambling products (Hing et al. 2015; Thomas et al. 2009). Further interest has focussed on factors that might contribute to problematic levels of gambling where the behaviour creates harmful outcomes. This is consistent

with the dominant pathogenic approach to public health that seeks to identify and understand risk factors for disease or illness (Brownson et al. 2009). Several studies have examined the relationship of exposures to potential risk factors with behavioural levels of gambling severity (Castren et al. 2013; Welte et al. 2004), including genetic determinants of problem gambling (Gyollai et al. 2014). In terms of individual behaviours and characteristics, the types of risk factors of interest have included patterns of participation in gambling (Currie et al. 2006; Hodgins et al. 2012), gambling product preferences (Binde 2011), gambling modality (Gainsbury et al. 2013), access to gambling venues and products (Jacques and Ladouceur 2006; LaPlante and Shaffer 2007; Young et al. 2012), demographic characteristics (Hing, Russell, Tolchard and Nower 2015) and individual psychological factors and comorbidities (Dussault et al. 2011; Miller and Currie 2008; Morasco et al. 2007).

The New Public Health approach (Baum 2016) emphasises the social causes of health outcomes, incorporating concepts of health promotion and ecological public health, to understand the complex relationships between social, environmental, cultural, economic and political determinants that influence health. Consistent with these models, the influence of socio-ecological environments, such as social and familial environments, have been examined in relation to gambling (Chiu and Woo 2012; Porter et al. 2004; Schreiber et al. 2012; Wheeler et al. 2006; Young et al. 2013) and particularly for youth (Griffiths and Wood 2000; Rahman et al. 2012). Broader socio-ecological influences such as gambling marketing (William et al. 2013) as well as the situational features of both land based (Hing and Breen 2007; Noseworthy and Finlay 2009; Thorne et al. 2016) and online gambling (Gainsbury et al. 2013; Hing et al. 2014; McMullan and Kervin 2012) have also been studied. The different perspectives have informed the development of theoretical models capturing the complex interaction of multiple upstream health determinants on both gambling behaviours and gambling outcomes (Abbott et al. 2013; Blaszczynski and Nower 2002; Tirachaimongkol et al. 2010). These developments are consistent with the broader health literature and the evolution from biomedical models of health to those focussed on individual influences (Hochbaum 1958; Rosenstock 1974) and more recently to socio-ecological models to explain health behaviours (Barker 1968; Bronfenbrenner 1979; Glass and McAtee 2006; Lewin 1951; Moos 1979).

#### *Relevance of SOC to gambling behaviour and harm*

An alternate way of considering gambling behaviour and outcomes is to move the focus from risk factors to understanding what creates health and wellbeing, the protective factors. That is, when exposed to the same socio-ecological environment, why do some people remain gambling at non-harmful levels, whilst others experience problems with gambling? This alternate approach is consistent with salutogenic theory, with SOC explaining different responses amongst individuals to stressful stimuli from the broader socio-ecological environment (Antonovsky 1987). SOC has previously been examined in relation to its influence on health behaviours and outcomes. In a systematic review of 458 studies and 13 doctoral theses, Eriksson and Lindström (2006) found that SOC had a main, moderating and mediating effect on health, explaining between 10% (Hood et al. 1995) and 22% (B. Nilsson et al. 2000) of the variance in population health. When examined in relation to the Medical Outcome Study (MOS) short form 36 (a frequently used measure for physical and mental health outcomes), SOC has also shown a strong relationship with the mental health components (Eriksson and Lindström 2006).

Only one study has considered SOC as an influence on gambling behaviour (Fried et al. 2010). SOC was considered as a mediating factor in the relationship between exposure to advertising and gambling behaviour in a sample of Israeli youth. No correlation was found between SOC and gambling behaviour. However, the study was limited by using an un-validated, abbreviated measure created by the authors, and the lack of differentiation between the levels of gambling behaviour within the sample (Fried et al. 2010). , Relevant findings have also been noted in examinations of SOC's influence on alcohol consumption, tobacco use, and drug use, including treatment outcomes for problematic levels of consumption. A significant association has been found between SOC and alcohol consumption, both in terms of the behaviour (consumption patterns) and associated health outcomes (Badura et al. 1999; Humphrey and McDowell 2013; Kuuppelomäki and Utriainen 2003; Midanik et al. 1992; Neuner et al. 2006; K. Nilsson et al. 2007). Similar findings have been noted with smoking (El-Shahawy et al. 2015; Gajdosova et al. 2009; Glanz et al. 2005; Igna et al. 2008) and drug use (García-Moya et al. 2013; Humphrey and McDowell 2013; Lundqvist 1995), particularly in relation to explaining differences in treatment outcomes (Abramsohn et al. 2009; Andersen and Berg 2001; Feigin and Sapir 2005). Given that, like gambling, the adoption and patterns of these behaviours vary between individuals exposed to the same socio-ecological environments, SOC may explain some of the variance in gambling behaviour and gambling related harm.

The aim of the present study is to explore whether there is a relationship between the SOC of a person who gambles, their gambling behaviour and their experience of harm from gambling. Four objectives are addressed.

The first two objectives are to identify if there is a significant relationship between SOC and gambling behaviour and then between SOC and gambling harm. If these relationships are significant the third objective is to determine if this relationship between SOC and gambling-related harm is only a result of the gambling behaviour, or represents a separate influence. The final objective is to examine whether there are differences in the influence of SOC on gambling-related harm, given that experiences of harm are not homogenous. Previous findings in relation to SOC and health behaviours such as smoking (El-Shahawy et al. 2015; Gajdosova et al. 2009; Igna et al. 2008) and alcohol consumption (Humphrey and McDowell 2013; Kuuppelomäki and Utriainen 2003; Midanik et al. 1992; Neuner et al. 2006), and their subsequent health outcomes support a hypothesis that stronger SOC will be related to lower prevalence of problem gambling and lower impact from gambling related harm. If significant, this relationship provides a way of understanding the interaction between the individual and socio-ecological determinants of health that impact on gambling and the potential of SOC as a protective factor against problem gambling and gambling-related harm. This is an exploratory study that took the opportunity to analyse an archival dataset that included a brief measure of SOC to assess the utility of a more detailed examination of relationships between SOC, gambling behaviour and gambling-related harm.

## **Method**

This is a secondary analysis of a national, online survey that examined the harms experienced from engagement with gambling. The present study utilised the data on demographic details, SOC, gambling behaviours, the overall impact of each group of harms and the experience of individual harms.

