## Youth Gambling Problems: The Identification of Risk and Protective Factors

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### ABSTRACT

The present study examined the relationship between several risk and protective variables associated with problem gambling, substance abuse, and other multiple risk-taking activities by adolescents. With the goal of identifying protective factors that prevent youth from escalating from social gambling to serious problem gambling, this research examined the relationship between family cohesion, school connectedness, coping and adaptive behaviours, mentor relationships, achievement motivation, involvement in conventional organizations, and the development of three health-compromising outcomes—youth problem gambling, substance abuse, and involvement in multiple risk-taking behaviours (e.g., smoking, unsafe sexual activity, and reckless driving). The sample consisted of 2,179 students, ages 11 to 19, in the Province of Ontario. Family and school connectedness were associated with decreased involvement in excessive gambling, substance use, and multiple risk-taking activities. Furthermore, an examination of the effect of potential protective factors on a set of risk factors predictive of adolescent problem gambling suggested that family cohesion plays a role in the prediction of probable pathological gamblers and those at risk for developing a gambling problem. These findings were interpreted with respect to their implications for the development and implementation of prevention programs.

### · RESUMÉ

La présente étude a examiné la relation entre plusieurs facteurs de risque et de protection qui touchent aux problèmes de jeu, à l'abus de substance et à d'autres activités de prise de risque. Dans le but d'identifier les facteurs de protection qui peuvent prévenir le passage du jeu social aux problèmes de jeu sérieux chez les jeunes, cette recherche s'est penchée sur la cohésion familiale, le sentiment d'appartenance à l'école, les capacités d'adaptation, les relations avec un mentor, la motivation à réussir, l'implication dans les organisations conventionnelles et le développement de trois conséquences négatives pour la santé-les problèmes de jeu, l'abus de substance et l'implication dans des activités de prise de risque (par exemple, la cigarette, les relations sexuelles non protégées et la conduite dangereuse). L'échantillon final était composé de 2 179 élèves âgés de 11 à 19 ans, dans la province de l'Ontario. Les résultats ont révélé que le lien d'appartenance à la famille et à l'école est associé à un taux moindre de participation au jeu et aux activités de prise de risque ainsi qu'à la consommation de substance. Par ailleurs, l'étude des effets des facteurs potentiellement protecteurs sur une série de facteurs de risque susceptibles de prédire les problèmes de jeu suggère que la cohésion familiale est un facteur important pour prédire les problèmes chez les jeunes joueurs problématiques et pathologiques. Ces conclusions pourront être utiles à la mise en œuvre et l'élaboration des programmes de prévention.

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#### **CHAPTER I**

#### Introduction

Children and adolescents' gambling patterns have been delineated over the past decade in research conducted across North America (e.g., Derevensky, Gupta, Dickson, Hardoon, & Deguire, 2003; Gupta & Derevensky, 1998a; Hardoon & Derevensky, 2002; Jacobs, 2000; National Research Council (NRC), 1999; Shaffer & Hall, 1996, 2001; Volberg, 2001). Although there are differing estimates of the overall prevalence of youth problem gambling (see the discussion by Derevensky, Gupta, & Winters, 2003), current adolescent prevalence rates of problem gamblers have been reported to be between 4 and 8%, with an estimated 10 to 15% of youth excessively gambling and at-risk for a severe gambling problem (Derevensky & Gupta, 2000a, 2002b; Jacobs, 2000; Gupta & Derevensky, 1998a; Hardoon, Derevensky, & Gupta, 2002; NRC, 1999; Shaffer & Hall, 1996, 2001). Given the widespread proliferation of the types of gambling activities attractive to youth, their ease of accessibility, and the negative behavioural, emotional and economic consequences associated with adolescent problem gambling, the need to find effective prevention techniques remains paramount (Dickson, Derevensky, & Gupta, 2002; Ladouceur et al., 2000; NRC, 1999). Furthermore, while strides have been made in identifying risk factors associated with adolescent problem gambling, there are distinct gaps in our knowledge base. For example, there are no predictive studies on protective mechanisms, or more generally on resilience, for youth with respect to problem gambling.

Efforts to understand the economic, social and psychological correlates of youth gambling have been increasing. Comprehensive reviews (e.g., Derevensky & Gupta, 2004; Gupta & Derevensky, 1998b; Gupta & Derevensky, 1997, 2000; Hardoon & Derevensky, 2002) suggest that despite some conflicting findings there appears to be an overall consensus that:

- Gambling is more popular amongst males than females.
- Probable pathological gamblers (PPG) are greater risk takers.
- Adolescent prevalence rates of pathological gambling are 2 to 4 times that of adults.
- Adolescent problem or pathological gamblers have lower self esteem.
- Adolescent problem gamblers have higher rates of depression and learning disabilities.
- Youth problem gamblers dissociate more frequently when gambling.
- Adolescents remain at increased risk for the development of an addiction or multiple addictions.

- Youth with severe gambling problems employ less effective coping strategies.
- Age of onset has been shown to be a risk factor, with pathological gamblers reporting starting serious gambling at early ages (age 9 or 10).
- Familial factors suggest that children start gambling with family members, including parents, siblings and other relatives.
- Personality correlates reveal specific at-risk traits with adolescent pathological gamblers scoring higher on excitability, extroversion, and anxiety, and lower on conformity and self-discipline.

Youth gambling problems can best be realized as one form of adolescent risk behaviour (Romer, 2003). With the present emphasis on science-based prevention in the field of mental health (e.g., Brounstein, Zweig, & Gardner, 1999), there is a heightened need for applied research identifying risk and protective factors associated with adolescent problem gambling. Given the increasing emphasis on cultivating resilience in prevention programming, it is critical to identify those protective factors associated with youth problem gambling. The current study examines several perceived problem gambling protective factors and their commonalities to, and distinctiveness from, protective factors associated with high-risk behaviours. As well, this study examines age differences in risk and protective factors and advances our understanding of the process involved in the development of problem gambling behaviour.

#### **CHAPTER II**

#### Review of the Literature

A national study outlining perceptions of attitudes toward gambling indicates that while Canadians believe gambling generates more harm than benefit, they perceive it is an "acceptable and inevitable part of our culture" (Azmier, 2000, p. 31). One of the most ominous aspects of gambling is the impact it has upon the lives of youth. Our current empirical knowledge of problem gambling reflects the serious nature of gambling-related problems for youth (Derevensky & Gupta, 2000a; Gupta & Derevensky, 2000; Jacobs, 2000; Korn & Shaffer, 1999).

A substantial increase in the proportion of youth who report gambling within one previous year and who report gambling-related problems has been delineated between 1984 to 2003 (Jacobs, 2000; Jacobs, *in press*). While 10 to 15% of adolescents are estimated to be at risk for developing or returning to serious gambling problems (Shaffer & Hall, 1996), between 39 and 92% of youth report having gambled during their lifetimes (Gupta & Derevensky, 1998a; Ladouceur, Dubé, & Bujold, 1994a; NRC, 1999) with 22 to 35% gambling for money once a week or more (Derevensky, Gupta, & Della-Cioppa, 1996; Gupta & Derevensky, 1998a). Jacobs (2000) has argued that underage youth have infiltrated every form of legal, organized, and informal gambling activities. Youth gambling and problem-gambling rates are not limited to North America, but are increasingly becoming an international concern (Derevensky, Gupta, Dickson, Hardoon, & Deguire, 2003; Griffiths, 2002).

### Theories of High-Risk Behaviour

The risky lifestyles of adolescents have been an ongoing concern for parents, educators, policy-makers, and public and mental health professionals. Included in the profile of risky lifestyles are a number of problem behaviours (e.g., illicit drug use, excessive drinking, delinquency, and problem gambling), health-related behaviours (e.g., tobacco use, failing to use a seat-belt, risky driving behaviour, unprotected sex), and school behaviours (e.g., truancy, drop-out) (Jessor, 1998; Romer, 2003).

A number of theoretical perspectives on adolescent risk-taking behaviours have arisen over the past 30 years. Prominent theories include the problem behaviour perspective (risk-taking can be predicted by personality correlates) (Donovan, Jessor, & Costa, 1991); a developmental perspective holding that moderate risk-taking is a normal and adaptive means to develop autonomy, independence, and self-regulation (Baer, MacLean, & Marlatt, 1998; Baumrind, 1987; Shedler & Block, 1990); perceived adolescent invulnerability and egocentrism (Elkind, 1967, 1985), and a cognitive perspective (risk-taking behaviour stems from a rational decision-making process and can be predicted by perceived risks and benefits) (Ajzen & Fishbein, 1980; Lavery & Siegel, 1993). Recent developments in the study of adolescent high-risk behaviours have seen the convergence of several aspects of these theories (e.g., Lavery & Siegel, 1993; Moore, Gullone, & Kostanski, 1997) into a more generic conceptual framework. This general model (Jessor, 1998) conceptualizes the interactive nature of risk and protective factors (Coie et al., 1993), the multifaceted nature of risk-taking (e.g., youth engage in a variety of risky behaviours) (Shapiro, Siegel, Scovill, & Hays, 1998; Siegel, Cousins, Rubovits, Parsons, Lavery, & Crowley, 1994), and participation in high-risk behaviours in general (Lavery & Siegel, 1993; Parsons, Siegel, & Cousins, 1997; Shapiro et al., 1998). An examination of the commonalities of risk factors for problem gambling and other addictions provides sufficient reason to believe that gambling can be incorporated into a more general adolescent risk behaviour theory, with subsequent prevention implications (Dickson, Derevensky, & Gupta, 2002).

In light of the conceptual convergence of adolescent high-risk behaviour theories and the demonstrated validity of Jessor's *Adolescent Risk Behaviour Model* (e.g., Baer et al., 1998; Donovan, Jessor, & Costa, 1999), it is not surprising that current research efforts also suggest the potential utility of general mental health prevention programs that target multiple adolescent risk behaviours (e.g., substance abuse, gambling, risky driving, truancy, and risky sexual activity) (e.g., Battistich, Schaps, Watson, & Solomon, 1996; Costello, Erkanli, Federman, & Angold 1999; Galambos & Tilton-Weaver, 1998; Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998). As such, commonalties of risk and protective factors amongst alcohol, tobacco, and illicit drug use have led to the integration of many prevention programs into more general substance abuse prevention programs. For example, the Substance Abuse and Mental Health Services Administration (U.S. Government) has incorporated a multi-domain model of risk and protective factors for science-based prevention and has been modified to include pathological gambling (Dickson et al., 2002) (see Figure 1).



Figure 1. A multi-domain model of risk and protective factors for adolescent risky behaviours.

Adapted from Understanding Substance Abuse Prevention: Toward 21<sup>st</sup> Century Primer on Effective Programs (Bournstein & Zweig, 1999) by Dickson et al., 2002.

Understanding Youth Problem Gambling Through a Generic Conceptual Model for High-Risk Behaviours

### Theoretical Constructs: Resiliency, Risk Factors, and Protective Factors

The resilience literature is predicated upon the finding that some individuals appear more immune to adversity, deprivation, and stress than others. For example, a child raised in a family with parental conflict and substance abuse may do well while another sibling may go on to develop problems such as an addiction, suicidal ideation, or suicidal behaviour. It remains inevitable that all individuals face stressful life events and children, as with adults, have different adaptive behaviours and often unique ways of coping. A child living with a parent who has a gambling problem may ultimately develop similar gambling behaviours, other mental health problems and delinquent behaviours. However, we know that certain individuals who have been exposed to excessive and pathological gambling by a parent may appear to be resilient. Such young people, who do well despite experiences of multiple stressors or poor environmental circumstances are perceived to be resilient (Garmezy, Masten, & Tellegen, 1984; Werner & Smith, 1982). Luthar, Cicchetti, and Becker (2000) conceptualized resilience as "a dynamic process encompassing positive adaptation within the context of significant adversity" (p. 544). Resilience is not a fixed attribute and can vary depending on situational factors, developmental period, and the general surrounding environment. Those youth who have not developed a gambling problem despite unfavorable circumstances, have adapted, at that particular time, to the various stressors (risk factors) they face. Children are not necessarily born resilient; rather it seems that they acquire resilient qualities through adaptation to specific situations to which they are exposed. Resilient youth seem to be able to more effectively cope with stressful situations and emotional distress in ways that enable them to develop appropriate adaptive behaviours and go on to become competent individuals (Garmezy et al., 1984).

In contrast, risk factors refer to individual characteristics, interpersonal relations, or social conditions that have been empirically found to lead to poor developmental outcomes (Masten, 1994). Risk factors are associated with higher probability of onset, greater severity, and longer duration of major mental health problems. In the past, prevention initiatives have largely focused on preventing or limiting the effects of risk factors.

Evidence of resilience in children (e.g., Garmezy, 1985; Rutter, 1987; Werner, 1986) has expanded the prevention field from a risk-prevention framework to one that includes both riskprevention and the fostering of protective factors. Protective factors have been found to lead to more positive outcomes than one would expect if the protective factors were not present. The identification and quantification of the effects of protective factors requires understanding that a protective factor may decrease the probability of a negative outcome in two ways. First, it can directly reduce problem behaviour (Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995; Stacy, Newcomb, & Bentler, 1992), measured in terms of its main effects. Second, a protective factor can moderate the impact of risk on behaviour (Jessor et al., 1995; Masten, Best, & Garmezy, 1990; Stacy et al., 1992). Thus, when protection is high, the strength of the relationship between a risk factor and the negative outcomes decreases. Protective factors do not necessarily yield resilience. If the strength or number of risk factors outweigh the impact of protective factors, the chance that poor outcomes will ensue increases.

The focus on resilience in the public and mental health fields has yielded an influx of new positive youth development programs designed to promote healthy youth-development. In a comprehensive summary of findings on evaluations of positive youth development programs,

Catalano, Berglund, Ryan, Lonczak, and Hawkins (2002) concluded that there is considerable empirical evidence that increasing positive youth-development outcomes is likely to prevent problem behaviour. Not only does this review cite a number of program evaluations evidencing positive changes in youth behaviour (e.g., interpersonal skills, cognitive competencies, quality of peer and adult behaviours), it describes several programs that show significant improvements in multiple high-risk behaviours. Despite the widespread implementation of youth development programs, research clearly indicates that prevention policies and programs must take a balanced approach focusing efforts on both the reduction of risk while simultaneously promoting protective factors (e.g., Pollard, Hawkins, & Arthur, 1999).

## A Generic Conceptual Model for High-Risk Behaviours

Jessor (1998) provided a model in which problem gambling can be included as a form of adolescent risky behaviour with health and life-compromising outcomes. This conceptual framework, presented in Figure 2, has been adapted from Jessor's (1998) framework which provides theoretical foundation for designing general mental health prevention programs that aim to foster resilience (Dickson et al., 2002). The model represents current trends in thinking about adolescent risk behaviour where risk and protective factors operate interactively, in and across a number of domains (biological, social environment, perceived environment, personality, and behaviour). Further, the protective factors in each of the domains of the general conceptual model correspond to the broad dimensions of resilience that have been identified by different research; social bonding (positive emotional ties to school, family, and the community), personal competence (feeling good about one's self, self-efficacy, and positive outlook), and social competence (one's ability to adjust in social situations).

The adolescent risk-behaviour model provides flexibility, permitting one to incorporate current research on risk and resilience on an ongoing basis. Problem gambling has been included into this framework based upon a growing body of empirical research. Problem adolescent gambling has a number of unique risk factors (indicated in italics) including paternal pathological gambling, access to gambling venues, persistent problem behaviours and early onset of gambling experiences.

Problem adolescent gambling also shares a number of common risk factors with other health-compromising behaviours (indicated in bold). These include being male, normative anomie, models for deviant behaviour, parent-friends normative conflict, low self-esteem, high risk-taking







#### **Bold: Shared factors**

Figure 2. Modified Jessor's Adolescent Risk Behaviour Model with youth gambling risk factors (Dickson et al., 2002).

propensity, poor school work, and school difficulties (for recent reviews of common risk and protective factors among high-risk behaviours see Blum, McNeely, & Nonnemaker, 2002; Perkins & Borden, 2003; Zhang, Welte, & Wieczorek, 2002). The remaining risk factors (presented in regular font) are those that have either not been studied or have not been found to be risk factors for problem gambling among youth but have been found to be antecedents for other adolescent risk behaviours.

As noted in Figure 2, variance in factors that influence whether an adolescent will engage in risk behaviours and variability in health outcomes amplifies the need to target the development of resilience in children and youth. A wide range of factors work together to influence whether an adolescent will engage in gambling behaviours including being male (biology), access to gambling venues (social environment), models for deviant behaviour (perceived environment), depression and anxiety (personality), and poor coping skills (behaviour). With the exception of early childbearing, adolescent problem gambling shares the same health compromising outcomes as other youth risk behaviours (Resnick et al., 1997). Accordingly, these outcomes vary from threats to physical health, compromises to various social roles (such as school failure or social isolation), threats to personal development (e.g., lowered self-concept) and compromises to typical tasks that prepare adolescents for adulthood such as acquiring motivation and skills to maintain a job. *Protective Factors for Problem Gambling* 

Protective factors for youth problem gambling, to date, have not been examined. As well, building a candidate list of protective factors requires examining the relevant literature. Dickson et al. (2002) hypothesized that those protective factors which have been illuminated in the reduction of multiple problem behaviours will likely be involved in directly effecting or moderating youth problem gambling. Similar to studies examining protective factors for tobacco, drug, and alcohol abuse, the concept of protective factors for youth problem gambling are best conceptualized as those factors which are directly associated with less dysfunction, interact with risk factors to buffer and minimize its effects, disrupt the mechanism through which the risk factor operates, or prevent the initial occurrence of the risk factor (Coie et al., 1993). Conceptually, the effect of protective factors is demonstrable in the presence of risk (Jessor, 1998). The following section provides an overview of possible protective factors for youth problem gambling suggested by the extensive body of research on youth high-risk behaviours.

*Family cohesion.* Within the adolescent's social environment, family cohesion and adaptability have been identified as significant protective factors against a number of high-risk behaviours. Family cohesion, also referred to as family connectedness, is defined as feelings of bonding with one's family (Olson, 2000; Resnick et al., 1997) and has been found to be related to each general domain of resilience (Springer, Wright, & McCall, 1997). The *Circumplex Model* (Olson, 2000) presented family cohesion as lying on a continuum ranging from extremely low cohesion to extremely high cohesion, with moderate levels of cohesion being most representative of healthy family functioning. Empirical studies suggested that increased family connectedness is related to adolescent reports of increased family life satisfaction (Henry, 1994) and to decreased problem behaviours (Barber & Buehler, 1996; Barrera & Li, 1996; Tolan, 1988). Family connectedness has been found to be protective against every health-risk behaviour measure except pregnancy (Resnick et al., 1997). A recent study (Baer, 2002) exploring the direct linear relationship between family cohesion and family functioning concluded that family cohesion is relatively stable and continuous from childhood through adolescence, rather than an attribute that normatively declines during adolescence (e.g., emotional withdrawal between youth and parents).

Although some research exists on the effects of ethnicity on family cohesion, the findings have generally been inclusive. While studies by Tolan (1988) and Rodick, Henggler, and Hanson, (1986) found that low levels of cohesion for Euro-American and high levels of cohesion for African-American were significantly associated with delinquency, Baer (2002) found few ethnic differences in a sample of Mexican-, African-, and Euro-Americans. There also may be sex differences in the protective function of family cohesion. For example, Weist, Freedman, Paskewitz, Proescher, and Flaherty (1995) reported that family cohesion did not serve protective functions for girls but did for boys.

*Mentorship*. A mentor relationship is one in which adolescents are given adult support, counsel, and friendship. Mentoring relationships have been shown to have an affective function (e.g., emotional support) (Klaw & Rhodes, 1995) and an instrumental function (Darling, Hamilton, & Niego, 1994), contributing to several aspects of youth resilience. Adults are thought to be instrumental by teaching skills, introducing new activities to adolescents and by strengthening the adolescents' sense of competence. Adolescents are more likely to have same-sex rather than othersex mentoring relationships (Darling, Hamilton, Toyokawa, & Matsuda, 2002).

Mentor relationships can be naturally occurring or programmed, the latter of which has been incorporated into several prevention program evaluations as a protective factor in youth's social environment (e.g., Rogers & Taylor, 1997; Taylor, LoSciuto, Fox, Hilbert, & Sonkowsky, 1999). Although most mentoring programs are school-based and academic-oriented, a review of the drug-prevention program, *Across Ages* (LoSciuto, Rajala, Townsend, & Taylor, 1996), provides evidence that mentoring may impact youth's substance use in a number of ways. The evaluation of *Across Ages* compared outcomes for students who participated in all components of the program (community service, parent workshops, mentoring, and a life-skills curriculum), with those that received all components except mentoring and with those who were not participating in the program. Students who had mentors were found to have used substances less frequently and expressed more positive attitudes toward school, their future, and elders than youth in the other two groups.

A comprehensive review of the findings from mentoring programs over 15 years (Spie, 2002) concluded that mentoring has a number of important benefits for the youth. The *Big Brothers-Big Sisters* (BBBS) (Tierney, Grossman, & Resch, 1995) evaluation provides the most provocative evidence that mentoring alone can make an impact on youth's high-risk behaviours. The BBBS evaluation found that participants were 46% less likely to initiate drug use and 27% less likely to initiate alcohol use. Students also exhibited less aggressive behaviour (e.g., hitting someone) and skipped half as many school days. Furthermore, participants reported feeling more academically competent and noted slightly higher grades. There is a substantial body of research examining why some programs are successful while others are not. Spie's (2002) review concluded that there are distinct features of the mentoring relationship that are protective, including the development of trust, commitment, respect between mentor and student, as well as involvement in enjoyable activities. Still further, it was noted that effective mentoring programs are built upon screening, training and ongoing support of mentors.

School connectedness. Perceived school connectedness is an individual's belief that they belong, are respected, and cared for at school. It is feeling of being treated fairly, close to others, and a part of the school, all of which contribute to youth's social bonding and competence. McNeely, Nonnemaker and Blum (2002) reported that perceived school connectedness is associated with a number of school characteristics including school size (lower school enrolments are related to increased school connectedness), perceptions of safety (classroom management and school discipline polices) (excessive disciplinary guidelines decreases school connectedness), and number of friends (school connectedness increases with the number of friends).

Findings from the National Longitudinal Study of Adolescent Health indicate that perceived school connectedness is a salient protective factor against most health-risking behaviours (Resnick et al., 1997). More specifically, school connectedness reduces the overall frequency, prevalence, and intensity of involvement in cigarette, alcohol, and marijuana use, as well as delinquent and violent behaviour, independent of community context, sex, or ethnic group (Dornbusch, Erickson, Laird, & Wong, 2001). Finally, studies seeking to identify factors that contribute to the academic resilience of students have found that a sense of belonging to school was found to be the only significant predictor of academic resilience (Gonzalez & Padilla, 1997) and of academic motivation to succeed (Furrer & Skinner, 2003).

Achievement motivation. Broadly speaking, two distinct conceptions of achievement motivation exist in the literature. The first viewpoint outlines achievement motivation as a stable personality trait described as one's unique internal drive or need that impels an individual towards action (Atkinson, 1957). A second perspective views achievement motivation as a goal that entices individuals toward action (e.g., Elliott & Dweck, 1988). Both concepts have been used in the literature pertaining to the protective function of achievement motivation, exemplifying the recommendation put forth by Covington (2000) in the *Annual Review of Psychology* that both perspectives are valid and add to our general understanding.

As a single factor, achievement motivation has been defined as an intrinsic desire to succeed (e.g., Lengua & Stormshak, 2000; Waxman, Huang, & Padron, 1997). As a two-factor concept, Man, Nygard, and Gjesme (1994) specified achievement motivation as two motive dispositions—the motivation to approach success and the motivation to avoid failure, both of which are based on the definition of motivation as a capacity to anticipate positive and negative effects. Accordingly, achievement motivation is assumed to be universal and not linked to specific situational contexts or momentary motivational states. Studies utilizing *Motivational Systems Theory* (e.g., Ford, 1992; Gordon Rouse, 2001) conceptualize it as the patterning of goals, emotions, and personal agency beliefs, and therefore measure several dimensions of achievement motivation as a personality construct has been found to exert a protective function for substance abuse and to

promote academic and psychological resilience (Gordon Rouse, 2001; Lengua & Stormshak, 2000; Waxman, Huang, & Padron, 1997).

In contrast to achievement motivation as a personality construct, a number of studies revealed that school orientation, valuing academic success, and school commitment are related to lower levels of high-risk behaviours (Felix-Ortiz & Newcomb, 1999; Jenkins, 1995; Kelly & Balch, 1971) and increased academic resilience (Gordon, 1996; Whitfield, 1995). Furthermore, preferences for mastery, hard work, and competitiveness have also been found to be related to positive mental health and actual school achievement (Accordino, Accordino, & Slaney, 2000). In their review of the literature, Andrews and Duncan (1997) concluded that taken together, both theory and empirical research support the notion that a bidirectional relation between academic motivation and substance use exists. However, in their attempts to specify this relationship, Andrews and Duncan concluded that it does not appear to hold true for substances that are presumably less antisocial, such as alcohol consumption, and likely gambling.

*Involvement in conventional activities*. Activities and events that afford the opportunity for youth to actively participate, make positive contributions, and experience positive social exchanges, foster prosocial involvement. Prosocial involvement promotes social, emotional, moral, and cognitive competencies and fosters self-determination and positive identity (for a summary of research findings see Catalano et al., 2002). Whether naturally occurring or programmed (e.g., youth development programs), youth involvement in extracurricular school and community-based activities and organizations (e.g., theatre groups, cultural clubs, religious groups, sports groups, music associations, and volunteer community services) has been found to be protective of a number of adolescent high-risk behaviours (Catalano et al., 2002; Elder, Leaver-Dunn, Wang, Nagy, & Green, 2000; Jessor, Turbin, & Costa, 1998; Stronski, Ireland, Michaud, Narring & Resnick, 2000). Although the amount of time involved in prosocial activities necessary to serve a protective function has received little attention, Catalano et al. (2002) concluded that effective youth development programs must provide structure and long-term consistency in program delivery.

*Coping strategies*. Coping strategies among youth have been studied as both a risk and protective factor for involvement in high-risk behaviours and consequential problems. Lazarus and Folkman's (1984) framework conceptualized coping as "Constantly changing cognitive and behavioural efforts to manage specific external or internal demands that are appraised as taxing or

exceeding the resources of the person" (p. 141). Accordingly, the dimensions of coping are outlined as problem-focused or active coping which are direct efforts to alter a given situation (e.g., direct problem solving) and emotion-focused coping—efforts to manage or reduce emotional distress (e.g., positive reframing, cognitive and behavioural distraction, social withdrawal and avoidance). Problem-focused coping and adaptive forms of emotion-focused coping have been linked to lower levels of psychological symptoms while avoidant coping is related to higher levels of symptoms such as antisocial behaviour, substance use (Ayers, Sandler, West, & Roosa, 1996; Compas, Malcarne, & Fondacaro, 1988; Glyshaw, Cohen, & Towbes, 1989; Lengua & Stormshak, 2000; Nower, 2001) and internalizing problems such as depression (Dumont & Provost, 1999; Jorgensen & Dusek, 1990; Steinhausen & Winkler Metzke, 2001).

Although an extensive body of literature exists on poor coping strategies as a general risk factor for multiple adverse consequences, fewer studies have examined the protective influences of adaptive or effective coping style on youth high-risk behaviours. Dumant and Provost (1999) classified resilient youth as those students who exhibited minimal depression despite reporting high levels of negative life events (stress). Resilient students used problem-solving coping strategies more frequently than youth identified as vulnerable (high levels of depression and stress) and non-adjusted (high depression and low stress). The protective function of active coping on internalizing disorders has been similarly identified in other studies (Holahan & Moos, 1991; Steinhausen & Winkler Metzke, 2001).

Broadening the scope of study to the protective function of coping on externalizing problems (e.g., substance use, delinquency), Weist et al. (1995) reported support for the protective function of problem-focused coping strategies for girls but not for boys in a sample of urban youth. Still, evidence for the protective function of coping tends to be indirect. For example, Grant et al. (2000) failed to find direct evidence that active coping strategies buffer the influences of stress on youth's internalizing and externalizing behaviours, but found evidence existing largely in the form of trends in the relation between active coping and specific subtypes of stress (e.g., daily hassles, major life events). For example, girls who reported more frequently using active coping strategies had less externalizing symptoms in the presence of major life events but not in the occurrence of daily life hassles. The authors suggested that these trends may signify protective effects that would be detectable in clinical samples or samples with greater statistical power and propose the need for future research along such lines.

Research on the effectiveness of coping strategies has had an important influence on the design and interpretation of studies on coping as a protective factor. For example, one predominant pattern in the literature on adolescent coping is that severe, uncontrollable, major life events evoke avoidant coping in youth, which provides temporary relief from symptoms, but over time, avoidant coping is less effective in dealing with ongoing stress (Grant et al., 2000; Spaccarelli, 1994). This pattern, paired with studies indicating that stressors are controllable, suggests that problem-focused coping is most effective (Compas et al., 1988; Osowiecke & Compas, 1999). Still further, it suggests a complex relationship between coping and type of stress (for a comprehensive review of the literature see Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001) and calls for future studies to examine the possibility that it is the possession of a broad repertoire of coping strategies and the flexible, situational utilization of various strategies depending upon situational factors that function to protect youth from high-risk behaviour problems rather than the use of a particular coping strategy.

## Identifying Protective Factors in the Presence of Risk

An important caveat to delineating protective factors for youth problem gambling is to examine them in concert with risk factors. As articulated by Jessor (1998), the effect of protective factors is demonstrable in the presence of risk. For this reason, in order to go beyond examining how protective factors directly reduce problem gambling to an inquiry of how they also moderate the impact of risk behaviour, risk factors must be incorporated into an empirical examination of protective factors. Fortunately, there is a growing body of empirical studies identifying and delineating various risk factors for youth problem gambling. Although not exhaustive, the following is a brief overview of our current state of knowledge on the risk correlates and factors associated with youth problem gambling.

*Biological domain.* To date, much of the literature suggests that males are at greater risk than females for developing gambling problems given its increased popularity amongst males, higher prevalence rates (almost double), and greater time and money spent on gambling (Derevensky & Gupta, 2000a, 2000b; Jacobs, 2000; Ladouceur, Dubé, & Bujold, 1994; Stinchfield, 2000). Research on motivational circuitry has also led to the hypothesis that the immaturity of frontal cortical and subcortical monoaminergic systems during normal neurodevelopment underlies adolescent impulsivity as a transitional trait-behaviour (Blum, Cull, Braverman, & Comings, 1996; Chambers & Potenza, 2003; Spear, 2000). Accordingly, research is underway exploring whether such neurological changes during development present a biological vulnerability to specific risky behaviours, including youth problem gambling which are characterized by impaired impulse control.

Social domain. Many studies have indicated that youth with gambling problems are more likely to have parents, siblings, or other relatives with an addiction (Fisher, 1993; Gupta & Derevensky, 1998a; Wood & Griffiths, 1998). Similarly, as youth mature they gamble more with friends, bringing about increased opportunities to gamble, social modelling (Hardoon & Derevensky, 2001), attitudinal changes (e.g., increased awareness of peer gambling problems and the attribution of skill to various gambling activities) (Derevensky & Gupta, 2000a; Dickson et al., 2002; Griffiths & Wood, 2000).

Perceived environment domain. As with many youth high-risk behaviours, findings suggest that stressful life events are also correlated to youth problem gambling (Jacobs, 1986; Kaufman, Derevensky, & Gupta, 2001). A substantial amount of research has been conducted on the impact that ongoing daily hassles and stressful life experiences have on healthy youth development and negative behavioural outcomes including substance abuse and delinquency (Dumont & Provost, 1999; Kaufman, Derevensky, & Gupta, 2002; Leadbeater, Blatt, & Quinlan, 1995; Reinherz, Stewart-Berghauer, Pakiz, Frost, & Moeykens, 1989; Seiffge-Krenke, 2000). Such research has been largely studied within the context of adolescent coping where the findings suggest the importance of measuring developmentally appropriate stress. It is important to note that it is the individual's perception of stressful events and their means of coping and the available social support resources which moderate the impact of stressful events.

