The Social Side of the Pathways Model: Examining the Mediation of Social Support on the Relationship between Psychopathology and Problem Gambling

Mark van der Maas

Department of Sociology, University of Toronto, Toronto, Ontario, Canada, M5S 2J4

Abstract

This study uses a large representative sample of gamblers in the Canadian province of Quebec to examine the relationship between social support and psychopathologies commonly associated with gambling problems. Generalized linear modeling is applied to the 2008 Canadian Community Health Survey to find that social support mediates the relationship between mood disorders and problems that a person experiences as a result of gambling. These findings are discussed in the context of developing a framework that understands the features of social support in relation to psychopathological predictors of gambling problems. The study concludes that prominent psychopathological predictors of problem gambling are best understood in the respective contexts of the social environments in which they are found.

Keywords: problem gambling, addiction, social support, Canada, generalized linear models, mood disorders, sociology

Résumé

Cette étude a été réalisée auprès d'un vaste échantillon représentatif de joueurs de la province de Québec, au Canada, en vue d'examiner le lien entre le soutien social et les psychopathologies accompagnant fréquemment les problèmes de jeu. Le modèle linéaire généralisé a été appliqué à l'Enquête de 2008 sur la santé dans les collectivités canadiennes en vue de découvrir le soutien social qui joue un rôle dans le lien entre les troubles de l'humeur et les problèmes que connaît une personne à cause du jeu. Les résultats de cette étude sont examinés dans le contexte de l'élaboration d'un cadre qui comprend des éléments de soutien social en matière de prédicteurs psychopathologiques des problèmes de jeu. L'étude conclut que les principaux prédicteurs psychopathologiques des problèmes de jeu sont mieux compris dans les contextes respectifs des environnements sociaux dans lesquels on les retrouve.

Introduction

In the current research literature, few theoretical frameworks are available that take a multidisciplinary approach to problem gambling. It is even rarer to find a theoretical approach that consistently applies sociological or social psychological concepts and which is constructed in a meaningful way. The importance of social support and positive social relationships in understanding gambling behaviour has been demonstrated in a variety of research settings. These studies show that generally those subjects with greater social support from their personal relationships experience fewer problems as a result of the gambling, though these relationships are complex and varied (Gomes & Pascual-Leone, 2009; Oei and Gordon, 2008; Petry and Weiss, 2009; Vander Bilt et al., 2004; Weinstock and Petry, 2008). However, little effort has been made to incorporate such research into a coherent theoretical model that seeks to understand these findings in relation to other fields' research on problem gambling.

The following research examines the extent to which an individual's access to social support accounts for the association between psychopathologies and problem gambling. In doing so, these findings contribute to the extant literature by revealing an important mechanism through which psychopathologies are associated with problem gambling. The present study is useful on several levels. First, making sense of social support in relation to widely studied psychological predictors of gambling problems will help to demonstrate the interconnection between mental health traits and social environment in predicting problems. Second, this study will be able to contribute to the development of a multidisciplinary theoretical model that makes sociological and social psychological research more relevant to our explanations of gambling-related harm.

Current theoretical models

Much of the research on problem gambling in the current literature focuses on individual attributes or conditions that are associated with problem gambling. This approach works to explain its presence. This focussing has led to an understanding of problem gambling as the result of an intersection of various risk factors, the majority of them being related to some manner of psychological or neurological condition or disorder. However, fewer theoretical perspectives exist that attempt to understand these conditions' contributions to gambling problems in context of the social environment in which they are found. If we are concerned with refining our knowledge of the situations or conditions where problem gambling is most likely to be present, we must address two propositions. First, to understand the relationships between these conditions and problem gambling more clearly, it is important to consider the extent to which features of the social environment explain these relationships. Second, that if a person's social support network offers them greater social resources, it decreases accordingly the negative impact of mental health problems in that person's everyday life. At a theoretical level, the goal of this paper is to expand on our understanding of the interconnections between predictors of

problem gambling by examining how a gambler's social support network is related to the experience of gambling-related harm.