### *Dataset*

The full archival dataset is from 5,205 people who identified either as someone who had gambled or been affected by another person's gambling (reference anonymised for review). Affected others (n=2129) were not of interest for the present study. The study utilised an ISO-accredited Australian commercial panel provider to recruit Australian adults (aged 18 years or older) who had ever gambled for an online survey to explore their experience of harm from engagement with gambling. An online recruitment and survey strategy was deemed the most appropriate due to the anonymity and privacy it afforded participants in disclosing sensitive information around a stigmatised issue (Shih and Fan 2008).

Participants were recruited in two stages. In the first stage 62,180 panel members were screened for whether they self-identified that their "own gambling had caused them problems, no matter how minor". A total of 2,458 people who gamble (3.95%) met the eligibility criteria and completed the survey. However, 71% of these participants scored in the most problematic category of the Problem Gambling Severity Index (PGSI; Ferris and Wynne 2001), presumably due to the term "problem" in the screening criteria. This was subsequently modified to capture people who self-identified as having "gambled often" for a second stage of recruitment. The second stage recruited a further 618 people who gamble, met the eligibility criteria, and completed the survey, with only 35% of these participants classified in the most problematic category of the PGSI. From both stages, 3,076 complete responses from people who gamble were obtained. A sub-sample (n=1236) of participants who reported having experienced harm from gambling within the last year was utilised for the present analysis. This reduced potential recall bias whilst still allowing for a sufficiently large sample for rigorous analysis.

### *Measures*

The full online survey included detailed questions about the experience of harm from gambling and the person's gambling behaviours. Only measures relevant to the present study are outlined below.

*Sense of coherence (SOC).* The abbreviated SOC-3 scale was developed by Lundberg and Nyström Peck (1995) for situations where it was not practical to use either the full SOC-29 or SOC-13, and was therefore utilised in the present study due survey length restrictions. The SOC-3 contains three questions which assess each of its theoretical components: manageability; meaningfulness and comprehensibility. The scale has satisfactory reliability and validity (Lundberg and Nyström Peck 1995) and has been used in large health studies (Agardh et al. 2003; Avlund et al. 2003; Bayard-Burfield et al. 2001; Jahnsen et al. 2002; van Loon et al. 2001). However, this abbreviated scale can only be considered to measure a global construct and does not allow for examining the individual components of SOC.

Consistent with the retrospective survey design, the SOC-3 questions included a prefix of “Thinking about this time in your life” to keep participants focussed on the 12 month period of interest. The three questions therefore became:

- Thinking about this time in your life, did you usually see a solution to problems and difficulties that other people find hopeless?
- Thinking about this time in your life, did you feel that your daily life was a source of personal satisfaction?
- Thinking about this time in your life, did you usually feel that the things that happen to you in your daily life were hard to understand?

Response options for each question were: “yes, usually”; “yes, sometimes”; or “no” which were used to create a summed index. For the first two questions “yes, usually” was scored as 0, “yes, sometimes” was scored as 1, and “no” was scored as 2. The third question was scored in the reverse order. The summed index ranged from 0 to 6, with 0 indicating a very strong SOC and 6 a very weak SOC (Lundberg and Nyström Peck 1995). Of the sample, 128 respondents were classified as “Very Weak SOC” (score of 5 or 6); 716 were classified as “Weak SOC” (score of 3 or 4); 331 were classified as “Strong SOC” (score of 1 or 2); and 61 were classified as “Very Strong SOC” (score of 0).

*Problem Gambling Severity Index (PGSI).* Problem gambling severity was measured using the PGSI, a nine item scale intended for use within a general population (Ferris and Wynne 2001). The PGSI’s validity has been independently validated (McMillen and Wenzel 2006), demonstrating high reliability, accuracy, and applicability. Items within the scale are measured on a 4 point scale from 0 (never) to 3 (almost always), creating a summed index from 0 to 27. The PGSI classified participants with scores of 8 or above as a problem gambler, between 3 and 7 a moderate risk gambler, 1 or 2 a low risk gambler, and 0 a non-problem gambler. The retrospective nature of the survey required the questions to refer to the 12 month period of the participant’s life so each question included a prefix of “At this time”.

*Gambling behaviour.* Participants were asked about three characteristics of their gambling behaviour during the period of interest. How often participants gambled was a fixed response of “monthly”, “2-4 times a month”, “2 to 3 times a week”, “4 to 5 times a week”, or “6 or more times a week”. How much time participants gambled on a typical day when they had gambled was a fixed response of “less than 30 minutes”, “more than 30 minutes but less than 1 hour”, “more than 1 hour but less than 2 hours”, “more than 2 hours but less than 3 hours” or “more than 3 hours”. Participants chose from a fixed response of how often they spent more than two hours gambling on a single occasion from “never”, “less than monthly”, “monthly”, “weekly”, or “daily or almost daily”.

*Harm Experienced.* Participants were asked whether or not they had experienced 73 specific harms based on a taxonomy of gambling-related harms (reference anonymised for review). These experiences were categorised as: financial harm; relationship harms; emotional or psychological distress; decrements to health; cultural harm; reduced performance at work or study; and criminal activity (reference anonymised for review). . To reduce perceived stigma and encourage accurate reporting, cultural harm and criminal activity were combined as “other”. Only harms from current engagement with gambling were included. A Likert scale was used to self-assess the overall impact of harm from each group. The grouped impact of “other” harms was excluded as it lacked an underlying construct and could be distorted by individual items perceived as severe (such as incarceration).

*Demographics.* Standard demographic questions determined participants’ age, gender, marital status, country of birth, employment status, highest education level and household income.

All participants were provided with the telephone and online contact details for a 24 hour gambling support service in the event they felt any discomfort from survey participation. Ethical clearance was gained from (Name of University Human Research Ethics Committee), clearance reference (number). All participants provided informed consent prior to data collection.

### *Analysis*

Non-parametric correlations (Spearman’s rho) examined associations between the variables of interest, including SOC, gambling behaviour, PGSI, and overall impacts of harm. To compare the four SOC groups for each harm experience, initial omnibus chi-square tests of independence were conducted. To understand the differences, observed post-hoc pairwise tests of proportions were employed. Results from the omnibus tests are

reported in Tables 2-7, under the inferential statistics headings along with the associated effect size ( $\Phi$ ). The pairwise tests are reported with subscripts within the same tables. Logistic regressions were then conducted to determine whether these bivariate results from the chi-square analysis held once gambling behaviour and PGSI were controlled for. A logistic regression was conducted for each harm experience, with harm (no/yes) as the dependent variable, SOC score as the independent variable, and the control variables also included as predictors. Both the odds ratios and the statistical significance for the SOC predictor are included in the odds ratio (OR) columns of the tables.