Personality or Intrapersonal domain. Just as anxiety has been found to be associated with youth alcoholism, drug abuse, and cigarette smoking (Merikangas, Dierker, & Szamari, 1998; Regier, Rae, Narrow, Kaelber, & Schatzberg, 1998), recent research indicates that anxiety is a critical risk correlate of problem gambling. More specifically, findings suggests that trait anxiety varies with gambling severity more substantially than state anxiety, such that adolescent pathological gamblers exhibit considerably more trait anxiety than social and at risk gamblers (Ste-Marie, Gupta, & Derevensky, 2002). Adolescent problem gamblers have also been found to exhibit generally poor coping skills, and more specifically to use more distraction and emotion-oriented strategies than non-gamblers (Getty, Watson, & Frish, 2000; Marget, Gupta, & Derevensky, 1999; Nower, 2001). Furthermore, youth with gambling problems also show signs

of increased amounts of depression (Gupta & Derevensky, 1998a, 1998b; Getty et al., 2000; Kaufman et al., 2001; Nower, 2001).

*Behavioural domain.* Research on problem gambling, based on self-report data, suggests that youth who experience gambling problems experience significant school problems, both behaviourally and academically. Youth problem gamblers report lower grades, perceive themselves as slow learners, and are more likely than non-gamblers to have been diagnosed with a learning disorder (Hardoon et al., 2002; Ladouceur, Boudreault, Jacques, & Vitaro, 1999). As well, youth problem gamblers have been found to have increased rates of truancy (Ladouceur et al., 1999; Lesieur, & Klein, 1987), have a history of delinquency (Stinchfield, 2000; Winters, Stinchfield, & Fulkerson, 1993), and be at greater risk for substance use (Hardoon et al., 2002; Ladouceur et al., 1999). These findings suggest that problem gambling is part of a more general problem-behaviour syndrome (Barnes, Welte, Hoffman, & Dintcheff, 2002; Vitaro, Brendgen, Ladouceur, & Tremblay, 2001).

## **Research Goals**

To date, there have been no studies examining protective factors as predictive of increased resilience related to adolescent problem gambling despite the likely beneficial implications for prevention initiatives. The primary goal guiding this research is to identify conditions and factors promoting excessive youth gambling problems and to delineate those factors that reduce the likelihood of youth problem gambling. More specifically:

- Are there differences in the presence of possible protective factors (family cohesion, school connectedness, effective coping, mentor relationships, achievement motivation, high perceived academic achievement, and involvement in conventional organizations) between Non-gamblers, Social gamblers, At-Risk gamblers, and Probable Pathological gamblers?
- Are there differences in the presence of risk factors (sex, risk propensity, trait anxiety, ineffective coping, familial and peer gambling, familial and peer substance use, stressful life experiences, and school problems) between Non-gamblers, Social gamblers, At-Risk gamblers, and Probable Pathological gamblers?
- Do differences in the presence of protective and risk factors exist between youth who are at risk for a substance use problem and youth who are not at risk?

- Are there differences in the presence of protective and risk factors between youth who are more involved in multiple risk behaviours and youth who are less involved in other risky activities?
- Are there age and sex differences for risk factors and possible protective within gambling-, substance use-, and multiple risk behaviour groups?
- Do differences exist in risk and possible protective factors between problem gambling, substance abuse, and involvement in multiple risk activities?
- What is the effect of possible protective factors on the probability of developing at risk gambling or probable pathological gambling when taking into account a number of risk factors?

### **CHAPTER III**

### Method

## **Participants**

The total sample included 2,582 youth (ages 11 to 18; grades 6 to 13) (Table 1). Participants were selected from nine school boards in the Province of Ontario (based upon their willingness to participate), representing diverse geographic locations (both urban and rural).

	Sample Distribution		
Grade	n	%	Mean Age
6	88	3.4	11.94
7	457	17.7	12.27
8	411	15.9	13.54
9	290	11.2	15.26
10	384	14.9	15.51
11	377	14.6	16.82
12	384	14.9	17.41
13	181	7.0	18.07
Total <sup>a</sup>	2572		
Sex			
Male	1107	42.9	7.46
Female	1430	55.4	7.65
Total <sup>b</sup>	2537		-

 Table 1.
 Sample Distribution

<sup>a</sup>Grade was not reported for 10 participants.

<sup>b</sup>Sex was not reported for 45 participants.

In spite of piloting the instruments, observations during data collection revealed that a large number of grade 6 students were unable to complete the questionnaire in the allotted time and failed to understand a number of the items. Of the total number of grade 6 students (n = 88), all had incomplete data, such that 70% of grade 6 students (n = 77) were missing data on 30% or more of the instruments and the remaining grade 6 students were missing data on at least 20% of the instruments. Given the extent of missing data for grade 6, and the resulting small sample size gathered for this grade, it was decided to exclude these students from all analyses. After eliminating grade 6 students from the sample and making further adjustments to address the collection of incomplete questionnaires (see the section below on handling missing data) the final sample used for analysis included 2,179 youth in grades 7 to 13 (age

range 12-19; M = 14.92, SD = 1.99). Table 2 summarizes the distribution of participants within each group.

Grade		Sample Distribution		
Grade			%	Mean Age
7		349	16.0	12.08
8		346	15.9	13.13
9		252	11.6	14.10
10		357	16.4	15.06
11		351	16.1	16.15
12		352	16.2	17.19
13		172	7.9	18.06
T	'otal	2179	100.0	
Sex				
Male		929	42.6	
Female		1250	57.4	
ТТ	'otal	2179	100.0	

Table 2. Final Sample Distribution Used for Analyses

The following school boards granted permission to conduct this research: Bluewater District School Board, Durham Catholic District School Board, Grand Erie District School Board, Rainbow District School Board, Thunder Bay Catholic District School Board, Upper Canada District School Board, Waterloo District School Board, Windsor-Essex Catholic District School Board, and York Catholic District School Board (Table 3).

School Poord	Sample Distribution		
School Board	N	%	
1. Bluewater	232	8.99	
2. Durham Catholic	321	12.43	
3. Grand Erie	256	9.91	
4. Rainbow	216	8.37	
5. Thunder Bay Catholic	429	16.62	
6. Upper Canada	234	9.06	
7. Waterloo	157	6.08	
8. Windsor-Essex Catholic	643	24.90	
9. York Catholic	94	3.64	

Table 3. School Board Distribution

The present sample is believed to be representative of the general population. With respect to gambling severity, the distribution of participants is consistent with previously

reported prevalence studies. Regarding drug and alcohol use severity, similar rates of youth identified as at risk for substance abuse (SA) were found in this study compared to past research using a similar school sample (Winters, 1992). It is important to note that this research was not designed as a prevalence study of adolescent risky behaviours. For details regarding voluntary participation and attrition, see the sections on procedure and response distortion. *Instruments* 

The instruments comprised self-reports of involvement and severity of youth high risk behaviours. One potential problem with self-report high-risk behaviour is that adolescents may not answer sensitive questions honestly, either exaggerating or minimizing involvement in certain activities (McCord, 1990). While self-report instruments have been challenged for their validity (e.g., Martin & Winters, 1998; Williams, Toomey, McGovern, Wagenaar, & Perry, 1995), there is ample evidence supporting their validity and use (Klein, Graff, & Santelli, 2001; Maisto, Connors, & Allen, 1995; Schinke et al., 2000). More specifically, research with adolescents has demonstrated the validity of the use of self-report measures with respect to multiple high risk behaviours including alcohol and drug use (Needle, McCubbin, & Lorence, 1983; Winters, Stinchfield, & Henly, 1990), sexual behaviour (Davoli, Perucci, & Sangalli, 1992; Orr, Fortenberry, & Blythe, 1997; Shew, Remafedi, & Bearinger, 1997) and tobacco use (Ausems, Mesters, van Breukelen, & De Vries, 2002; Wills & Cleary, 1997). The accuracy of self-report measures in general is further increased when confidentiality and anonymity are assured (Schinke, Tepavac, & Cole, 2000).

*DSM-IV-MR-J.* (Fisher, 2000). This instrument is a revised version of the DSM-IV-J (Fisher, 1992) and includes 12-items (9-categories) used to screen for pathological gambling during adolescence. The items are modeled after the DSM-IV (APA, 1994) criteria for diagnosis of adult pathological gambling. The revised DSM-IV-J, the DSM-IV-MR-J (MR = multiple response, J = juvenile), was developed for use with adolescents who have gambled during the past year. To compensate for the lack of opportunity for probing, most of the questions in the revised instrument have been given four response options; *never, once or twice, sometimes,* or *often.* The DSM-IV-MR-J represents a more conservative classification system of problem and pathological gambling groups in that various questions require an endorsement above a certain severity level to receive an endorsement rating (score of 1). Any score of 4 or more within the 9 categories is indicative of pathological gambling. Based on clinical judgement and past research indicating the similarities

between at-risk gamblers and probable pathological gamblers, the scale was modified for this study to enable youth to respond to item 6 ("In the past year, after losing money gambling, have you returned another day to try and win back money you lost?") with the above four response headings wherein they received a score of 1 if they selected *sometimes* or *often*. The DSM-IV-MR-J has been widely used by several researchers, and has been found to be the most conservative adolescent measure of pathological gambling (Derevensky & Gupta, 2000a; Gupta & Derevensky, 1998a, 1998b; Volberg, 1998). Internal consistency reliability for the DSM-IV-MR-J is adequate, with Cronbach's alpha = .75 (although slightly lower than .78 for the original DSM-IV-J screen) (Fisher, 2000) and the alpha for the modified version used in this study was found to be .82.

Achievement Motives Scale (AMS. (Gjesme & Nygard, 1970). The AMS is a 30-item scale comprised of 2 subscales (15 items each), measuring adolescent's motive to approach success and motive to avoid failure, with internal consistency reliabilities of .78 and .85 respectively. This potential protective personality factor represents participants' tendency to engage in challenging situations. Where higher scores on both subscales indicate greater motives to approach success and avoid failure, the AMS identifies individuals with the combination of high motives to approach success and low motives to avoid failure (those who are more apt to anticipate positive outcomes and apply themselves in situations where the outcomes are uncertain). Although this measure has yet to be used in the examination of youth high-risk behaviours, the validity of this measure has been argued in a number of studies (Hagtvet & Zuo, 2000; Halvari, 1997; Man, Nygard, & Gjesme, 1994; Nygard, 1982).

Adolescent-School Problems Scale (A-sch) (Butcher et al., 1992) is a 20-item content scale from the Minnesota Multiphasic Personality Inventory-Adolescent (MMPI-A) (Archer, 1997). Items were reversed coded to be weighted in a positive direction, summed and transformed into *T*scores (covaried for sex) whereby higher scores reflect greater negative attitudes toward academic achievement, poor school performance, and behavioural and academic deficits, as well as a measure of general maladjustment. *T*-scores range from normal (below 60), to moderately elevated school problems (60 to 64), to significant school problems and symptoms ( $\geq$  65). This scale has high face validity (Acher, 1997) and its test-retest reliability for use on a normative sample is .69 for both males and females (Milne & Greenway, 1999).

Adolescent Coping Orientation for Problem Experiences (ACOPE) (Patterson & McCubbin, 1987). The ACOPE is a self-report questionnaire that is a modified version of the
Young Adult Cope, consisting of 54 specific coping behaviours which adolescents use to manage, change, and adapt to stressful situations. Individuals respond on a 5-point scale (1 = never; 2 = hardly ever; 3 = sometimes; 4 = often; 5 = most of the time) to indicate how often they use each coping strategy when feeling tense or facing a problem. This study utilizes the subscales described by Jorgensen and Dusek (1990) called "salutary effort" (effective coping) and "stress palliation" (ineffective coping). Thirty-nine items form the effective coping subscale, representing a mixture of adaptive cognitive, behavioural, and emotional strategies. A total effective coping score is derived, with high scores indicative of adaptive coping (a = 0.89). Fifteen items form the ineffective coping subscale and measure a risk factor for youth problem gambling (Getty et al., 2000; Marget et al., 1999; Nower, 2001). Responses on the ineffective coping subscale were reverse coded and summed to derive an ineffective coping score, with lower scores indicative of more frequent use of maladaptive coping strategies (a = 0.78).

Demographic Questionnaire. A number of items were created to assess individual factors such as sex, age, and grade. The following 2 items from the Gambling Activities Questionnaire (GAQ) (Gupta & Derevensky, 1999) were included to assess peer and familial history of gambling and drugs and alcohol problems: "To your knowledge do any these people have a gambling problem or a drinking or drug problem?" Participants were given the following list of multiple choice responses; mother or stepmother, father or stepfather, sister, brother, other relative, friend, classmate, and other person in your life. In order to assess participant's involvement in conventional activities, individuals were asked to indicate from a list of clubs and community organizations their past, present or future plans for involvement during the current school year. Participants' perceived academic achievement was revealed through responses to the statement "Overall, my grades are. ..." indicating either *below average, average*, or *above average*.

*Family Adaptability and Cohesion Evaluation Scales (FACES-II)* (Olson, Portner, & Bell, 1982). Family relations as a function of emotional bodying among family members was assessed by the 16-item Cohesion Subscale of the FACES-II which has been found to have good internal consistency (a = 0.87) (Hampson, Hulgus, & Beavers, 1991) and validity (Daley, Sowers-Hoag, & Thyer, 1991; Knight, Tein, Shell, & Roosa, 1992). All items were summed and youth were assigned a family cohesion type based on their total cohesion score, ranging from *very connected* (scores between 71 and 80), *connected* (scores between 60 and 70), *separated* (scores between 50 and 59), and *disengaged* (scores between 15 and 50).

Personal Experience Screening Questionnaire (PESQ—Problem Severity subscale) (Winters, 1992). The PESQ is a standardized self-report screening instrument used to identify youth needing an assessment for alcohol and other drugs (AOD). The Problem Severity (PS) subscale consists of 18 items designed to tap the severity of drug involvement problems and 3 items that measure a faking bad response distortion. Questions are formatted using a Likert scale tapping behaviours common among AOD abusing adolescents and frequency of use of substances. High PS scores indicate the need for an AOD referral. If a participant scores high on the distortion scale, the validity of their PS score is not reliable. Youth identified as needing an AOD referral using the PESQ generally lie about 1½ standard deviations above the mean of a general school sample. The PESQ is reported to have high internal consistency reliability ( $\alpha = 0.91$ ) and construct validity ( $\alpha = 0.91$ ).

Risk Involvement and Perception Scale (modified RIPS)-modified version (Shapiro et al., 1998). The original RIPS (Siegel et al., 1994) is a self-report inventory composed of three subscales; Risk Involvement; Perceived Risks; and Perceived Benefits regarding a range of common (e.g., drinking alcohol) to low frequency behaviours (e.g., cocaine use). Items on the Risk Involvement scale are anchored by: never (0), rarely (1 or 2), occasionally (3 to 5), often (6 or 7), and daily or more (8) and items on the perception scales are anchored by: not risky/beneficial (0), slightly risky/beneficial (1-2) moderately risky/beneficial (3 to 5), very risky/beneficial (6 or 7), and extremely risky/beneficial (8). This is a theory-driven research instrument that has been modified a number of times to fit the purposes of particular studies. From the original 27 items, three items pertaining to sexual activity were excluded based on the request of school boards, two items (binge eating and taking speed) were omitted based on observations during data collection that a number of students failed to understand their meaning, and two gambling-related items were omitted to keep predictor and outcome variables conceptually distinct. A risk involvement score was obtained by summing responses to the involvement scale where high scores are indicative of greater involvement. Risk Propensity refers to the extent to which youth perceive involvement in risky activities as both highly beneficial and not very risky and was derived by summing the totals for each scale and dividing perceived benefits by perceived risks, where higher scores indicate greater dispositions to risk-taking (past research indicates that high scores on the Perceived Benefits subscale and low scores on the Perceived Risks subscale, together, have been found to be predictive of behavioural intention and involvement in high-risk behaviours-Gullone & Moore,

2000; Gullone et al., 2000; Parsons, Halkitis, Bimbi, & Borkowski, 2000; Siegel et al., 1994). The modified Risk Involvement, Perceived Risks, and Benefits subscales have good reliability with internal consistency coefficients of .83, .92 and .88 respectively.

School Connectedness (Resnick et al., 1997). Youth were asked about their feelings during the current school year, of being connected to their school, on an eight-item school connectedness scale with response options on a five-point Likert scale ranging from *strongly agree* to *strongly disagree*. Items were summed and standardized by age (grade level), with higher scores representing greater school connectedness. This measure was derived from the National Longitudinal Study of Adolescent Health (Add Health, 1998), has reasonable internal reliability (a = .77) and has been used in a number of studies (e.g., Dornbusch et al., 2001; Jacobson & Rowe, 1999).

State-Trait Anxiety Inventory (STAI)—Trait subscale (Spielberger, 1983). Participants completed the 20-item trait anxiety subscale of the STAI in order to measure the presence of this risk factor for adolescent problem gambling (Ste-Marie et al., 2002). The STAI Trait subscale asks respondents to rate the frequency of their anxiety feelings on a 4-point Likert scale (a = 0.90) with the following anchors: not at all; somewhat; moderately so; and very much so. A total score was obtained by recoding reversed items so that all items were weighted in a positive direction (elevated T-scores indicate higher levels of anxiety), summing all items, and converting them to sex-based T-scores (M = 50, SD = 10) according to norms provided.

Some of the aforementioned instruments are specifically intended for survey purposes (e.g., DSM-IV-MR-J) and others were developed as clinical screening instruments (e.g., FACES-II, PESQ-PS, A-Sch, STAI-Trait) but have also been widely used in multiple research studies. Three measures, including the RIPS, ACOPE, and AMS have been used primarily for research and have been drawn upon to explore various risk and protective factors for youth problem gambling.

A complete copy of the questionnaire which included all the instruments can be found in Appendix A.

### Procedure

Thirty-two school boards in the Province of Ontario were selected to participate and formal applications to conduct the research were made to each of these boards. Ten school boards granted permission to conduct the study within their schools, with the understanding that individual school principals were able to accept or reject the research project. School boards accepting the research project provided the researcher with a complete list of schools, administration staff, and mailing addresses. A random sample of schools within each of the approved boards was approached for consent. This procedure was consistent for all school boards with the exception of two; Bruce Grey and York Catholic. Although Bruce Grey District School Board approved the study, data was not collected from this board as a result of time and distance limitations. Therefore, data were collected from 9 out of 10 school boards that approved the study. Additionally, York Catholic School Board approved the study for secondary schools only, which resulted in the approval and collection of data in two secondary schools within this district.

Data collection was organized around school location, schedule, convenience, and size. Data collection was group administered and took place either in classrooms, the school cafeteria, or library. In those schools where a large number of students agreed to participate, or where students were scattered in various classrooms, group administration was scheduled in the school cafeteria or library. Adequate supervision was ensured by the presence of both a research coordinator as well as at least one research assistant. Data collection was also carried out in individual classrooms during the homeroom period or throughout the day (according to administrator specifications so as to create the least possible disruption).

Student participation was voluntary and individuals were able to terminate their participation at any time without consequences. Informed consent was obtained from parents and children prior to their participation. A separate consent form was developed for students age 18 and over as they were able to provide their own consent. Consent forms were sent to participating schools and were distributed to the students by the school administration. The consent form informed the parents and students of the nature and procedure of the research. Participating students completed the instruments in one fifty-minute period. No deceptive practices were included and participants were assured total anonymity, confidentiality, and were assigned an identification number. Moreover, teachers were requested to either leave the room or remain at the front of the classroom in order to respect participants' confidentiality.

All students were given the same general instructions prior to commencing the study. A minimum of one trained researcher was present at all times to answer any questions and provide clarification if necessary. Questions were generally limited to word definitions and differed based upon participants' cognitive and developmental level.

Data coding and entry. The data were coded and entered using a Fugitsu scanner (Scan partner 620C) and Optical Mark Recognition software (Remark Office OMR 5.5). This software recognizes optical marks and barcodes. Once the data were collected, completed questionnaires were scanned into the image scanner and subsequently saved as an SPSS file set for analyses. This procedure has proven to have a very low data entry error rate.

#### Data Analysis

Participants were divided into groups based upon gambling frequency and gambling severity as measured by their performance on the DSM-IV-MR-J gambling screen. These groups include Non-gamblers (identified by answering *No* to the question, "Have you ever gambled in the past year?"), Social gamblers (DSM-IV-MR-J score = 0 or 1), At-Risk gamblers (DSM-IV-MR-J score = 2 or 3), and Probable Pathological gamblers (PPGs) (DSM-IV-MR-J score  $\geq$  4). As well, participants were divided into high and low risk categories depending upon sex, age, and mean score, according to the PESQ manual. Finally, participants were divided into low, moderate, and high risk involvement groups based on responses to the RIPS—Risk Involvement subscale. The data in this cross-sectional design were analyzed with SPSS 11. Chi-square tests of independence were used to test for significant differences in the frequency of reported protective and risk factors between gambling groups.

The original research design involved conducting a MANOVA with gambling groups, substance use groups (PESQ-Problem Severity), and involvement in multiple risk activity groups (RIPS-Involvement) as grouping variables, and the variables sex, age, trait anxiety (STAI-Trait), school problems (A-sch), perceived parental, sibling, peer, and relative gambling and substance abuse (SA) problems (PESQ), ineffective and effective coping (ACOPE), family cohesion (FACES-II-Cohesion), school connectedness, risk propensity (RIPS-Perceived Benefits and Perceived Risk), perceived academic achievement, mentoring, and involvement in conventional activities in order to determine if there were significant differences within the grouping variables on the dependent measures. However, exploratory analyses indicated that the assumptions of MANOVA were not met; not all dependent variables were normally distributed and variances were deemed to be unequal. Furthermore, results from a Pearson correlation analysis indicated that the dependent variables were not largely uncorrelated. It was therefore determined to run a series of one way ANOVAs, rather than conducting a MANOVA which would have resulted in a loss in degrees of freedom and potentially skew the results (Tabachnick & Fidell, 2001).

Univariate analysis of variance and post-hoc tests of significance (Tamhane's T2 statistic was used when variances between the groups was unequal and Tukey HSD was used when equality of variances existed between the groups) were used to determine whether there were significant differences in the means of reported levels of each protective and risk factor between gambling groups. Age and sex differences were also explored. Finally, a Pearson correlation analysis and logistic regression were conducted to determine the contribution of risk and protective factors to the development of youth problem gambling.

*Missing data.* An analysis of the missing data was conducted before data analyses in order to obtain a sample as free from response bias and missing information as possible. Preliminary examination revealed that a number of participants did not indicate their age, sex, or grade. Furthermore, several participants had a substantial amount of missing information on the scales measuring various risk and protective factors. This was not surprising given the sensitivity of the subject matter and the length of the instrument.

Regarding missing demographic information, those omitting sex (45 participants) were initially treated as a separate variable (assigned a label as sex unknown) and were retained for analyses in this study. Cross-referencing age with grade permitted a replacement of values for those missing one of either grade or age. Those missing both age and grade were omitted from the study (10 participants) as a number of independent and dependent variables required this information to obtain age and grade-based standardized scores. Sex was re-examined after making adjustments for missing data due to incompletion and response bias in the independent and dependent variables and it was found that 38 questionnaires were missing sex identification. These questionnaires were omitted from further analyses given the relatively small number questionnaires lacking sex identification and the low occurrence of At-Risk and PPGs in this group (n = 6 and 1 respectively) such that their omission did not appreciably change gambling group prevalence rates within the total sample.

Regarding missing data on the dependent and independent variables, actions were taken according to recommendations or extrapolation procedures for handling missing data provided in the manuals of the scales used in this study. Accordingly, the following extrapolation formula outlined by the STAI and the PESQ manuals was used to calculate a value to replace a missing item:

Extrapolated Raw Score = (Score for Non-Missing Items) \* [(Total Number of Items on the Scale)/(Total Number of Non-Missing Items for the Scale)]

This formula was only applied if there were two or fewer (less than 10%) missing items. Although several statisticians recommend not calculating scores for measures when there are missing data, this rule is primarily applied to scales used for a clinical population. In view of the fact that the current study consists of a community sample, the extrapolation method was also applied to the remaining scales in this study that did not have standard procedures for handling missing data with the exception of missing data on the DSM-IV-MR-J.

Analysis of the DSM-IV-MR-J indicated that two participants had completely omitted this scale (and were thus omitted from further analyses) and 63 participants had not fully completed the scale. Examination of the 63 incomplete scales revealed that 45 participants had missed 1 item, 17 had missed 2 items, and 1 had missed 4 items. Given the importance of retaining the problem gamblers in this sample, the total DSM score for probable pathological gambling was calculated regardless of a questionnaire's level of completion. When examined for gambling severity, a cross-tabulation indicated that of the 65 cases who were missing data on the DSM-IV-MR-J, 16 were identified as Non-gamblers, 33 as Social gamblers, 10 as At-Risk gamblers, and 4 as PPGs. Thus, it was decided to include the participants missing data on the DSM-IV-MR-J total score with the caveat that their DSM-IV-MR-J score may actually be an *underestimate* of their true score and the overall prevalence of gambling severity may be somewhat underestimated in this study sample.

#### **Response Distortion**

Questionnaires that were obviously problematic due to responses completed in an obvious pattern were discarded (three questionnaires). After extrapolating for missing data, exploratory analyses were undertaken on questionnaires that were missing one or more subscales in order to determine whether it would be appropriate to include some or all incomplete questionnaires for particular analyses. Gambling severity prevalence rates were obtained in a sample (N = 2444) which excluded only those questionnaires that were missing information on more than 10% of all independent and dependent variables (98 questionnaires). These rates were compared to prevalence rates in a sample (N = 2179) based upon participants who had 100% of data (omitting 169 questionnaires). As can be seen in Table 4, the proportions of gambling groups across samples remain relatively consistent. Although it is perferable to work on data missing less than 10% of information by making statistical adjustments, it is preferable to work with complete data to obtain the most refined results. Given the large sample size obtained and the consistent proportions across sample groups, it was decided that the current results would only include questionnaires that had complete information on all independent and dependent variables.

	Percentage of Gambler Type in Sample						
Gambling Type	Sample Excluding < 10% missing data		Sample with 100% data				
	n	%	п	%			
Non-gambler	923	37.8	827	38.0			
Social gambler <sup>a</sup>	1204	49.3	1074	49.3			
At-Risk gambler <sup>b</sup>	191	7.8	170	7.8			
Probable Pathological <sup>c</sup> gambler	126	5.2	108	5.0			
Total	2444	100	2179	100			

Table 4. Proportion of Gambling Groups Varying by Missing Data Cut-off Criteria

<sup>a</sup>DSM-IV-MR-J score (0-1). <sup>b</sup>DSM-IV-MR-J score (2-3). <sup>c</sup>DSM-IV-MR-J score ( $\geq 4$ ).

In summary, 88 grade 6 questionnaires were excluded from all analyses and data replacement due to extrapolation; missing data on age and sex, and decisions regarding response bias resulted in the removal of 315 questionnaires. Overall, actions taken based on the amount of missing data collected resulted in the total remaining sample being a minimum of 2179 for all analysis with the exception of the logistical regressions which required cleaning of all outliers on all independent and dependent variables (an N of 2,099 was used for the regression analyses).

Although actions taken to the handle missing data in this study may be considered highly conservative, they were deemed necessary given the nature of this study and its implications for prevention.

#### **CHAPTER IV**

#### Results

#### Health-Compromising Behaviours

## Youth Problem Gambling

The DSM-IV-MR-J assesses 9 variables related to pathological gambling: progression and preoccupation, tolerance, withdrawal and loss of control, escape, chasing, lies, and deception, illegal activities and family or school disruption. A score of 4 or more out of the 9 categories is indicative of probable pathological gambling. The question "In the *past year* have you gambled for money?" on a Likert response scale, anchored by *never*, *once or twice*, *sometimes*, and *often*, was used to classify participants as Non-gamblers and the DSM-IV-MR-J was used to classify the remaining gamblers into three groups: Social gambler (score 0 or 1), At-Risk gambler (score 2 or 3), and Probable Pathological gambler (PPG) (score  $\geq$  4). As depicted in Table 5, 37.9% of youth were classified as Non-gamblers, 49.3% as Social gamblers, 7.8% as At-Risk gamblers, and 5.0% as PPGs.

		Gambling Groups <sup>1</sup>			
		Non	Social	At-Risk	Probable
	N	gambler	gambler <sup>a</sup>	gambler <sup>b</sup>	Pathological
		( <i>n</i> = 827)	(n = 1074)	(n = 170)	gambler <sup>c</sup>
					(n = 108)
Sex***					
Male	929	22.8	56.0	11.7	9.5
Female	1250	49.2	44.3	4.9	1.6
Grade***					
7	349	52.7	39.3	6.0	2.0
8	346	39.0	46.2	8.7	6.1
9	252	48.0	40.9	7.9	3.2
10	357	37.3	52.7	5.9	4.2
11	351	31.1	51.0	9.1	8.8
12	352	28.7	56.8	9.4	5.1
13	172	25.6	62.2	7.6	4.7
Total	2179	37.9	49.3	7.8	5.0

Table 5. Gambling Severity by Sex and Developmental Level

<sup>T</sup>Percentage.

<sup>a</sup>DSM-IV-MR-J score (0-1). <sup>b</sup>DSM-IV-MR-J score (2-3). <sup>c</sup>DSM-IV-MR-J score ( $\geq$  4).

\**p* < .001.

With respect to sex differences in gambling severity, males (9.5%) reported significantly more gambling problems than females (1.6%),  $?^2(3, N = 2179) = 211.12, p < .001$ . Males appeared to be almost 6 times more likely to be classified as PPGs and 2 times more likely to be classified as At-Risk gamblers than females (11.7% vs. 4.9%) (Table 5). As can be seen in Table 5, the frequency of probable pathological gambling varied considerably by grade (age),  $?^2(18, N = 2179) = 93.59, p < .001$ , being lowest in grade 7 (2.0%). The rate jumped significantly in grade 8 (6.1%), increased in grades 9 through 11, and was greatest in grade 11 (8.8%). Although youth in grade 13 were approximately 18 years of age (M = 18.06, SD = 0.37), and were legally permitted to gamble on the lottery (scratch tickets, sports betting, and draws) but not casino wagering in Ontario (the legal age is 19), the prevalence of probable pathological gambling was not substantially different between grades 12 (5.1%) and 13 (4.7%).

# Substance Use and Gambling Amongst Youth

In order to assess participants' use of drugs and alcohol, the Personal Experience Screening Questionnaire—Problem Severity Subscale (PESQ) was administered. The Problem Severity Scale provides a global measure of problem severity by reflecting the extent to which individuals are psychologically and behaviourally involved with drugs. High scores suggest symptoms indicating drug use and drug dependence (e.g., use in multiple settings, loss of control, restructuring of activities as to accommodate drug use), while low scores are indicative of relatively infrequent use in limited social settings.

It is important to note that the PESQ—Problem Severity Subscale incorporates a validity scale which measures response distortion, specifically the tendency to fake bad (infrequency). High scores on this scale generally indicate a questionable profile and suggest that interpretation should be approached with caution. In accordance with PESQ manual procedures, an endorsement on any of the items on the INF scale resulted in cases being identified as faking bad, resulting in 113 cases being eliminated from analyses. The PESQ was normed for adolescents, 12 to 18 years of age. Given that this scale was developed for clinical use, it was decided to include 19 year olds in the analyses but to interpret the results with caution.

A Problem Severity Scale mean score was calculated by summing all items related to problem severity. As noted, higher mean scores are indicative of more serious chemical dependence. According to the PESQ manual (Winters, 1992), participants were classified into high and low risk categories depending upon sex, age, and mean score. A score in the low risk category indicates no problems with alcohol or drug use, while a score in the high risk category ( $1\frac{1}{2}$  SD above the mean of a general school sample) suggests the need for a comprehensive chemical dependency assessment.