Several theoretical frameworks exist that try to incorporate a range of risk factors from different disciplines that approach the problem of problem gambling. One such theoretical framework is the Pathways Model. The Pathways Model was developed by Blaszczynski & Nower (2002) to address the wide range of existing explanations of problem gambling at the time. The Pathways Model has been used to examine several aspects of gambling including seniors gambling (Tirachaimongkol, Jackson, & Tomnay, 2010), gambling propensity among young adults (Fabiansson, 2010), variation in gamblers by age (Welte, Barnes, Tidwel, & Hoffman, 2011), impacts of gambling on family life (Kalischuk, 2010), and the relevance of mythic icons in gambling (Nixon & Solowoniuk, 2009). The goal of this theoretical framework is to develop a model of problem gambling where the existing explanations of fields in neurobiology, psychiatry, psychological sociology etc. could be understood as complementary rather than competing explanations for problem gambling. The result is a theoretical model that allows the findings of many different types of research to be understood in relation to each other. Another important aspect of the Pathways Model is its ability to recognize variation among problem gamblers. By recognizing that there are many contributing factors that lead to a diagnosis of problem gambling the theory also points out that there is also likely variation in the types of problems that a person experiences because of their gambling. This leads to the model's three "pathways" to problem gambling: (1) behaviourally conditioned gamblers, (2) emotionally/biologically vulnerable gamblers, and (3) antisocial-impulsivist gamblers.

Of particular interest to the current study are traits belonging to the "emotionally/biologically vulnerable" pathway. This pathway includes gamblers who learn how to gamble and how to perceive the results of their gambling activities through behavioural conditioning, but who also have a psychological or neurological condition that predisposes them to harm. Specifically, this study examines the relationships between anxiety disorders, mood disorders and supportive relationships. Analyzing the interplay between psychopathologies and features of a person's social life, such as social support and family life, can help us gain a greater understanding of how a person's emotionally vulnerable condition might lead to gambling. Showing that the link between psychopathologies and problem gambling is shaped significantly by features of a person's social relationships represents an important step in gambling research. Not only does the link represent a significant expansion of the Pathways Model, but it also serves the wider purpose of aiding in interdisciplinary understandings of problem gambling.

Anxiety and mood disorders

Two generally supported correlates with problem gambling are anxiety disorders and mood disorders. Conditions such as depression and obsessive compulsive disorder have long been associated in the psychological research literature with the presence of problem gambling (Beaudoin & Cox, 1999; Black & Moyer, 1998; Castellani & Rugle, 1995;

Giddens, Xian, Scherrer, Eisen, & Potenza, 2011; McCormick, 1994; Vitaro, Ferland, Jacques, & Ladouceur, 1998). Not surprisingly, these families of conditions play a prominent role in multidisciplinary frameworks such as the Pathways Model.

Epidemiological evidence has shown that both conditions are strongly related to problem gambling. In an analysis of the Canadian Community Health Survey for the 1.2 cycle (for the year 2002), el-Guebaly et al. (2006) found that people with a mood disorder and/or an anxiety disorder were about 1.9 times more likely to experience moderate to high severity of problem gambling, as measured by the PGSI. (Petry, Stinson, & Grant, 2005) note that some inconsistency exists in existing research between the conditions and problem gambling. However, in their epidemiological study of the 2001-2002 NESARC survey, Petry et al. found that, after controlling for various demographic factors, both mood disorders and anxiety showed strong and significant relationships with pathological gambling (Petry et al., 2005).

While these conditions are clearly important for the treatment and prevention of problem gambling, it is also important to recognize that these conditions do not operate in a vacuum. Research has shown that various social factors play an important role in determining what effects these conditions will have. For example, in their study of social anxiety disorder and alcohol abuse, Buckner, Timpano, Zvolensky, Sachs-Ericsson, and Schmidt (2008) found that co-morbidity between the two was significantly lower in the presence of high social support from friends. Similarly, in a study of comorbidity between substance use and mental health problems, Warren et al. (2007) found that, among participants in residential drug abuse programs, social support was linked to both better mental health and lower cocaine and heroin use. Weinstock et al. (2006) determined that family functioning is significantly related to the occurrences of mood disorder episodes. Specifically, they found that, among patients with major depressive disorder and bipolar affective disorder, acute episodes were associated with family dysfunction.

Social Support

Current gambling research has found that low levels of social support are an important risk factor in problem gambling. Social support has been shown to be both a protective factor against the negative effects of anxiety and mood disorders and an encouraging factor in the treatment of problem gambling. In a study of 60 outpatients of a problem gambling treatment program in Ontario, Gomes and Pascual-Leone (2009) found that emotional support and instrumental support were associated with greater motivation to abstain from gambling, greater self-confidence, and reductions in depressed affect, all of which led to better treatment outcomes. Similarly, in their examination of over 200 pathological gamblers, Petry and Weiss (2009) discovered that social support was both positively related to positive outcomes in abstaining from gambling, and was negatively related to both the presence of anxiety disorder and the presence of clinical depression. In terms of social support as a protective factor against problem gambling, in their study of a sample of university

students, Weinstock and Petry (2008) found that students with higher levels of perceived social support were less likely to be problem gamblers.