## Results

### *Participants*

Mean age of the sample was 40 years ( $SD = 14.1$ ), and 53.8% were male. The majority of participants were born in Australia (82.3%) and 5.1% identified as Aboriginal or Torres Strait Islander. Over half the participants were partnered (married 42.8% and de facto 13.8%), 2.1% were widowed, 10.8% were divorced, and 29.7% had never married. The majority of participants were engaged in full time employment (48%), with 19.9% undertaking part time or casual work, 6.7% unemployed, 5.5% home duties, 6.1% students, and 11.2% were retired or pensioners. In terms of education levels, 34.7% had a university degree or higher, 29.9% had vocational qualifications, 17.2% had completed high school and a further 17.4% had some high school education (years 8-11).

### *SOC and Gambling Behaviours*

Spearman's rho indicated weak to moderate positive correlations between PGSI and SOC, and SOC and the gambling behaviours of how often people gambled, how much time they spent gambling on a typical day they gambled, and how often they spent more than two hours gambling on a single occasion (Table 1). That is, stronger levels of SOC were related to lower levels of gambling behaviour and problem gambling severity.

**Table 1.** Descriptive statistics and correlations between PGSI, SOC and gambling behaviour

[Insert Table 1 here]

### *SOC and the Experience of Harm*

Spearman's rho indicated moderate to strong correlations between PGSI scores and each of the overall harms. Stronger SOC was significantly related to lower overall impact of each group of harms, although correlations were weak (Table 1). A Pearson chi-square test evaluated whether SOC was related to the experiences of individual harms. In general, stronger levels of SOC were related to lower levels of individual harms due to gambling in the last 12 months (see Tables 3 to 8).

SOC and the experience of financial harms were significantly related (Table 2). As SOC became stronger, endorsement of financial harms decreased, such as reduced savings, reduced available spending money, increased credit card debt, selling personal items, being late to pay bills, and less spending on beneficial items of non-immediate consequence such as insurance and home maintenance. This pattern also extended to more immediately impactful experiences such as less spending on medication, healthcare and food, needing assistance from welfare organisations, loss of supply of utilities, and loss of a significant asset. Experiences that were not significantly related to SOC levels were taking on additional employment to generate funds for gambling, bankruptcy and needing emergency accommodation. When the effect of gambling behaviour was controlled for, SOC was still significantly related to a number of financial harms, including reduced savings and spending money, late payment of bills, reduced spending on both beneficial and essential items, requiring assistance from welfare organisations and needing emergency accommodation. Other experiences of harm were close but not significant in this sample, including increased credit card debt and less spending on recreational expenses. Of further interest are items showing a negative association: taking on additional employment, loss of utilities, loss of significant assets and bankruptcy. In interpreting these findings it is important to highlight that factors that may influence risk for some of these harms are not captured within the data set, for example, whether participants owned significant assets prior to gambling that they were then at risk of losing.

**Table 2.** % Endorsement of financial harms due to gambling in the last 12 months ( $N=1236$ )

[Insert Table 2 here]

Stronger SOC was related to lower levels of both relationship, and emotional and psychological, harms (Tables 3 and 4). As SOC strengthened, reported harms decreased, including spending less time with people they care about, getting less enjoyment from time spent with people they care about, neglecting relationship responsibilities, experiencing tension or conflict within relationships, and experiencing social isolation. Similar patterns were identified for emotional and psychological harms such as feelings of distress, failure, worthlessness, hopelessness and desire to escape, where endorsement rates declined as SOC levels increased. The chi-square test was statistically significant for all harms in each group. After controlling for the influence of gambling behaviour, SOC still had a significant association with several relationship harms and emotional and psychological harms. For relationships, these harms included spending less time and getting less enjoyment from time with people they care about, neglecting relationship responsibilities, experiencing greater tension and conflict in relationships, feeling belittled in relationships and experiencing social isolation. For emotional and psychological harms, these were feelings of distress, failure, worthlessness, hopelessness and a desire to run away. In contrast, feelings of shame, anger and regret were not significant when controlling for gambling behaviour.

**Table 3.** % Endorsement of relationship harms due to gambling in the last 12 months ( $N=1236$ )

[Insert Table 3 here]

**Table 4.** % Endorsement of emotional and psychological harms due to gambling in the last 12 months ( $N=1236$ )

[Insert Table 4 here]

For most health related harms, stronger levels of SOC were again related to lower levels of endorsement (Table 5). These harms include important health behaviours such as reduced physical activity, nutrition, self care, and use of health services or treatment. However, SOC and tobacco consumption were not significantly associated, and the relationship with alcohol, whilst significant at the omnibus chi-square level, showed poor differentiation between levels of SOC. SOC and attempted suicide were also not significantly related. Relationships between SOC and several health related harms remained significant after controlling for gambling behaviour. Of particular importance are significant relationships between SOC and experiences of harm that are risk factors themselves for other health outcomes, such as levels of physical activity, dietary practices, sleep patterns, alcohol consumption and depression. Neglecting hygiene and self care was close, but not significant (.051).

**Table 5.** % Endorsement of health related harms due to gambling in the last 12 months ( $N=1236$ )

[Insert Table 5 here]

Relationships between SOC and work or study related harms were examined only for the 932 participants who were employed or studying during the last year ( $n=932$ ). Lower endorsement of work and study harms, such as reduced performance, being late or absent, gambling on work time, lack of progression and losing their job were also related to stronger SOC, although the significance for most was only at the  $p<0.05$  level. After controlling for gambling behaviour, several harms remained significant, including reduced performance, being late or absent, conflict with colleagues and lack of progression in job or study.

**Table 6.** % Endorsement of work or study related harms due to gambling in the last 12 months ( $N=932$ )

[Insert Table 6 here]

Individual “other” harms were examined only where it was possible to identify that someone was at risk of experiencing the harm. Relationships between endorsement and strength of SOC were not as consistent for these harms, although some were significant (Table 7). Harms relating to unethical or illegal sourcing of funds through theft from friends and family and borrowing money with no intent to repay it, reduced in endorsement

as SOC levels strengthened, as did the experience of violence. When controlling for the influence of gambling behaviour, only the experience of violence remained significant.