Results revealed that 19.2% (n = 397) of the total sample scored in the high risk category indicating that they are psychologically and behaviourally involved with chemicals to a potentially problematic degree. Males and females equally reported potentially problematic substance use (18.9% and 19.5%). Developmentally, older children (grades 9 to 13) were found to be significantly more at risk than younger children in grades 7 and 8, ?<sup>2</sup>(6, N = 2066) = 292.40, p < .001 (see Table 6). More specifically, students in grades 9 and 10 reported similar rates of possible substance use problems (11.8% and 17.9% respectively) while grades 11, 12, and 13 reported similar and substantially higher rates than other grades (31.3%, 39.6%, and 38.0% respectively). Finally, with respect to gambling involvement, the percentage of risk for a substance abuse problem significantly increased such that PPGs were found to be at greatest risk, ?<sup>2</sup>(3, N = 2066) = 130.47, p < .001 (Table 6). Almost half (49.4%) of those identified as PPGs

Sample <sup>1</sup>	Problem Severity Score				
( <i>N</i> = 2066)	At-risk <sup>2</sup>	М	SD		
Sex					
Male	18.9	27.84	9.29		
Female	19.5	27.59	8.04		
Grade***					
7	.9	22.01	2.69		
8	3.6	23.38	4.18		
9	11.8	26.39	6.78		
10	17.9	27.84	8.27		
11	31.3	31.47	10.10		
12	39.6	32.77	9.33		
13	38.0	32.31	9.34		
Gambling Groups***					
Non-gambler	9.8	24.99	6.54		
Social gambler <sup>a</sup>	21.6	28.41	8.28		
At-Risk gambler <sup>b</sup>	37.7	32.82	10.67		
Probable pathological gambler <sup>c</sup>	49.4	36.82	13.06		

Table 6. Substance Abuse: Sex, Development and Gambling Behaviours

<sup>1</sup>113 participants endorsed the INF scale and were thus excluded from analyses. <sup>2</sup>Within category percentages of participants scoring as high risk on the PESQ-PS. <sup>a</sup>DSM-IV-MR-J score (0-1). <sup>b</sup>DSM-IV-MR-J score (2-3). <sup>c</sup>DSM-IV-MR-J score ( $\geq 4$ ). <sup>\*\*\*</sup> p < .001. were identifiably at risk for substance abuse. These findings paralleled those found in another recent study on a similar sample in Ontario (Hardoon et al., 2002).

Sex, developmental, and gambling severity differences. There were no significant sex differences in mean scores on the PESQ-Problem Severity Subscale, t(1677.47) = .615, p = .539. Levene's test for equality of variances was significant, suggesting unequal variances. With respect to developmental differences, a one way analysis of variance (ANOVA) revealed significantly greater mean scores for older students. In fact, a linear increase by grade level was observed (see Table 6). Levene's test of homogeneity of variances was found to be significant. Therefore, post hoc comparisons were performed using the Tamhane T2 statistic, which is a stringent conservative, pairwise test of comparisons and appropriate when the variances are unequal. Children in younger grades were significantly different from one another (grade 7 vs. 8 and grade 8 vs. 9) (p < .001), and different from older grades (10 to 13) (p < .001). Although students in grades 10 and 11 significantly differ from one another, older adolescents (grades 11 to 13) are not significantly different with respect to their substance use.

A one way analysis of variance (ANOVA) suggests a positive association between severity of substance problems and degree of gambling problems. The mean substance problem severity scores significantly varied between gambling groups, F(3, 2062) = 85.33, p < .001 (see Figure 3). Levene's test of homogeneity of variances was found to be significant and the null hypothesis of equal variances was rejected, necessitating the use of Tamhane's T2 statistic for post hoc comparisons. Significant differences between all gambling groups with respect to problem substance use severity were found with the exception of At-Risk gamblers vs. PPGs (Table B1, Appendix B). Interestingly, an increase in means was observed such that substance use problem severity increased up until the point of at risk gambling. Those identified as At-Risk gamblers reported similar levels of problems with substance use as PPGs, although PPGs had the highest mean scores compared to Social (p < .001) and Non-gamblers (p < .001) (Table 6). However, the increase between At-Risk gamblers and PPGs in Figure 3 was not significant. *Involvement in Multiple Risk Behaviours and Gambling Amongst Youth* 

The RIPS-Risk Involvement subscale assesses youth involvement in a wide range of risky behaviours during the past 12 months (Table 7). High scores reflect greater involvement in multiple risky activities. Items on the RIPS subscales pertaining to sexual activity were omitted from the instrument, as requested by several schools, as were those using vocabulary found to be

# Substance Abuse Among Gamblers



Figure 3. Substance abuse among youth gamblers.

1. Driving a car	11. Smoking cigarettes
2. Driving 15 mph over the speed limit	12. Crash dieting or diet pills
3. Drinking	13. Cheating on exam
4. Sunbathing	14. Misusing prescription drugs
5. Cutting class	15. Smoking marijuana
6. Getting drunk	16. Riding a motorcycle
7. Walking alone at night	17. Taking cocaine or crack
8. Contact sports	18. Shoplifting
9. Riding without seatbelts	19. Accepting a ride from a stranger
10. Not studying for an exam	20. Riding with a drunk driver

Table 7. Items on the RIPS-Invo	lvement Scale
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developmentally inappropriate and often not understood by participants. In addition, two items pertaining to gambling were excluded given the coverage of gambling items in the DSM-IV-MR-J. In total, seven of the 27 items were removed from the original RIPS-Risk Involvement subscale.

The mean score for the total sample was relatively low (M = 28.48. SD = 20.34). Participant's risk involvement scores were ranked into quartiles to create the following three risk involvement-groups based upon participation in the past 12 months: (a) the top quartile representing those in the sample reporting the greatest involvement of risk activities relative to the sample; (b) the middle two quartiles representing participants who report moderate involvement; and (c) the bottom quartile encompassing students who reported the least involvement in risk activities.

Sex and developmental differences in risk activity involvement. Overall, males more frequently reported greater participation in risky activities than females (37.6% vs. 30.0%), ?<sup>2</sup>(2, N = 2179) = 18.62, p < .001 (Table 8). Further, an independent samples *t*-test revealed that males

	Risk Involvement Score					
	High Involvement <sup>1</sup>	M	SD			
Total Sample	25.0 <sup>a</sup>	28.48	20.34			
Sex***		******				
Male	37.6	31.12	21.23			
Female	30.0	26.51	26.51			
Grade***						
7	5.2	13.50	11.46			
8	14.5	20.23	17.50			
9	21.8	24.90	17.64			
10	30.5	28.07	19.64			
11	51.3	36.47	19.38			
12	59.7	40.63	19.91			
13	59.3	40.35	18.66			
Gambling Groups***						
Non-gambler	16.0	19.86	16.42			
Social gambler <sup>b</sup>	38.2	30.73	18.35			
At-Risk gambler <sup>c</sup>	57.1	39.08	21.45			
Probable pathological gambler <sup>d</sup>	78.7	55.42	26.39			
Substance Use Groups***						
No risk	17.6	21.39	14.69			
At-risk <sup>d</sup>	84.9	50.40	16.34			

Table 8. Multiple Risk Activities by Sex, Developmental Level, Gambling, and Substance Use

*Note:* Range 0-160, the higher the score the greater the involvement in multiple risk activities. <sup>1</sup>Percentage of participants scoring in the high risk category on the RIPS-I.

<sup>a</sup>Top quartile of the sample. <sup>b</sup>DSM-IV-MR-J score (0-1). <sup>c</sup>DSM-IV-MR-J score (2-3). <sup>d</sup>DSM-IV-MR-J score ( $\geq$  4).

<sup>e</sup>Identified as at risk on the PESQ-PS.

 $p^{**} > 001.$ 

(M = 31.12, SD = 21.23) indicated somewhat higher involvement in multiple risk activities than females (M = 26.51, SD = 19.42), t(1896.22) = 5.19, p < .001. Levene's test for equality of variances was significant, suggesting unequal variances. Regarding developmental differences, as expected, older youth reported greater involvement in risk activities,  $?^2(12, N = 2179) =$ 614.76, p < .001 (Table 8). A one way analysis of variance (ANOVA) revealed significant developmental differences in participant's RIPS-Involvement (RIPS-I) scores and an examination of the means indicated that involvement increased by grade level (see Table 8). Levene's test of homogeneity of variances was significant. Tamhane's T2 statistic revealed that younger students were significantly different from one another [grade 7 vs. 8 (p < .001) and grades 8 vs. 9 (p < .05)], and different from older children (p < .001) (Table B2, Appendix B). Although students in grades 9 and 10 did not significantly differ from one another, those in grade 10 differed from their older peers. No differences appeared in pairwise comparisons between students in grades 11 to 13 with respect to involvement in multiple risk activities.

Differences in gambling severity and substance use. The frequency of reporting high involvement in multiple risk behaviours significantly varied between gambling groups  $?^2(6, N = 2179) = 343.63, p < .001$  and between substance use groups  $?^2(2, N = 2066) = 697.27, p < .001$  (Table 8). More specifically, PPGs more frequently reported high involvement in other risk-taking activities compared to other gambling groups and 84.9% of youth at risk for substance abuse reported high involvement in multiple risk activities (relative to the total sample) in contrast to only 17.6% of non-risk individuals.

An ANOVA revealed that the mean involvement in multiple risk activities significantly differed between gambling groups, F(3, 2175) = 161.88, p < .001. Levene's test of homogeneity of variances was significant and Tamhane's T2 statistic for post hoc comparisons revealed significant differences between the mean RIPS-Involvement scores in all gambling-group pairwise comparisons (p < .001) (Table B3, Appendix B). More specifically, there was a significant positive relationship between reported involvement in multiple risk activities and gambling. As seen in Table 8, probable pathological gamblers had the highest mean scores compared to At-Risk, Social, and Non-gamblers (p < .001). A similar positive relationship between tand substance use was found, with an independent samples *t*-test revealing that youths' reported involvement in multiple risk activities was significantly greater for those individuals in the at risk substance abuse group (M = 50.40, SD =

16.34) compared to those not at risk for substance abuse (M = 21.39, SD = 14.69), t(557.99) = -32.40, p < .001 (Table 8). Levene's test for equality of variances was significant, suggesting unequal variances.

# Gambling, Substance Abuse, and Involvement in Multiple Risk Activities

Youth in this sample were assessed to see how many problem behaviours they reported. As seen in Table 9, almost half of PPGs (49.4%) were also at risk for a substance abuse problem and 78.7% of PPGs also reported high involvement in multiple risk activities. Given that the RIPS-Involvement score was derived from quartile splits on a normed distribution, it would be expected that 25% of youth would be identified in the RIPS high involvement group. Compared to the norm, the percentage of PPGs who reported high involvement in multiple risk activities was substantially greater. Most PPGs were also identifiably at risk for either a substance use problem or high involvement in multiple risky behaviours while 11.3% PPGs reported problems in all three health-compromising measures. Increased probabilities for involvement in multiple risk behaviours were also found when looking at youth who were identified as at risk for substance use, given that 84.9% of those at risk for substance abuse also indicated high involvement in multiple risk activities. Finally, a small but noteworthy percentage of those in each high-risk group were also identified as being involved in all three health-compromising behaviours (11.3% of PPGs, 10.3% of the at-risk substance abuse group, and 9.7% of the high RIPS-Involvement group).

	Percentage of Youth Identified in Multiple Problem Behaviour Groups <sup>1</sup>					
Problem Group	PPG	At-risk Substance Abuse	High RIPS-I	At-risk for all Three Problem Behaviors		
PPG <sup>2</sup>		49.4	78.7	11.3		
At-risk Substance Abuse <sup>3</sup>	10.3		84.9	10.3		
High RIPS-Involvement <sup>4</sup>	11.7	53.4		9.7		

Table 9. Gambling, Substance Abuse, and High Involvement in Multiple Risk Activities

<sup>1</sup>Analyses involving PESQ-PS had a total sample size of 2066 due to 113 participants who endorsed the INF scale being excluded from analyses. All other analyses had a sample size of 2179.

<sup>2</sup>DSM-IV-MR-J score ( $\geq$  4).

<sup>3</sup>Identified as at-risk on the PESQ-PS.

<sup>4</sup>Participants scoring in the high risk category on the RIPS-I.

Protective Factors for Gambling, Substance Abuse and Multiple Risk Behaviour Mentorship

Past research has suggested that there are distinct features of the mentoring relationship that are protective (e.g., the development of trust and commitment) of healthy youth development and that buffer problematic involvement in high-risk activities. Although the purpose of this study was not to examine mentorship, two items were included in order to determine the presence of this protective correlate in the lives of the youth. Youth were considered to have a mentor relationship if they positively endorsed the statement, "Is there an adult in your life (apart from your parents) that you feel cares for you?" and reported having been involved in at least one activity (e.g., played organized sports, worked on project for school, talked about a personal problem) with their mentor in the previous month.

Overall, 74.0% of the total sample reported having a mentor. The average number of activities youth reported to be involved in with their mentor was 3.62. With respect to sex, more females (79.1%) compared to males (70.4%) reported having a mentor,  $?^2(1, N = 2137) = 21.32$ , p < .001. With respect to developmental differences, grade 8 students reported more frequently having a mentor compared to other children,  $?^2(6, N = 2137) = 12.91$ , p < .05 (for sex and developmental differences in mentorship, see Table B4, Appendix B). No differences in reported presence of mentorship relationships were found between gambling severity groups, between substance abuse risk groups, and between risk involvement groups (Table B5, Appendix B). *Involvement in Conventional Activities* 

Involvement in conventional organizations (e.g., religious groups, community center activities, Scouts or Guides) and extra-curricular school activities has frequently been cited as a positive factor that reduces youth from the risks of engaging in high-risk activities. A list of such activities was included in order to determine the importance of this protective factor. Youth reported those activities in which they were currently participating and those they planned to participate in during the school year. Overall, 90.4% of youth reported being involved in at least one of these activities. Of those reporting some involvement, the average number of activities reported being involved in was 3.24. No sex and developmental differences were noted, nor were group differences in reporting of conventional activities found between gambling groups, substance use groups, and multiple risk involvement groups (see results in Table B6, Appendix B).

### Effective Coping

Given the possible links between effective coping strategies and resilience in youth to the development of various problem behaviours, effective coping strategies were assessed using the ACOPE. The 39 items pertaining to effective coping were summed to obtain an effective coping score, on which higher scores indicated more frequent use of effective coping strategies. Scores on the ACOPE-effective coping subscale can range from 39 to 195 (on a 5-point Likert scale). In order to determine the proportion of youth with the effective coping protective factor and exploring whether or not effective coping varied by severity of gambling, substance abuse, and involvement in multiple risky activities, effective coping scores (M = 110.47, SD = 19.67) were grouped into quartiles to create the following three groups: (a) the bottom quartile representing those in the sample reporting the least use of effective coping strategies; (b) the middle two quartiles representing participants reporting average use of effective coping strategies; and (c) the top quartile encompassing individuals who reported the greatest use of effective coping strategies.

Gambling severity and effective coping. PPGs (15.7%) were less likely to be identified as high users of effective coping skills than At-Risk gamblers (26.5%), Social gamblers (23.3%), and Non-gamblers (29.3%),  $?^{2}(6, N = 2179) = 15.48, p < .05$  (see Table 10).

An ANOVA was performed in order to determine whether or not there were differences in participant effective coping mean scores across gambling groups, with effective coping score as the dependent variable and gambling groups as the factor. Statistically significant but negligible differences were found in coping mean scores as a function of gambling severity, F(3, 2175) = 5.07, p < .01 (Table 11). Levine's test of homogeneity was found to be significant, indicating inequality of variances between the groups. Tamhane's T2 statistic revealed statistically significant differences in mean scores between Non-gamblers and Social gamblers (mean difference of 2.65, p < .05) and Non-gamblers vs. PPGs (mean differences of 6.39, p <.01). Although only minor differences were found in the use of effective coping strategies between gambling groups, there is ample research pointing to differences in overall coping strategies (effective and ineffective strategies) and styles among youth differing in gambling severity (Getty et al., 2000; Gupta & Derevensky, 1998a, 1998b; Gupta, Derevensky, & Marget, *in press*; Marget et al., 1999; Nower, 2001).

	Effective Coping <sup>1</sup>				
	Low use	Moderate use	High use		
Gambling Groups <sup>2*</sup>					
Non-gambler	24.3	46.4	29.3		
Social gambler	26.0	50.7	23.3		
At-Risk gambler	28.2	45.3	26.5		
Probable pathological					
gambler	29.6	54.7	15.7		
Substance Use Groups <sup>3*</sup>					
No risk	25.0	47.9	27.1		
At-risk	26.7	53.1	20.2		
RIPS-I Groups <sup>4***</sup>					
Low	25.3	44.1	30.6		
Moderate	26.6	48.3	25.1		
High	25.1	54.3	20.6		

Table 10. Effective Coping Strategies Among High-Risk Behaviour Groups

<sup>1</sup>Percentage. Effective coping groups created by ranking all scores. Low use group = bottom quartile; Moderate use group = middle two quartiles; High use group = top quartile.  $^{2}N = 2179$ . Categorized by the DSM-IV-MR-J.

 $^{3}N = 2006$ . Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.  $^{4}N = 2179$ . Categorized by the RIPS-I. \*p < .05. \*\*\*p < .001.

()/()	Total Sample		Gambling Groups					
(N = 2179)			Non- gambler	Social gambler <sup>a</sup>	At-Risk gambler <sup>b</sup>	Probable Pathological gambler <sup>c</sup>		
	M	SD	М	M	М	М		
Sex								
Male	107.70	20.18	108.61	107.20	108.10	107.93		
Female	113.34	18.34	114.19	112.84	113.97	99.50		
Grade								
7	115.74	22.033	117.42	114.36	111.43	111.57		
8	111.51	20.794	113.50	110.63	112.67	103.76		
9	111.11	19.048	114.28	109.20	104.70	103.63		
10	108.63	18.383	107.65	110.39	105.14	100.20		
11	109.86	19.024	109.43	109.09	114.47	111.06		
12	109.60	18.316	112.05	109.16	108.91	101.94		
13	109.49	17.595	112.14	107.71	112.00	114.75		
Total	110.94	19.619	112.76	110.11	110.21	106.37		

Table 11. Effective Coping: Sex and Developmental Differences by Gambling Groups

\*Range 39-195, the higher the score the more use of effective coping skills. <sup>a</sup>DSM-IV-MR-J score (0-1). <sup>b</sup>DSM-IV-MR-J score (2-3). <sup>c</sup>DSM-IV-MR-J score ( $\geq 4$ ).

Substance use severity and effective coping. Youth not classified as at-risk for substance abuse (27.1%) had the highest use of effective coping strategies, compared to 20.2% of youth identified as being at-risk for substance use,  $?^2(2, N = 2066) = 8.29, p < .05$  (see Table 12). A ttest revealed that those who were not identified as being at-risk for substance use (M = 111.67,SD = 19.90) reported using effective coping strategies significantly more often than those identified as at-risk for substance abuse (M = 108.75, SD = 17.77), t(653.90) = 2.87, p < .01(Table 12). Levene's test for homogeneity indicated that the variances between groups was not equal. With respect to sex and developmental differences in effective coping within gambling groups, the data set was divided by substance use group and an independent samples t-tests for sex and an ANOVA for age (grade) were performed. Significant sex differences in the use of effective coping strategies were found within those not at-risk. Females (M = 108.37, SD =20.59) had higher mean effective coping skill than males (M = 114.03, SD = 19.06), t(1428.12) =-5.70, p < .001. Sex differences were also found within the at-risk for substance abuse group such that females (M = 110.42, SD = 16.95) had greater use of effective coping skills than males (M = 106.34, SD = 18.68), t(395) = -2.26, p < .05 (Table 12). Levene's test of homogeneity indicated that the variances within sex groups for non-risk and at-risk groups were not equal.

 Table 12. Effective Coping: Sex and Developmental Differences within Substance Abuse and

 RIPS-Involvement Groups

Effective	Substance Abuse Groups <sup>1</sup>		R	IPS-I Groups	2
Coping*	Non-risk	At-risk	Low	Moderate	High
	M	М	M	M	M
Sex					
Male	108.37	106.34	107.37	107.73	107.92
Female	114.03	110.42	115.51	113.19	110.89
Grade					
7	115.82	105.33	117.71	111.37	109.11
8	111.96	104.42	112.53	111.00	109.18
9	112.28	106.46	112.60	112.08	106.75
10	108.98	107.24	106.17	111.31	108.15
11	109.28	111.34	107.42	108.51	111.45
12	110.25	109.02	104.68	112.02	108.94
13	110.69	107.35	104.80	109.32	110.06
Total	111.67	108.75	112.50	110.86	109.46

\*Range 39-195, the higher the score the more use of effective coping skills.

 $^{1}N = 2006$ . Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 $^{2}N = 2179$ . Categorized by the RIPS-I.

Significant developmental differences were only found in the non-risk group, F(6, 1662) = 4.13, p < .001. Equal variance between the groups was not assumed and post hoc pairwise comparisons indicated differences in mean scores between grades 7 and 10, 11, and 12 (see Table B9, Appendix B for post hoc test results).

Multiple risk activity involvement and effective coping. A positive relationship between frequency of reported effective coping and level of involvement in multiple risk activities was found,  $?^2(4, N = 2179) = 22.53$ , p < .001. Youth classified as being the least involved in multiple risky activities reported greater use of effective coping strategies (30.6%) than those moderately involved (25.1%) and youth who were in the lowest involvement level group (20.6%). An ANOVA was performed in order to determine whether effective coping varied as a function of involvement in multiple risk-taking activities, with effective coping score as the dependent variable and RIPS-Involvement group as the factor. No notable differences were found (see means in Table 12).

With respect to sex differences within RIPS-Involvement groups, females were found to report more use of effective coping skills within all groups (see Table B7, Appendix B for independent samples *t*-test results). Levene's test for homogeneity was found not to be significant for both groups and therefore equality of variances was assumed. An ANOVA revealed significant developmental differences in only the low involvement group, F(6, 715) = 6.09, p = .001 (see Table B8, Appendix B for mean scores). Assuming equality of variances between the groups, Tukey's HSD test indicated that only grades 7 vs. 10 and grades 7 vs. 11 significantly varied in mean effective coping scores (see Table B9, Appendix B for post hoc test results).

### Family Cohesion

In light of research indicating the protective function of family cohesion for a number of youth high-risk behaviours, family cohesion was included to explore its possible role in protecting youth from developing a gambling problem. To assess participant's family cohesion, the 16-item FACES-II Cohesion subscale was administered. This measure was designed for use with adult and adolescent populations and therefore caution must be taken when interpreting the results given that a number of participants in this sample were somewhat younger (grades 7 and 8). A total cohesion score (possible range being 16 to 80) was derived by summing all items, whereby high scores indicated *very connected*. According to the norms provided in the FACES-

II manual, participants were assigned a family cohesion type based on their total cohesion score. Family cohesion types included *very connected* (scores ranging from 71 to 80), *connected* (scores ranging from 60 to 70), *separated* (scores ranging from 50 to 59), and *disengaged* (scores ranging from 16 to 50). Overall, frequencies for the total sample revealed that 33.7% of participants had scores in the disengaged category, 31.3% had scores in the separated category, 29.4% reported scores indicative of being connected, and 5.6% of the sample perceived themselves as being very connected to their family (Table 13).

Gambling severity and family cohesion. As presented in Table 13, there was a significant difference in reported level of family cohesion between gambling groups,  $?^2(3, N = 2179) = 84.26, p < .001$ . Accordingly, PPGs were less likely to report being connected (11.1%) than atrisk gamblers (21.8%), Social gamblers (28.7%), and Non-gamblers (34.2%). Furthermore, substantially more PPGs (56.6%) reported scores indicative of being very disconnected compared to At-Risk gamblers (47.1%), Social gamblers (32.9%), and Non-gamblers (21.9%).

		Family Cohesion Type <sup>1</sup>					
	Disengaged (16-50)	Separated (51-59)	Connected (60-70)	Very Connected (≥ 70)			
Total Sample	33.7	31.3	29.4	5.6			
Gambling Groups <sup>2***</sup>							
Non-gambler	29.1	27.9	34.2	8.8			
Social gambler	32.9	34.5	28.7	3.9			
At-Risk gambler	47.1	27.6	21.8	3.5			
PPG	56.6	31.4	11.1	1.9			
Substance Use Groups <sup>3***</sup>							
Not at-risk	28.6	31.5	33.2	6.7			
At-risk	47.1	32.0	18.9	2.0			
RIPS-I groups <sup>4***</sup>							
Low	20.1	29.3	39.8	10.8			
Moderate	33.3	32.7	30.0	4.0			
High	47.7	31.7	18.4	2.2			

Table 13. Fai	mily Cohesion	Types in	High-Risk	Behaviour	Groups
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<sup>1</sup>Percentage of youth within FACES-II family cohesion type.

 $^{2}N = 2179$ . Categorized by the DSM-IV-MR-J.

 ${}^{3}N = 2006$ . Categorized on the PESQ-PS. 113 participants who endorsed the PESQ-PS INF scale were excluded from analysis.

 $^{4}N = 2179$ . Categorized by the RIPS-I.

p < .001.

The family cohesion mean scores of participants across gambling groups (Table 14) were analysed by a one way analysis of variance (ANOVA). Family cohesion mean scores progressively decreased from Non-gamblers to each level of gambling severity group, F(3, 2175)= 27.80, p < .001 (see Figure 4). Levine's test of homogeneity was significant and post hoc analysis using Tamhane's T2 statistic revealed significant differences between all pairwise comparisons with the exception of differences between At-Risk gamblers and PPGs (Table B10, Appendix B).

The data set was divided by gambling severity group and an independent samples *t*-test for sex and an ANOVA for developmental differences were performed. No notable sex differences were found (Table B12, Appendix B). However, significant developmental differences in family cohesion mean scores were found for Non-gamblers [F(6, 820) = 6.73, p <.001] and Social gamblers [F(6, 1067) = 6.63, p < .001] (for means, see Table 15). Levine's test of homogeneity was significant for the Non-gambler group. Post hoc analysis using Tamhane's T2 statistic revealed significant differences in pairwise comparisons for grades 7 vs. 8, 9, 10, 11, and 12. Levine's test of homogeneity was found to be significant for the Social gambler group and post hoc analysis using Tamhane's T2 statistic revealed significant differences in pairwise

	Gambling Groups <sup>1</sup>				
( <i>N</i> = 2179)	Non- gambler	Social gambler	At-Risk gambler	Probable Pathological gambler	
	M*	M*	M*	M*	
Sex					
Male	57.54	54.99	51.73	48.01	
Female	55.94	53.67	49.92	47.35	
Grade					
7	60.48	58.34	55.52	47.14	
8	56.87	55.59	54.03	47.52	
9	55.40	54.51	48.35	51.50	
10	54.49	54.72	48.62	44.60	
11	53.94	52.09	50.09	49.74	
12	55.10	52.59	49.64	48.61	
13	54.55	53.24	51.38	43.25	
Total	56.35	54.31	51.08	47.89	

Table 14. Family Cohesion: Gambling Severity

\*Range 16-80, the higher the score the greater perceived family cohesion. <sup>1</sup>Categorized by the DSM-IV-MR-J.



Figure 4. Family cohesion among high-risk behaviours.

comparisons for grades 7 vs. 10, 11, and 12 and grades 8 vs. 11 (see Table B13, Appendix B for post hoc test results).

Substance use and family cohesion. Youth not identified as being at-risk for substance abuse generally reported higher levels of family cohesion. More specifically, non-risk youth report perceptions of connectedness more frequently than those identified at-risk for substance abuse (33.2% vs. 18.9%),  $?^2(3, N = 2066) = 67.77, p < .001$  (Table 15). A *t*-test to determine differences in mean family cohesions scores for substance use problem severity revealed that mean family cohesion scores of non-risk youth (M = 55.94, SD = 10.46) were significantly higher than students at-risk for substance abuse (M = 50.27, SD = 11.10), t(2064) = 9.58, p < .001 (Table 15 and Figure 4). Levene's test for equality of variances was not significant,

	Substance A	Substance Abuse Groups <sup>1</sup>		RIPS-I Groups <sup>2</sup>		
	Non-risk	At-risk	Low	Moderate	High	
	<i>M</i> *	M*	M*	M*	M*	
Sex						
Male	55.96	50.26	58.77	54.44	51.36	
Female	55.92	50.28	58.86	54.33	49.41	
Grade						
7	59.26	54.67	61.03	55.45	49.17	
8	56.15	45.08	58.57	53.01	50.52	
9	55.40	47.39	57.90	53.81	49.38	
	55.44	49.73	57.60	54.53	48.95	
11	52.92	51.38	55.96	53.28	50.58	
12	55.06	50.53	55.86	55.54	50.96	
13	54.88	50.50	54.70	56.30	50.84	
Total	55.94	50.27	58.83	54.38	50.35	

Table 15. Family Cohesion: Substance Use and Multiple Risk Involvement

\*Range 16-80, the higher the score the greater perceived family cohesion.

 $^{1}N = 2066$ . Categorized on the PESQ-PS. 113 participants who endorsed the PESQ-PS INF scale were excluded from analysis.

 $^{2}N = 2179$ . Categorized by the RIPS-I.

suggesting equal variances. No notable sex differences were observed. Developmentally, there were differences for non-risk youth, F(6, 1662) = 9.77, p < .001. Levine's test of homogeneity was not significant; consequently, a Tukey's HSD post hoc analysis revealed significant differences in pairwise comparisons between grades 7 vs. 8, 9, 10, 11, 12 and 13, and grades 8 vs. 11 (see Table B11, Appendix B for post-hoc test results).

Multiple risk activity involvement and family cohesion. A significant difference in reported family cohesion was found between multiple risky activity groups such that the low involvement group reported greater family cohesion (connected, 39.8%) than moderately involved youth (30.0%) and youth with the highest involvement (18.4%),  $?^2(6, N = 2179) = 192.31, p < .001$  (Table 15). An ANOVA to determine differences in participant's family cohesion mean scores across gambling groups (family cohesion score as the dependent variable and RIPS-Involvement group as the grouping factor) revealed significant differences. It was observed that family cohesion scores decrease from the low-involvement to the high involvement group, F(2, 2176) = 121.24, p < .001 (Table 15 and Figure 4). Results from post hoc tests using Tamhane's T2 statistic revealed significant differences in all pairwise comparisons between groups (see Table B10, Appendix B for post hoc test results). No significant sex differences in

family cohesion between groups were found. An ANOVA examining developmental differences in family cohesion by level of involvement revealed significant differences only for the low involvement group, F(6, 708) = 4.25, p = .001 (see Table 15). Assuming equality of variances between the groups, Tukey's HSD test indicated that only grades 7 vs. 10, and grades 7 vs. 11 significantly varied in mean effective coping scores (see Table B11, Appendix B for significant post hoc test results).

### School Connectedness

Given the substantial body of literature suggesting that youth who report experiencing a sense of school connectedness are less likely to become involved in substance use and other high-risk behaviours, an 8-item scale was included, derived from the National Longitudinal Study of Adolescent Health (1998). To obtain a measure of each participant's school connectedness, reversed items were recoded such that all items were weighted in a positive direction. Items were subsequently summed to create a single scale score and transformed into *z*-scores (M = 0, SD = 1, ranging from -3.0 to +3.0) within each grade, with higher *z*-scores representing greater school connectedness. In order to examine differences between levels of reported school connectedness and the dependent variables (gambling severity, substance use, and multiple risk activity involvement), participants' standardized scores were ranked into quartiles to create the following three groups: (a) the top quartile representing those reporting the greatest school connectedness relative to the entire sample; (b) the middle two quartiles representing participants reporting average levels of school connectedness; and (c) the bottom quartile encompassing students who report the lowest levels of school connectedness.

*Gambling severity and school connectedness*. As seen in Table 16, At-Risk gamblers (15.9%) and PPGs (16.7%) were significantly less likely than Social gamblers (22.3%) and Nongamblers (30.6%) to report being highly connected to their school,  $?^2(6, N = 2179) = 60.22, p <$ .001. Furthermore, substantially more PPGs (39.8%) and At-Risk gamblers (39.4%) reported scores indicative of low school connectedness compared to Social gamblers (23.0%) and Nongamblers (20.9%). In order to determine whether differences in school connectedness across gambling groups existed a one way analysis of variance (ANOVA) was performed, with school connectedness *z*-score as the dependent variable and gambling groups as the factor. Significant group differences in school connectedness mean *z*-scores were found, *F*(3, 2175) = 24.88, *p* <

	School Connectedness <sup>1</sup>			
	Low	Average	High	
Gambling Groups <sup>2***</sup>				
Non-gambler	20.9	48.5	30.6	
Social gambler	23.0	54.7	22.3	
At-Risk gambler	39.4	44.7	15.9	
Probable pathological				
gambler	39.8	43.5	16.7	
Substance Use Groups <sup>3****</sup>				
No risk	20.4	52.3	27.3	
At-risk	34.8	50.6	14.6	
RIPS-I Groups <sup>4***</sup>				
Low	15.8	52.5	31.7	
Moderate	22.1	52.4	25.5	
High	35.1	48.2	16.7	

Table 16. School Connectedness Reported by High-Risk Behaviour Groups

<sup>1</sup>Percentage. Groups created by ranking all scores. Low school connectedness group = bottom quartile; Average = middle two quartiles; High group = top quartile.

 $^{2}N = 2179$ . Categorized by the DSM-IV-MR-J.