In their study of the relationship between coping with stress and specific gambling motivations, Thomas, Allen, Phillips, & Karantzas (2011) found that high subjective social support was a direct protective factor against gambling frequency. The researchers also determined that social support indirectly protected against avoidance-motivated and accessibility-motivated gambling. Hardoon, Gupta, & Derevensky (2004), in the sample of student in grades 7-13, found that respondents who screened for probable pathological gambling had significantly lower scores of perceived social support compared to other students. High perceived support from both family and peers served as protective factors from problem gambling (Hardoon et al., 2004).

In their study of the members of gamblers anonymous, Oei and Gordon (2008) also determined that social support was significantly related to gambling behaviours. Specifically, Oei and Gordon found that social support and involvement in meetings of gamblers anonymous were the most strongly associated factors with abstinence from gambling.

It is important to note that social relationships can also have the effect of increasing the likelihood of gambling. In a longitudinal study of older adults (mean 78.8 years old), Vander Bilt et al. (2004) found that social support was positively related to gambling participation. It was suggested in their research that this situation is the result of gambling being a positive social activity for older adults and reflects high rates of sociability motivation in older adults as opposed to action-seeking or escapist motivations. Relationships can also lead to greater stress and problem gambling. Elman, Tschibelu, and Borsook (2010) through extensive interviews with problem gamblers, discovered that the experience of interpersonal stress was positively related to problem gambling severity.

Research Question

The above discussion suggests several things. First, it implies that strong theoretical frameworks for a multidisciplinary approach to problem gambling research do indeed exist, but also that sociological research to this point is not well represented within them. Second, the presence of psychopathologies, particularly anxiety and mood disorders, are key defining aspects in the categories of problem gamblers in a wealth of psychological research. Third, the degree of social support that a person receives is related to gambling frequency, the experience of gambling-related harm, and negative effects associated with mood and anxiety disorders.

Given the above assumptions, it is reasonable to expect that social support plays an important role in the extent to which psychopathologies are related to problem gambling. The current study is then driven by the following two questions: (1) Is higher perceived social support related to lower problem gambling scores when mood disorders and anxiety disorders are controlled for? (2) Does perceived social

support mediate the association between psychopathologies and problem gambling? Showing that aspects of the social environment are as effective as, and perhaps even modify, established psychological predictors of problem gambling supports the greater inclusion of sociological variables into theoretical frameworks for explaining problem gambling. Such an inclusion has the potential to improve the model as a tool for conducting multidisciplinary research, for guiding treatment and prevention strategies, and for allowing understanding of gambling research across disciplines.

Method

Data Source

The data source for this study is the Canadian Community Health Survey for the 2007-2008 collection cycle. The CCHS is a national level cross-sectional survey which collects data throughout the year and releases it annually. It is the joint effort of the Canadian Institute of Health Information (CIHI), Statistics Canada, and Health Canada. The survey's sample includes Canadian residents, over the age of 12, in all ten provinces and three territories. The survey excludes those persons living on reserves and other aboriginal settlements, institutionalized populations, and residents in two small communities in Quebec.

The entire sample collects data from over 130,000 Canadian residents in 136 Health Regions. These Health Regions are divided into both large urban centres and rural areas to avoid over-representation from urban areas. Respondents were selected through a combination of area frames, random digit dialing, and telephone number list frames. The CCHS data was collected by face-to-face interviews and telephone computer-assisted telephone interviews by specially-trained interviewers. Interviews typically lasted between 40 and 45 minutes.

Participant Sample

This study will focus on the Quebec subsample since that was the only province that administered questions relating to both gambling and social support for the 2007-2008 cycle of the CCHS. This study includes only adults 18 years old and above who had participated in at least one gambling activity in the twelve months prior to their interview (9014). After listwise deletion for missing cases for variables included in the analyses and 8 deleted outliers (see discussion below), the sample for the present study contained 8010 participants.

Materials

This study employs the Problem Gambling Severity Index (hereinafter referred to as the PGSI), a part of the Canadian Problem Gambling Index (hereafter referred to as the CPGI), as its measure for problem gambling. The PGSI was developed for use with large surveys, in part because of the problems associated with other psychiatric diagnostics screens, such as the South Oaks Gambling Screen and the DSM-IV

criteria for pathological gambling (Ferris & Wynne, 2001). In comparison to other commonly used screens for problem gambling, the CPGI includes more questions related to the consequences of respondents' gambling practices. This problem-based approach makes the use of this scale more appropriate for sociological research than more addiction-based diagnostic scales (Ferris & Wynne, 2001). The PGSI is specifically useful to this study because of its capability to measure the severity of gambling problems, not just their presence or absence.