**Table 7.** % Endorsement of other experiences of harm due to gambling in the last 12 months ( $N=1236$ ).

[Insert Table 7 here]

## Discussion

This study aimed to explore whether there is a relationship between the SOC of a person who gambles, their gambling behaviours and their experience of harm from gambling using an archival dataset that utilised a simplified measure of SOC. An individual's SOC represents a capacity to operationalise generalised resilience resources to respond to stressful stimuli such that an individual moves towards health, rather than away from it. The study found that, in general, a stronger level of SOC was related to less problematic gambling behaviours and less gambling-related harm. This relationship remained for numerous harm experiences even when gambling behaviour was controlled for. The patterns of these relationships are of concern from a public health perspective; reflect the heterogeneity of harmful experiences from gambling; and suggest that examining the influence of each component of SOC may offer further insight.

An initial objective was to determine if there is a relationship between SOC and gambling behaviours. Stronger levels of SOC were found to relate to lower intensity of gambling behaviour and lower problem gambling severity. These results suggest that SOC can help to explain differences in gambling behaviours between individuals exposed to the same socio-ecological environment and are consistent with findings on the influence of SOC on other addictive behaviours such as smoking (El-Shahawy et al. 2015), alcohol consumption (Neuner et al. 2006) and drug use (García-Moya et al. 2013). Given previous findings that SOC is modifiable (Bronikowski and Bronikowska 2009; Lundblad and Hansson 2005), efforts to strengthen SOC may enhance protection against gambling harms. This is of particular relevance to minimising harm in youth, who are more vulnerable to problematic gambling (Delfabbro et al. 2013; Raisamo et al. 2013; Turner et al. 2008), and more receptive to efforts to strengthen SOC (Bronikowski and Bronikowska 2009). The relationship between SOC and gambling behaviour identified in the current study supports the value of health promotion programmes that strengthen SOC as a primary prevention strategy.

Tertiary prevention strategies aimed at strengthening SOC in people already experiencing problems with gambling can also assist in harm minimisation. This is because SOC influences our response to stressful stimuli (Olsson et al. 2006) and may be a mediator between an individual's response to relevant individual and socio-ecological stimuli and their gambling behaviour (Binde 2012). Engagement in gambling itself can cause further stressful stimuli that SOC would also influence the response to, thus impacting on the experience of harm separate to behaviour. The present study identified a relationship between SOC and experiences of gambling harm. Stronger SOC was related to lower overall impact of each harm group, and lower endorsement of individual harm experiences. This relationship could either reflect the relationship between gambling behaviour and gambling harm, or capture a separate mediating influence of SOC on the response to the further stimuli caused by the gambling behaviour. When gambling behaviour was controlled for, stronger SOC was still found to be significantly related to the majority of individual harm experiences. This result suggests that when gambling behaviour creates stressful stimuli, SOC can mediate the response and subsequent harmful outcomes experienced. For example, even when gambling at the same behavioural level, a person with stronger SOC would be less likely to experience harms such as less spending on beneficial and essential items; increased tension and conflict in relationships; feelings of distress, failure and worthlessness; increased experiences of stress related health problems; absence from work; and experiences of violence. Previous research has identified the ability of therapeutic environments to improve SOC (Lundblad and Hansson 2005). Thus, engagement with tertiary prevention strategies such as gambling treatment that target the improvement of an individual's SOC should contribute to harm minimisation.

The individual harms that retained a significant relationship with SOC after controlling for gambling behaviour were a finding of particular interest from a public health perspective. The majority of these harms represent risk factors for a range of health outcomes through both proximal and distal determinants of health (World Health

Organization 2015). These harms, which are more likely to be experienced by people with weaker SOC, included reduced spending on beneficial expenses (such as repairs and insurance) and essential expenses (such as food, medication and housing); increased negative health behaviours such as loss of sleep, reduced physical activity, and poor nutrition; and increased experiences such as stress related illnesses and episodes of depression. This is consistent with other studies examining SOC and health behaviour (Ageborg et al. 2005; Hassmen et al. 2000; van Loon et al. 2001) and is concerning in terms of the influence of the behaviours on the burden of disease (World Health Organization 2015). Similarly, the findings around relationship harms that remained significant also reflect the risk of further harm through conflict, estrangement and social isolation. A number of these experiences also represent the potential for increased social costs of gambling-related harm. Assistance from welfare organisations and the need for emergency accommodation represent direct costs to the community. Indirect costs associated with relationship breakdowns, poorer individual health, reduced work attendance and performance, as well as increased violence, are also borne by the community. Whilst a strong SOC can be seen as a protective factor against gambling-related and subsequent harms, a weak SOC can be seen as increasing the risk of further harm to the individual and cost to the community.

The pattern of harms that were related to SOC and remained significant after controlling for gambling behaviour, reflects the heterogeneity of the harms surveyed and is consistent with salutogenic theory (Antonovsky 1996, 1987). People with stronger SOC were less likely to endorse harms such as late payment of bills, whilst the results around more salutogenic responses to stimuli such as taking on additional employment showed a different relationship. This was particularly evident in the emotional and psychological harms, where feelings of distress, failure, worthlessness, hopelessness and running away were significantly related for people with weak SOC, whilst harms that suggested a component of comprehension or manageability such as shame, anger at their behaviour and regret were not. It is possible these patterns in the relationship between SOC and individual harm experiences reflect differences in the influence of the individual components of SOC: comprehensibility; manageability; and meaningfulness. Previous studies examining the structure of SOC have highlighted the role of these individual components in an individual's response to different stimuli (Feldt et al. 2000, 2003, 2005; Sandell et al. 1998), with some debate around which component is of primary importance (Antonovsky 1987; Bergman et al. 2012) and how this influences the stability of SOC across the lifecourse (Antonovsky 1987). Antonovsky (1987) saw meaningfulness as the most important component, arguing that it was required to sustain comprehensibility and manageability. Comprehensibility was the second most important component because manageability requires understanding. This suggests that even if someone could make sense of a stimulus and believe they had the resources to respond, if they lacked motivation to do so then this would have further potentially negative implications. Whilst it is not possible to assess the influence of individual components of SOC within the present study, they offer a potential explanation for some of the current findings and direction for future research.