 $^{3}N = 2006$ . Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 $^{4}N = 2179$ . Categorized by the RIPS-I.

p < .001.

.001, and an examination of the means (Table 17) suggest a negative association between school connectedness and gambling severity. Levine's test of homogeneity was found to be significant and post hoc analyses using Tamhane's T2 statistic revealed significant differences between all pairwise comparisons with the exception of At-Risk gamblers and PPGs (Table B15, Appendix B for post-hoc test results).

No meaningful sex and developmental differences in school connectedness for the entire sample were found. With respect to sex and developmental differences in school connectedness within gambling groups, the data set was divided by gambling group and an Independent samples *t*-tests for sex and an ANOVA for grade were performed. Significant sex differences were found for Social gamblers [t(1072) = -2.576, p < .01] and PPGs [t(106) = 2.68, p < .01] such that in both groups females had greater school connectedness mean *z*-scores (Table 17). Levine's test for homogeneity revealed that the variances between males and females for Social gamblers and PPGs could be assumed to be equal. No notable developmental differences within gambling groups were found.

	Gambling Groups <sup>1</sup>				
( <i>N</i> = 2179)	Non- gambler	Social gambler	At-Risk gambler	Probable Pathological gambler	
	М*	M*	M*	M*	
Sex					
Male	0.106	-0.079	-0.469	-0.321	
Female	0.160	0.072	-0.321-	-1.193	
Grade					
7	0.184	-0.074	-0.736	-1.332	
8	0.201	-0.017	-0.314	-0.766	
9	0.172	-0.054	-0.345	-0.793	
10	0.157	-0.005	-0.470	-0.768	
11	-0.006	0.055	-0.171	-0.156	
12	0.055	-0.052	-0.720	-0.184	
13	0.294	0.173	0.016	-0.090	
Total	0.146	-0.001	-0.416	-0.483	

Table 17. School Connectedness: Differences by Sex, Development and Gambling Severity

\*School connectedness z-scores (range -3 through +3 where higher scores reflect greater connectedness) are normalized by grade.

<sup>1</sup>Categorized by the DSM-IV-MR-J.

Substance use severity and school connectedness. The results revealed significant differences in reported school connectedness with more youth not at-risk for substance abuse reporting high school connectedness than those at-risk (27.3% vs. 14.6%),  $?^2(2, N = 2066) = 49.40, p < .001$ . School connectedness significantly differed between those individuals identified as at-risk for substance abuse (M = 0.103, SD = .103) and those who are not (M = -0.305, SD = 1.05), t(556.48) = 7.12, p < .001. Interestingly, sex differences were found within the non-risk substance use group [t(1667) = -4.86, p < .001] such that females had higher scores (M = .1969, SD = .9366) than males (M = -.0276, SD = .9207). No significant developmental differences were found within substance use groups (see Table 18 for mean scores and Table B17 for ANOVA results).

Multiple risk activity involvement and school connectedness. Results from cross tabulations indicate a significant difference between multiple risk involvement groups in frequency of reported levels of school connectedness,  $?^2(4, N = 2179) = 92.63, p < .001$ . More specifically, 31.7% of youth in the low RIPS-Involvement group reported high school connectedness compared to 25.5% of youth in the moderately involved group and 16.7% of youth in the highly involved group. An ANOVA revealed significant differences in school

connectedness scores between the groups, F(2, 2176) = 49.0, p < .001 (see means in Table 18). Post hoc analyses using Tamhane's T2 statistic revealed significant differences between all pairwise comparisons such that youth who reported moderate involvement reported the highest

Table 18. School Connectedness Scores: Differences by Substance Abuse and Multiple

	Substance Al	buse Groups <sup>1</sup>	RIPS-I Groups <sup>2</sup>		$s^2$
	Non-risk	At-risk	Low	Moderate	High
	M*	M*	М*	M*	M*
Sex					·
Male	-0.276	-0.312	-0.010	-0.034	-0.241
Female	0.197	-0.299	0.343	0.146	-0.329
Grade					
7	0.0256	-1.056	0.186	-0.304	-1.191
8	0.0595	-0.710	0.226	-0.050	-0.687
9	0.0780	-0.161	0.294	-0.041	-0.382
10	0.139	-0.494	0.280	0.143	-0.488
11	0.123	-0.203	0.260	0.164	-0.189
12	0.131	-0.378	-0.226	0.273	-0.270
13	0.369	-0.016	0.058	0.287	0.129
Total	0.103	-0.305	0.213	0.691	-0.287

**Risk Involvement** 

\*School connectedness z-scores (range -3 through +3 where higher scores reflect greater connectedness) are normalized by grade.

 $^{1}N = 2066$ . Categorized on the PESQ-PS. 113 participants who endorsed the PESQ-PS INF scale were excluded from analysis.

 $^{2}N = 2179$ . Categorized by the RIPS-I.

school connectedness scores and youth in the high RIPS-Involvement group reported substantially lower school connectedness scores than both low- and moderate RIPS-Involvement groups (see Table B14, Appendix B for post hoc test results).

Females were found to report greater school connectedness for both the low involvement [t(501.47) = -5.13, p < .001] and moderate involvement groups [t(731) = -2.58, p < .01] (Table B16, Appendix B). Significant developmental differences were found within the moderately involved group, F(2, 730) = 4.66, p < .001. Tukey's HSD revealed significant differences in pairwise comparisons between grades 7 and 10, 11, 12, and 13 such that grade 7 students reported substantially lower school connectedness than students in older grades. Notable developmental differences were also found within the high involvement group, F(6, 717) = 6.84, p < .001. Similarly, significant differences between grades 7 and 11, 12, and 13 and between 13

and 8, 10, and 12 such that students in grade 7 reported lower school connectedness than older students (see Table B15, Appendix B for post hoc test results).

### Achievement Motivation

Given the protective role of achievement motivation in substance abuse, academic, and psychological resilience delineated in the literature, this personality factor was included to explore its possible protective function for youth problem gambling. To obtain a measure of participant's achievement motives, the AMS, which is a 30-item scale comprised of the *motive to approach success* (Ach-S) subscale and the *motive to avoid failure* (Ach-F) subscale (15 items each) was administered. The range of scores on both scales is 15 to 60, where higher scores are indicative of the motive to approach success and to avoid failure.

According to AMS theory, individuals with the combination of high motives to approach success and low motives to avoid failure are more apt to anticipate positive outcomes and apply themselves in situations where the outcomes are uncertain. Individuals with a strong tendency to avoid failure are thought to be more likely to anticipate negative outcomes and thus less likely to engage in challenging situations. In order to identify those strongest in this personality trait, a categorical variable of achievement motivation was obtained by summing the items on their respective scale and ranking the subscale totals into quartiles. The lowest scores on the Ach-S were assigned a value of one such that those in the highest quartile group have the highest Ach-S. The highest scores on the Ach-F were assigned a value of 1 such that those in the highest quartile have the lowest Ach-F. Total motives scores were then derived from summing the values of Ach-S and Ach-F quartile ranks (possible range of scores being from 2 to 8) and divided into the following three groups: low achievement motives (scores 2 and 3), average achievement motives (scores 4 to 6), and high achievement motives (scores 7 and 8). Means of gambling groups, substance use groups, and multiple-risk activity involvement groups on each subscale of the AMS can be found in Table B18, Appendix B. Cross tabulations between levels of achievement motivation and each level of health-compromising behavioural outcome were conducted and no significant differences were found (Table B19, Appendix B). Summary of Protective Factors for Health-Compromising Behaviours

Although the results of the ANOVAs and Independent samples *t*-tests conducted on each health-compromising behaviour have been noted, a summary table of significant findings for the protective factors between health-compromising behaviours is provided in Table 19. Several

(possible) protective factors were found to significantly differ between gambling groups, substance use groups, and groups formed by level of involvement in multiple risky activities. More specifically, greater presence of a particular factor (indicated by mean scores) was observed among non- and less involved groups while those groups consisting of youth with increased problem severity reported the least presence of protective factors. Chi-square analyses indicated that achievement motivation, the presence of a mentor, and involvement in prosocial activities did not substantially vary between any health-compromising behaviours groups.

Gambling	df, N	F	p
Family Cohesion	3, 2175	27.80	< .001
School Connectedness	3, 2175	24.89	< .001
Effective Coping Skills	3, 2175	5.07	< .01
Multiple Risk Involvement			
Family Cohesion	2, 2176	121.24	<.001
School Connectedness	2,2176	50.00	<.001
Effective Coping Skills	2,2176	4.37	<.01
Substance Abuse	df	t	p
Family Cohesion	2064	9.58	<.001
School Connectedness	556.48	7.12	<.001
Effective Coping Skills	653.90	2.87	<.01

Table 19. High-Risk Behaviour Severity Differences on Protective Factors

*Note*: Although effective coping skills was found to be statistically significant, the means between problem-behaviour groups did not meaningfully vary.

# Risk Factors for Gambling, Substance Abuse, and Multiple Risk Behaviour Perceived Familial and Peer Problem Behaviour

Past research has suggested that individuals who have gambling-related problems are more likely to have a parent or a family member with an addiction. Overall, of those individuals who reported that family members or peers were perceived to have a gambling problem, 3.4% were mothers or stepmothers, 3.6% fathers or stepfathers, 0.7% sisters, 2.6 % brothers, 13.9% other relatives, 12.1% friends, 8.5% classmates, and 5.3% other significant people in their lives. Of those individuals who reported that family or peers were believed to have a drug or alcohol problem, or both indicated that 4.0% were mothers or stepmothers, 10.4% fathers or stepfathers, 2.6% sisters, 5.6% brothers, 23.4% other relatives, 28.5% friends, 21.0% classmates, 10.7% other people in their lives (see Table 20). As presented in Table 20, more participants reported

Individual with Problem	Perceived Problems <sup>1</sup>			
	Gambling	Substance Abuse		
Family Member				
Mother or Stepmother	3.4	4.0		
Father or Stepfather	3.6	10.4		
Sister	.7	2.6		
Brother	2.6	5.6		
Other Relative	13.9	23.4		
Peers				
Friend	12.1	28.5		
Classmate	8.5	21.0		
Significant Other	5.3	10.7		

Table 20. Perceived Familial and Peer Problems

<sup>1</sup>Percentage of total sample reporting family and peer problems.

that someone in their family or friendship circle were likely to have a substance abuse problem than a gambling problem.

Perceptions among gambling severity groups. With respect to gambling severity, results revealed that PPGs and At-Risk gamblers reported perceiving significantly more gambling problems among family members and peers than Non-gamblers and Social gamblers (Table 21). Furthermore, although the frequency of reported family and peer problems differs between At-Risk and PPGs, these two groups together reported substantially more gambling problems among peers than Social and Non-gamblers. In general, negative associations were observed between knowing others with gambling problems and participant's reported gambling severity (Table 20). PPGs reported more family members, peers, and friends with gambling problems (see Table 21). More specifically, PPGs reported significantly more fathers or stepfathers (7.4%),  $?^{2}(3, N =$  $2179 = 10.26, p < .05, and brothers (15.7\%), ?^{2}(3, N = 2179) = 104.23, p < .001, with perceived$ gambling problems compared to At-Risk gamblers (2.9% and 7.6% respectively). Both PPGs and At-Risk gambling groups equally reported (yet significantly greater than Non- and Social gambler groups) that to their knowledge their mother or stepmother (6.4% and 6.3% respectively), sisters (2.8% and 2.9% respectively), and other relatives (21.3% and 18.8% respectively) had gambling problems. With respect to peers, PPGs reported a significantly greater percentage of friends (41.7%),  $?^2(3, N = 2179) = 196.89$ , p < .001, who have gambling problems. This same pattern of significant differences between gambling groups

	Gambling Groups <sup>1</sup>				
Individual with Gambling Problem	Non- gambler	Social gambler	At-Risk gambler	Probable Pathological gambler	
Family Member					
Mother or Stepmother**	2.1	3.8	5.3	6.5	
Father or Stepfather*	2.3	4.3	2.9	7.4	
Sister***	.1	.7	2.9	2.8	
Brother <sup>***</sup>	1.0	1.7	7.6	15.7	
Other Relative***	10.9	14.7	18.8	21.3	
Peers					
Friend***	6.2	10.2	34.1	41.7	
Classmate <sup>***</sup>	4.1	8.5	17.1	29.6	
Significant Other ***	4.0	4.7	9.4	15.7	

Table 21. Perceived Familial and Peer Gambling Problems: Gambling Severity

<sup>1</sup>Percentage. Categorized by the DSM-IV-MR-J. \*p < 05. \*\*p < 01. \*\*\*p < 001.

was observed for classmates (29.6%),  $?^2(3, N = 2179) = 98.11, p < .001$ , and other individuals in the participants' lives (15.7%),  $?^2(3, N = 2179) = 32.76, p < .001$ . PPGs reported significantly more sisters (10.2%),  $?^2(3, N = 2179) = 31.32, p < .001$  with substance use problems than At-Risk gamblers (2.4%).

While rates were still significantly higher than Non-gamblers and Social gamblers, no differences were found between adolescent PPGs and At-Risk youths' reported knowledge regarding the gambling problems of their mother or stepmothers (11.1% and 8.2% respectively), their fathers or stepfathers (22.2% and 17.1%), their brothers (13.9% and 10.0%) and other relatives (37.0% and 31.8% respectively). With respect to peers, PPGs reported significantly more friends (51.9%),  $?^2(3, N = 2179) = 81.40, p < .001$ , with perceived substance use problems compared to other youth. Finally, although problem gambling rates were still significantly higher than Non-gamblers and Social gamblers, no significant differences were found between PPGs and At-Risk gamblers with respect to their classmates' drug or alcohol problems (35.2% and 29.4% respectfully) and other significant people in the participants' lives (16.7% and 19.4% respectively) (see Table 22). It is important to note that these results were reflective of the participants and reports were not validated by second party reports.

Perceptions among substance use and RIPS-Involvement groups. Similar analyses were conducted on perceived familial and peer gambling and substance abuse problems by substance

Individual	Gambling Groups <sup>1</sup>				
With Substance Abuse Problem	Non- gambler	Social gambler	At-Risk gambler	Probable Pathological gambler	
Family Member					
Mother or Stepmother***	2.1	4.2	8.2	11.1	
Father or Stepfather***	7.0	10.8	17.1	22.2	
Sister <sup>***</sup>	1.2	3.0	2.4	10.2	
Brother <sup>***</sup>	3.0	6.1	10.0	13.9	
Other Relative***	19.0	24.1	31.8	37.0	
Peers					
Friend <sup>***</sup>	20.2	29.8	45.3	51.9	
Classmate <sup>***</sup>	16.4	21.8	29.4	35.2	
Significant Other***	8.6	10.4	19.4	16.7	

Table 22. Perceived Familial and Peer Substance Abuse Problems: Gambling Severity

<sup>1</sup>Percentage. Categorized by the DSM-IV-MR-J. \*\*\*p < .001.

use group and groups differentiated by RIPS-Involvement (Tables 23 and 24). At-risk youth perceived their friends and classmates to have more gambling problems than youth not at risk for substance abuse (Table B20, Appendix B). Furthermore, at-risk youth reported substantially more substance use problems than youth not at risk with respect to their fathers or stepfathers

Table 23. Perceived Familial and Peer	Gambling Problems	Reported by	<sup>,</sup> High-Risk	Groups
---------------------------------------	-------------------	-------------	------------------------	--------

	High Risk Groups <sup>1</sup>				
Individual with Gambling Problem	PPG <sup>2</sup>	At-risk Substance Use <sup>3</sup>	High Multiple Risk Involvement <sup>4</sup>		
Family Member					
Mother or Stepmother	11.1	5.0	5.1		
Father or Stepfather	22.2	4.5	5.1		
Sister	10.2	0.5	1.2		
Brother	13.9	4.3	4.7		
Other Relative	37.0	17.1	16.7		
Peers					
Friend	51.9	23.4	23.2		
Classmate	35.2	16.9	15.9		
Significant Other	16.7	6.8	7.9		

<sup>1</sup>Percentage.  ${}^{2}N = 2179$ . DSM-IV-MR-J score ( $\geq 4$ ).

 $^{3}N = 2006$ . Identified by the PESQ-PS Scale.

 $^{4}N = 2179$ . Identified by the RIPS-I.

		High Risk Groups <sup>1</sup>	
Individual with Substance Use Problem	PPG <sup>2</sup>	At-risk Substance Use <sup>3</sup>	High Multiple Risk Involvement <sup>4</sup>
Family Member			
Mother or Stepmother	11.1	8.6	8.0
Father or Stepfather	22.2	18.4	18.8
Sister	10.2	3.0	4.3
Brother	13.9	10.3	9.9
Other Relative	37.0	37.0	31.6
Peers			
Friend	51.9	50.9	47.7
Classmate	35.2	31.5	30.5
Significant Other	16.7	15.4	15.6

Table 24. Perceived Familial and Peer Substance Abuse Problems Reported by High-Risk Groups

<sup>1</sup>Percentage.

 $^{2}N = 2179$ . DSM-IV-MR-J score ( $\geq 4$ ).

 $^{3}N = 2006$ . Identified by the PESQ-PS Scale.

 $^{4}N = 2179$ . Identified by the RIPS-I.

(18.4% vs. 7.5%), other relatives (37% vs. 19.8%), friends (50.9% vs. 20.7%), and classmates (31.5% vs. 16.7%) (Table B21, Appendix B). With regard to differences in perceived gambling and substance use problems among RIPS-Involvement groups, significantly more youth in the high involvement group perceived their friends (23.2%) and classmates (15.9%) appear to have a gambling problem than youth in the low involvement group (3.6% and 3.6% respectfully) (Table B22, Appendix B) as well as more perceived substance abuse problems in their father or stepfathers (18.8% vs. 3.3%), brothers (4.7% vs. 1.0%) other relatives (31.6% vs. 16.3%), friends (47.7% vs. 11.4%), classmates (30.5% vs. 11.2%), and other significant peers (7.9% vs. 3.6%) (Table B23, Appendix B).

Comparisons between high-risk groups on gambling, substance abuse, and involvement in multiple risk activities (Tables 23 and 24), suggest that PPGs were more likely to perceive gambling and substance use problems in their social environment than youth at-risk for substance abuse and youth in the high RIPS-Involvement group.

# Stressful Life Experiences

In light of past research outlining the impact stressful life events have on youth high-risk behaviours, a list of major stressful life events was included to confirm its presence as a
significant risk factor. Youth identified and reported those stressful life events experienced (in their lifetime or those currently being experienced) (see Table 25).

Not surprisingly, 84.6% of the total sample report having experienced, or were currently experiencing, at least one major stressful life event. Regarding sex differences, females (86.5%) were more likely to report the presence of stressful life events than males (82.1%),  $?^2(1, N = 2179) = 7.75$ , p < .01. No statistically significant developmental differences were noted. Of those reporting having experienced a stressful life event, the average number of events reported was 2.39.

Differences by problem behaviour severity. The average number of stressful life events reported did not significantly differ by gambling severity, substance use, or involvement in multiple risk activities. Most youth in this sample reported having experienced approximately the same number of stressful life events. However, differences were found in the reported frequency of particular stressors between gambling severity groups (Table 25). More specifically, PPGs (70.4%) and At-Risk gamblers (70.6%) reported having a death of a close friend or family member more often than Social gamblers (65.2%) and Non-gamblers (59.0%),  $?^2(3, N = 2179) = 14.39, p < .01$ , and an arrest of a family member (26.9% and 23.5% vs. 13.4% and 10.2% respectively),  $?^2(3, N = 2179) = 38.71, p < .001$  (Table 25).

Probable pathological gamblers (22.2%) reported significantly more personal illness in the past few years than Non-gamblers (8.2%), Social gamblers (10.8%), and At-Risk gamblers (15.3%),  $?^2(3, N = 2179) = 24.01$ , p < .001. Lastly, female PPGs (10%) were significantly more likely to report having been pregnant than female Non-gamblers (1.1%), Social gamblers (2.7%) and At-Risk gamblers (3.3%).

Differences in reported stressful life experience between substance use group and multiple risk involvement groups were also examined. Significantly more youth at-risk for substance abuse experienced physical or sexual abuse (12.3% vs. 5.8%) and an arrest of family member (22.7% vs. 10.2%) (Table B24, Appendix B). Similarly, in contrast to the low involvement group, youth in the high involvement group reported more physical or sexual abuse (13.8% vs. 2.9%), arrest in the family (21.5% vs. 7.5%), as well as a parental job loss (25.7% vs. 13.2%). Not surprisingly, as reports of stressful life experiences increase, so too does gambling severity, substance use, and involvement in multiple risk-taking activities (see Table B25, Appendix B).

	Gambling Groups <sup>1</sup>			
Stressful Life Event	Non- gambler	Social gambler	At-Risk gambler	Probable Pathological gambler
Parental divorce or remarriage	20.7	23.3	28.2	19.4
Death of friend or family member you are close to**	59.0	65.2	70.6	70.4
Moving to a new town or city	29.0	28.5	34.7	35.2
Physical or sexual abuse	7.1	7.7	9.4	12.0
Parent lost his or her job	16.8	19.4	25.3	22.2
Close family member had/has serious mental or physical illness	32.3	33.8	35.3	38.0
Arrest of family member***	10.2	13.4	23.5	26.9
You have had a serious illness in the past few years***	8.2	10.8	15.3	22.2
You have been pregnant (females only)*	1.1	2.7	3.3	10.0

Table 25. Stressful Life Experiences and Gambling Severity

<sup>1</sup>Percentage within gambling group categorized by the DSM-IV-MR-J.

<sup>2</sup>42 Participants had not indicated whether or not they had a mentor.

 $p^* < 05$ .  $p^* < 01$ .  $p^* < 001$ .

## Self-Perceived Academic Achievement

Poor academic achievement has frequently been cited as a risk factor and correlate for the development of problem behaviours. Overall, 45.4% of the total sample perceived their grades as above average, 45.3% as average, and 9.3% as below average (Table 26). Not surprisingly, sex differences revealed more males (11.9%) perceived their academic achievement as below average than females (7.4%),  $?^2(2, N = 2179) = 13.56, p < .001$ . Regarding developmental differences, with the exception of grade 13, children in older grades (grades 10 to 12) more frequently perceived themselves as performing below average (10.1% to 15.1%) than younger children (grades 7 to 9) (4.9% to 7.8%),  $?^2(2, N = 2179) = 63.59, p < .001$ . Grade 13 students less frequently reported low self-perceived grades than grades 10 to 12; likely because grade 13 is not a requirement for high school graduation but is a prerequisite for university enrolment and therefore is likely composed of students with higher grades (Grade 13 was abolished in 2002).

*Gambling severity, substance abuse, and multiple risk involvement.* The frequency of reported low grades significantly differed between gambling groups such that PPGs (23.1%) more frequently regarded their grades as below average compared to At-Risk gamblers (14.7%),

Social gamblers (9.2%) and Non-gamblers (6.5%),  $?^2(6, N = 2179) = 50.09, p < .001$  (Table 26). No meaningful sex or developmental differences were found within gambling severity groups.

	Self-Perceived Academic Achievement <sup>1</sup>				
	Below Average	Average	Above Average		
Total	9.3	45.3	45.4		
Gambling Groups <sup>2***</sup>					
Non-gambler	6.5	42.9	50.5		
Social gambler	9.2	46.3	44.5		
At-Risk gambler	14.7	48.8	36.5		
Probable Pathological					
gambler	23.1	47.2	29.6		
Substance Use Groups <sup>3***</sup>					
No Risk	6.2	44.4	49.4		
At-risk	17.9	48.6	33.5		
RIPS-I Groups <sup>4***</sup>					
Low	3.9	38.3	57.8		
Moderate	8.9	45.8	45.3		
High	15.2	51.5	33.3		

Table 26. Perceived Grades in Problem Behaviour Groups

<sup>1</sup>Percentage.

 $^{2}N = 2179$ . Categorized by the DSM-IV-MR-J.

 $^{3}N = 2006$  due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 $^{4}N = 2179$ . Categorized by the RIPS-I.

 $p^{***} > 001.$ 

Regarding self-perceived academic achievement among substance use and RIPS-Involvement groups, 17.9% of youth in the At-Risk group for substance abuse reported low self-perceived grades compared to 6.2% of students in the non-risk group,  $?^2(2, N = 2066) = 70.11, p < .001$  (Table 26). Finally, 15.2% youth in the high RIPS-Involvement group reported low self-perceived academic achievement in contrast to 8.9% of the moderately involved and 3.9% of the low-involvement groups,  $?^2(4, N = 2179) = 111.47, p < .001$  (Table 26). No meaningful sex or developmental differences were found within substance use groups or RIPS-Involvement groups. *Trait Anxiety* 

Trait anxiety varies with gambling severity more substantially than state anxiety and was measured as a potential risk factor in this study. For each participant, a trait anxiety total score on the 20-item STAI-Trait subscale was obtained by recoding reversed items such that all items were weighted in a positive direction; summing all items on the trait subscale; and converting

them to sex-based *T*-scores (M = 50, SD = 10) according to norms provided (Speilberger, 1983). With a possible range of 31 through 88 for males and 30 through 87 for females, elevated *T*-scores indicate higher levels of anxiety. In order to examine differences between levels of reported anxiety and the dependent variables (gambling, substance use, and multiple risk activity involvement), participant's *T*-scores were ranked into quartiles to create the following three groups: (a) the top quartile representing those in the sample reporting the greatest anxiety relative to the entire sample; (b) the middle two quartiles representing participants reporting moderate anxiety; and (c) the bottom quartile including students reporting low levels of anxiety.

Gambling severity and anxiety. A significant difference in reports of anxiety was found between gambling groups such that more PPGs and At-Risk gamblers (39.8% and 37.6% respectively) were classified as having high anxiety (relative to the total sample) than Social gamblers (24.0%) and Non-gamblers (19.3%),  $?^2(6, N = 2179) = 50.01, p < .001$  (Table 27). In order to determine whether there were differences in the mean scores of participants across gambling groups a one way analysis of variance (ANOVA) was performed, with trait anxiety as

	Anxiety Groups <sup>1</sup>			
	Low	Average	High	
Total	26.8	49.1	24.1	
Gambling Groups <sup>2***</sup>				
Non-gambler	29.9	50.8	19.3	
Social gambler	27.5	48.5	24.0	
At-Risk gambler	15.9	46.5	37.6	
Probable Pathological				
gambler	13.9	46.3	39.8	
Substance Use Groups <sup>3***</sup>				
Not at-risk	28.9	50.6	20.5	
At-risk	20.7	45.0	34.3	
RIPS-I Groups <sup>4***</sup>				
Low	33.7	50.4	15.9	
Moderate	26.7	50.2	23.1	
High	20.0	46.7	33.3	

Table 27. Trait Anxiety Reported by High-Risk Groups

<sup>1</sup>Percentage. Anxiety groups created by ranking all *T*-scores. Low anxiety group = bottom quartile; Average anxiety group = middle two quartiles; High group = top quartile. <sup>2</sup>N = 2179. Categorized by the DSM-IV-MR-J.

 $^{3}N = 2006$  due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 $^{4}N = 2179$ . Categorized by the RIPS-I.

p < 001.

the dependent variable and gambling groups as the factor. There were significant between group mean anxiety scores, F(3, 2176) = 19.06, p < .001 (Table 28). Furthermore, it was observed that mean scores increased from Non-gamblers to the more involved gambling groups. Levine's test of homogeneity was not found to be significant, indicating equality of variances between the groups. Consequently, a Tukey HSD post hoc analysis revealed that Non-gamblers significantly differed from both At-Risk gamblers and PPGs in reported anxiety, and that Social gamblers differed from At-Risk gamblers and PPGs. Non-gamblers and Social gamblers were found to form one homogeneous subset while At-Risk gamblers and PPGs form another (p < .05) (Table B26, Appendix B). With respect to sex and developmental differences within gambling groups on the STAI-Trait Anxiety scale, the data set was divided by gambling group and an independent samples *t*-test for sex and an ANOVA for grade were performed. No significant sex or developmental differences were found.

			Gambling Groups <sup>1</sup>				
(N=2179)	Overall Sample	Non- gambler	Social gambler	At-Risk gambler	Probable Pathological gambler		
	<u>M*</u>	M*	M*	M*	M*		
Sex							
Male	47.69	46.20	47.08	49.69	52.43		
Female	48.29	47.33	48.80	52.10	52.30		
Grade*							
_7	46.19	45.09	46.42	51.43	55.14		
8	46.83	45.42	46.60	50.37	52.52		
9	47.78	47.29	47.35	52.05	50.00		
10	48.08	47.30	47.62	52.57	54.33		
11	49.89	49.61	49.27	50.50	53.81		
12	49.29	48.94	49.44	49.15	49.78		
13	48.18	48.05	48.23	47.69	49.00		
Total	48.04	47.04	47.97	50.55	52.41		

Table 28. Trait Anxie	ty: Developmental	, Sex, and	Gambling Severit	y Differences
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\*STAI Trait subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater trait anxiety. <sup>1</sup>Categorized by the DSM-IV-MR-J.

Substance use and anxiety. Cross-tabulations reveal that more youth at-risk for substance abuse than those who are not (34.3% vs. 20.5%) were identified as having high anxiety relative to the overall sample,  $?^2(2, N = 2066) = 36.20, p < .001$  (Table 29). An Independent samples *t*-test to determine differences in mean anxiety scores by substance use problems revealed that the

mean anxiety of those youth in the at-risk for substance abuse group (M = 50.49, SD = 9.25), was significantly higher than those in the group identified as not at risk for substance abuse (M = 47.19, SD = 7.94), t(542.98) = -6.56, p < .001 (Table 29). Levene's test for equality of variances was significant, suggesting unequal variances. With respect to sex and developmental differences within substance use groups on the STAI-Trait Anxiety scale, the data set was divided by substance use group and an Independent samples *t*-tests for sex differences, and an ANOVA for grade differences was performed. No significant sex and developmental differences were found (Tables B27 and B28, Appendix B).

Multiple risk activity involvement and anxiety. Results from cross tabulations indicate that more youth classified as having high involvement in multiple risk activities (33.3%) were also in the high anxiety group compared to moderately involved youth (23.1%) and those in the low involvement group (15.9%),  $?^2(4, N = 2179) = 72.06, p < .001$  (Table 27). An ANOVA to determine differences in mean anxiety scores among RIPS-Involvement groups revealed that group differences existed, F(2, 2176) = 49.94, p < .001 (Table 29). Levene's test of homogeneity of variances was found to be significant and subsequent post hoc comparisons using the

	Substance Abuse Groups <sup>1</sup>		]	RIPS-I Groups <sup>2</sup>		
	Non-risk	At-risk	Low	Moderate	High	
	M*	M*	M*	M*	M*	
Sex						
Male	47.11	48.82	46.26	47.59	48.88	
Female	47.24	51.63	45.70	48.25	51.50	
Grade						
7	46.14	51.33	44.86	48.74	52.61	
8	46.47	49.75	45.61	47.15	50.32	
9	47.15	50.36	46.40	47.75	50.16	
10	47.06	50.61	45.74	47.27	51.58	
11	48.90	50.94	47.94	48.84	51.13	
12	48.16	50.77	50.89	48.51	49.50	
13	47.66	49.13	50.20	47.60	48.32	
Total	47.19	50.49	45.91	47.97	50.24	

 Table 29. Trait Anxiety: Sex and Developmental Differences in Substance Abuse and Multiple

 Risk Involvement Groups

\*STAI Trait subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater trait anxiety.

 $^{1}N = 2006$  due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 $^{2}N = 2179$ . Categorized by the RIPS-I.

Tamhane T2 statistic revealed significant differences in mean anxiety scores in all pairwise comparisons (Table B26, Appendix B). With respect to sex and developmental differences within RIPS-Involvement groups on the STAI-Trait Anxiety scale, the data set was divided by substance use group and an Independent samples *t*-tests for sex and an ANOVA for grade were performed and no significant sex and developmental differences were found.

### School Problems

Given the substantial body of literature suggesting that youth who experience behavioural or academic problems in school are at heightened risk for substance abuse, delinquency, and gambling problems, the A-Sch subscale of the MMPI-A was used to assess this risk factor. After recoding reversed items such that all items were weighted in a positive direction, participants' raw scores were calculated and transformed into *T*-scores (M = 50, SD = 10), according to the test manual (*T*-scores are covaried for sex) whereby higher scores reflect greater negative attitudes toward academic achievement, poor school performance, and behavioural and academic deficits. According to the test manual, *T*-scores below 60 are considered to be within the normal range; *T*-scores of 60 to 64 indicate an individual is experiencing moderately elevated school problems; and *T*-scores equal to or greater than 65 indicate significant symptoms or problems. Frequencies for the total sample revealed that 11.6% of participants had scores in the highly elevated school problems range and 4.5% of participants met the criteria for moderately elevated school problems.