The current study includes only respondents aged 18 and older. Age is coded by the CCHS as a categorical variable consisting of 16 categories. With the exception of the 18-19 years old category, these categories are separated into of groups of five years (e.g., 20-24) with a maximum category of 80 years or older. Existing research has found that the relationship between age and problem gambling is better understood as a non-linear relationship. Rates of problem gambling have been found to be lower among young adults and older adults and higher among middle aged groups (Welte et al., 2011). To account for this, a term is introduced that squares age, forming a quadratic regression equation.

Gender is coded as a dichotomous variable. The gender of the respondent as either a man or a woman was determined by the interviewer. If it was not clear which category the respondent belonged to the interviewer was instructed to ask the respondent which gender he or she was. Models also control for marital status. Marital status is coded as a dichotomous variable for this study with "married" and "common-law" coded as "yes" and widowed, separated, divorced, and never married coded as "no."

The degree of social support available to the respondent is measured by the Social Support Survey, which is part of the Mental Outcomes Survey (MOS) (Sherbourne & Stewart, 1991). This scale includes information on several aspects of social support including positive social interaction, emotional and informational support, affection, and tangible social support. There are 19 items asking respondents about scenarios related to the following question: "How often is each of the following kinds of support available to you if you need it?" (Sherbourne & Stewart, 1991, p. 713). Each item is scored on a Likert scale with a score 0 indicting "none" and 4 indicating "all the time." The scale has a minimum score of 0, maximum score of 76, and a mean of 64.5. Higher scores on this scale indicate higher levels of support. The Social Support Survey also includes a question concerning how many close relationships a person maintains from which they might receive the aforementioned support. Respondents are asked to indicate a number for the following question: "About how many close friends and close relatives do you have, that is, people you feel at ease with and can talk to about what is on your mind?" (Sherbourne & Stewart, 1991, p. 713). Eight respondents indicated having over 95 close relationships and were removed as outliers. The next highest score was 60.

Psychopathologies are represented by the presence of anxiety disorders and mood disorders. The presence of an anxiety disorder is indicated by a yes/no answer to the following question: "Do you have an anxiety disorder such as a phobia,

Table 1
Sample description

	Variable	Count/Mean	%/*SD*
Gender	Male	3631	45.33%
	Female	4379	54.67%
Age	18-29	1576	19.68%
	30-39	1412	17.63%
	40-49	1367	17.07%
	50-64	2300	28.71%
	65 and up	1355	16.92%
Mood/anxiety disorders	Neither	7256	90.59%
	Anxiety only	314	3.92%
	Mood only	273	3.41%
	Comorbidity	167	2.08%
Marital status	Married/cohabiting	4348	54.28%
	Single/Divorced/Separated/Widowed	3662	45.72%
Social support	Social Support Survey (mean score)	64.4	14.2
	Number of relationships (mean)	7.5	6.6

obsessive-compulsive disorder or a panic disorder?" Likewise, the presence of a mood disorder is indicated by a yes/no answer to the following question: "Do you have a mood disorder such as depression, bipolar disorder, mania or dysthymia?" (Statistics Canada, 2008, p. 25). These two questions are preceded by the phrase, "Remember, we are interested in conditions diagnosed by a health professional." Whereas it might be preferable to have a screening tool for detecting these conditions in a survey sample, the current measures are considered to be justifiable because they are likely to be highly specific. That is, while they may miss undiagnosed mental health disorders, they are nevertheless unlikely to produce a large number of false positives. To account for problems of comorbidity of these conditions (Mineka, Watson, & Clark, 1998), they have been combined into a categorical variable. The categories of this variable are "neither anxiety nor mood disorders" (the reference category), "mood disorder only," "anxiety disorder only," and "both anxiety and mood disorder."

Analysis

Data analysis for this study employs hierarchical multiple regressions. The estimates reported represent the raw estimates for each variable. The first step examines the relationship between PGSI scores and two common psychopathological predictors of high problem gambling scores, mood disorders, and anxiety disorders. This first step also controls for basic demographic variables of age and gender. The second step introduces social predictors of low problem gambling scores, marital status, perceived social support, and the number of relationships from which one receives that support. The third step combines psychopathological predictors of high gambling scores with social predictors of low gambling scores.

The experience of considerable problems due to gambling is a relatively rare occurrence. This suggests that it is difficult to estimate the relationships between gambling problems and other variables using least squares regression without bringing into serious question the validity of those findings. For this reason the current study uses a generalized linear model approach which assumes a gamma distribution for the models with a log function. The use of generalized linear models is rare in gambling research. However, this technique has proven useful in modelling other similarly distributed events such as alcohol consumption (Lopes, Andreozzi, Ramos, & Sá Carvalho, 2008) health economics research (Basu & Rathouz, 2005) and risk assessment (Blough, Madden, & Hornbrook, 1999). Typically, gamma models cannot be run when there are zero values on the dependent variables. To account for this, a score of 0.1 was added to all scores on the PGSI. This means that, when interpreting the fitted values of the models, a score of 0.1 should be subtracted from the predicted values. Such adjustments are made in the discussion and presentation of the results.