An unexpected finding was the relationship between SOC and attempted suicide, which was not statistically significant. Weak SOC has previously been identified as a risk factor for suicidality (Sjöström et al. 2012), and whilst there is no population level data examining the relationship between problem gambling and suicide, small studies have identified concerning patterns of association (Blaszczynski and Farrell 1998; Gray 2013; Penfold et al. 2006; Wong et al. 2010). The lack of significance in the present study may be the result of statistically low endorsement rates. However, the overall rate of participants reporting attempted suicide (7.7% for the sample) is worth highlighting and requires further investigation.

### *Limitations*

As an exploratory study utilising an archival dataset, the present study is not without limitations. Use of a large, online panel means that the results are not representative of all gamblers in Australia. However, the sample is quite large allowing an appropriate analysis of the variables of interest and is balanced for gender. The use of an online recruitment modality creates a sampling bias of people who have access to the internet, registered with the panel provider, and are comfortable participating in online surveys. This potential for bias was balanced against the added privacy and anonymity the environment creates which encourages more accurate and complete responses (Shih and Fan 2008). A further sampling bias exists from the over-representation of people who have experienced problems with gambling created by the use of the initial screening question. Even with the alternate screening question, it could be argued that simply asking if people have had any negative consequences from participating in gambling could generate feelings of perceived stigma associated with problem gambling and deter many recreational or low risk gamblers from participating.

A more significant limitation is use of the SOC-3 which was necessary to contain survey length. Whilst the SOC-29 and the SOC-13 are reliable and valid instruments there is less agreement on the reliability of the SOC-3 (Lundberg and Nyström Peck 1995; Olsson et al. 2009; Schumann et al. 2003). Use of the full SOC-29 or SOC-13 in future confirmatory studies is strongly recommended and would also allow examination of the influence of the individual components of SOC rather than just its universal influence. However, despite these limitations the present study clearly identified a relationship between SOC, gambling behaviour and gambling-related harm.

## **Conclusion**

The present study sought to explore the potential of SOC, in examining the interaction between individual and environmental level determinants, to explain differences in gambling behaviour and the experience of gambling-related harm. Using an abbreviated measure of SOC within an archival dataset, a relationship between the SOC of a person who gambles, their gambling behaviour, and experience of harm has been identified. Furthermore, the relationship with SOC remained significant for a number of individual experiences of harm even when gambling behaviour was controlled for. These harms represent risk for further negative impacts in terms of individual health outcomes or costs to the community. The findings of the present study demonstrate the value of Antonovsky's sense of coherence in understanding gambling behaviour and gambling related harm which is consistent with other addictions research. Specifically, these findings suggest that SOC may explain differences in how an individual responds to broader environmental determinants. This response may influence their gambling behaviour; and gambling behaviour creates a second set of stimuli which may be further mediated by SOC, in turn influencing experiences of harm. Gambling related harms are not homogenous however, and differences in their experience could reflect the influence of individual components of SOC, which warrants further investigation.

The findings have a practical application in primary and tertiary prevention strategies that can contribute to gambling harm minimisation. Primary prevention efforts that strengthen SOC, particularly in youth, can not only act as a protective measure against gambling harm, but are likely to have broader health benefits based on findings that enhanced SOC can have for other beneficial health outcomes. Tertiary prevention programs, such as gambling treatment, can also achieve their harm minimisation goals by targeting strengthened SOC as a therapeutic outcome. Further research is clearly needed to improve our understanding of the role of SOC in influencing both gambling behaviour and the experience of harm. However, the present study has demonstrated the potential value of, and provided clear direction for, this line of investigation.

## References

- Abbott, M., Binde, P., Hodgins, D., Pereira, A., Volberg, R., & Williams, R. J. (2013). Conceptual Framework of Harmful Gambling: An international collaboration. Guelph ON: Ontario Problem Gambling Research Centre (OPCRC).
- Abramsohn, Y., Peles, E., Potik, D., Schreiber, S., & Adelson, M. (2009). Sense of coherence as a stable predictor for methadone maintenance treatment (MMT) outcome. *Journal of Psychoactive Drugs*, 41(3), 249-253.
- Agardh, E. E., Ahlbom, A., Andersson, T., Efendic, S., Grill, V., Hallqvist, J., et al. (2003). Work stress and low sense of coherence is associated with type 2 diabetes in middle-aged Swedish women. *Diabetes Care*, 26(3), 719-724.
- Ageborg, M., Allenius, B. L., & Cederfjäll, C. (2005). Quality of life, self-care ability, and sense of coherence in hemodialysis patients: A comparative study. *Hemodialysis International*, 9(s4), S8-S14.
- Andersen, S., & Berg, J. E. (2001). The use of a Sense of Coherence Test to predict drop-out and mortality after residential treatment of substance abuse. *Addiction Research & Theory*, 9(3), 239-251.
- Antonovsky, A. (1979). *Health, stress, and coping*. San Francisco CA: Jossey-Bass Publishers.
- Antonovsky, A. (1987). *Unraveling the mystery of health: How people manage stress and stay well*. San Francisco CA: Jossey-Bass Publishers.
- Antonovsky, A. (1993). The structure and properties of the Sense of Coherence scale. *Social Science and Medicine*, 36(6), 725-733.
- Antonovsky, A. (1996). The salutogenic model as a theory to guide health promotion. *Health Promotion International*, 11(1), 11-18.
- Avlund, K., Vass, M., & Hendriksen, C. (2003). Onset of mobility disability among community-dwelling old men and women: The role of tiredness in daily activities. *Age and Ageing*, 32(6), 579-584.
- Badura, K., Gorczyca, P., Tomalczyk, E., & Matysiakiewicz, J. (1999). Estimation of a sense of coherence in patients with alcoholic dependence syndrome: Introductory report. *Wiadomosci lekarskie (Warsaw, Poland: 1960)*, 53(9-10), 488-492.
- Barker, R. G. (1968). *Ecological psychology: Concepts and methods for studying the environment of human behavior*. Stanford CA: Stanford University Press.
- Baum, F. (2016). *The new public health* (Vol. Ed. 4). Melbourne VIC: Oxford University Press.
- Bayard-Burfield, L., Sundquist, J., & Johansson, S. (2001). Ethnicity, self reported psychiatric illness, and intake of psychotropic drugs in five ethnic groups in Sweden. *Journal of Epidemiology and Community Health*, 55(9), 657-664.
- Bergman, E., Malm, D., Ljungquist, B., Berterö, C., & Karlsson, J.-E. (2012). Meaningfulness is not the most important component for changes in sense of coherence. *European Journal of Cardiovascular Nursing*, 11(3), 331-338.
- Binde, P. (2009). Gambling motivation and involvement: A review of social science research. *Statens Folkhälsoinstitut, Rapport R(20)*.
- Binde, P. (2011). What are the most harmful forms of gambling? Analyzing problem gambling prevalence surveys. *CEFOS Working Papers 12*.
- Binde, P. (2012). Why people gamble: a model with five motivational dimensions. *International Gambling Studies*, 13(1), 81-97.
- Blaszczynski, A., & Farrell, E. (1998). A case series of 44 completed gambling-related suicides. *Journal of Gambling Studies*, 14(2), 93-109.
- Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, 97(5), 487-499.
- Breen, H. M., Hing, N., & Gordon, A. (2011). Indigenous Gambling Motivations, Behaviour and Consequences in Northern New South Wales, Australia. *International Journal of Mental Health and Addiction*, 9(6), 723-739.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by design and nature*. Cambridge, MA: Harvard University Press.
- Bronikowski, M., & Bronikowska, M. (2009). Salutogenesis as a framework for improving health resources of adolescent boys. *Scandinavian Journal of Public Health*, 37(5), 525-531.
- Brownson, R. C., Fielding, J. E., & Maylahn, C. M. (2009). Evidence-based public health: a fundamental concept for public health practice. *Annual Review of Public Health*, 30, 175-201.
- Castren, S., Basnet, S., Salonen, A. H., Pankakoski, M., Ronkainen, J.-E., Alho, H., et al. (2013). Factors associated with disordered gambling in Finland. *Substance Abuse Treatment, Prevention, and Policy*, 8(1), 24.
- Chiu, E. Y.-W., & Woo, K. (2012). Problem Gambling in Chinese American Adolescents: Characteristics and Risk Factors. *International Journal of Mental Health and Addiction*, 10(6), 911-922.