Gambling severity and school problems. As can be seen in Table 30, the frequency of reported highly elevated school problems was positively associated to gambling such that PPGs more frequently reported having scores in the highly elevated school problems range (43.5%) than At-Risk gamblers (23.5%), Social gamblers (10.6%), and Non-gamblers (6.3%),  $?^2(6, N = 2179) = 163.42, p < .001$ . In order to determine whether there were differences in the mean scores of participants across gambling groups a one way analysis of variance (ANOVA) was performed, with school problems *T*-scores as the dependent variable and gambling groups as the factor. Mean school problems scores were found to significantly differ between gambling groups, F(3, 2175) = 61.48, p < .001 (Table 31 and Figure 5). Levine's test of homogeneity was significant and a post hoc analysis using Tamhane's T2 revealed that, with the exception of pairwise comparisons between At-Risk gamblers and PPGs, significant differences were found for all pairwise comparisons (see Table B29, Appendix B).

	School Problems <sup>1</sup>			
	Normal $(T$ -score $\leq 55)$	Moderately Elevated School Problems (T-score 6 to 64)	Highly Elevated School Problems ( <i>T</i> -score $\geq 65$ )	
Total	83.5	4.5	11.6	
Gambling Groups <sup>2***</sup>				
Non-gambler	89.7	4.0	6.3	
Social gambler	84.8	4.6	10.6	
At-Risk gambler	71.8	4.7	23.5	
Probable Pathological				
gambler	48.2	8.3	43.5	
Substance Use Groups <sup>3***</sup>				
No risk	88.7	4.1	7.2	
At-risk	71.3	6.0	22.7	
RIPS-I Groups <sup>4***</sup>				
Low	94.3	2.1	3.6	
Moderate	86.4	5.0	8.6	
High	70.9	6.4	22.7	

Table 30. Clinical Cut-offs: School Problems

<sup>1</sup>Percentage. MMPI-School Problems subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater school difficulties.

 $^{2}N = 2179$ . Categorized by the DSM-IV-MR-J.

 $^{3}N = 2006$ . Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 $^{4}N = 2179$ . Categorized by the RIPS-I.

\*\*\*\**p* < .001.

With respect to sex and developmental differences in school problems within gambling groups, the data set was divided by gambling group and an Independent samples *t*-test for sex and an ANOVA for grade were performed. Significant sex differences were found only for PPGs such that males (M = 58.60, SD = 67.70) reported experiencing more school problems compared to females (M = 67.70, SD = 13.65), t(106) = -2.60, p < .01 (Table B30 in Appendix B). Significant developmental differences were found for Non-gamblers [F(6, 820) = 5.03, p < .001], At-Risk gamblers [F(6, 163) = 2.32, p < .05], and PPGs [F(6, 101) = 2.35, p < .05] (Table B31 in Appendix B). For each group, Tukey HSD post hoc analyse revealed significant differences in the number of school problems between grades 7 vs. 9, 7 vs. 11, and between 10 vs. 11.



Figure 5. School problems among problem severity groups as measured by the MMPI-A (A-sch) scale.

Substance use severity and school problems. Youth who are at risk for a substance-abuse problem more frequently reported experiencing highly elevated school problems (22.7% vs. 7.2%),  $?^2(2, N = 2066) = 89.85$ , p < .001. An Independent samples *t*-test revealed that severity of school problems significantly differs between individuals identified as at-risk for substance abuse problems (M = 47.61, SD = 10.17) and those who are not (M = 54.78, SD = 13.01), t(516.91) = -10.25, p < .001 (Table 32 and Figure 5). Levene's test for equality of variances was significant, suggesting unequal variances. With respect to sex and developmental differences in school problems within substance use groups, the data set was divided by substance use group and an Independent samples *t*-tests for sex and an ANOVA for grade were performed. No significant sex differences were found within each substance use group. However, developmental differences were found for the non-risk group, F(6, 1662) = 5.54, p < .001 and the at-risk for substance abuse group, F(6, 390) = 7.07, p < .001 (Table 32). Given that the test for

		Gambl	ng Groups <sup>1</sup>			
(N = 2179)	Non- gambler	Social gambler	At-Risk gambler	Probable Pathological gambler		
	M*	M*	M*	<u>M*</u>		
Sex						
Male	46.93	49.18	54.16	58.60		
Female	47.35	49.56	57.64	67.70		
Grade						
7	44.68	48.84	57.86	67.57		
8	47.37	49.74	55.47	67.10		
9	49.26	50.68	58.85	60.75		
10	46.15	49.22	57.71	64.20		
11	50.49	50.51	49.91	56.03		
12	47.90	49.54	58.03	55.94		
13	45.70	46.36	49.15	54.50		
Total	47.24	49.38	55.41	60.29		

Table 31. School Problems and Gambling Severity: Sex and Developmental Differences

\*MMPI-School Problems subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater school problems.

<sup>1</sup>Categorized by the DSM-IV-MR-J.

Table 32. School Problems: Sex and Developmental Differences in Substance Abuse and RIPS-

	Substance Abuse Groups <sup>1</sup>		I	RIPS-I Groups <sup>2</sup>		
	Non-risk	At-risk	Low	Moderate	High	
	M*	M*	M*	<u>M</u> *	M*	
Sex						
Male	48.27	53.96	45.92	49.22	54.21	
Female	47.15	55.34	44.17	48.95	55.44	
Grade					<u> </u>	
7	47.10	82.00	44.22	53.32	66.61	
8	49.10	68.08	45.19	53.07	61.92	
9	49.36	57.50	46.32	50.29	60.09	
10	46.49	56.25	44.01	47.33	57.10	
11	48.64	53.74	46.52	48.29	53.94	
12	46.20	54.99	43.61	46.45	53.10	
13	44.48	49.33	43.50	43.15	49.24	
Total	47.61	54.78	44.82	49.06	54.85	

### Involvement Groups

\*MMPI-School Problems subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater school problems.

 $^{1}N = 2006$ . Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 $^{2}N = 2179$ . Categorized by the RIPS-I.

homogeneity of variance was significant for both groups, Tamhane's T2 post hoc tests results indicated that significant developmental differences in school problems existed for the non-risk substance abuse group between grades 8 vs. 12 and 13, 9 vs. 10, 12, and 13, and 11 vs. 13 (Table B32, Appendix B). Pairwise grade comparisons in the at-risk substance abuse group revealed significant differences in school problems existed between grades 8 vs. 10, 11, 12, and 13, and 12 vs. 13 (Table B32, Appendix B).

Multiple risk activity involvement and school problems. The frequency of reported school problems significantly differed between RIPS-Involvement groups,  $?^{2}(4, N = 2179) = 162.34, p < 100$ .001. As can be seen in Table 30, 22.7% of youth in the high involvement group reported highly elevated school problems compared to 8.6% in the moderate involvement group and 3.6% of those least frequently involved in multiple risk activities. A one way analysis of variance (ANOVA) revealed that severity of school problems significantly differed between gambling groups, F(2, 2176) = 156.88, p < .001 (Table 32 and Figure 5), with means demonstrating a positive relationship with gambling severity. With respect to sex and developmental differences in school problems within RIPS-Involvement groups, the data set was divided by level of involvement. An Independent samples t-tests for sex and an ANOVA for developmental differences were performed. No notable sex differences were found. However, developmental differences in school problems existed within the moderately- [F(6, 726) = 12.24, p < .001] and highly- [F(6, 717) = 11.88, p < .001] involved multiple risk activity groups. Given that Levene's test for homogeneity was significant for both groups, post hoc tests using Tamhane's T2 statistic revealed significant differences in the moderately involved group between grades 7 vs. 10, 11, 12, and 13; 8 vs. 10, 11, 12, and 13; and 13 vs. 9, 10, and 11 (Table B33, Appendix B). **Risk Propensity** 

The presence of high perceived benefits and low perceived risks for various risk-taking activities has been shown to result in behavioural intention and involvement in high-risk behaviours. In order to determine an individual's disposition to risk-taking, the Perceived Risks and Perceived Benefits subscales (22 items each) of the RIPS were included. However, from the original 27 items, 3 items pertaining to sexual activity were excluded based on the request of school boards and 2 additional items related to binge eating and taking speed were omitted based on observations during data collection that a number of students did not understand their

meaning. The modified version of the perceived risks subscale and perceived benefits subscale were found to have good reliability, with alpha coefficients of .92 and .88 respectively.

A risk propensity score was derived by summing the totals for each scale and dividing perceived benefits by perceived risks. Subsequent scores range from 0-17.83, where higher scores indicate greater dispositions to risk-taking. In order to determine the proportion of youth considered to have the risk propensity factor, Risk Propensity Intensity scores were ranked and divided into three groups with an equal number of cases such that group 1 includes individuals in the sample with the lowest risk propensity scores and group 3 having the highest scores.

Gambling severity and risk propensity. A significant difference in risk propensity between gambling groups was found  $?^{2}(6, N = 2179) = 218.80, p < .001$ . Similar percentages of At-Risk gamblers and PPGs report high risk propensity (50.6% and 56.5% respectively) compared to less frequent reports by 25.8% Social gamblers and 14.6% Non-gamblers (Table 33).

	Risk Propensity Groups <sup>1</sup>			
	Low	Moderate	High	
Total	25.0	50.0	25.0	
Gambling Groups <sup>2***</sup>				
Non-gambler	36.6	48.8	14.6	
Social gambler <sup>a</sup>	19.6	54.6	25.8	
At-Risk gambler <sup>b</sup>	14.1	35.3	50.6	
Probable Pathological	· · · · · · · · · · · · · · · · · · ·			
gambler <sup>c</sup>	6.5	37.0	56.5	
Substance Use Groups <sup>3***</sup>				
No risk	31.0	52.2	16.8	
At-risk	4.8	48.1	47.1	
RIPS-I Groups <sup>4***</sup>				
Low	48.9	42.0	9.1	
Moderate	20.6	60.7	18.7	
High	5.7	47.1	47.2	

Table 33. Risk Propensity Reported by High-Risk Behaviour Groups

<sup>1</sup>Percentage. Risk Propensity groups created by ranking all scores. Low risk propensity = bottom quartile; Average risk propensity group = middle two quartiles; High risk propensity group = top quartile.

 $^{2}N = 2179$ . Categorized by the DSM-IV-MR-J.

 $^{3}N = 2006$ . Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 $^{4}N = 2179$ . Categorized by the RIPS-I.

 $p^{**} p < .001.$ 

In order to determine whether there were differences in the risk propensity mean scores of participants across gambling groups a one way analysis of variance (ANOVA) was performed, with risk propensity score as the dependent variable and gambling groups as the factor. The mean risk propensity scores significantly varied between gambling groups, F(3, 2175) = 46.96, p< .001. Levine's test of homogeneity was found to be significant, and post hoc analyses using Tamhane's T2 statistic revealed significant differences between all pairwise comparisons with the exception of At-Risk gamblers and PPGs (Table B34, Appendix B). With respect to sex and developmental differences in risk propensity for gambling groups, the data set was divided by gambling group and an Independent samples *t*-test for sex and an ANOVA for developmental differences were performed. No significant sex or developmental differences were found (Table B35, Appendix B).

Substance use severity and risk propensity. More youth at risk for substance abuse reported having high risk propensity scores than those not at risk for substance abuse (47.1% vs. 16.8%),  $?^2(2, N = 2066) = 215.53$ , p < .001 (Table 33). An Independent samples *t*-test revealed that risk propensity significantly differs between those who are identified as at-risk for substance abuse and those who are not, t(506.98) = -10.11, p < .001. Levene's test for equality of variances was significant. With respect to sex and developmental differences in risk propensity within substance use groups, the data set was divided by substance use group and an independent samples *t*-test for sex and an ANOVA for grade were performed. Interestingly, sex differences were found within the at-risk substance use group, t(246.49) = 4.46, p < .001, with males having higher scores (M = .38, SD = .43) compared to females (M = .30, SD = .36). No significant developmental differences were found (grade and sex means within the groups can be seen in Table B36, Appendix B).

Multiple risk activity involvement and risk propensity. As expected, significant differences in frequency of reported risk propensity between RIPS-Involvement groups were found,  $?^2(4, N = 2179) = 162.34$ , p < .001. More specifically, 47.2% of youth who are highly involved in multiple risk activities reported having high risk propensity compared to moderately and low involvement youth (18.7% and 9.1% respectively) (Table 33). In order to determine whether there were differences in the risk propensity mean scores of participants across multiple risk activity involvement groups a one way analysis of variance (ANOVA) was performed, with risk propensity score as the dependent variable and RIPS-Involvement group as the factor.

Results revealed significant group differences with means demonstrating a positive relationship between risk propensity and involvement in multiple risk behaviours F(2, 2176) = 101.37, p < .001. Levine's test of homogeneity was found to be significant and post hoc analyses using Tamhane's T2 statistic revealed significant differences between all pairwise comparisons (see Table B34, Appendix B). No significant sex and developmental differences in risk propensity within RIPS-Involvement groups were found (see Tables B37 and B38, Appendix B). *Coping Behaviour* 

In order to assess the presence of risk in terms of ineffective coping skills, the ACOPE was administered. To measure ineffective coping, the 15 items pertaining to ineffective coping were reverse coded such that all items were weighted in a positive direction and summed to obtain a total ineffective coping score. *Lower* scores indicate more frequent use of ineffective coping strategies (possible range of scores is 15 to 75). In order to determine the proportion of youth with the ineffective coping risk score and exploring whether coping varied by severity of gambling, substance abuse, and involvement in multiple risk activity, ineffective coping scores (M = 50.74, SD = 8.41) were ranked into quartiles to create the following three groups: (a) the bottom quartile representing those in the sample reporting the least use of ineffective coping strategies relative to the entire sample; (b) the middle two quartiles representing participants reporting average use of ineffective coping strategies; and (c) the top quartile encompassing students reporting the greatest use of ineffective coping strategies.

*Gambling severity and coping*. A negative relationship between reported use of ineffective coping strategies and gambling severity was found. Significantly more PPGs (50.9%) and At-Risk gamblers (45.3%) were classified in the group reporting the highest use of ineffective coping strategies compared to the reported use by Social gamblers (27.0%) and Non-gamblers (18.4%),  $?^2(6, N = 2179) = 149.20, p < .001$  (Table 34).

In order to determine whether there were differences in the mean scores of participants across gambling groups, a one way analysis of variance (ANOVA) was performed, with ineffective coping score as the dependent variable and gambling groups as the factor. An inverse relationship between use of ineffective coping strategies and gambling was observed (Table 35) with significant differences in mean coping scores between gambling groups, F(3, 2175) = 58.91, p < .001. Levine's test of homogeneity was significant and post hoc analyses using

	Ineffective Coping <sup>1</sup>				
	Low	Moderate	High		
Gambling Groups <sup>2***</sup>					
Non-gambler	34.6	47.0	18.4		
Social gambler	20.9	52.1	27.0		
At-Risk gambler	11.2	43.5	45.3		
Probable Pathological					
gambler	5.6	43.5	50.9		
Substance Use Groups <sup>3****</sup>					
No risk	30.4	53.2	16.4		
At-risk	5.3	35.0	59.7		
RIPS-I Groups <sup>4***</sup>					
Low	46.1	47.4	6.5		
Moderate	20.7	57.9	21.4		
High	7.0	41.9	51.1		

Table 34. Ineffective Coping Strategies Reported by High-Risk Behaviour Groups

<sup>1</sup>Percentage. Groups created by ranking all total scores. High use group = top quartile; moderate group = middle two quartiles; low use group = top quartile.

 $^{2}N = 2179$ . Categorized by the DSM-IV-MR-J.

 $^{3}N = 2006$ . Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.

 ${}^{4}N = 2179$ . Categorized by the RIPS-I. \*\*\* p < .001.

				Groups <sup>1</sup>		
(N = 2179)	Total Sample		Non gambler*** <sup>##</sup>	Social gambler****	At-Risk gambler***	Probable Pathological gambler
	M	SD	М	M	М	М
Sex						
Male	51.77	8.377	55.92	51.93	48.27	45.17
Female	49.97	8.351	52.02	48.70	43.46	42.25
Grade						
7	55.15	8.066	56.94	54.29	49.24	42.86
8	52.71	7.935	54.28	52.83	49.20	46.76
9	50.25	8.054	51.12	50.47	47.40	41.38
10	50.65	8.142	53.39	49.73	46.48	43.73
11	48.25	8.360	49.47	48.49	45.75	45.16
12	48.05	7.802	49.85	48.07	44.12	44.94
13	49.28	7.863	52.91	49.06	42.92	42.75
Total	50.74	8.407	53.02	50.26	46.54	44.63

Table 35. Coping: Sex and Developmental Differences: Total Sample and Gambling Severity

Note: Range 15-75, the lower the score the more use of ineffective coping strategies. <sup>1</sup>Categorized by the DSM-IV-MR-J.

\*\*p < .001, \*\*p < .01 sex differences. \*\*p < .001 developmental differences.

Tamhane's T2 statistic revealed significant differences between all pairwise comparisons with the exception of mean scores between At-Risk gamblers and PPGs (see Table B39, Appendix B).

Within all gambling groups except PPGs, males reported greater use of ineffective coping skills compared to females (for means see Table 35, and Table B40, Appendix B for independent samples *t*-test results). Significant developmental differences were found in the non-gambling group, F(6, 820) = 16.26, p < .001, and within the Social gambler group, F(6, 1067) = 14.02, p < .001. Levine's test of homogeneity was not found to be significant for either of these groups, necessitating the use of Tukey HSD post hoc tests. Regarding the Non-gambler group, significant differences in pairwise comparisons were found between grade 7 vs. all other grades, grades 8 vs. 9, grades 8 vs. 11, grades 8 vs. 12, grades 10 vs. 11 and grades 10 vs. 12. Within the Social gambling group, younger youth (grades 7 and 8) had similar effective coping scores, and significantly higher mean coping scores (and therefore less use of ineffective coping strategies) than older youth.

Substance use severity and coping. More youth classified as being at-risk for substance abuse (59.7%) reported high use of ineffective coping strategies (relative to the total sample), compared to 16.4% of youth not identified as being at-risk for substance use,  $?^2(2, N = 2066) =$ 343.40, p < .001. An independent samples *t*-test revealed that use of ineffective coping strategies significantly differs between those identified as at-risk for substance abuse (M = 43.90, SD =7.28) and those not at risk (M = 52.87, SD = 7.41), t(2064) = 21.74, p < .001 (Table 36). No significant sex and developmental differences in use of ineffective coping strategies within substance use groups were found (Tables B40 and B41, Appendix B).

*Multiple risk activity involvement and coping*. Youth in the high RIPS-Involvement group more frequently reported greater use of ineffective coping strategies (51.1%) than moderately involved (21.4%) and youth who were classified in the lowest involvement level group (6.5%),  $?^2(4, N = 2179) = 533.82, p < .001$ . An ANOVA was performed in order to determine differences in participant's ineffective coping mean scores across RIPS-Involvement groups, with ineffective coping score as the dependent variable and RIPS involvement group as the factor. Significant groups differences in ineffective coping mean scores were found, F(2, 2176) = 382.32, p < .001 (Table 36). Levine's test of homogeneity was found to be significant, indicating inequality of variances between the groups. Tamhane's T2 statistic revealed significant differences between

	Substance A	buse Groups <sup>1</sup>	R	IPS-I Groups	2
	Non-risk	At-risk	Low	Moderate	High
	<i>M</i> *	M*	M*	M*	M*
Sex					
Male	53.77	45.88	56.70	52.60	47.25
Female	52.22	42.54	55.27	50.03	43.48
Grade					
7	55.42	43.33	57.04	51.65	45.61
8	53.45	40.33	55.60	51.16	46.36
9	51.40	42.68	54.40	49.74	44.18
10	52.86	44.02	55.83	51.25	44.29
11	50.74	44.36	54.62	50.80	44.77
12	51.65	43.62	53.39	51.28	45.58
13	52.61	44.95	53.80	52.85	46.75
Total	52.87	43.90	55.80	51.13	45.30

Table 36. Coping: Sex and Developmental Differences in Substance Abuse and RIPS-

Involvement Groups

\*Range 15-75, the higher the score the more use of ineffective coping strategies.  $^{1}N = 2006$ . Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.  $^{2}N = 2179$ . Categorized by the RIPS-I.

all pairwise comparisons (see Table B40, Appendix B). No notable sex or developmental differences within RIPS-Involvement groups were found (see Tables B40 and B41, Appendix B). Summary of Risk Factors for Health-Compromising Behaviours

Although the results of the ANOVAs and Independent samples *t*-tests conducted on each health-compromising behaviour have been noted, a summary table of significant differences in scores on the risk factors provided to facilitate comparisons in risk factors between health-compromising behaviours (Tables 37, 38, and 39). All risk factors included in this study were found to significantly differentiate between groups derived from problem severity scores regarding gambling, substance abuse, and involvement in multiple risk activities and results suggest a positive association between risk factors and the problem severity of each health-compromising outcome.

Risk Factors	df, N	F	p
Substance Abuse	3, 2062	85.33	<.001
Involvement in Multiple Risk Activities	3, 2175	161.88	<.001
Trait Anxiety	3, 2175	19.06	<.001
Risk Propensity	3, 2175	47.69	< .001
School Problems	3, 2175	61.48	< .001
Ineffective Coping Skills	3, 2175	58.91	<.001

Table 37. Risk Factors for Gambling Severity

Risk Factors	df	t	p
Involvement in Multiple Risk Activities	557.99	-32.40	<.001
Problem Gambling	449.56	-7.42	<.001
Trait Anxiety	542.98	-6.56	<.001
Risk Propensity	507.07	-10.10	<.001
School Problems	516.91	-10.25	<.001
Ineffective Coping Skills	2064	21.74	<.001

Table 38. Risk Factors for Substance Abuse

Table 39. Risk Factors for Involvement in Multiple Risk Activities

Risk Factors	df, N	F	р
Substance Use	2,2063	915.43	<.001
Problem Gambling	2, 2176	114.49	<.001
Trait Anxiety	2, 2176	49.94	< .001
Risk Propensity	2, 2176	101.54	<.001
School Problems	2,2176	156.88	<.001
Ineffective Coping Skills	2, 2176	382.32	<.001

### Summary of Risk and Protective Factors

Table 40 provides an overall summary of all variables found to be factors related to decreases in youth problem gambling (protective factors) and increases in youth problem gambling (risk factors) based upon the significant main effects found in the ANOVA analyses. Correlates of health-compromising variables found in chi-square analyses are also included. In general, the identified risk and protective factors and correlates are similar across all health-compromising outcomes.

	Gambling	At-risk for	Involvement in
	Problems	Substance	Multiple High-
		Abuse	<b>Risk Activities</b>
Protective Factors			
Family cohesion	*	*	*
School connectedness	*	*	
Effective coping Skills			
Achievement motivation			
Mentorship			
Involvement in conventional activities			····
Risk Factors			
Sex (being male)	*		*
Age	*	*	*
Substance use	*	*	*
Trait anxiety	*	*	*
Risk propensity	*	*	*
School problems	*	*	*
Ineffective coping skills	*	*	*
Self-perceived low academic grades	*	*	*
Stressful life experiences			
Parental divorce or remarriage		*	*
Death of friend or family member you	*	*	*
are close to			
Moving to a new town or city		*	
Physical or sexual abuse		*	*
Parent lost his or her job		*	*
Close family member had/has serious		*	*
mental or physical illness	<u> </u>		
Arrest of family member	*	*	*
You have had a serious illness in the	*	*	*
past tew years			
Y ou nave been pregnant (females only)	*	*	*
Parental problem gambling	*	*	
Sibling problem gambling	*	*	· · · · · · · · · · · · · · · · · · ·
Relative problem gambling	*	*	
Friend problem gambling	*	*	*
Unidentified person problem gambling	*	*	*
Parental substance use problem	*	*	*
Sibling substance use problem	*	*	*
Relative substance use problem	*	*	*
Friend substance use problem	*	*	*
Substance use problem (unidentified)	*	*	*

Table 40. Summary Table of Risk and Protective Factors and Correlates

\*significant factors.

#### Inter-Correlations Between Variables

Organized according to classes of variables, Table 41 presents Pearson correlations between all continuous risk and protective factor variables. Most of these correlations are low to moderate; therefore, risk and protective variables in this study could be, for the most part, considered to be sufficiently independent for further analyses.

There are however, some exceptions to this observation. First, the inter-correlations between the protective factors were positive and moderate regarding family cohesion and school connectedness (r = .36, p < .01) and family cohesion and effective coping (r = .32, p < .01). A moderate correlation was found between the risk factors of anxiety and ineffective coping (r = .36, p < .01), and relatively high correlations were found between trait anxiety and school problems (r = .45, p < .01) and school problems and ineffective coping (r = .50, p < .01). Concerning inter-correlations between risk and protective factors, increases in trait anxiety were found to be related to decreases in family cohesion (r = ..39, p < .01) and school connectedness (r = ..40, p < .01), while school problems were found to be moderately to highly correlated with family cohesion (r = ..40, p < .01), and school connectedness (r = ..55, p < .01).

Table 42 displays the correlations among health-compromising outcomes. Gambling was moderately correlated with substance use (r = .31, p < .01) and involvement in multiple risk activities (r = .38, p < .01) while substance use was very highly correlated to involvement in multiple risk activities (r = .74, p < .01). Many of the youth who were identified as being at-risk for substance abuse also reported more extensive involvement in multiple risky activities.

	<u> </u>			T	, ····-						
	1	2	3	4	5	6	7	8	9	10	11
1. Grade	-	047	.126	.099	.014	267	179	.007	092	025	119
2. Sex		-	.035	101	042	106	001	.089	.142	178	.061
3. Trait Anxiety			-	.033	.451	362	393	397	152	306	273
4. Risk Propensity				-	.229	235	149	114	048	010	102
5. School					-	497	401	551	202	268	438
Problems											
6. Ineffective					1	-	.334	.299	203	.162	.207
Coping											
7. Family							-	.360	.322	.170	.193
Cohesion	·										
8. School								-	.277	.186	252
Connectedness											
9. Effective									_	155	120
Coping											
10. Achievement											201
Motivation											
11. Perceived							······				<u> </u>
Academic											
Achievement											

Table 41. Pearson Correlations Matrix: Risk and Protective Factors

Note: All continuous risk and protective factor variables entered in a bivariate Pearson analysis using a two-tailed test of significance at the .05 level.

Table 42. Pearson C	Correlations N	Matrix:	Health-C	ompromising	Outcomes
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	Gambling	Substance Use	Multiple Risk Involvement
Gambling	-	.314	.382
Substance Use		-	.743
Multiple Risk Involvement			-

Note: All continuous dependent variables entered in a bivariate Pearson analysis using a twotailed test of significance at the .05 level.

## Logistical Regression

Given the large body of empirical studies examining risk and protective factors in predictive models for substance use and other high-risk behaviours, only predictive models for youth problem gambling were examined in this study. Analyses consisted of binary logistic regression, which is used when the dependent measure is dichotomous and the independent variables are continuous, categorical, or both. The logistic regression procedure was selected as it does not assume linearity of relationships between the independent variables and the dependent measure, normally distributed variables, non-homeoscedasticity, and it has generally less stringent requirements. Prior to running regression analyses, each variable was examined for outliers and scores found to lie above or below three standard deviations were omitted from analyses to avoid biasing the results (Tabachnick & Fidell, 2001). The removal of outliers across all variables resulted in an omission of 80 participants (3.7%) of the sample used in all prior analyses with a remaining sample size of 2099 participants.

All regression analyses were performed with a training sample in order to cross validate the results. A training sample is a portion of the total sample upon which a regression model is developed. This was accomplished by randomly splitting the sample into two subsamples: (a) 72% (n = 1511) of the sample; and (b) 28% (n = 588) of the sample. The regression equation (model) was developed on the training sample (72%) and applied on the validation sample (28%) which was a portion of the sample that was not included in the development of the model. This procedure is also known as a *Hold-Out Sample* technique (Tabachnick & Fidell, 2001) and was utilized to facilitate the generalizability of the results. The initial results obtained on a sample without weights indicated that a weighted sample (which may be necessary to use when the predicted variable, such as probable pathological gambling, is a small proportion of the total sample) was not necessary for subsequent analyses.

A total of six models were developed (Table 43). Three models predicted probable pathological gambling only, wherein probable pathological gambling was entered as the dichotomous dependent variable with probable pathological gambling (DSM-IV-MR-J scores  $\geq$  4) receiving a value of 2 and the rest of the sample a value of 1). Three models predicted At-Risk gamblers and PPGs wherein gambling was entered as the dichotomous dependent variable with

At-Risk gamblers and PPGs (DSM-IV-MR-J scores  $\geq$  3) receiving a value of 2 and Non- and Social gamblers receiving a value of 1.

		Factors	C-Statistic					
Model	Population	Entered	Training	95% CI	Validation	95% CI		
			Sample		Sample			
1	PPGs	<b>Risk factors</b>	.90	.87, .93	.89	.85, .94		
2	At-Risk gamblers and PPGs	Risk factors	.86	.83, .88	.85	.81, .89		
3	PPGs	Protective factors	.82	77, .86	.75	.67, .83		
4	At-Risk gamblers and PPGs	Protective factors	.76	.73, .80	.72	.66, .78		
5	PPGs	Risk and protective factors	.90	.87, .93	.88	.82, .93		
6	At-Risk gamblers and PPGs	Risk and protective factors	.86	.83, .89	.84	.79, .88		

Table 43. Summary of Logistic Regression Models

Independent variables were entered using the *backward stepwise likelihood-ratio* (backward LR) method wherein all independent variables are initially included in the model and those variables determined insignificant (based on probability of the likelihood ratio statistic on the maximum partial likelihood estimates) are eliminated until the remaining variables are all deemed important. A change in -2 log likelihood (a measure of how well the model fits the data, also called the deviance) tests the null hypothesis that the coefficients of the terms removed from the model are zero. Thus, the smaller the likelihood value, the better the model fits the data. Backward LR is often considered the preferred method of exploratory analyses because it assesses the overall predictive capability of the model rather than significance of each independent variable (Tabachnick & Fidell, 2001) and has the advantage of identifying variables that may only appear significant when another variable is controlled or held constant (Menard, 1995). Thus, even if a variable is not found to be significant by the Wald or F-ratio, it is retained in the model based on its significant likelihood ratio. Such factors have an indirect effect on the other factors in the model, though it is not possible to determine how and on what variable(s) it is indirectly affecting. The strength of association between each risk or protective factor and the outcome of at-risk or probable pathological gambling was estimated by an Odds ratio (OR) with

a 95% confidence interval (Hosmer & Lemeshow, 1989). The Receiver Operating Characteristics (ROC) Curve was calculated to ascertain each model's ability to predict future outcomes (graphically displayed for Models 5 and 6 only). Comparing the *C* statistic (area under the ROC Curve) for the training and validation samples permitted an examination of how well the model fit the data and the generalizability of the results.

## Risk Factors for Probable Pathological Gamblers

The first logistic regression was performed with entering all risk factors (trait anxiety *T*-score, risk propensity, school problems *T*-score, ineffective coping, perceived academic achievement, parental-, sibling-, friend-, and other person with a gambling problem, and parental-, sibling-, friend-, and other person with a substance use problem, as well as sex and age) as the covariates. Although grade level was chosen to represent developmental differences in the ANOVA analyses, age was entered in the regressions rather than grade because it was a more finely defined continuous variable. Factors were not entered as categorical regardless of whether they were dichotomous or not to ensure ease of interpretation. Accordingly, entering several categorical variables may produce a smooth distribution of probabilities among the two groups given the substantial number of dichotomous variables in the study and the sample size. Probable pathological gambling was entered as the dichotomous dependent variable with probable pathological gamblers (DSM-IV-MR-J scores  $\geq$  4) receiving a value of 2 and the rest of the sample a value of 1.

As can be seen in Table 44, the variables to be retained, termed Model 1, included sex, trait anxiety, risk propensity, school problems, sibling gambling problem, and friend gambling problem. The odds ratio [Exp(B)] is a measurement of relative risk when directionality is determined; the value indicates the change in odds of the behaviour being present with a one-unit change in the independent variable (B), holding constant the contribution of the other variables. If the odds ratio deviates sufficiently from 1, the factor and outcome of pathological gambling are considered to be associated. Interpretation of what constitutes sufficient deviance from 1 is determined by subject matter, research questions, and correlation between independent variables. In this study, a 5% deviation may be considered meaningful given the correlation between variables (e.g., students who associate with friends who gamble also tend to have lower school connectedness). Thus, although the deviation is statistically estimated, holding all other variables constant, one must keep in mind that in reality, all other variables are not kept constant. To

interpret odds ratios for continuous variables, it is important to consider that each factor is measured on a different scale.