Conditions for mediation tests include that (1) the mediator (social support) is significantly related to the dependent variable (PGSI scores), (2) the mediated variable-past diagnosis of a mood disorder) is significantly related to the dependent variable, and (3) the mediated variable is significantly related to the mediating variable. To test the whether a mediation effect is taking place, the relationship between the mediated variable and the dependent variable must be significantly lowered with the introduction of the mediator variable. To test whether this lowering of effect is significant, a Sobel test was performed (Sobel, 1982). The following analyses were performed using the R project for statistical computing.

Results

As shown in Table 2, PGSI is regressed as the dependent variable on mood disorders, perceived social support, and controls. Model 1 first looks at psychopathology and basic demographic variables. This model largely supports existing research findings. As expected, gender shows a significant negative effect on PGSI scores. The literature has shown that women have significantly lower rates of problem gambling in comparison to men and the findings here support that as well (Hraba & Lee, 1996). Significances of both the age and age-squared variables show a non-linear relationship between age and PGSI scores where rates of gambling problem scores are lower at the younger and older ends of the scale, and highest in the middle age groups. This finding supports research describing the relationship between age and gambling problems as being curvilinear (Welte et al., 2011). The presence of mood and anxiety disorders show strong and positive effects on PGSI scores, and they are significant at the $p < 0.001$ level. This model confirms the generally-supported findings that both mood disorders and anxiety disorders are strong predictors of gambling problems. Further, having been diagnosed with both anxiety and mood disorder shows an even stronger effect, thereby supporting research that identifies problem of mental health comorbidity among problem

Table 2
Psychological and social predictors of PGSI scores: Generalized linear model regression analysis

	Model 1		Model 2		Model 3	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Gender (Female)	-0.54***	0.087	-0.396***	0.088	-0.448***	0.084
Age	0.155*	0.068	0.252***	0.071	0.214**	0.068
Age sq.	-0.009*	0.004	-0.014***	0.004	-0.012**	0.004
Mood Disorder	0.718**	0.238			0.403	0.230
Anxiety Disorder	0.971***	0.223			0.827***	0.214
Mood and Anxiety Disorders	1.525***	0.302			1.127***	0.292
Marital Status (Married)			-0.410***	0.095	-0.370***	0.091
Social Support			-0.018***	0.003	-0.014***	0.003
Number of relationships			-0.008	0.007	-0.006	0.006
Intercept	-1.675***	0.074	-0.609	0.091	-0.843*	0.365
AIC	-5156		-5351		-5742	

*p < 0.05, **p < 0.01, ***p < 0.001.

gamblers (Beaudoin & Cox, 1999; Black & Moyer, 1998; Castellani & Rugle, 1995; Giddens et al., 2011; McCormick, 1994; Vitaro et al., 1998).

The second model examines variables that are used to indicate the quantity and quality of social support that a person receives. In reference to model 1, we see the effect of gender reduces somewhat but still remains significant. The age variables increase in their effect, and their level of significance increases to the $p < 0.001$ level. Social support shows a significant negative relationship with PGSI scores, indicating that those subjects in the sample with higher levels of social support tend to experience fewer problems related to gambling. However, the number of social relationships from which a person receives social support does not show a significant effect in the model. While the AIC score is lower for model 2 compared to model 1, an analysis of variance test shows that the improvement in model fit is not significant.

Model 3 includes the two sets of independent variables. The age variables and gender variable all show a similar effect as in the first two models. Variables in this model relating to social support show reasonably consistent effects with model 2. Likewise, both the presence of an anxiety disorder and comorbidity of mood and anxiety disorders show strong and significant effects. While in model 2 mood disorders were significantly related to higher PGSI scores, model 3 shows that, once model has adjusted for social support, that association becomes non-significant. This suggests that the relationship between mood disorders and problem gambling scores is mediated by the degree of support that a person has. After confirming that the conditions for testing mediation were met, a Sobel test was conducted on the relationships involved. The models used in the Sobel test controlled for the presence

of anxiety disorders, comorbidity with anxiety disorder, gender, age, and marital status. The Sobel test statistic is 3.937 where p<0.001 on a two tailed probability test. One interpretation of this pattern is that the relationship between mood disorders and problem gambling is indirect. The positive relationship between the presence of a mood disorder and problem gambling scores is explained in part by the negative relationship observed between mood disorder and the social support that one receives, specifically that those subjects who have been diagnosed with a mood disorder report significantly lower levels of social support. The observation that model 3 has the lowest AIC score of the models examined shows that the combined model provides the best fit for the data examined. An analysis of variance test shows that model 3 is a significant improvement or both model 1 and model 2 (p< 0.001).