- Currie, S. R., Hodgins, D. C., Wang, J., el-Guebaly, N., Wynne, H., & Chen, S. (2006). Risk of harm among gamblers in the general population as a function of level of participation in gambling activities. *Addiction, 101*(4), 570-580.
- Delfabbro, P., King, D., & Griffiths, M. (2013). From Adolescent to Adult Gambling: An Analysis of Longitudinal Gambling Patterns in South Australia. *Journal of Gambling Studies, 1*-17.
- Dussault, F., Brendgen, M., Vitaro, F., Wanner, B., & Tremblay, R. E. (2011). Longitudinal links between impulsivity, gambling problems and depressive symptoms: a transactional model from adolescence to early adulthood. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 52*(2), 130-138.
- El-Shahawy, O., Sun, P., Tsai, J. Y.-k., Rohrbach, L. A., & Sussman, S. (2015). Sense of coherence and tobacco use myths among adolescents as predictors of at-risk youth cigarette use. *Substance Use & Misuse, 50*(1), 8-14.
- Eriksson, M., & Lindström, B. (2006). Antonovsky's Sense of Coherence Scale and the relation with health: A systematic review. *Journal of Epidemiology and Community Health, 60*(5), 376-381.
- Feigin, R., & Sapir, Y. (2005). The Relationship Between Sense of Coherence and Attribution of Responsibility for Problems and Their Solutions, and Cessation of Substance Abuse Over Time. *Journal of Psychoactive Drugs, 37*(1), 63-73.
- Feldt, T., Leskinen, E., & Kinnunen, U. (2005). Structural invariance and stability of sense of coherence: A longitudinal analysis of two groups with different employment experiences. *Work & Stress, 19*(1), 68-83.
- Feldt, T., Leskinen, E., Kinnunen, U., & Mauno, S. (2000). Longitudinal factor analysis models in the assessment of the stability of sense of coherence. *Personality and Individual Differences, 28*(2), 239-257.
- Feldt, T., Leskinen, E., Kinnunen, U., & Ruoppila, I. (2003). The stability of sense of coherence: Comparing two age groups in a 5-year follow-up study. *Personality and Individual Differences, 35*(5), 1151-1165.
- Feldt, T., Lintula, H., Suominen, S., Koskenvuo, M., Vahtera, J., & Kivimäki, M. (2007). Structural validity and temporal stability of the 13-item sense of coherence scale: Prospective evidence from the population-based HeSSup study. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation, 16*(3), 483-493.
- Ferris, J., & Wynne, H. (2001). The Canadian problem gambling index. *Ottawa, ON: Canadian Centre on Substance Abuse.*
- Fried, B. G., Teichman, M., & Rahav, G. (2010). Adolescent gambling: Temperament, sense of coherence and exposure to advertising. *Addiction Research & Theory, 18*(5), 586-598.
- Gainsbury, S. M., Russell, A., Hing, N., Wood, R., & Blaszczynski, A. (2013). The impact of internet gambling on gambling problems: a comparison of moderate-risk and problem Internet and non-Internet gamblers. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors, 27*(4), 1092-1101.
- Gajdosova, B., Orosova, O., Madarasova Geckova, A., Tavel, P., & van Dijk, J. P. (2009). Personality dimensions, sense of coherence and self-esteem as risk/protective factors for smoking among university students. *Studia Psychologica, 51*(2-3), 183-192.
- Gana, K., & Garnier, S. (2001). Latent structure of the sense of coherence scale in a French sample. *Personality and Individual Differences, 31*(7), 1079-1090.
- García-Moya, I., Jiménez-Iglesias, A., & Moreno, C. (2013). Sense of coherence and substance use in Spanish adolescents. Does the effect of SOC depend on patterns of substance use in their peer group? *Adicciones, 25*(2), 109-117.
- Glanz, K., Maskarinec, G., & Carlin, L. (2005). Ethnicity, Sense of Coherence, and Tobacco Use Among Adolescents. *Annals of Behavioral Medicine, 29*(3), 192-199.
- Glass, T. A., & McAtee, M. J. (2006). Behavioral science at the crossroads in public health: extending horizons, envisioning the future. *Social Science and Medicine, 62*(7), 1650-1671.
- Gray, J. I. (2013). Gambling Related Suicides, Victoria 2000 - 2012. Coroners Court of Victoria: Coroner's Prevention Unit.
- Griffiths, M., & Wood, R. T. (2000). Risk factors in adolescence: the case of gambling, videogame playing, and the internet. *Journal of Gambling Studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming, 16*(2-3), 199-225.
- Gyollai, Á., D Griffiths, M., Barta, C., Vereczeki, A., Urbán, R., Kun, B., et al. (2014). The genetics of problem and pathological gambling: a systematic review. *Current pharmaceutical design, 20*(25), 3993-3999.
- Hassmen, P., Koivula, N., & Uutela, A. (2000). Physical exercise and psychological well-being: a population study in Finland. *Preventive Medicine, 30*(1), 17-25.
- Hing, N., & Breen, H. (2007). Workplace Factors that Encourage and Discourage Gambling amongst Gaming Venue Employees: A Managers' Perspective. *International Journal of Mental Health and Addiction, 5*(4), 346-366.