Model 1 suggested that the odds of being a probable pathological gambling problem were approximately 3.1 (CI =1.03, 1.08) times greater for individuals who perceive one of their friend(s) as having a gambling problem and 2.8 times more likely (CI = 1.77, 5.01) if an individual perceived his or her sibling as having a gambling problem. Regarding personality characteristics, the odds of become a problem gambler were approximately 3.0 times greater (OR = 2.98, CI = 1.80, 5.47) for every unit increase in risk propensity, whereas increases in trait anxiety do not substantially increase one's odds of becoming a problem gambler (OR = 1.04, CI = 1.15, 6.75) though it was retained in the model because it increases the overall predictive function of the model. School difficulties were also not found to have a *substantial* impact on the odds of developing a gambling problem (OR = 1.1, CI = 1.01, 1.07) but was retained in the model to increase its predictive ability.

A negative parameter for a variable indicates that the variable diminishes risk (likelihood of the predicted outcome). In this study, where sex was entered as a dichotomous variable, with males assigned a value of 1 and females a value of 2, an increase in one unit was found to decrease a participant's odds of developing a gambling problem. Thus, females had a decreased odds (OR = .16, CI = .08-.30) of developing problem gambling. The odds ratio for males' increased chances of being problem gamblers (OR = .84) was considerably less than found in other studies (e.g., Hardoon, Gupta, & Derevensky, 2002). This may be due to the fact that sex was covaried for a number of variables used in this study and the large number of variables considered in the model decreased the power of individual variables (E. Hadaya, personal communication, May 22, 2003). Ineffective coping, perceived academic achievement, parental gambling, knowing a significant other (identity not specified) with a gambling problem, and parental-, sibling-, and friend substance use problem did not enter the model.

The Receiver Operating Characteristics (ROC) Curve is often used with a logistic regression model as an indication of the model's capability to predict future outcomes. The ROC Curve is a measure of discrimination which graphically represents of the trade-off between false negative and false positive rates. A random classification should achieve approximately .50. Thus, if one were to randomly select a student and discover whether he or she has a gambling problem, the ROC Curve would graphically represent the random chance of finding an individual

with a gambling problem with a value of approximately .50. The closer the ROC Curve is to the upper left hand corner of the graph, the better the results (e.g., see Figure 6). Model 1 indicated that the area under the curve (C statistic) was .90 (CI = .87, .93) for the training sample and .89 (CI = .85, .94) for the validation sample, indicating that the model's overall ability to correctly identify PPGs and the unspecified group (consisting of Non-, Social- and At-Risk gamblers) was excellent (1.78 times better than random classification) (Table 43). The similar C statistic for the training and validation samples indicates that the model was not significantly *overfitting* the data, which suggests that the results can be generalized.

Variable	В	S.E.	Wald	df	р	Exp(B)	95% CI
Sex	-1.85	.33	30.55	1	<.001	.16	.0830
Trait Anxiety	.09	.02	5.58	1	.018	1.04	1.15-6.75
Risk Propensity	1.09	.27	16.74	1	<.001	2.98	1.80-5.47
School Problems	.05	.01	18.20	1	<.001	1.05	1.01-1.07
Sibling Gambling Problem	1.02	.45	5.14	1	.023	2.78	1.77-5.01
Friend Gambling Problem	1.14	.28	16.22	1	<.000	3.12	1.03-1.08

Table 44. Model 1: Risk Factors for PPGs

*Note*: B = Parameters, Exp(B) = odds ratio. Sex coded as 2 for female and 1 for male. CI indicates confidence interval.

# Risk Factors for At-Risk Gamblers and Probable Pathological Gamblers Combined

The second logistic regression analysis performed involved combining the At-Risk and PPGs as a single group for the purpose of determining whether risk factors for At-Risk gamblers were similar to those for probable pathological gamblers. Researchers have hypothesized that At-Risk gamblers have similar psychological characteristics to PPGs and that a proportion of At-Risk gamblers transition quickly to PPGs (Gupta & Derevensky, 1998a; 1998b; Hardoon et al., 2002). The initial covariate list of risk factors entered in Model 1 was inserted for Model 2 and gambling was entered as the dichotomous dependent variable with at-risk and probable pathological gambling (DSM-IV-MR-J scores  $\geq 3$ ) receiving a value of 2 and non- and social gambling receiving a value of 1. Results generated a good model fit at step 9 on the basis of 7 predictor variables retained, identified as Model 2: sex, trait anxiety, risk propensity, school problems, sibling gambling problem, friend gambling problem and other person substance use problem (Table 45).

The odds of being a PPG were approximately 5 times greater (CI = 2.44, 5.57) for every unit increase in risk propensity. Further, individuals who perceived one of their siblings as

having a gambling problem had an increase in odds of developing a gambling problem themselves by 4.1 times (CI = 1.0, 1.05) and 3.7 times greater (CI = 3.21, 8.24) if they reported having a friend with a gambling problem. Trait anxiety did not substantially increase one's odds of being a problem gambler (OR = 1.03, CI = 1.85, 9.05) and was also found to have only an indirect effect in the model due to its non-significant Wald. School problems (OR = 1.05, CI = 1.21, 2.53) were also not found to substantially increase one's odds of developing a gambling problem. However, trait anxiety and school problems were retained because they increased the predictive function of the model. Males had an increase of .75 times of developing a gambling problem. Contrasting Model 1, a new variable entered this model such that individuals who reported knowing someone with a substance abuse problem (identity was not reported) increased the predictive ability of the model although it did not substantially increase one's odds of become a problem gambler (OR = 1.74, CI = 1.03-1.7).

The ROC Curve was obtained for both the training and validation samples. The area under the ROC Curve for the training sample was .855 (CI = .83, .88) and .850 (CI = .81, .89) for the validation sample, indicating good prediction of both Non- and Social gamblers and At-Risk gamblers and PPGs (Table 43). Furthermore, similar C statistics obtained for both the training and validation samples suggest excellent generalizability of the model.

Variable	В	S.E.	Wald	df	р	Exp(B)	95% CI
Sex	-1.38	1.94	50.46	1	<.001	.25	.1737
Trait Anxiety	.02	.01	4.48	1	.34	1.03	1.85-9.05
Risk Propensity	1.64	.24	46.25	1	<.001	5.14	2.44-5.57
School Problems	.05	.01	29.83	1	<.001	1.05	1.21-2.52
Sibling Gambling Problem	1.41	.41	12.09	1	.001	4.09	1.00-1.05
Friend Gambling Problem	1.31	.21	38.57	1	<.001	3.69	3.21-8.24
Substance Use Problem	.56	.19	8.73	1	.003	1.74	1.03-1.7
(identity not indicated)							

Table 45. Model 2: Risk Factors for At-Risk Gamblers and PPGs

*Note*: B = Parameters, Exp(B) = odds ratio. Sex coded as 2 for female and 1 for male. CI indicates confidence interval.

#### Protective Factors for Probable Pathological Gamblers

The third logistic regression was performed entering all protective factors, (FACESfamily cohesion subscale, school connectedness, perceived academic achievement, and sex) with the exception of effective coping and achievement motivation, as the covariates. Achievement motivation and effective coping were not entered because the results from the ANOVA did not reveal substantial differences between gambling groups. Gambling was entered as the dichotomous dependent variable with probable pathological gamblers (DSM-IV-MR-J scores  $\geq$  4) receiving a value of 2 and the rest of the sample a value of 1. As shown in Table 46, the variables to be retained, termed Model 3 include: sex, family cohesion, and school connectedness.

Model 3 suggested that the odds of developing a gambling problem were not substantially increased by the protective factors although the overall model was found to have good predictive ability. Accordingly, one unit increase in family cohesion decreased one's odds of developing a gambling problem by .94 (CI = .89, .98) and one unit increase in school connectedness decreased the odds by .93 (CI = .92, .96). Finally, being female decreased an individual's odds of becoming a problem gambler by .15 (CI = .08, .27). The ROC Curve was obtained for both the training and validation samples; the area under the ROC Curve was .82 (CI = .77, .86) for the training sample and .75 (CI = .67, .83) for the validation sample, indicating that compared to random classification, Model 3 increased prediction by 50% (an increase from .50 to .75) (Table 43). The similar *C* statistics for the training and validation samples suggest good generalizability of the model.

Table 46. Model 3: Protective Factors for PPGs

Variable	B	S.E.	Wald	df	p	Exp(B)	95% CI
Sex	-1.93	.31	39.52	1	<.001	.15	.0827
Family Cohesion	060	.01	25.64	1	<.001	.94	.9296
School Connectedness	069	.03	7.74	1	.005	.93	.8998

*Note*: B = Parameters, Exp(B) = odds ratio. Sex coded as 2 for female and 1 for male. CI indicates confidence interval.

# Protective Factors for At-Risk Gamblers and Probable Pathological Gamblers Combined

The fourth logistic regression analysis performed involved combining the At-Risk and PPGs as a single group for the purpose of determining whether protective factors for At-Risk gamblers were similar to those for PPGs. At-Risk gamblers and PPGs (DSM-IV-MR-J scores  $\geq$  3) were assigned a value of 2 and the rest of the sample a value of 1. The same covariate list of protective factors initially entered in Model 3 was inserted in Model 4. Results generated a good model fit at step two on the basis of three predictor variables, identified as Model 4 which includes: sex, family cohesion, and school connectedness (Table 47). According to Model 4, one

unit increase in family cohesion (OR = .96, CI = .89, .96) and school connectedness (OR = .92, CI = .94, .97) decreased the odds of being either at risk for a gambling problem or having a gambling problem by only approximately .90 times and being female decreased the odds by .24 (CI = .17, .33). The ROC Curve was obtained for both the training and validation samples and the area under the ROC Curve was .76 (CI = .73, .80) for the training sample and .72 (CI = .66, .78) for the validation sample, demonstrating that Model 4 increased prediction by 44% (increase from .50 to .72) relative to random classification and has good generalizability (Table 43).

Variable	В	S.E.	Wald	df	Р	Exp(B)	95% CI
Sex	-1.45	.17	70.32	1	<.001	.24	.8996
Family Cohesion	045	.01	32.11	1	<.001	.96	.9497
School Connectedness	079	.02	20.87	1	<.001	.92	.1733

Table 47. Model 4: Protective Factors for At-Risk Gamblers and PPGs

*Note*: B = Parameters, Exp(B) = odds ratio. Sex coded as 2 for female and 1 for male. CI indicates confidence interval.

## Risk and Protective Factors for Probable Pathological Gamblers

A final logistic regression model for predicting PPGs was performed. Accordingly, all risk and protective factors that had been retained in Models 1 (risk factors only) and 3 (protective factors only) were entered as the independent variables and probable pathological gambling was entered as the dichotomous dependent variable with probable pathological gamblers (DSM-IV-MR-J scores  $\geq$  4) receiving a value of 2 and the rest of the sample a value of 1. More specifically, the risk factors (sex, trait anxiety *T*-score, risk propensity, school problems *T*-score, sibling gambling problem, and friend gambling problem) were entered in block one and the covariate protective factors (family cohesion, and school connectedness) were entered in block two. Backward LR was used to enter both blocks. Thus, the most predictive risk factor model was obtained prior to entering the protective factors. Once established, all protective factors were entered in the final risk model and only those protective factors which maximized the model's predictive power were retained.

In Table 48, the variables retained, termed Model 5, are sex, trait anxiety, risk propensity, school problems, sibling gambling problem, friend gambling problem, and family cohesion. More specifically, the odds of being a probable pathological gambler were approximately 3.2 times greater (CI = 1.81, 5.53) for those who perceived a friend as having a gambling problem and 2.7 times greater (CI = 1.11, 6.47) if one perceived their sibling as having a gambling problem. Risk propensity increased one's odds of being an At-Risk gambler and PPG (OR = 2.64, CI = 1.60, 4.37) whereas trait anxiety which was found to have only an indirect effect, did not substantially increase the likelihood of developing a gambling problem (OR = .99, CI = .99, 1.06). It nonetheless was retained because it added to the model's overall predictive ability. Similarly, school problems only increased the odds that one will be at risk or have a gambling problem by 1.0 (CI = 1.02, 1.07) while being male increased one's odds by .84. The only protective factor retained in the model was family connectedness which was not found to substantially decrease the odds of problem gambling (OR = .96, CI = .94, 99).

The ROC Curve was obtained for both the training and validation samples and the area under the ROC Curve was found to be .90 (CI = .87, .93) for the training sample and .88 (CI =

Variable	В	S.E.	Wald	df	р	Exp(B)	95% CI
Sex	-1.85	.34	30.46	1	<.001	.16	.0830
Trait Anxiety	.024	.017	1.86	1	.17	1.024	.99-1.06
Risk Propensity	.97	.26	14.42	1	<.001	2.64	1.60-4.35
School Problems	.043	.013	10.27	1	.001	1.046	1.02-1.07
Sibling Gambling Problem	.99	.450	4.84	1	.028	2.69	1.11-6.49
Friend Gambling Problem	1.15	.285	16.30	1	.000	3.15	1.80-5.49
Family Cohesion	038	.013	7.87	1	.005	.96	.9499

Table 48. Model 5: Risk and Protective Factors for PPGs

*Note*: B = Parameters, Exp(B) = odds ratio. Sex coded as 2 for female and 1 for male. CI indicates confidence interval.



Figure 6. ROC Curve: Risk and protective factor model for PPGs on validation sample.

.82, .93) for the validation sample (Table 48), demonstrating excellent prediction (76% greater than random assignment) and sound model generalizability (see Figure 6 for the validation sample ROC Curve).

In order to examine in greater detail how well Model 5 discriminated between the specified group (PPGs) and the unspecified group (all other DSM-IV-MR-J categories), the probabilities for each individual passed through Model 5 were obtained and ranked into deciles, assigning the lowest probabilities to the first decile. This permitted the calculation of the *lift* and *capture rate* for PPGs (Table 49) and non-PPGs (Table 50) in each decile. The lift represents the ratio of the model's ability to discriminate between the specified and unspecified groups compared to the obtained prevalence rate for the total sample. For example, as seen in Table 49, the 9th decile has the lift of approximately 2. Therefore, when applying this model to a group of students, it can be expected that individuals falling in the 9th decile are 2 times more likely to be a probable pathological gambler than the prevalence rate for the total sample (5.1%), whereas those falling in the 10th decile are almost 6 times more likely to be a possible pathological gambler. The *capture rate* is the percentage of the specified group that is correctly identified by this model in each decile. Table 49 illustrates that if a group of 100 students or more (e.g., in a

Decile	Decile Total	Non-PPG (Unspecified Group)	Probable Pathological Gamblers <sup>1</sup> (Specified Group)						
	n	n	n % The Lift Capture Ra						
1	209	209	0	0.00	0.00	0.00			
2	210	209	1	0.50	0.10	0.93			
3	210	210	0	0.00	0.00	0.00			
4	210	210	0	0.00	0.00	0.00			
5	209	207	2	1.00	0.20	1.87			
6	210	208	2	1.00	0.20	1.87			
7	210	201	9	4.30	0.84	8.41			
8	210	200	10	4.80	0.94	9.35			
9	210	188	22	10.50	2.06	20.56			
10	209	148	61	29.20	5.73	57.01			
Totals	2097	1990	107	5.10	1.00	100.00			

Table 49. Model 5: The Lift and Capture Rate

*Note*: The *Lift* indicates the ratio of the model's ability to discriminate between specified and unspecified groups compared to the sample prevalence rate. *Capture rate* indicates the percentage of PPGs correctly identified in each decile from the total number of PPGs in the sample.

<sup>1</sup>DSM-IV-MR-J score ( $\geq$  4).

school population) were to complete a questionnaire constituting the variables in Model 5, approximately 21% of all PPGs in the school population within the 9th decile and 57% within the 10<sup>th</sup> decile would be correctly identified. [A minimum number of 100 students are required to obtain the lift and capture rates stated above, based upon the *Law of Sampling Size* (Jang, Cox, Edson, & Satake, (2001)]. Thus, the accumulative capture rate for the top 20% of students (based on their odds ratio) in the sample population (9th and 10th deciles) was 72% compared to the combined prevalence rate of PPGs in the 9th and 10th deciles in a random population sample of youth (19.97%).

The lift and capture rates were also calculated for the non-problem gambler group. As seen in Table 50, the lift and capture rate was similar for deciles 1 to 7 and dropped off just slightly for the 9th and 10th deciles. In general, it can be expected that individuals falling in any of the 10 deciles have a similar non-probable pathological gambling probabilities as the prevalence rate for the total sample (94.9%). The capture rate for the top two deciles (9th and 10th), illustrated that, if a group of students (e.g., in a school population) were to complete a questionnaire constituting the variables depicted in Model 5, approximately 9.5% of all non-PPGs in the school population would be correctly identified in the 9th decile and 7.4% in the 10th decile. Thus, the accumulative capture rate for the top 20% students in the sample

Decile	Decile Total	PPGs <sup>1</sup>	Non-Probable Pathological Gamblers							
	n	n	n	%	The Lift	Capture Rate (%)				
1	209	0	209	100.00	1.05	10.50				
2	210	1	209	99.52	1.05	10.50				
3	210	0	210	100.00	1.05	10.55				
4	210	0	210	100.00	1.05	10.55				
5	209	2	207	99.04	1.04	10.40				
6	210	2	208	99.05	1.04	10.45				
7	210	9	201	95.71	1.01	10.10				
8	210	10	200	95.24	1.00	10.05				
9	210	22	188	89.52	0.94	9.45				
10	209	61	148	70.81	0.75	7.44				
Totals	2097	107	1990	94.90	1.00	100.00				

Table 50. Model 5: The Lift and Capture Rate for Non-PPGs

*Note*: The *Lift* indicates the ratio of the model's ability to discriminate between specified and unspecified groups compared to random assignment. *Capture rate* indicates the percentage of Non-PPGs correctly identified in each decile from the total number of Non-PPGs in the sample. <sup>1</sup>DSM-IV-MR-J score ( $\geq 4$ ).

population (9th and 10th deciles) was 16.89%, compared to the combined prevalence rate of non-PPGs in the 9th and 10th deciles in a random population sample of youth (19.98%). In summary, it can be expected that taking the top 20% highest students (based on a ranking of student's probabilities) of those passed through Model 5 would result in the retention of 72% of all PPGs in the total sample and approximately 17% of all non-PPGs in the total sample. *Risk and Protective Factors for At-Risk and Probable Pathological Gamblers Combined* 

A final logistic regression for predicting both at-risk and probable pathological gambling was performed. Accordingly, all risk and protective factors retained in Models 2 (risk factors only) and 4 (protective factors only) were entered as the independent variables and probable pathological gambling was entered as the dichotomous dependent variable with At-Risk gamblers and PPGs (DSM-IV-MR-J scores  $\geq$  3) receiving a value of 2 and the rest of the sample a value of 1. More specifically, the risk factors (sex, trait anxiety *T*-score, risk propensity, school problems *T*-score, sibling gambling problem, friend gambling problem, and other person with a substance use problem) were entered in block one and protective factors (family cohesion, and school connectedness) were entered in block two. Backward LR was used to enter both blocks. The most predictive risk factor model was obtained prior to entering the protective factors. Once established, all protective factors were entered in the final risk model and only those protective factors which maximized the model's predictive power were retained.

As identified in Table 51, the variables to be retained, termed Model 6, were sex, trait anxiety, risk propensity, school problems, sibling gambling problem, friend gambling problem, other substance use problem, family cohesion, and school connectedness. Trait anxiety did not substantially increase one's odds of becoming an At-Risk gambler or PPG (OR = 1.01, CI = .99, 1.04) (trait anxiety was only an indirect affect because of its non-significant *F*-ratio) and neither did school problems (OR = 1.04, CI = 1.02, 1.06). Similarly, if the participant reported knowing someone with a substance use problem (identity unspecified) his or her odds of becoming an At-Risk gambler or PPG was only increased by 1.4 times (CI = 1.21, 2.54). However, if someone had a sibling who gambles, his or her odds of becoming At-Risk gambler or PPG increased by approximately 4 times (OR = 3.96, CI = 1.77, 8.85) and individuals reporting having friends who gamble had similar increases in odds (OR = 3.78, CI = 2.49, 5.73). The most substantial impact on one's odds of becoming At-Risk gambler or PPG is risk propensity (OR = 4.8, CI = 2.97,7.76). Finally, being male only increased one's odds of becoming an At-Risk gambler or PPG by .74 times. The protective factors that entered did not have substantial Ors; increased family cohesion (OR = .98, CI = .96, 1.0) and school connectedness (OR = .96, CI = .92, 1.01) were not found change the odds of becoming an At-Risk gambler or PPG. School connectedness had an indirect effect in Model 6 (an insignificant *p*-value based on the *F*-ratio), but did not enter at all in Model 5. Thus, school connectedness appears to be a more substantial protective factor

Variable	В	S.E.	Wald	df	р	Exp(B)	95% CI
Sex	-1.35	.20	48.11	1	<.001	.26	.1838
Trait Anxiety	.01	.01	.98	1	.322	1.01	.99-1.04
Risk Propensity	1.57	.25	40.98	1	< .001	4.80	2.97-7.76
School Problems	.04	.01	14.51	1	< .001	1.04	1.02-1.06
Sibling Gambling Problem	1.38	.41	11.27	1	.001	3.96	1.77-8.85
Friend Gambling Problem	1.33	.21	39.13	1	<.001	3.78	2.49-5.73
Substance Use Problem	.56	.19	8.73	1	.003	1.75	1.21-2.54
(identity not indicated)							
Family Cohesion	02	.01	4.42	1	.036	.98	.96-1.00
School Connectedness	04	.02	3.08	1	.079	.96	.92-1.00

Table 51. Model 6: Risk and Protective Factors for At-Risk Gamblers and PPGs

*Note*: B = Parameters, Exp(B) = odds ratio. Sex coded as 2 for female and 1 for male. CI indicates confidence interval.

when predicting the outcome of being an At-Risk or PPG than predicting PPGs alone (however, the increased effect may also be due to the increased number of cases in the predicted group).

The ROC Curve obtained for both the training and validation samples indicated that the area under the ROC Curve was .858 (CI = .83, .89) for the training sample and .835 (CI = .79, .88) for the validation sample (Table 43), demonstrating a 67% increase in prediction from random assignment (from .50 to .835) and reliable generalizability of the model (see Figure 7 for the validation sample ROC Curve).

In order to examine in greater detail how well Model 6 discriminated between the specified group (At-Risk and PPGs) and the unspecified group (Non-gamblers and Social gamblers), the probabilities for each individual passed through Model 6 were obtained and ranked into deciles, assigning the lowest probabilities to the first decile. Table 52 illustrates that the 9th decile has the lift of approximately 2. Therefore, when applying this model to a group of students, it can be expected that individuals falling in the 9th decile were 2 times more likely than the prevalence rate for the total sample (13.2%) to be a possible pathological gambler



Figure 7. ROC Curve: Risk and protective factor model for At-Risk gamblers and PPGs on validation sample.

whereas those scoring in the 10th decile are 4.4 times more likely to be an At-Risk gambler or PPGs. The capture rate for Model 6 is the percentage of the number of At-Risk gamblers or PPGs that are correctly identified by this model in each decile. Table 52 illustrates that if a group of students (e.g., in a school population) were to complete a questionnaire constituting the variables in Model 6, approximately 22% of all At-Risk gamblers and PPGs in the school population within the 9th decile and approximately 43% within the 10th decile would be correctly identified. Thus, the accumulative capture rate for the top two deciles is excellent (65%) compared to the prevalence of At-Risk gamblers and PPGs in the 9th and 10th deciles that would be obtained in a random sample of youth (24.38%).

The lift and capture rates were also calculated for the Non-gambler and Social gambler group. As seen in Table 53, the lift slowly decreased from deciles 1 through 10. Individuals falling in the 9th decile were approximately .82 times more likely to be a Non-gambler or Social gambler than prevalence for the total sample (86.8%) while those falling in the 10th decile were approximately .50 times more likely. The capture rate for the top two deciles (9th and 10th) implies that if a group of students (e.g., in a school population) were to complete a questionnaire constituting the variables in Model 6, approximately 8.2% of all Non- and Social gamblers in the school population would be correctly identified in the 9th decile and 5.0% in the 10th decile. Thus, the accumulative capture rate for the top 20% highest scores in the sample population (9th and 10th deciles) is 13.2% compared to the prevalence rate of Non- and Social gamblers in the

Decile	Decile Total	Non- and Social gamblers (Unspecified Group)	At-Risk gamblers and PPG <sup>1</sup> (Specified Group)					
	N	n	n	%	The Lift	Capture Rate (%)		
1	209	207	2	0.96	0.07	0.72		
2	210	207	3	1.43	0.11	1.08		
3	210	207	3	1.43	0.11	1.08		
4	210	202	8	3.81	0.29	2.89		
5	209	198	11	5.26	0.40	3.97		
6	210	194	16	7.62	0.58	5.78		
7	210	190	20	9.52	0.72	7.22		
8	210	175	35	16.67	1.26	12.64		
9	210	150	60	28.57	2.16	21.66		
10	209	90	119	56.94	4.31	42.96		
Totals	2097	1820	277	13.21	1.00	100.00		

Table 52. Model 6: The Lift and Capture Rate for At-Risk Gamblers and PPGs

Note: The Lift indicates the ratio of the model's ability to discriminate between specified and unspecified groups compared to the average predictive ability. Capture rate indicates the percentage of At-Risk gamblers and PPGs correctly identified in each decile from the total number of At-Risk and PPGs in the sample.

<sup>1</sup>DSM-IV-MR-J score (> 3).

Table 53. Model 6: The Lift and Capture Rate for Non-gamblers and Social Gamblers

Decile	Decile Total	At-Risk gamblers and PPGs <sup>1</sup>	Non Gamblers and Social Gamblers						
	N	n	n	%	The Lift	Capture Rate (%)			
1	209	2	207	99.04	1.14	11.37			
2	210	3	207	98.57	1.14	11.37			
3	210	3	207	98.57	1.14	11.37			
4	210	8	202	96.19	1.11	11.10			
5	209	11	198	94.74	1.09	10.88			
6	210	16	194	92.38	1.06	10.66			
7	210	20	190	90.48	1.04	10.44			
8	210	35	175	83.33	0.96	9.62			
9	210	60	150	71.43	0.82	8.24			
10	209	119	90	43.06	0.50	4.95			
Totals	2097	277	1820	86.79	1.00	100.00			

Note: The Lift indicates the ratio of the model's ability to discriminate between specified and unspecified groups compared to random assignment. Capture rate indicates the percentage of Non- and Social gamblers correctly identified in each decile from the total number of Non- and Social gamblers in the sample.

<sup>1</sup>DSM-IV-MR-J score ( $\geq$  3).
9th and 10th deciles in a random population sample (19.98%). Taking the top 20% highest students (based on their probabilities) of those passed through Model 6 would result in the retention of 65% of all At-Risk and PPGs and 13.2% of all Non- and Social gamblers in the total sample.

# Summary of Logistical Regression Results

Although family cohesion had a direct role in the identification of at-risk and probable pathological gambling and school connectedness had an indirect role in identifying at-risk gambling, the presence of these protective factors did not mediate the predictability of identifying which youth may be at risk for gambling problems or youth who are currently experiencing serious problem gambling (e.g., comparing Model 4 to Model 6). Perhaps the absence of risk more than the presence or absence of protective factors drives the probability of developing problem gambling. This result may be partially due to risk factors being so strong that the effects of protective factors become more difficult to see when examined with a cluster of risk factors, as suggested by the development of protective factor models (Models 3 and 4) that were able to identify at-risk gamblers and PPGs with good proficiency. Ultimately, protective factors need to be examined over-time to test their impact on the development of problem gambling. Accounting for protective factors in the study of the youth problem gambling has advanced our understanding the development of the disorder and increases our awareness of what may constitute effective prevention and intervention initiatives.

#### **CHAPTER V**

#### Discussion

The present study examined the relationship between several risk and protective variables associated with problem gambling, substance abuse, and other multiple risk-taking activities. Specifically, the relations among variables within the biological, social, perceived environment, personality, and behavioural domains of Jessor's *Adolescent Risk Behaviour Model* (1998) were investigated. The selection of these variables was predicated upon our current state of knowledge of youth gambling problems and those factors influencing other health-compromising behaviours (e.g., tobacco use, failing to use a seat-belt, risky driving behaviour, drug and alcohol use). Finally, the impact of possible protective factors on a set of pre-identified risk factors for youth problem gambling was explored.

## Health-Compromising Behaviours

### Problem Gambling Amongst Youth

Gambling behaviour may best be conceptualized on a continuum ranging from social and recreational gambling, to problem gambling (at risk gambling), and to pathological gambling (NRC, 1999). While most adults and youth gamble in a responsible, controlled manner and few exhibit serious gambling-related problems, an identifiable number of individuals experience serious problems. Pathological gambling is characterized by a continuous or periodic loss of control over gambling, a preoccupation with gambling and obtaining money to support one's gambling activities, irrational thinking, and a continuation of the behaviour despite adverse consequences (APA, 1994). Adolescents who are engaging in excessive gambling and are experiencing serious gambling-related problems are often referred to as *probable pathological gamblers* since adolescent gambling screens do not qualify as diagnostic tools for pathological gambling (Derevensky, Gupta, & Winters, 2003).

With respect to problem gambling, the majority of youth in this study were found to be either Non-gamblers (37.9%) or Social gamblers (49.3%), while 7.8% of youth were classified as At-Risk gamblers and 5.0% were identified as Probable Pathological gamblers. These findings are consistent with previous research (Adalf & Ialomiteau, 2000; Derevensky & Gupta, 2000a; Hardoon et al., 2002; NRC, 1999; Shaffer & Hall, 1996; Shaffer & Korn, 2002; Ste-Marie et al., 2001) but are in contrast to other recent surveys conducted in Ontario that found slightly lower prevalence rates for probable pathological gambling (2.8%) using the same gambling screen (DSM-IV-MR-J) (Derevensky & Gupta, 2001; Gupta & Derevensky, 2001). Perhaps these differences may be attributed to regional divergence, school, or sampling bias. Nonetheless, an important number of adolescents under the age of 19 are gambling and experiencing serious gambling-related problems, which is concerning, given the poor outcomes for individuals (both youth and adults) and the high social and psychological costs associated with severe gambling problems.

Not surprisingly, males were found to have more gambling-associated problems than females (e.g., more males were found to be At-Risk gamblers and Probable Pathological gamblers). Problem gambling was found to increase with age (grade level), with students in grade 11 having the highest rates of at-risk and probable pathological gambling. However, the lower rates of probable pathological gambling in grade 13 are in contrast to those found in other recent studies (e.g., Hardoon et al., 2002). It is uncertain whether this may be the result of a cohort effect or sampling differences. Furthermore, it is not possible to conclude whether gambling merely increases as a function of age, as a function of increased exposure to gambling (e.g., opportunities to gamble), or whether the trends in this sample reflect the transient increases in adolescent experimentation similar to the developmental trajectory of most adolescent problem behaviours including delinquency (Moffitt, 1993), alcohol problems (Zucker, Ellis, & Fitzgerald, 1994; Zucker, Fitzgerald, & Moses, 1995), substance use (Baer et al., 1998), and multiple problem behaviours (Loeber et al., 1998; Romer, 2003). Despite these unknowns which would be better clarified with longitudinal research, gambling and problem gambling among youth represent a serious public policy concern.

#### Drug and Alcohol Use

The finding that 19.2% of youth are involved in using chemicals (i.e., drugs and alcohol) to a problematic degree is consistent with similar findings reported in the literature and is disconcerting. Past research suggests that approximately 6 to 10% percent of adolescents meet the criteria for drug dependency (Wheeler & Malmquist, 1987) and between 9 and 28% of youth have problems with alcohol (NRC, 1999). Not surprisingly, a significant number of older adolescents were classified in the high-risk category (substance use) compared to younger youth. No sex differences were found, with similar numbers of males and females found to be at-risk for substance abuse.