Discussion

To begin with, the models contained in the above analysis confirm many aspects of problem gambling that we already know. In terms of demographics, these models show that women experience fewer problems as a result of gambling compared to men (Hraba & Lee, 1996), and that age shows a non linear relationship with gambling, with younger and older adults experiencing fewer problems in comparison to those adults in the middle age groups (Welte et al., 2011).

While research on personal relationships as related to problem gambling has received less attention in the literature, the findings here show mixed support for existing research on such variables. First, the amount of social support that a person receives was related to significantly lower gambling problems. Conversely, the number of relationships from which a person receives social support does not show a significant relationship with problem gambling scores in the analyses of this study. These findings suggest that it is the quality of social support that is associated with fewer gambling-related problems, rather than size of a person's social support network. They also show that social support is an aspect of one's social environment that requires greater consideration in theoretical frameworks. Particularly, in the context of the Pathways Model, the degree of social support that person receives should be considered as a part of a person's "path" to problem gambling. Unfortunately, the current study is unable to explore the causal order of the relationship between support and gambling problems. This limitation makes it difficult to determine where to place the variable into the current model, making further research on the subject necessary.

Interestingly, the comparison of the first and second models shows that the social support related variables summarized the data better than the models focusing on psychopathologies commonly used as explanatory factors in the development of problem gambling as indicated by the lower AIC score. Perhaps a more important result of this study is the finding that the relationship between having been diagnosed with a mood disorder and the problem gambling score became non-significant with the introduction of the social support variables. The current study interprets this finding as a mediating effect as identified in the results section. Under this interpretation, the initial relationship observed between mood disorders and problem

gambling scores is, in part, explained through mood disorders' relationship with social support.

As mentioned earlier, psychopathologies such as mood disorders are not only a crucial aspect of current theoretical frameworks for understanding problem gambling, but also to a large range of psychiatric and psychological research on problem gambling (Beaudoin & Cox, 1999; Black & Moyer, 1998; Blaszczynski & Nower, 2002; Castellani & Rugle, 1995; Giddens et al., 2011; McCormick, 1994; Vitaro et al., 1998). Again, causal ordering is difficult to assert given the methods of this study. However, this study suggests that the social environment that a person lives in not only has an effect on gambling problems itself, but also affects how closely certain psychological conditions are related to gambling problems. The findings of this study suggest that the support that a person receives from his or her close personal relationships mediates the relationship between mood disorders and gambling problems. For the Pathways Model specifically, and for theoretical approaches to problem gambling more generally, the above findings suggest that variables related to social environment not only have their own important relationships to gambling problems, but are also necessary in understanding the relationships between problem gambling and different psychopathologies. It is important to note that this study also found no mediation effect between anxiety disorders and social support-related variables. As the Pathways Model suggests, different types of emotional vulnerability are likely to react with a person's social environment in different ways (Blaszczynski & Nower, 2002). This study then further supports the goal of the Pathways Model in that it shows greater variability in regard to gambling problems.

The implications of these findings are important not only for the theoretical frameworks we use to study problem gambling but also in how we treat and prevent gambling. Understanding that the social relationships that a person maintains affects the relationship between powerful predictors of problem gambling and the experience of gambling-related problems is a necessary part of any multidisciplinary theoretical framework on the subject. Recognizing the interconnectedness of social and psychological traits makes theoretical frameworks of problem gambling more useful, not only for designing multidisciplinary research, but also for allowing researchers from disparate fields to understand their research in relation to each other. Such a model also helps us to recognize the confluence of personal traits and social environment to help inform policy and encourage more responsible provision of gambling opportunities. The current study aims to contribute to that goal by showing not that the social environment is as important as psychopathological predictors of gambling problems, but that the effects of both factors are best understood in relation to each other rather than separately.

Limitations

There are several important limitations to this study. First, while this study borrows from the logic of the Pathways model, this study is nonetheless not able to examine

the whole of the Pathways Model itself. The data available is not able to examine certain aspects of the model, such as biological or neurological predispositions toward problem gambling. Additionally, impulsivist traits and anti-social personality traits are not included in the data. Another weakness of the current study is that it was not able to study the rate of problem gambling as the dependent variable in the models. The rates of problem gambling in the sample, according to the CPGI screen, were quite low (approximately 2.4%). This fact presented problems when trying to examine categories that had especially low rates of problem gambling. This study opted instead to focus on the PGSI as a continuous dependent variable. This decision was made to capture more persons in the sample who experience problems as a result of gambling but do not also screen positively for problem gambling. The current study shows that the social support that a person receives affects the relationships between individual traits that the person possess and experiencing problems related to gambling. It is reasonable to assume other individual traits would behave similarly. Given the findings of the current study, future research on the relationship between social support and these other aspects of the Pathways Model is needed.