- Hing, N., Cherney, L., Blaszczynski, A., Gainsbury, S. M., & Lubman, D. I. (2014). Do advertising and promotions for online gambling increase gambling consumption? An exploratory study. *International Gambling Studies*, 14(3), 394-409.
- Hing, N., Russell, A. M., Vitartas, P., & Lamont, M. (2015, online). Demographic, behavioural and normative risk factors for gambling problems amongst sports bettors. *Journal of Gambling Studies*. DOI: 10.1007/s10899-015-9571-9.
- Hing, N., Russell, A., Tolchard, B., & Nower, L. (2015, online). Risk factors for gambling problems: An analysis by gender. *Journal of Gambling Studies*. DOI: 10.1007/s10899-015-9548-8
- Hochbaum, G. M. (1958). *Public participation in medical screening programs: A socio-psychological study*: US Department of Health, Education, and Welfare, Public Health Service, Bureau of State Services, Division of Special Health Services, Tuberculosis Program.
- Hodgins, D. C., Schopflocher, D. P., Martin, C. R., el-Guebaly, N., Casey, D. M., Currie, S. R., et al. (2012). Disordered gambling among higher-frequency gamblers: who is at risk? *Psychological Medicine*, 42(11), 1-12.
- Hood, S. C., Beaudet, M. P., & Catlin, G. (1995). A healthy outlook. *Health Reports*, 7(4), 25-32.
- Humphrey, K., & McDowell, A. (2013). Sense of coherence as a predictor of risky health behaviours amongst teenage girls on a targeted youth development programme. *Journal of Public Mental Health*, 12(3), 146-152.
- Ignat, C. V., Julkunen, J., & Ahlström, R. (2008). Sense of coherence relates with smoking. *Journal of Health Psychology*, 13(8), 996-1001.
- Jacques, C., & Ladouceur, R. (2006). A prospective study of the impact of opening a casino on gambling behaviours: 2- and 4-year follow-ups. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, 51(12), 764.
- Jahnsen, R., Villien, L., Stanghelle, J., & Holm, I. (2002). Coping potential and disability--sense of coherence in adults with cerebral palsy. *Disability and Rehabilitation*, 24(10), 511-518.
- Kindig, D., & Stoddart, G. (2003). What is population health? *American Journal of Public Health*, 93(3), 380-383.
- Korn, D., & Shaffer, H. (1999). Gambling and the Health of the Public: Adopting a Public Health Perspective. *Journal of Gambling Studies*, 15(4), 289-365.
- Kuuppelomäki, M., & Utriainen, P. (2003). A 3 year follow-up study of health care students' sense of coherence and related smoking, drinking and physical exercise factors. *International Journal of Nursing Studies*, 40(4), 383-388.
- LaPlante, D. A., & Shaffer, H. J. (2007). Understanding the influence of gambling opportunities: expanding exposure models to include adaptation. *American Journal of Orthopsychiatry*, 77(4), 616-623.
- Lee, C.-K., Lee, B., Bernhard, B. J., & Lee, T. K. (2009). A Comparative Study of Involvement and Motivation among Casino Gamblers. *Psychiatry Investigation*, 6(3), 141-149.
- Lewin, K. (1951). *Field theory in social science: selected theoretical papers*. London: Social Science Paperbacks.
- Lloyd, J., Doll, H., Hawton, K., Dutton, W. H., Geddes, J. R., Goodwin, G. M., et al. (2010). How Psychological Symptoms Relate to Different Motivations for Gambling: An Online Study of Internet Gamblers. *Biological Psychiatry*, 68(8), 733-740.
- Lundberg, O., & Nyström Peck, M. (1995). A simplified way of measuring sense of coherence. *The European Journal of Public Health*, 5(1), 56-59.
- Lundblad, A.-M., & Hansson, K. (2005). Outcomes in couple therapy: Reduced psychiatric symptoms and improved sense of coherence. *Nordic Journal of Psychiatry*, 59(5), 374-380.
- Lundqvist, T. (1995). Chronic cannabis use and the sense of coherence. *Life Sciences*, 56(23-24), 2145-2150.
- McMillen, J., & Wenzel, M. (2006). Measuring Problem Gambling: Assessment of Three Prevalence Screens. *International Gambling Studies*, 6(2), 147-174.
- McMullan, J., & Kervin, M. (2012). Selling Internet Gambling: Advertising, New Media and the Content of Poker Promotion. *International Journal of Mental Health and Addiction*, 10(5), 622-645.
- Midanik, L. T., Soghikian, K., Ransom, L. J., & Polen, M. R. (1992). Alcohol problems and sense of coherence among older adults. *Social Science and Medicine*, 34(1), 43-48.
- Miller, N. V., & Currie, S. R. (2008). A Canadian Population Level Analysis of the Roles of Irrational Gambling Cognitions and Risky Gambling Practices as Correlates of Gambling Intensity and Pathological Gambling. *Journal of Gambling Studies*, 24(3), 257-274.
- Moos, R. H. (1979). Social-Ecological Perspectives on Health. In G. C. Stone, F. Cohen, & N. E. Adler (Eds.), *Health psychology: a handbook: theories, applications, and challenges of a psychological approach to the health care system*. San Francisco: Jossey-Bass.
- Morasco, B. J., Weinstock, J., Ledgerwood, D. M., & Petry, N. M. (2007). Psychological Factors that Promote and Inhibit Pathological Gambling. *Cognitive and Behavioral Practice*, 14(2), 208-217.