Risk for chemical dependency was found to increase with gambling severity, such that a greater percentage of probable pathological gamblers were also in the high-risk category on the PESQ-Problem Severity scale. Probable pathological gamblers had the highest mean scores indicating greater problematic involvement with all forms of substances. The finding that youth with serious gambling problems appeared to have more substance abuse problems replicates previous findings where 50% of probable pathological gamblers were also high substance users (Hardoon et al., 2002). These findings also confirm past research linking problem gambling to alcohol, tobacco, and illicit drug use (Griffiths & Sutherland, 1998; Potenza, Steinberg, McLaughlin, Wu, Rounsaville, & O'Malley, 2000).

### Involvement in Multiple Risk Activities

Although rates of involvement in a multiple risk activities (e.g., cocaine use, shoplifting) during the past 12 months were relatively low for the total sample, risk-taking across a variety of activities increased with gambling severity, such that a greater percentage of PPGs more frequently reported higher rates of involvement in multiple risk-taking behaviours then their peers. Further, PPGs had the highest mean scores on the RIPS-Involvement scale, indicating elevated involvement in a broad spectrum of risk-taking activities compared with their peers. Similar to gambling severity, 84.9% of youth identified as at-risk for substance abuse were also in the high multiple risky behaviour group, compared to only 17.6% of those in the non-risk youth. The finding that Non-gamblers and youth not at-risk for substance abuse have similar mean scores on the RIPS-Involvement scale, and the positive association found between multiple risk involvement and gambling severity, suggests that a certain identifiable group of youth become increasingly involved in a host of risk-taking activities concurrently. Unfortunately, the RIPS-involvement scale only permits a measure of involvement and does not provide an indication of problem severity in relation to involvement, making it impossible to assess the extent of potential health-compromising outcomes related to general risk-taking.

## Shared and Unique Factors Associated with Health-Compromising Behaviour

Given the current theoretical and empirical trend moving toward an integrated conceptualization of adolescent high-risk behaviour and the recent move in the mental and public health fields toward integrating policies and prevention initiatives for multiple risk behaviour rather than treating each problem behaviour individually (for a comprehensive review see Romer, 2003), youth in this study were examined to see how many health-compromising behaviours they were involved in. This study found that almost half of those youth identified as probable pathological gamblers are also identified as at-risk for a substance abuse problem (confirming the results of a previous study by Hardoon et al., 2002) and over three quarters of PPGs also reported high involvement for multiple risk activities. Such findings support the current theoretical and empirical trend of moving toward an integrated conceptualization of adolescent high-risk behaviour for both prevention and treatment. Findings from this study can be interpreted within the domains of Jessor's *Adolescent Risk Behaviour Model* (1998); biological, social, perceived environment, personality, and behavioural.

#### **Biological Domain**

This study confirmed past research pointing to the increased risk of males being more likely to develop gambling problems. No sex differences emerged in regard to substance abuse, although males were found to be at greater risk for involvement in multiple risk activities. Similarly, as age increased, so too did prevalence rates across all health-compromising outcomes.

# Social Domain

The importance of the social environment on severity of problem behaviours was clearly established. Having a parent, sibling, relative, friend, or significant person with either a gambling problem or substance use problem were risk correlates for all health-compromising outcomes.

Probable pathological gamblers reported knowing a number of individuals with substance-use problems. A positive association was observed suggesting that having or knowing peers with substance use problems is a risk correlate of youth problem gambling. This is consistent with Gupta and Derevensky's (2000) contention that PPGs in treatment appear to have replaced old *good friends* with gambling associates and Wynne et al.'s (1996) assertions that these youth tend to run in similar "packs." Peer associations appeared to be the most substantial risk correlates of increasing multiple risk-taking. Youth identified as being most involved in risk activities reported more friends (23.2%) and classmates (9.5%) with gambling problems than other youth (9.8% and 4.9%, respectfully). Although familial gambling problems were not found to be a notable risk correlate, familial substance use problems were, with highly involved youth reporting more paternal and sibling substance use problems than other youth.

#### Perceived Environment Domain

Family cohesion differed significantly between gambling severity groups, substance use problem groups, and multiple risk activity groups, while school connectedness differed between gambling severity- and substance use problem groups. Non-risk groups for each healthcompromising outcome reported significantly greater levels of these factors. School connectedness varied between multiple risk involvement groups such that youth identified as moderately involved in multiple risk activities had a greater school connectedness mean score than the low- and high-involvement groups. This finding is not surprising given that a number of items on the RIPS involved school-related risk activities (e.g., contact sports). Furthermore, it can be expected that within the group of low risk-takers, there are youth who are socially isolated, accounting for decreased feelings of school connectedness.

Whereas family cohesion was found to have a direct role in the prediction of problem gambling (although it did not moderate the probabilities of developing a gambling problem), school connectedness had only an indirect function in the identification of the combined group of at-risk and probable pathological gamblers, suggesting that family connectedness may be a more important protective factor in the development of problem gambling. From a developmental perspective, obtaining a sense of self-worth and value within the family precedes, and likely facilitates the development of self-worth in relation to school and other community groups. This points to the need for prevention initiatives within the family sphere and suggests the importance of designing school-based prevention programs that seek to develop student's attachment, trust, and identification with larger groups (e.g., school clubs and sports teams, Scouts or Guides).

Mentorship, the third variable in youths' perceived environment domain that was examined for its protective function was not found to be a protective correlate for youth problem gambling, substance abuse, and involvement in multiple risk activities. However, only a small number of items were used to tap this factor and therefore its measurement may not have been sufficiently weighted to adequately assess this variable.

#### Personality Domain

Although a number of personality risk factors that predispose youth substance abuse and other high-risk behaviours have been delineated in past studies, fewer studies have examined personality factors that potentially decrease an individual's chances of developing healthcompromising outcomes. This study failed to reveal whether achievement motivation is associated with any of the three health-compromising outcomes, but it did confirm the significant risk correlate of anxiety and risk propensity for all high-risk behaviours.

Individuals identified as at-risk for substance abuse were more likely to report levels of trait anxiety falling in the top quartile of the total sample compared to non-risk youth (34.3% vs. 20.5%). Similarly, highly involved youth (33.3%) more frequently reported high levels of trait anxiety compared to youth who reported moderate- and low-involvement in multiple risk activities (23.1% and 15.9% respectively). Both At-Risk (37.6%) and PPGs (39.8%) more frequently reported high anxiety levels (relative to the total sample), than Social gamblers (24.0%) and Non-gamblers (19.3%) and trait anxiety increased the probability of At-Risk and probable pathological gambling among youth.

Youth who reported high risk propensity, indicative of high perceived benefits in risk taking and low perceptions of costs, appeared to be at an increased risk for the development of gambling and substance use problems and were more likely to have increased involvement in multiple risk activities compared to the norm. Accordingly, a significantly greater percentage of At-Risk gamblers (50.6%) and PPGs (56.5%) reported elevated levels of risk propensity, in contrast to 25.8% of Social gamblers and 14.6% of Non-gamblers. Similarly, almost half (47.1%) of all youth found to be at-risk for substance abuse indicated elevated risk propensity in contrast to 16.8% of non-risk youth, and substantially more youth with high involvement in multiple risk activities reported elevated risk propensity compared to youth in the moderate- and low involvement groups (47.2%, 18.7%, and 9.1% respectively). Thus, youth who exhibit high risk propensity appear to be at greater risk for multiple health-risk behaviour outcomes. *Behavioural Domain* 

This study examined a number of factors in the behavioural domain including protective correlates (e.g., effective coping and involvement in conventional activities) and risk correlates (e.g., ineffective coping, school difficulties, and low self-perceived academic achievement). Youth involvement in conventional activities was not found to be associated to any of the health-compromising outcomes. This result, however, may be due to its poor measurement, which did not permit an evaluation of frequency or extent of involvement.

Effective coping skills were not found to differ among severity groups regarding each health-compromising behavioural outcome. This is consistent with the fact that although use of positive coping skills (e.g., problem-focused coping) has been linked to lower levels of

psychological symptoms, few, if any, studies have found similar coping strategies to be predictive of decreased externalizing problem behaviours, such as those examined in this study. However, ineffective coping styles (e.g., avoidant strategies) have been found to be related to higher levels of externalizing disorders, which is confirmed by the findings in this study. Although ineffective coping did not load significantly into any predictive models, participants' use of ineffective coping increased as a function of gambling severity with significantly more PPGs (50.9%) and At-Risk gamblers (45.3%) indicating the greatest use of ineffective coping strategies compared to Social gamblers (27.0%) and Non-gamblers (18.4%). Similar trends were found for substance abuse and involvement in multiple risk activities, suggesting that ineffective coping strategies may function similarly as a risk factor for multiple health-compromising outcomes.

Youth experiencing significant school problems were found to be at increased risk for problem gambling and substance use, as well as for increased involvement in multiple risk activities. A large percentage of probable pathological gamblers (43.5%) met the criteria for significant school problems on the MMPI-A, with a smaller but significant proportion of At-Risk gamblers (23.5%) meeting this criteria. As well, there was a positive association between mean school problem scores and gambling, with PPGs and At-Risk gamblers mean scores being significantly greater than Non- and Social gamblers. These youth are more likely to have negative attitudes toward academic achievement, poor school performance, and behavioural and academic deficits. Not surprising then was the finding that self-reported below-average grades was a significant risk-correlate of increased gambling and substance use severity, and increased involvement in multiple risk activities. These results also support previous research that school problems are predictive of an individual being a probable pathological gambler (Hardoon et al., 2002).

## Implications of the General Conceptual Model

The current study has tapped into several of the variables in *The General Conceptual Model for High-Risk Behaviours*. This model was used to facilitate a comparative analysis of risk and protective variables across multiple high-risk behaviours and it set the foundation for the study's final goal, the examination of the predictive function of protective correlates for youth problem gambling. The role of family cohesion and school connectedness in predicting the development of youth problem gambling suggests that they could likely be incorporated into *The*  *General Conceptual Model for High-Risk Behaviours*, although their effects need to be examined longitudinally before doing so. The strong similarities in risk and protective correlates associated with multiple health-compromising behaviours attests to the theoretical rationale for designing prevention initiatives that are directed at risk and protective factors rather than at categorical problem behaviours.

# Implications for Prevention and Awareness Programming

By modifying the combinations of risk and protective factors that predict multiple problem behaviours, prevention initiatives are likely to have a greater impact on youth's longterm development than focusing on only those factors that predict a single negative behavioural outcome. The substantial inter-correlations among high-risk behaviours also speaks to the need for integrating prevention strategies for multiple problem behaviours. For example, to address the finding that youth with serious gambling problems appeared to have more substance abuse problems, prevention programs could employ harm reduction strategies that encourage students to avoid gambling when drinking, due to the loss of inhibitions increasing the likelihood of increased gambling and amounts wagered. Despite increased evidence for moving youth problem gambling into a broader high-risk behaviour prevention framework, the pros and cons for doing so need to carefully considered.

*Combining theoretical orientations.* One disadvantage to designing prevention programs that target multiple high-risk behaviours is the complexity of merging the two distinct and seemingly opposing theoretical orientations of the abstinence and harm reduction models, and the subsequent challenge of communicating clear messages to youth. It has been recently argued that the abstinence orientation is most effectively endorsed for activities that cannot be entered into without facing negative consequences to self or others (e.g., Berridge, 1999; Single, 2000), while harm reduction programs, which seek to help individuals without requiring abstinence from an activity that may result in short-term or long-term harm, are useful in targeting high-risk activities that are socially acceptable and which fall on a continuum of harm (e.g., alcohol consumption, sexual activity, substance use and gambling) (Dickson, Derevensky, & Gupta, 2004; Erickson, 1999; Marlatt, 1996).

Whether prevention programs are designed specifically for problem gambling or incorporated into a general mental health curriculum targeting multiple high-risk behaviours, the need for merging abstinence and harm reduction prevention approaches is exemplified by the apparent contradiction that arises when the principles of the harm reduction paradigm are applied to adolescents. Research clearly highlights that age of onset of gambling behaviour represents a significant risk factor, with the younger the age of initiation being correlated with the development of future gambling related problems (Dickson et al., 2002; Gupta & Derevensky, 1998a; Jacobs, 2000; National Research Council, 1999; Wynne, Smith, & Jacobs, 1996). This finding strongly suggest that delaying age of onset of gambling experiences would be fundamental in a successful prevention paradigm, which fits better under the umbrella of abstinence, and does not adhere to the principles of the harm reduction approach. Furthermore, prevention experts cannot advocate for a value-neutral stance (e.g., accepting the adolescent's decision to engage in gambling) toward involvement in risky activities while conveying the expectation that youth are required to adhere to legal prohibitions. Thus, students need to hear the message that legal age limits for gambling (as well as for alcohol) are in place for the purpose of allowing time for preparing youth to approach such activities with responsible values, attitudes, knowledge and behaviours. Legal age limits convey the risky nature of activities and limit particular contexts and forms of gambling that often involve numerous high-risk activities. For example, the casino environment generally exposes youth to smoking, alcohol consumption, and the potential of propagating fantasy images of high-rollers and instant money. Thus, differences between unstructured (e.g., betting between friends) and formal/structured gambling (e.g., betting on table games and slot machines) need to be openly discussed.

*Gating strategies.* The design and implementation of prevention programs that target common risk and protective factors associated with multiple problem behaviours faces the challenge of establishing effective multiple gating strategies (Dishion, Andrews, Kavanagh, & Soberman, 1996) to ensure adolescents receive prevention services matched to their level of risk. Gating strategies require careful screening and assessing of multiple problem behaviours. For example, screening all students in a school could lead to the identification of high-risk adolescents who require more intensive assessments and intervention (often called secondary intervention) than their peers. Primary or universal programs are likely sufficient for low- or moderate-risk youth, but such programs are likely to be insufficient for youth who have several risk factors and are engaged in several potential problem behaviours. Alternatively, the strategies found to be effective for high-risk students may actually have harmful consequences for low-risk youth.

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The degree to which a person is already involved in problem behaviour appears to be relevant to the impact of prevention strategies (Kelly, Swaim, & Wayman, 1996; Siegel & Biener, 2000). Assuming that youth identified as at-risk for gambling problems would be best gated into secondary prevention programs for high-risk youth, the delineation of risk and protective factors for At-Risk gamblers versus PPGs may be useful in the development of appropriate prevention strategies. Results from frequency analyses, analyses of variance, and logistical regression, suggest that although At-Risk gamblers and PPGs appear quite similar in their risk and protective factor profile, a number of unique differences exist between them. Although both At-Risk gamblers and PPGs reported similar perceived substance use problems among relatives and peers, knowing someone with a substance use problem had a role in predicting the combined group of At-Risk gamblers and PPGs, but not PPGs alone, suggesting that this variable may play a larger role in the movement from social gambling to at-risk gambling than increasing the probabilities of at-risk gambling escalating to probable pathological gambling. An important aspect of prevention programming for this group may therefore be the development of positive peer associations and the development of coping strategies for peer substance use.

Risk propensity was a common risk factor for At-Risk gamblers and PPGs, although it was a stronger predictor of at-risk gambling than of probable pathological gambling. At-Risk gamblers and PPGs appeared to have similar family cohesion and school connectedness. However, findings suggest that family cohesion may play a more significant role in the development of probable pathological gambling than school connectedness. Most significantly, At-Risk gamblers and PPGs were found to differ in their experience of school difficulties such that a large percentage of probable pathological gamblers (43.5%) met the criteria for significant school problems on the MMPI-A, with a smaller but significant proportion of At-Risk gamblers (23.5%) meeting this criteria as well. Only the PPG mean school problems score (M = 60.29) fell within the moderately elevated school problems category, while the means of the other groups fell within the normal range. At-Risk gamblers also appeared to differ from PPGs in regard to self-perceived academic achievement given that PPGs were more likely to report low self-perceived academic achievement than At-Risk gamblers (23.1% vs. 14.7%). It will therefore be important to bear in mind that youth who are at-risk for gambling may not necessarily appear to

be experiencing school problems more than their peers but their gating into targeted secondary programs is nonetheless vital.

*Program evaluation.* Due in part to the categorical nature of funding, programs often assess quite narrow outcomes (e.g., only substance abuse, psychological symptoms, school truancy) (Greenberg, Domitrovich, & Bumbarger, 1999). As programs aim to modify common risk factors for multiple problem behaviours and to promote competence, measures of multiple dimensions of outcome are necessary. The increased emphasis on implementing multi-year programs which are more likely to foster enduring change necessitate extensive follow-up evaluations in addition to more traditional pretest-posttest outcome indices of program effectiveness. There is no single program component that can prevent multiple high-risk behaviours. It is therefore important to continue making efforts to reduce youths' accessibility to gambling venues, early gambling experiences, school difficulties, and other risk factors related to youth problem gambling through interventions directed at the community level (e.g., reformed social policies, multi-media campaigns), school level (prevention programming), as well as at the family and individual levels. The evaluation of comprehensive prevention initiatives will likely require considerable time and financial investment.

*"Teaching" versus "instilling" responsible values.* It can be argued that prevention strategies which aim to target risk factors include teaching functional information (e.g., substance-specific information), examining perceptions of risk and harmfulness, investigating short-term social consequences, and correcting misperceptions, while resilience-focussed prevention strategies include instilling values, and building personal and social competence, as well as other developmental stage-related tasks. One issue that surfaces when teaching youth responsible gambling behaviour remains—how to address youth who do not have responsible gambling as a goal and are not motivated to behave responsibly. In this study, risk propensity (low perceived risks and high perceived benefits of participating in high-risk activities) was one of the strongest variables to increase an individual's probabilities of developing at-risk or probable pathological gambling.

Perceived benefits of risk-taking have been found to be more important than the costs that may be incurred by unsafe sex (Parsons et al., 2000) and substance use and dangerous driving (Benthin, Slovac, & Severson, 1993; Parsons et al., 1997; Moore & Gullone, 1996). These findings raise a critical question for prevention experts. How can youth be encouraged to value

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'responsible' gambling, and more generally to value healthy behaviours? Much theoretical and empirical research on attitudes and motivation (Azjen & Fishbein, 1980; DiClementi & Prochaska, 1998) has been undertaken to understand the importance and development of values. Framed within a harm reduction approach, motivational interviewing (MI; Miller & Rollnick, 1996) has been receiving more attention in the prevention literature. Masterman and Kelly (2003) reviewed the promising role of motivational interviewing in primary prevention programs for adolescent drinking, noting its specific advantages for working with adolescents and its complimentary nature to harm reduction approach. MI should likely be considered for the broad range of adolescent high-risk behaviours.

Unfortunately, *health* and *responsible* behaviour have, in the past, been presented as objectives or ideals toward which youth are encouraged to strive and are therefore extrinsic to oneself. For example, numerous evaluations of abstinence-based school alcohol and drug prevention programs and policies (Brown, D'Emidio-Caston, & Pollard, 1997; Gorman, 1998) highlight how easily ideals can be negated by youth as being too far removed from the realities of life. Prevention programs need to offer youth opportunity for cognitive and affective exposure to responsible behaviour and health and for testing validity. Gow (1996) argues for the important role of the teacher, liberal arts education, and relationships between youth and the community (e.g., internships, community volunteering). Research on the importance of rites of passage in adolescents (Brookins, 1996; Bushnell, 1997; Schuck & Bucy, 1997) and mentoring (Barron-McKeagney, Woody, & D'Souza, 2001; Royse, 1998; Thompson & Kelly-Vance, 2001) may well inform efforts to design strategies toward this goal.

Although research indicates that it may be most fruitful to incorporate youth problem gambling prevention into more broad-based prevention for multiple problem behaviours, gambling-specific prevention initiatives may be necessary for At-Risk gamblers and PPGs, although further prevention research is needed to explore this possibility. The lift and capture rate analyses performed in this study were intended to aid this line of research. Distributing an instrument consisting of only those measures retained in the Model 5 (predicting PPGs) or Model 6 (predicting At-Risk gamblers and PPGs) in a school for the purpose of screening those students to identify At-Risk gamblers and PPGs would result in excellent identification of these students. Thus, if a school counsellor or psychologist observes increased gambling activity in his or her school or local community and decides to implement a prevention program to only those at risk for a gambling problem, a screen including these variables would be a useful tool in identifying which students should receive the program. Administering the screen, running student's responses through a regression model to obtain their probabilities of developing at-risk gambling or probable pathological gambling, and then taking the top 20% highest probability students, would result in the retention of 65% of all At-Risk gamblers and PPGs and 13.2% of all Non-and Social gamblers in the total school sample. This is therefore an effective means of implementing targeted prevention and intervention initiatives within schools. An important caveat to this study is the limitation of its cross-sectional design. Although the models developed in this study are able to predict problem gambling well, a causal relationship between each model and problem gambling has not been examined. These findings however, strongly suggest causal relationships may exist and give reason to undertake studies designed to explore causal links.

Schools are the social center in the lives of many of today's youth and, as this study indicates, peer gambling problems have a powerful impact on one's risk of developing at-risk and problem gambling. The information presented in this study can be utilized to screen at-risk students within schools, which may be particularly useful when faced with times of limited resources for prevention. Furthermore, difficulty in reaching youth probable pathological gamblers for treatment (Gupta & Derevensky, 2000) also suggests that selective gambling-specific intervention programs may be a way to offer services to these youth or be a vehicle to reach youth for individual treatment.

## Statement of Original Contribution

This was the first study to examine protective factors as predictors of increased resilience related to adolescent problem gambling. Past research focused on a small number of factors rather than the combination of several factors related to youth problem gambling and has primarily been conducted on problem gambling in isolation rather than concurrently with other youth high-risk behaviours. This research examined potential protective factors for youth problem gambling as well as their impact upon a set of risk factors found to predict youth problem gambling. Further, this study examined in concert, the relationships between as many risk and protective factors as possible for youth problem gambling and the commonalities in factors among various high-risk behaviours. These findings have considerable implications for prevention programs.

# Limitations and Directions for Future Research

Although this study yielded interesting findings regarding risk and protective factors of youth problem gambling and other health-compromising outcomes, there were several methodological limitations. First, cautions related to the cross-sectional nature of the present research are necessary. Although the risk and protective factors measured in this study have been identified in longitudinal prospective studies as predictors of youth substance abuse and other health-compromising outcomes, the data collected and analyzed here were cross-sectional. Causal interpretations of the relationships among risk, protection, and behavioural outcomes require longitudinally designed studies. In view that the findings from the present study only suggest important prevention and treatment targets, longitudinal studies are needed to show improved outcomes for youth at risk for problem gambling following interventions on the variables identified in this study (e.g., boosting school connectedness for At-Risk gamblers). Longitudinal data are also required to distinguish between youth with problem behaviour(s) expressed only during adolescence and those whose problem behaviour(s) persist into adult life. Discovering the differing risk profiles and trajectories for these two groups would inform the need to direct differential prevention initiatives for each group (e.g., a harm-reduction approach for those whose onset and course of problem behaviours will run its term during adolescence).

The importance of theory in integrating research focus, methodology, and the evaluation of results has been increasingly emphasized within the mental health field (e.g., Brounstein et al., 1999) for the translation of research into effective prevention and treatment initiatives. Although Jessor's *Adolescent Risk Behaviour Model* has been a useful tool in organising exploratory investigation in this study, prospective analyses utilising more complex methodologies examining multiple risk and protective factors (e.g., structural equation modeling) as they interact and unfold over time are needed to validate the inclusion of risk and protective factors of youth problem gambling into this model.

The present study used self-report data without corroboration from parents, teachers, or peers, neither were school records of achievement investigated. There is also a risk that sampling bias may have occurred because schools and participants may have self-selected to participate. This method may have led to an under-estimation of the prevalence of gambling, substance abuse, and involvement in multiple risk activities. School samples tend to underestimate pathology in general as youth at greatest risk are more likely to drop-out of school or to have been absent or truant during data collection (MacMahon & Trichopoulos, 1996). Although findings from the regression models suggest generalizability of the results, they have several limitations and are only generalizable to the population of school-attending adolescents. If this study were to be replicated with a sample that included delinquent students, disadvantaged students, or students struggling with substantial school difficulties, perhaps the role of the protective factors would be more significant. Future studies might usefully include sampling from community organizations, youth detentions centers, and other non-educational settings.

A number of protective factors were tapped only superficially (e.g., mentorship), largely due to time limitations of the participants. The set of risk and protective factors assessed in this study was limited to the measures and instruments included in the questionnaire. Further research that includes a greater array of such variables is necessary. The use of multiple instruments measuring similar constructs will help ensure the reliability of the identification of risk and protective factors.

Finally, a discussion is required regarding the conceptualization of protective factors. Protective factors function to decrease the probability of developing problem gambling in two ways. First, they might directly reduce problem behaviour, as seen in this study in the detection of significant main effects in the ANOVA and regression analyses (Jessor et al., 1995; Stacy, Newcomb & Bentler, 1992). Second, a protective factor might mediate the impact of a specific risk factor of problem gambling, or diminish an individual's involvement in problem gambling, or both (Jessor et al., 1995; Masten et al., 1990; Stacy et al., 1992). This function is represented by a significant interaction effect on a risk variable (e.g., in a regression analysis). There is a growing body of studies in the literature that refer to factors with the first function as compensatory while reserving the term protective for only those factors that are represented by a significant interaction effect on a risk variable. It is therefore important to consider that protective factors in this study may be more clearly specified by the term compensatory given that only main effects were examined. Although the goal of this study was to identify protective factors for youth problem gambling, further research is required in delineating protective factors to examine the specific paths in which the identified protective factors operate. As noted by Blum et al. (2002), the relationships between risk and protective factors are complex, and the ways in which protective factors work differ across contexts and across outcomes.

#### References

- Accordino, D. B., Accordino, M. P., & Slaney, R. B. (2000). An investigation of perfectionism, mental health, achievement, and achievement motivation in adolescents. *Psychology in the Schools*, 37, 535-545.
- Add Health. (1998). The National Longitudinal Study of Adolescent Health, *Carolina Population Center at the University of North Carolina at Chapel Hill*. Last accessed April 20, 2003. Last modified 30 August 2002. FTP: http://www.cpc.unc.edu/addhealth.
- Adalf, E. M., & Ialomiteanu, A. (2000). Prevalence of problem gambling in adolescents:
  Findings from the 1999 Ontario Student Drug Survey. *Canadian Journal of Psychiatry*, 45, 752-755.
- Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behaviour. Englewood Cliffs, NJ: Prentice-Hall.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Andrews, J. A. & Duncan, S. C. (1997). Examining the reciprocal relation between academic motivation and substance use: Effects of family relationships, self-esteem, and general deviance. *Journal of Behavioural Medicine*, 20, 523-549
- Archer, R. P. (1997). *MMPI-A: Assessing adolescent psychopathology*. Mahmaw, NJ: Laurence Erlbaum Associates.
- Atkinson, J. W. (1957). Motivational determinants of risk-taking behaviour. *Psychological Review*, 64, 359-372.
- Ausems, M., Mesters, I., van Breukelen, G., & De Vries, H. (2002). Short-term effects of a randomized computer-based out-of-school: Smoking prevention trial aimed at elementary schoolchildren. *Preventive Medicine 34*, 581–589.
- Ayers, T. S., Sandler, I. N., West, S. G., & Roosa, M. W. (1996). A dispositional and situational assessment of children's coping: Testing alternative models of coping. *Journal of Personality*, 64, 923-958.
- Azjen, I., & Fishbein, M. (Eds.) (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, N J: Prentice-Hall.
- Azmier, J. (2000). Gambling in Canada: Triumph, tragedy, or tradeoff. Canadian gambling behaviour and attitudes. Calgary, AB: Canada West Foundation.

- Baer, J. (2002). Is family cohesion a risk or protective factor during adolescent development? Journal of Marriage and Family, 64, 668-675.
- Baer, J. S., MacLean, M. G., & Marlatt, G. A. (1998). Linking etiology and treatment for adolescent substance abuse: Toward a better match. In R. Jessor (Ed.), New perspectives on adolescent risk behaviour. New York, NY: Cambridge University Press.
- Barber, B. K., & Buehler, C. (1996). Family cohesion and enmeshment: Different constructs, different effects. *Journal of Marriage and the Family*, 58, 433-443.
- Barnes, G. M., Welte, J. W., Hoffman, J. H., & Dintcheff, B. A. (2002). Effects of alcohol misuse on gambling patterns in youth. *Journal of Studies on Alcohol*, 63, 767-775.
- Barrera, M., Jr., & Li, S. A. (1996). The relation of family support to adolescents: Psychological distress and behaviour problems. In G. R. Pierce, B. R. Sarason, & I. G. Sarason (Eds.), *Handbook of social support and the family* (pp. 313-343). New York: Plenum Press.
- Barron-McKeagney, T., Woody, J. D., & D'Souza, H. J. (2001). Mentoring at-risk Latino children and their parents: Impact on social skills and problem behaviors. *Child & Adolescent Social Work Journal, 18*, 119-136.
- Battistich, V., Schaps, E., Watson, M., & Solomon, D. (1996). Prevention effects of the Child Development Project: Early findings from an ongoing multisite demonstration trial. *Journal of Adolescent Research*, 11, 12-35.
- Baumrind, D. (1987). A developmental perspective on adolescent risk taking in contemporary America.In C. E. Irwin (Ed.), *Adolescent social behaviour and health* (pp. 93-125). San Francisco: Jossey-Bass.
- Benthin, A., Slovic, P. & Severson, H. (1993). A psychometric study of adolescent risk perception. *Journal of Adolescence*, 16, 153-168.
- Berridge, V. (1999). Histories of harm reduction: Illicit drugs, tobacco, and nicotine. Substance Use & Misuse, 34, 35-47.
- Blum, K., Cull, J., Braverman, E. R, & Comings, D. (1996). Reward deficiency syndrome. American Scientist, 84, 132–45.
- Blum, R. W., McNeely, C., & Nonnemaker, J. (2002). Vulnerability, risk, and protection. Journal of Adolescent Health, 31 (Suppl. 1), 28-39.
- Brookins, C. C. (1996). Promoting ethnic identity development in African American youth: The role of rites of passage. *Journal of Black Psychopathology*, *22*, 388-417.

- Brounstein, P. J., Zweig, J. M., & Gardner, S. E. (1999). Understanding substance abuse prevention: Toward the 21<sup>st</sup> century; A primer on effective programs. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Prevention, Division of Knowledge Development and Evaluation.
- Brown, J. H., D'Emidio-Caston, M., & Pollard, J. (1997). Students and substances: Social power in drug education. *Educational Evaluation and Policy Analysis*, 19, 65-82.
- Bushnell, M. (1997). Small school ritual and parent involvement. Urban Review, 2, 283-295.
- Butcher, J. N., Williams, C. L., Graham, J. R. Archer, R. P., Tellegen, A., Ben-Porath, Y. S., & Kaemmer, B. (1992). *Minnesota Multiphasic Personality Inventory-Adolescent*. Minneapolis: The University of Minnesota Press.
- Catalano, R. F., Berglund, M. L., Ryan, J. A., Lonczak, H. S., & Hawkins, J. D. (2002). Positive youth development in the United States: Research findings on evaluations of positive youth development programs. *Prevention & Treatment*, [On-line journal], 5. Available FTP: http://journals.apa.org/prevention/volume5/pre0050015a.html. Last accessed April 1, 2004.
- Centre for Substance Abuse Prevention (2001). 2001 Annual report of science-based prevention programs. Rockville, MD: National Center for the Advancement of Prevention.
- Chambers, R. A. & Potenza, M. N. (2003). Neurodevelopment, impulsivity, and adolescent gambling *Journal of Gambling Studies*, 19, 53-84.
- Coie, J., Watt, N., West, S., Hawkins, J., Asarnow, J., Markman, H., Ramey, S., Shure, M., & Long, B. (1993). The science of prevention. *American Psychologist, 48*, 1013-1022.
- Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin*, 127, 87-127.
- Compas, B. E., Malcarne, V. L., & Fondacaro, K. M. (1988). Coping with stressful events in older children and young adolescents. *Journal of Consultation and Clinical Psychology*, 56, 405-411.
- Costello, E. J., Erkanli, A., Federman, E., & Angold, A. (1999). Development of psychiatric comorbidity with substance abuse in adolescents: Effects of timing and sex. *Journal of Clinical Child Psychology*, 28, 298-311.