Another possible problem lies with the anxiety and mood disorder variables. As noted in the methods section, these variables are each a self-reported yes/no answer to whether the participant has received a diagnosis from a mental health professional. These variables may not reflect the actual rates of these conditions for several reasons. First, they do not capture subclinical or undiagnosed mental health problems. Second respondents may over-report, under-report, or may be unable to remember mental health diagnoses. Third, the questions ask for lifetime diagnosis rather than currently experiencing the condition. The current study is limited by the methods under which the survey was collected, but the fact that the question references clinical diagnosis makes it less likely for respondents to self-diagnose, and lowers the chances of false-positive screens.

Unfortunately, the current study uses only cross-sectional data, making it difficult to assert more specific claims about the causal ordering of the relationship between social support and psychopathology variables. This limitation is particularly a problem when trying to contextualize the current findings in multidisciplinary framework such as the Pathways Model, which implies a temporal ordering of the variables involved. As such, it is difficult to determine "where" in the Pathways Model social support related variables should be placed. However, the interaction effect between social support and mood disorders suggests a moderating effect between mood disorders and problem gambling, placing it "between" those variables.

References

Basu, A., & Rathouz P. J. (2005). Estimating marginal and incremental effects on health outcomes using flexible link and variance function models. *Biostatistics 6*, 93–109. doi:10.1093/biostatistics/kxh020

Black, D. W., & Moyer, T. (1998). Clinical features and psychiatric comorbidity of subjects with pathological gambling behavior. *Psychiatric Services 49*, 1434–1439. Retrieved from http://ps.psychiatryonline.org/doi/pdf/10.1176/ps.49.11.1434

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction 97*, 487–499. doi:10.1046/j.1360-0443.2002.00015.x

Blough, D. K., Madden, C. W., & Hornbrook, M. C. (1999). Modeling risk using generalized linear models. *Journal of Health Economics 18*, 153–171. doi:10.1016/S0167-6296(98)00032-0

Buckner, J. D., Timpano, K. R., Zvolensky, M. J., Sachs-Ericsson, N, & Schmidt, N. B. (2008). Implications of comorbid alcohol dependence among individuals with social anxiety disorder. *Depression and Anxiety 25*, 1028–1037. doi:10.1002/da.20442

Castellani, B., & Rugle, L. (1995). A comparison of pathological gamblers to alcoholics and cocaine misusers on impulsivity, sensation seeking, and craving. *Substance Use and Misuse 30*, 275–289. doi:10.3109/10826089509048726

Beaudoin C. M., & Cox, B. (1999). Characteristics of problem gambling in a Canadian context: A preliminary study using a DSM-IV-based questionnaire. *Canadian Journal of Psychiatry 44*, 483–487. Retrieved from https://ww1.cpa-apc.org/Publications/Archives/CJP/1999/June/cox.htm

el-Guebaly, N., Patten, S. B., Currie, S., Williams, J. V. A., Beck, C. A., Maxwell, C. J., & Wan, J. L. (2006). Epidemiological associations between gambling behaviour, substance use & mood and anxiety disorders. *Journal of Gambling Studies 22*, 275–287. doi:10.1007/s10899-006-9016-6

Elman, I., Tschibelu, E., & Borsook, D. (2010). Psychosocial stress and its relationship to gambling urges in individuals with pathological gambling. *American Journal on Addictions 19*, 332–339. doi:10.1111/j.1521-0391.2010.00055.x

Fabiansson, C. (2010). Pathways to excessive gambling: A societal perspective on youth and adult gambling pursuits. Burlington, VT: Ashgate.

Ferris, J., & Wynne, H. (2001). The Canadian Problem Gambling Index: Final Report. Ottawa, ON: Canadian Centre on Substance Abuse.