- Neuner, B., Miller, P., Maulhardt, A., Weiss-Gerlach, E., Neumann, T., Lau, A., et al. (2006). Hazardous alcohol consumption and sense of coherence in emergency department patients with minor trauma. *Drug and Alcohol Dependence*, 82(2), 143-150.
- Nilsson, B., Holmgren, L., & Westman, G. (2000). Sense of coherence in different stages of health and disease in northern Sweden: Gender and psychosocial differences. *Scandinavian Journal of Primary Health Care*, 18(1), 14-20.
- Nilsson, K., Starrin, B., Simonsson, B., & Leppert, J. (2007). Alcohol-related problems among adolescents and the role of a sense of coherence. *International Journal of Social Welfare*, 16(2), 159-167.
- Noseworthy, T. J., & Finlay, K. (2009). A comparison of ambient casino sound and music: effects on dissociation and on perceptions of elapsed time while playing slot machines. *Journal of Gambling Studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 25(3), 331-342.
- Oei, T., & Raylu, N. (2010). Gambling Behaviours and Motivations: a Cross-Cultural Study of Chinese and Caucasians in Australia. *International Journal of Social Psychiatry*, 56(1), 23-34.
- Olsson, M., Gassne, J., & Hansson, K. (2009). Do different scales measure the same construct? Three sense of coherence scales. *Journal of Epidemiology and Community Health*, 63(2), 166-167.
- Olsson, M., Hansson, K., Lundblad, A., & Cederblad, M. (2006). Sense of coherence: Definition and explanation. *International Journal of Social Welfare*, 15(3), 219-229.
- Penfold, A., Hatcher, S., Sullivan, S., & Collins, N. (2006). Gambling Problems and Attempted Suicide. Part I. High Prevalence Amongst Hospital Admissions. *International Journal of Mental Health and Addiction*, 4(3), 265-272.
- Porter, J., Ungar, J., Frisch, G. R., & Chopra, R. (2004). Loneliness and life dissatisfaction in gamblers. *Journal of Gambling Issues* 11, 1-21.
- Rahman, A. S., Pilver, C. E., Desai, R. A., Steinberg, M. A., Rugle, L., Krishnan-Sarin, S., et al. (2012). The relationship between age of gambling onset and adolescent problematic gambling severity. *Journal of Psychiatric Research*, 46(5), 675-683.
- Raisamo, S., Halme, J., Murto, A., & Lintonen, T. (2013). Gambling-related harms among adolescents: a population-based study. *Journal of Gambling Studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 29(1), 151-159.
- Rosenstock, I. M. (1974). The health belief model and preventive health behavior. *Health Education Monographs*, 2(4), 354-386.
- Sandell, R., Blomberg, J., & Lazar, A. (1998). The factor structure of Antonovsky's Sense of Coherence Scale in Swedish clinical and nonclinical samples. *Personality and Individual Differences*, 24(5), 701-711.
- Schreiber, L. R. N., Odlaug, B. L., & Grant, J. E. (2012). Recreational gamblers with and without parental addiction. *Psychiatry Research*, 196(2-3), 290-295.
- Schumann, A., Hapke, U., Meyer, C., Rumpf, H. J., & John, U. (2003). Measuring sense of coherence with only three items: a useful tool for population surveys. *British Journal of Health Psychology*, 8(4), 409-421.
- Shih, T.-H., & Fan, X. (2008). Comparing response rates from web and mail surveys: A meta-analysis. *Field Methods*, 20(3), 249-271.
- Sjöström, N., Hetta, J., & Waern, M. (2012). Sense of coherence and suicidality in suicide attempters: A prospective study. *Journal of Psychiatric and Mental Health Nursing*, 19(1), 62-69.
- Stewart, S. H., Zack, M., Collins, P., & Klein, R. M. (2008). Subtyping pathological gamblers on the basis of affective motivations for gambling: relations to gambling problems, drinking problems, and affective motivations for drinking. *Psychology of Addictive Behaviors*, 22(2), 257 - 268.
- Tarras, J., Singh, A. J., & Moufakkir, O. (2000). The profile and motivations of elderly women gamblers. *Gaming Research & Review Journal*, 5(1), 33-46.
- Thomas, A., Allen, F., & Phillips, J. (2009). Electronic gaming machine gambling: measuring motivation. *Journal of Gambling Studies*, 25(3), 343-355.
- Thorne, H., Goodwin, B., Langham, E., Rockloff, M., & Rose, J. (2016). Preferred Electronic Gaming Machine Environments of Recreational versus Problem Gamblers: An in-venue mixed methods study. *Journal of Gambling Issues*, In press.
- Tirachaimongkol, L. C., Jackson, A. C., & Tomnay, J. E. (2010). Pathways to problem gambling in seniors. *Journal of Gerontological Social Work*, 53(6), 531-546.
- Turner, N., Macdonald, J., Bartoshuk, M., & Zangeneh, M. (2008). Adolescent Gambling Behaviour, Attitudes, and Gambling Problems. *International Journal of Mental Health and Addiction*, 6(2), 223-237.
- van Loon, A. J. M., Tijhuis, M., Surtees, P. G., & Ormel, J. (2001). Personality and coping: their relationship with lifestyle risk factors for cancer. *Personality and Individual Differences*, 31(4), 541-553.
- Welte, J. W., Barnes, G. M., Wieczorek, W. F., Tidwell, M. C., & Parker, J. C. (2004). Risk factors for pathological gambling. *Addictive Behaviour*, 29(2), 323-335.

- Wheeler, B. W., Rigby, J. E., & Huriwai, T. (2006). Pokies and poverty: problem gambling risk factor geography in New Zealand. *Health & Place, 12*(1), 86-96.
- William, J., Alvin, L., Richard, M., & Saalem, S. (2013). Permission email messages significantly increase gambler retention. *Journal of Business Research, 66*(9), 1617-1622.
- Wong, P. W., Cheung, D. Y., Conner, K. R., Conwell, Y., & Yip, P. S. (2010). Gambling and completed suicide in Hong Kong: a review of coroner court files. *Primary Care Companion to the Journal of Clinical Psychiatry, 12*(6).
- World Health Organization (2015). Global Health Risks-Mortality and burden of disease attributable to selected major risks. *The Lancet*.
- Young, M., Doran, B., & Markham, F. (2013). Gambling Spaces and the Racial Dialectics of Social Inclusion: A Case Study of a Remote Australian Casino. *Geographical Research, 51*(2), 192-203.
- Young, M., Markham, F., & Doran, B. (2012). Placing Bets: gambling venues and the distribution of harm. *Australian Geographer, 43*(4), 425 - 444.