Giddens, J. L., Xian, H., Scherrer, J. F., Eisen, S. A., & Potenza, M. N. (2011). Shared genetic contributions to anxiety disorders and pathological gambling in a male population. *Journal of Affective Disorders 132*, 406–412. doi:10.1016/j.jad.2011.03.008

Gomes, K., & Pascual-Leone, A. (2009). Primed for change: Facilitating factors in problem gambling treatment. *Journal of Gambling Studies 25*, 1–17. doi:10.1007/s10899-008-9111-y

Hardoon, K. K., Gupta, R., & Derevensky, J. L. (2004). Psychosocial Variables Associated with Adolescent Gambling. *Psychology of Addictive Behaviors 18*, 170–179. doi:10.1037/0893-164X.18.2.170

Hraba, J., & Lee. G. (1996). Gender, gambling and problem gambling. *Journal of Gambling Studies 12*, 83-101. doi:10.1007/BF01533191

Kalischuk, R. (2010). Cocreating life pathways: Problem gambling and its impact on families. *Family Journal 18*, 7–17. doi:10.1177/1066480709357898

Lopes, C., Andreozzi, V. L., Ramos, E., & Sá Carvalho, M. (2008). Modelling over week patterns of alcohol consumption. *Alcohol & Alcoholism 43*, 215–222. doi:10.1093/alcalc/agm151

McCormick, R. A. (1994). The importance of coping skill enhancement in the treatment of the pathological gambler. *Journal of Gambling Studies 10*, 77–86. doi:10.1007/BF02109780

Mineka, S., Watson, D., & Clark, L. A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology 49*, 377–412. doi:10.1146/annurev.psych.49.1.377

Nixon, G., & Solowoniuk, J. (2009). Introducing the hero complex and the mythic iconic pathway of problem gambling. *International Journal of Mental Health and Addiction 7*, 108–123. doi:10.1007/s11469-008-9153-5

Oei, T. P. S., & Gordon, L. M. (2008). Psychosocial factors related to gambling abstinence and relapse in members of Gamblers Anonymous. *Journal of Gambling Studies 24*, 91–105. doi:10.1007/s10899-007-9071-7

Petry, N. M., Stinson, F. S., & Grant, B. F. (2005). Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry 66*, 564–574. doi:10.4088/JCP.v66n0504

Petry, N. M., & Weiss, L. (2009). Social support is associated with gambling treatment outcomes in pathological gamblers. *American Journal on Addictions 18*, 402–408. doi:10.3109/10550490903077861

Sherbourne, C. D., & Stewart, A. L. (1991). The MOS social support survey. *Social Science and Medicine 32*, 705–714. doi:10.1016/0277-9536(91)90150-B

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological Methodology 13*, 290–312. Retrieved from http://www.jstor.org/table/270723?seq=1#page_scan_tab_contents

Statistics Canada. (2008). Canadian Community Health Survey (CCHS). Ottawa, ON: Statistics Canada, Health Statistics.

Thomas, A. C., Allen, F. L., Phillips, J., & Karantzas, G. (2011). Gaming machine addiction: The role of avoidance, accessibility, and social support. *Psychology of Addictive Behaviors 25*, 738–744. doi:10.1037/a0024865

Tirachaimongkol, L. C., Jackson, A. C., & Tomnay, J. E. (2010). Pathways to problem gambling in seniors. *Journal of Gerontological Social Work 53*, 531–546. doi:10.1080/01634372.2010.487817

Vander Bilt, J., Dodge, H. H., Pandev, R., Shaffer, H. J., & Ganguli, M. (2004). Gambling participation and social support among older adults: A longitudinal community study. *Journal of Gambling Studies 20*, 373–389. doi:10.1007/s10899-004-4580-0

Vitaro, F., Ferland, F., Jacques, C., & Ladouceur, R. (1998). Gambling, substance use, and impulsivity during adolescence. *Psychology of Addictive Behaviors 12*, 185–194. doi:10.1037/0893-164X.12.3.185

Warren, J. I., Stein, J. A., & Grella, C. E. (2007). Role of social support and self-efficacy in treatment outcomes among clients with co-occurring disorders. *Drug and Alcohol Dependence 98*, 267–274. doi:10.1016/j.drugalcdep.2007.01.009

Weinstock, L. M., Keitner, G. I., Ryan, C. E., Solomon, D. A., & Miller, I. W. (2006). Family functioning and mood disorders: A comparison between patients with major depressive disorder and bipolar I disorder. *Journal of Consulting and Clinical Psychology 74*, 1192-1202. doi:10.1037/0022-006X.74.6.1192

Weinstock, J., & Petry, N. M. (2008). Pathological gambling college students' perceived social support. *Journal of college student development*, *49*(6), 625. doi:10.1353/csd.0.0047

Welte, J. W., Barnes, G. M., Tidwel, M.-C. O., & Hoffman, J. H. (2011). Gambling and problem gambling across the lifespan. *Journal of Gambling Studies 27*, 49–61. doi:10.1007/s10899-010-9195-z

****

For correspondence: Mark van der Maas M.A., Department of Sociology, University of Toronto, 725 Spadina Avenue, Toronto, ON, Canada, M5S 2J4. E-mail: mark.vandermaas@mail.utoronto.ca

Competing interests: None declared.

Ethics approval: This study used secondary de-identified data.