- Covington, M. V. (2000). Goal theory, motivation, and school achievement: An integrative review. *Annual Review of Psychology*, *51*, 171-200.
- Daley, J. G., Sowers-Hoag, K. M., & Thyer, B. A. (1991). Construct validity of the circumplex model of family functioning. *Journal of Social Service Research*, 15, 131-147.
- Darling, N., Hamilton, S. F., & Niego, S. (1994). Adolescents' relations with adults outside the family. In R. Montemayor, G. R. Adams, & T. P. Gullotta (Eds.), Advances in adolescent development: Adolescent close relationships (Vol. 6; pp. 216–235). Newbury Park, CA: Sage.
- Darling, N., Hamilton, S. F., Toyokawa, T., & Matsuda, S. (2002). Naturally occurring mentoring in Japan and the United States: Social roles and correlates. *American Journal of Community Psychology*, 30, 246-270.
- Davoli, M., Perucci, C. A., & Sangalli, M. (1992). Reliability of sexual behaviour data among high school students in Rome. *Epidemiology*, *3*, 531–536.
- Derevensky, J., & Gupta, R. (2004). Adolescents with gambling problems: A review of our current knowledge. *e-Gambling: The Electronic Journal of Gambling Issues, 10*, 119-140.
- Derevensky, J., & Gupta, R. (2001). Le problème de jeu touche aussi les jeunes. *Psychologie Québec, 18*(6), 23-27.
- Derevensky, J. L., & Gupta, R. (2000a). Youth gambling: A clinical and research perspective. *e-Gambling: The Electronic Journal of Gambling Issues*, [on-line journal], 2, 1-11. Available FTP: http://www.camh.net/egambling/. Last accessed April 1, 2004.
- Derevensky, J. L., & Gupta, R. (2000b). Prevalence estimates of adolescent gambling: A comparison of the SOGS-RA, DSM-IV-J, and the GA. 20 Questions. *Journal of Gambling Studies*, *16*, 227-251.
- Derevensky, J. L., Gupta, R., & Della-Cioppa, G. (1996). A developmental perspective of gambling behaviour in children and adolescents. *Journal of Gambling Studies*, 12, 49-66.
- Derevensky, J., Gupta, R., Dickson, L., Hardoon, K., & Deguire, A. (2003). Understanding youth gambling problems: A conceptual framework. In D. Romer (Ed.), *Reducing Adolescent Risk* (pp. 239-246). Newbury Park, CA: Sage.
- Derevensky, J., Gupta, R., Hardoon, K., Dickson, L., & Deguire, A.-L. (2003). Youth gambling:
  Some social policy issues. In G. Reith (Ed.), *Gambling: Who wins, who loses* (pp. 239-257). New York, NY: Prometheus Books.

- Derevensky, J., Gupta, R., & Winters, K. (2003). Prevalence rates of youth gambling problems: Are the current rates inflated? *Journal of Gambling Studies*, 19, 405-425.
- Dickson, L., Derevensky, J., & Gupta, R. (2004). Harm-reduction for the prevention of youth gambling problems and other high-risk behaviors. *Journal of Adolescent Research*, 19, 88-128.
- Dickson, L., Derevensky, J., & Gupta, R. (2002). The prevention of youth gambling problems: A conceptual model. *Journal of Gambling Studies*, 18, 97-159.
- DiClementi, C. & Prochaska, J., (1998). Towards a comprehensive, Transtheoretical Model of change: Stages of change and addictive behaviors. In W. Miller & N. Heather (Eds.).
   Treating Addictive Behaviors 2nd Edition (pp. 3-24). New York, NY: Plenum.
- Dishion, T. J., Andrews, D. W., Kavanagh, K., & Soberman, D. (1996). Preventive interventions for high-risk youth: The Adolescent Transitions Program. In R. Dev Peters, & R. J. McMahon, (Eds.) Childhood Disorders, Substance Abuse, and Delinquency: Prevention and Early Intervention Approaches (pp. 65-80). Newbury Park, CA: Sage.
- Donovan, J. E., Jessor, R., & Costa, F. M. (1999). Adolescent problem drinking: Stability of psychosocial and behavioural correlates across a generation. *Journal of Studies on Alcohol*, 60, 352-361.
- Donovan, J. E., Jessor, R., & Costa, F. M. (1991). Adolescent health behaviour and conventionality-unconventionality: An extension of problem-behaviour theory. *Health Psychology*, 10, 52-95.
- Dornbusch, S. M., Erickson, K. G., Laird, J., & Wong, C. A. (2001). The relation of family and school attachment to adolescent deviance in diverse groups and communities. *Journal of Adolescent Research, 16*, 396-422.
- Dumant, M., & Provost, M. A. (1999). Resilience in adolescents: Protective role of social support, coping strategies, self-esteem, and social activities on experience of stress and depression. *Journal of Youth and Adolescence*, 28, 343-363.
- Elder, C., Leaver-Dunn, D., Wang, M., Nagy, S., & Green, L. (2000). Organized group activity as a protective factor against adolescent substance use. *American Journal of Health Behaviour, 24*, 108-113.
- Elkind, D. (1967). Egocentrism in adolescence. Child Development, 38, 1025-1034.
- Elkind, D. (1985). Egocentrism redux. Developmental Review, 5, 218-226.

- Elliott E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. Journal of Personality and Social Psychology, 53, 5-12.
- Erickson, P. G. (1999). Introduction: The three phases of harm reduction. An examination of emerging concepts, methodologies, and critiques. *Substance Use & Misuse, 34*, 1-7.
- Felix-Ortiz, M. & Newcomb, M. D. (1999). Vulnerability for drug use among Latino adolescents. *Journal of Community Psychology*, 27, 257-280.
- Fisher, S. (2000). Developing the DSM-IV-MR-J criteria to identify adolescent problem gambling in non-clinical populations. *Journal of Gambling Studies*, *16*, 253-273.
- Fisher, S. (1993). Gambling and pathological gambling in adolescents. *Journal of Gambling Studies*, 9, 277-288.
- Fisher, S. (1992). Measuring pathological gambling in children: The case of fruit machines in the U.K. *Journal of Gambling Studies*, *8*, 263-285.
- Ford, M. E. (1992). Motivating humans: Goals, emotions, and personal agency beliefs. Newbury Park, CA: Sage.
- Furrer, C. & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology*, *95*, 148-162.
- Galambos, N. L., Tilton-Weaver, L. C. (1998). Multiple risk behaviour in adolescents and young adults. *Health Review*, 10, 9-20.
- Garmezy, N. (1985). The NIMH-Israeli high-risk study: Commendations, comments, and cautions. *Schizophrenia Bulletin*, 11, 349-353.
- Garmezy, N., Masten, A. S., & Tellegen, A. (1984). The study of stress and competence in children: A building block for developmental psychopathology. *Child Development*, 55, 97-111.
- Getty, H. A., Watson, J., & Frish, G. R. (2000). A comparison of depression and styles of coping in male and female GA members and controls. *Journal of Gambling Studies*, 16, 377-391.
- Gjesme, T., & Nygard, R. (1970). Achievement-related motives: Theoretical considerations and constructions of a measuring instrument. University of Oslo: unpublished report.
- Glyshaw, K., Cohen, L. H., & Towbes, L. C. (1989). Coping strategies and psychological distress: Prospective analyses of early and middle adolescents. *American Journal of Community Psychology*, 17, 607-623.

- Gonzalez, R., & Padilla, A. M. (1997). The academic resilience of Mexican American high school students. *Hispanic Journal of Behavioural Science*, 19, 301-317.
- Gordon, K. A. (1996). Resilient Hispanic youths' self-concept and motivational patterns. Hispanic Journal of Behavioural Sciences, 18, 63-73.
- Gordon Rouse, K. A. (2001) Resilient students' goals and motivation. *Journal of Adolescence*. 24, 461-472.
- Gorman, D. M. (1998). The irrelevance of evidence in the development of school-based drug Prevention policy, 1986-1996. *Evaluation Review*, 22, 118-146.
- Gow, K. M. (1996). Making a god of self-esteem: The tyranny of misdirected sentiment. Gloucester, ON: Centre for Renewal in Public Policy.
- Grant, K. E., O'Koon, J. H., Davis, T., Roache, N., Poindexter, L. Armstrong, M., Minden, J., McIntosh, J. (2000). Protective factors affecting low-income urban African youth exposed to stress. *Journal of Early Adolescence*, 20, 388-417.
- Greenberg, M. T., Domitrovich, C., Bumbarger, B. (1999). Preventing mental disorders in school-age children: A review of the effectiveness of prevention programs. *Prevention Research Center for the Promotion of Human Development*, College of Health and Human Development, Pennsylvania State University, PA. Last accessed April 4, 2004.
  FTP: http://www.prevention.psu.edu/pubs/docs/CMHSxs.pdf.
- Griffiths, M.D. (2002). Gambling and gaming addictions in adolescence. Leicester, UK: British Psychological Society/Blackwells.
- Griffiths, M., & Sutherland, I. (1998). Adolescent gambling and drug use. Journal of Community and Applied Social Psychology, 8, 423-427.
- Griffiths, M. D., & Wood, R. (2000). Risk factors in adolescence: The case of gambling, videogame playing, and the internet. *Journal of Gambling Studies, 16*, 199-226.
- Gullone, E. & Moore, S. M. (2000). Adolescent risk-taking and the five-factor model of personality. *Journal of Adolescence*, 23, 393-407.
- Gullone, E., Moore, S. M., Moss, S. & Boyd, C. P. (2000). The Adolescent Risk-Taking Questionnaire (ARQ): Development and psychometric evaluation. *Journal of Adolescent Research*, 15, 231-250.
- Gupta, R., Derevensky, J., & Marget, N. (*in press*). Coping strategies employed by adolescents with gambling problems. *Child and Adolescent Mental Health*.

- Gupta, R., & Derevensky, J. L. (2001). An examination of the differential coping styles of adolescents with gambling problems. Report prepared for the Ministry of Health and Long Term Care. Toronto, ON.
- Gupta, R., & Derevensky, J. (2000). Adolescents with gambling problems: From research to treatment. *Journal of Gambling Studies*, 16, 315-342.
- Gupta, R., & Derevensky, J. (1999). Attitudes and Gambling Activities Questionnaire (AGAQ). McGill University, Montreal, QC.
- Gupta, R., & Derevensky, J. (1998a). Adolescent gambling behaviour: A prevalence study and examination of the correlates associated with excessive gambling. *Journal of Gambling Studies*, 14, 319-345.
- Gupta, R. & Derevensky, J. (1998b). An empirical examination of Jacobs' General Theory of addictions: Do adolescent gamblers fit the theory? *Journal of Gambling Studies*, 14,17-49.
- Gupta, R., & Derevensky, J. (1997). Familial and social influences on juvenile gambling. Journal of Gambling Studies, 13, 179-192.
- Hagtvet, K., & Zuo, L. (2000). Conceptual and empirical components of an internal domain study: An illustration in terms of the achievement motives scale, *Scandinavian Journal of Educational Research*, 44, 49-78.
- Halvari, H. (1997). Moderator effects of age on the relation between achievement motives and performance. *Journal of Research in Personality*, *31*, 303-318.
- Hampson, R. B., Hulgus, Y. F., & Beavers, W. R. (1991). Comparisons of self-report measures of the Beavers System Model and Olson's Circumplex Model. *Journal of Family Psychology*, 4, 326-340.
- Hardoon, K., & Derevensky, J. (2002). Child and adolescent gambling behaviour: Our current knowledge. *Clinical Child Psychology and Psychiatry*, 7, 263-281.
- Hardoon, K., & Derevensky, J. L. (2001). Social influences involved in children's gambling behaviour. *Journal of Gambling Studies*, 17, 191-216.
- Hardoon, K., Derevensky, J., & Gupta, R. (2002). An examination of the influence of familial, emotional, conduct and cognitive problems, and hyperactivity upon youth risk-taking and adolescent gambling problems. Report prepared for the Ontario Problem Gambling Research Centre, Guelph, ON.

- Henry, C. S. (1994). Family system characteristics, parental behaviours, and adolescent family life satisfaction. *Family Relations*, 43, 447-455.
- Holahan, C. J., & Moos, R. H. (1991). Life stressors, personal and social resources, and depression: A 4-year structural model. *Journal of Abnormal Psychology*, 100, 31–38.
- Hosmer, D. W., & Lemeshow, S. (1989). Applied Logistic Regression. New York, NY: Wiley.
- Jacobs, D. F. (*in press*). Youth gambling in North America: Long-term trends and future prospects. In J. Derevensky & R. Gupta (Eds.), *Gambling problems in youth: Theoretical and applied perspectives*. New York, NY: Kluwer Academic/Plenum Publishers.
- Jacobs, D. F. (2000). Juvenile gambling in North America: An analysis of long term trends and future prospects. *Journal of Gambling Studies*, 16, 119-152.
- Jacobs, D. F. (1986). A general theory of addictions: A new theoretical model. *Journal of Gambling Behaviour*, 2, 15-31.
- Jacobson, K. C., & Rowe, D. C. (1999). Genetic and environmental influences on the relationships between family connectedness, school connectedness, and adolescent depressed mood: Sex differences. *Developmental Psychology*, 35, 926-939.
- Jenkins, P. (1995). School delinquency and school commitment. Sociology of Education, 68, 221-239.
- Jessor, R. (1998). New perspectives on adolescent risk behaviour. In R. Jessor (Ed.), New perspectives on adolescent risk behaviour (pp. 1-10). Cambridge, UK: Cambridge University Press.
- Jessor, R., Turbin, M. S., & Costa, F. M. (1998). Protective factors in adolescent health behaviour. *Journal of Personality & Social Psychology*, 75, 788-800.
- Jessor, R., Van Den Bos, J., Vanderryn, J., Costa, F., & Turbin, M. (1995). Protective factors in adolescent problem behaviour: Moderator effects and developmental change. *Developmental Psychology*, 31, 923-933.
- Jorgensen, R. S., & Dusek, J. B. (1990). Adolescent adjustment and coping strategies. *Journal of Personality*, 58, 503–513.
- Kaufman, F., Derevensky, J., & Gupta, R. (2002, June). *The relationship between life stresses, coping styles and gambling behaviour among adolescents*. Poster presented at the annual meeting of the National Council on Problem Gambling, Dallas.

- Kaufman, F., Derevensky, J., & Gupta, R. (2001). The relationship between levels of gambling involvement, the occurrence of life stress, and differential coping styles in an adolescent sample. Paper presented at Psychology Rounds, Jewish General Hospital, Montreal, QC.
- Kelly, D., & Balch, R. (1971). Social origins and school failure: A re-examination of Cohen's theory of working-class delinquency. *Pacific Social Review*, 14, 413-430.
- Kelly, K. J., Swaim, R. C., & Wayman, J. C. (1996). The impact of a localized antidrug media campaign on targeted variables associated with adolescent drug use. *Journal of Public Policy & Marketing*, 15, 238-251.
- Klaw, E., & Rhodes, J. E. (1995). Mentor relationships and the career development of pregnant and parenting African-American teenagers. *Psychology of Women Quarterly*, 19, 551-562.
- Klein, J. D., Graff, C. A., & Santelli, J. S. (2001). Improving adolescent health care surveillance.
  In M. A. Cynamon & R. A. Kulka (Eds), Seventh Conference on Health Survey Research Method (pp. 11-18). Hyattsville, MD: National Center for Health Statistics.
- Knight, G. P., Tein, J. Y., Shell, R., & Roosa, M. (1992). The cross-ethnic equivalence of parenting and family interaction measures among Hispanic and Anglo-American families. *Child Development*, 63, 1392-1403.
- Korn, D. A., & Shaffer, H. J. (1999). Gambling and the health of the public: Adopting a public health perspective. *Journal of Gambling Studies*, 15, 289-365.
- Ladouceur, R., Bouchard, C., Rhéaume, C., Jacques, C., Ferland, F., Leblond, J., & Walker, M.
  (2000). Is the SOGS an accurate measure of pathological gambling among children, adolescents, and adults? *Journal of Gambling Studies*, 16, 1-12.
- Ladouceur, R., Boudreault, N., Jacques, C., & Vitaro, F. (1999). Pathological gambling and related problems among adolescents. *Journal of Child & Adolescent Substance Abuse*, 8, 55-68.
- Ladouceur, R., Dubé, D., & Bujold, A. (1994). Prevalence of pathological gambling and related problems among college students in the Quebec metropolitan area. *Canadian Journal of Psychiatry*, 39, 289-293.
- Lavery, B., & Siegel, A. W. (1993). Adolescent risk-taking: An analysis of problem behaviours in problem children. *Journal of Experimental Child Psychology*, 55, 277-294.
- Lazarus, R. S., & Folkman, S. (1984). Stress appraisal and coping. New York: Springer.

- Leadbeater, B. J., Blatt, S. J. & Quinlan, D. M. (1995). Sex-linked vulnerabilities to depressive symptoms, stress, and problem behaviours in adolescents. *Journal of Research on Adolescence*, *5*, 1-29.
- Lesieur, H. R., & Klein, R. (1987). Pathological gambling among high school students. *Addictive Behaviours*, 12, 129-135.
- Lengua, L. J., & Stormshak, E. A. (2000). Sex, sex roles and personality: Sex differences in the prediction of coping and psychological symptoms. *Sex Roles*, *43*, 787-820.
- Loeber, R., Farrington, D., Stouthamer-Loeber, M., & Van Kammen, W. (1998). Multiple risk factors for multiproblem boys: Co-occurrence of delinquency, substance use, attention deficit, conduct problems, physical aggression, covert behaviour, depressed mood, and shy/withdrawn behaviour. In R. Jessor (Ed.), *New perspectives on adolescent risk behaviour* (pp. 90-147). Cambridge, UK: Cambridge University Press.
- LoSciuto, L., Rajala, A. K., Townsend, T. N., Taylor, A. S. (1996). An outcome evaluation of Across Ages: An intergenerational mentoring approach to drug prevention. *Journal of Adolescent Research*, 11, 116-129.
- Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, *71*, 543-562.
- MacMahon, B., & Trichopoulos, D. (1996). *Epidemiology: Principles and methods* (2nd ed.). Boston, MA: Little, Brown & Company.
- Maisto, S. A., Connors, G. J., & Allen, J. P. (1995). Contrasting self-report screens for alcohol problems: a review. *Alcoholism: Clinical and Experimental Research*, 19, 1510-1516.
- Man, F., Nygard, R., & Gjesme, T. (1994). The achievement motives scale (AMS): Theoretical basis and results from a first try-out of a Czech form. *Scandinavian Journal of Educational Research*, 38, 209-218.
- Marget, N., Gupta, R. & Derevensky, J. (1999, August), *The psychosocial factors underlying adolescent problem gambling*. Poster presented at the annual meeting of the American Psychological Association, Boston, MA.
- Marlatt, G. A. (1996). Harm reduction: Come as you are. Addictive Behaviors, 21, 779-788.
- Martin, C. S., & Winters, K. C. (1998). Diagnosis and assessment of alcohol use disorders among adolescents. *Alcohol Health and Research World*, 22, 95-105.

- Masten, A. (1994). Resilience in individual development: Successful adaptation despite risk and adversity. In M. Wong & E. Gordon (Eds.), *Educational resilience in inner-city America* (pp. 3-26). Hillsdale, MI: Erlbaum.
- Masten, A., Best, K., & Garmezy, N. (1990). Resilience and development: Contributions from the study of children who overcome adversity. *Development and Psychopathology*, 2, 425-444.
- Masterman, P. W. & Kelly, A. B. (2003). Reaching adolescents who drink harmfully: Fitting intervention to developmental reality. *Journal of Substance Abuse Treatment, 24*, 347-355.
- McCord, J. (1990). Problem behaviours. In S. Feldman & G. Elliot (Eds.), *At the threshold* (pp. 414-430). Cambridge, MA: Harvard University Press.
- McNeely, C. A., Nonnemaker, J. M. Blum, R. W. (2002). Promoting school connectedness: Evidence from the National Longitudinal Study of Adolescent Heath. *Journal of School Health*, 72, 138-146.
- Menard, S. (1995). Applied logistics regression analysis. Thousand Oaks, CA: Sage.
- Merikangas, K. R., Dierker, L. C., & Szamari, P. (1998). Psychopathology among offspring of parents with substance abuse and/or anxiety disorders: A high risk study. *Journal of Child Psychology & Psychiatry & Allied Discipline*, 39, 711-720.
- Miller, W. R., & Rollnick, S. (1991). *Motivational interviewing: Preparing people to change* addictive behaviour. New York, NY: Gildford.
- Milne, L. C., & Greenway, P. (1999). Do high scores on the Adolescent-School Problems and Immaturity Scales of the MMPI-A have implications for cognitive performance as measured by the WISC-III? *Psychology in the Schools, 36*, 199-203.
- Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behaviour: A developmental taxonomy. *Psychological Review*, 100, 674-701.
- Moore, S. & Gullone, E. (1996). Predicting adolescent risk behavior using a personalized costbenefit analysis. *Journal of Youth and Adolescence*, 25, 343-359.
- Moore, S. M., Gullone E., & Kotanski, M. (1997). An examination of adolescent risk-taking using a story completion task. *Journal of Adolescence*, 20, 369-397.
- National Research Council (1999). *Pathological gambling: A critical review*. Washington, DC: National Academy Press.

- Needle, R., McCubbin, H., & Lorence, J. (1983). Reliability and validity of adolescent selfreported drug use in a family-based study: A methodological report. *International Journal of Addiction, 18*, 901-912.
- Nower, L., (2001). Taking risks: The relationship of impulsivity, sensation seeking, stresscoping, and substance use in youth gamblers. *Dissertation Abstracts International*, 62(1A), 2001, 332.
- Nygard, R. (1982). Achievement motives and individual differences in situational specificity of behaviour. *Journal of Personality and Social Psychology*, 43, 319-327.
- Olson, D. H. (2000). Circumplex model of marital and family systems. *Journal of Family Therapy*, 22, 144-167.
- Olson, D. H., Portner, J., & Bell, R. Q. (1982). FACES II: Family adaptability and cohesion evaluation scales. Family Social Science, University of Minnesota, St. Paul, MN.
- Orr, D. P., Fortenberry, J. D., & Blythe, M. J. (1997). Validity of self-reported sexual behaviours in adolescent women using biomarker outcomes. *Sexually Transmitted Disorders*, 24, 261-266.
- Osowiecki, D. M. & Compas, B. E. (1999). Coping and perceived control in adjustment to breast cancer. *Cognitive Therapy and Research*, 23, 169-180.
- Parsons, J. T., Siegel, A. W., & Cousins, J. H. (1997). Late adolescent risk-taking: Effects of perceived benefits and risks on behavioural intentions and behavioural change. *Journal of Adolescence*, 20, 381-392.
- Parsons, J. T., Halkitis, P. N., Bimbi, D., & Borkowski, T. (2000). Perceptions of the benefits and costs associated with condom use and unprotected sex among late adolescent college students. *Journal of Adolescence*, 23, 377-391.
- Patterson, J. M. & McCubbin, H. I. (1987). Adolescent coping orientation for problem experiences. In H. McCubbin (Ed.), *Family Assessment Inventories*. Family Stress Coping and Health Project, University of Wisconsin-Madison.
- Perkins, D. F, & Borden, L. M. (2003). Positive behaviours, problem behaviours, and resiliency in adolescence. In R. M. Lerne, & M. A, Easterbrooks, (2003). *Handbook of psychology: Developmental psychology*, 6 (pp. 373-394). New York, NY: Wiley.

- Pollard, J. A., Hawkins, J. D., & Arthur, M. W. (1999). Risk and protection: Are both necessary to understand diverse behavioural outcomes in adolescence? *Social Work Research*, 23, 145-158.
- Potenza, M. N., Steinberg, M. A., McLaughlin, S. D., Wu, R., Rounsaville, B. J., &
  O'Malley, S. S. (2000). Illegal behaviours in problem gambling: Analysis of data from a gambling helpline. *Journal of the American Academy of Psychiatry and the Law, 28*, 389-403.
- Regier, D. A., Rae, D. S., Narrow, W. E., Kaelber, C. T., & Schatzberg, A. F. (1998). Prevalence of anxiety disorders and their comorbidity with mood and addictive disorders. *British Journal of Psychiatry*, 173(Suppl. 34), 24-28.
- Reinherz, H. Z., Stewart-Berghauer, G., Pakiz, B., Frost, A. K., & Moeykens, B. A. (1989). The relationships of early risk and current mediators to depressive symptomatology in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28, 942-947.
- Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J. Tabor, J., Beunring, T., Sieving, R. E., Shew, M., Ireland, M., Bearinger, L. H., & Udry, J. R. (1997).
  Protecting adolescents from harm: Findings from the national longitudinal study on adolescent health. *Journal of the American Medical Association*, 278, 823-32.
- Rogers, A. M., & Taylor, A. S. (1997). Intergenerational mentoring: A viable strategy for meeting the needs of vulnerable youth. *Journal of Gerontological Social Work, 28*, 125-140.
- Rodick, J. D., Henggeler, S. W., & Hanson, C. L. (1986). An evaluation of the family adaptability and cohesion evaluation scales and the Circumplex Model. *Journal of Abnormal Child Psychology*, 14, 77-87.
- Romer, D. (2003). Reducing adolescent risk: Toward an integrated approach. Newbury Park, CA: Sage.
- Royse, D. (1998). Mentoring high-risk minority youth: Evaluation of the Brothers project. Adolescence, 33, 145-158.
- Rutter, M. (1987). Psychosocial resilience and protective mechanism. *American Journal of* Orthopsychiatry, 57, 316-331.
- Schinke, S. P., Tepavac, L., & Cole, K. C. (2000). Preventing substance use among Native

American youth: Three-year results. Addictive Behaviours, 25, 387-397.

- Schuck, L. A., & Bucy, J. E. (1997). Family rituals: Implications for early intervention. *Topics in Early Childhood Special Education*, 17, 477-493.
- Seiffge-Krenke, I. (2000). Causal links between stressful events, coping style, and adolescent symptomatology. *Journal of Adolescence*, 23, 675-691.
- Shaffer, H. J., & Hall, M. N. (2001). Updating and refining prevalence estimates of disordered gambling behaviour in the United States and Canada. *Canadian Journal of Public Health*, 92, 168-172.
- Shaffer, H. J., & Hall, M. N. (1996). Estimating prevalence of adolescent gambling disorders. A quantitative synthesis and guide toward standard gambling nomenclature. *Journal of Gambling Studies*, *12*, 193-214.
- Shaffer, H. J., & Korn, D. A. (2002). Gambling and related mental disorders: A public health analysis. *Annual Review of Public Health*, 23, 171-212.
- Shapiro, R., Siegel, A. W., Scovill, L. C., & Hays, J. (1998). Risk-taking patterns of female adolescents: What they do and why. *Journal of Adolescence*, 21, 143-159.
- Shedler, J., & Block, J. (1990). Adolescent drug use and psychological health: A longitudinal inquiry. *American Psychologist, 45*, 612-630.
- Shew, M. L., Remafedi, G. J., & Bearinger, L. H. (1997). The validity of self-reported condom use among adolescents. *Sexually Transmitted Disorders*, 24, 503–510.
- Siegel, M., & Biener, L. (2000). The impact of an antismoking media campaign on progression to established smoking: Results of a longitudinal youth study. *American Journal of Public Health*, 90, 380-386.
- Siegel, A. W., Cousins, J. H., Rubovits, P., Parsons, J. T., Lavery, B., & Crowley, C. L. (1994). Adolescents' perceptions of the benefits and risks of their own risk taking. *Journal of Emotional and Behavioural Disorders, 2*, 89-98.
- Single, Eric. (2000, November 17). Harm reduction as the basis for drug policy: what does it mean and how does it matter? Paper presented at the Addictions Millennium 2000 Conference, Toronto, ON.
- Spear, L. P. (2000). The adolescent brain and age-related behavioural manifestations. *Neuroscience and Biobehavioural Reviews, 24,* 417-463.

- Spie, C. L. (2002). Mentoring programs for adolescents: A research summary. *Journal of Adolescent Health, 31*(Suppl. 6), 251-260.
- Spielberger, C. D. (1983). Manual for the State-Trait Anxiety Inventory for Children. Redwood City, CA: Mind Garden.
- Springer, J. F., Wright, L. S., McCall, G. J. (1997). Family interventions and adolescent resiliency: The southwest Texas state high-risk youth program. *Journal of Community Psychology*, 25, 435-452.
- Stacy, A., Newcomb, M., & Bentler, P. (1992). Interactive and higher-order effects of social influences on drug use. *Journal of Health and Social Behaviour*, 33, 226-241.
- Steinhausen, H., & Winkler Metzke, C. (2001). Risk, compensator, vulnerability, and protective factors influencing mental health in adolescence. *Journal of Youth and Adolescence*, 30, 259-280.
- Ste-Marie, C., Derevensky, J., & Gupta, R. (2002). Anxiety and social stress related to adolescent gambling behaviour. *International Gambling Studies*, *2*, 123-141.
- Stinchfield, R. (2000). Gambling and correlates of gambling among Minnesota public school students. *Journal of Gambling Studies 16*, 153-173.
- Stronski, S. M., Ireland, M., Michaud, P., Narring, F., & Resnick, M. D. (2000). Protective correlates of stages in adolescent substance use: A Swiss national study. *Journal of Adolescent Health, 26*, 420-427.
- Tabachnick, B. G., & Fidell, L. S. (2001). Using multivariate statistics (4th ed.). New York, NY: HarperCollins.
- Taylor, A. S., LoSciuto, L., Fox, M., Hilbert, S. M., & Sonkowsky, M. (1999). The mentoring factor: Evaluation of the across ages' intergenerational approach to drug abuse prevention. *Child & Youth Services*, 20, 77-99.
- Thompson, L. A., & Kelly-Vance, L. (2001). The impact of mentoring on academic achievement of at-risk youth. *Children & Youth Services Review, 23*, 227-242.
- Tierney, J. P., Grossman, J. B., & Resch, N. L. (1995). Making a difference: An impact study of Big Brothers/Big Sisters. Philadelphia, PA: Public/Private Ventures.
- Tolan, P. H. (1988). Socioeconomic, family and social stress correlates of adolescent antisocial and delinquent behaviour. *Journal of Abnormal Child Psychology*, *16*, 317-331.

- Vitaro, F., Brendgen, M., Ladouceur, R., & Tremblay, R. E. (2001). Gambling, delinquency, and drug use during adolescence: Mutual influences and common risk factors. *Journal of Gambling Studies*, 17, 171-190.
- Volberg, R. (2001, July). White paper: Measures to track gambling rates, behaviours and related factors. Paper presented at the National Council on Problem Gambling. St. Louis, MO.
- Volberg, R.A. (1998, March). *Gambling and problem gambling among adolescents in New York*. Report to the New York Council on Problem Gambling.
- Waxman, H. C., Huang, S. L., & Padron, Y. N. (1997). Motivation and learning environment differences between resilient and nonresilient Latino middle school students. *Hispanic Journal of Behavioural Sciences*, 19, 137-155.
- Weist, M. D., Freedman, A. H., Paskewitz, D. A., Proescher, E. J., & Flaherty, L. T. (1995). Urban youth under stress: Empirical identification of protective factors. *Journal of Youth* and Adolescence, 24, 705-721.
- Wheeler, K., & Malmquist, J. (1987). Treatment approaches in adolescent chemical dependency. *Pediatric Clinics of North America*, 34, 437-447.
- Werner, E. E. (1986). Resilient offspring of alcoholics: A longitudinal study from birth to age 18. Journal of Studies on Alcohol, 47, 34-40.
- Werner, E. E., & Smith, R. S. (1982). Vulnerable but invincible: A study of resilient children. New York, NY: McGraw-Hill.
- Whitfield, D. (1995). Increasing interest and achievement motivation among adolescents: An overview. *High School Journal, 79*, 33-40.
- Williams, C. L., Toomey, T. L., McGovern, P., Wagenaar, A. C., Perry, C. L. (1995).
   Development, reliability, and validity of self-report alcohol-use measures with young adolescents. *Journal of Child and Adolescent Substance Abuse*, 4, 17-40.
- Wills, T. A., & Cleary, S. D. (1997). The validity of self-reports of smoking: Analyses by race/ethnicity in a school sample of urban adolescents. *American Journal of Public Health*, 87, 56-61.
- Winters, K. C. (1992). Development of an adolescent alcohol and other drug abuse screening scale: Personal experience screening questionnaire. *Addictive Behaviours*, 17, 479-490.

- Winters, K.C., & Henly, G.A. (1987). Advances in the assessment of adolescent chemical dependency: Development of a chemical use problem severity scale. *Psychology of Addictive Behaviours*, 1, 146-153.
- Winters, K. C., Stinchfield, R. D., & Fulkerson, J. (1993). Patterns and characteristics of adolescent gambling. *Journal of Gambling Studies*, 9, 371-386.
- Winters, K. C., Stinchfield, R. D., & Henly, G. A. (1990). Validity of adolescent self-report of alcohol and other drug involvement. *International Journal of Addiction*, 25, 1379-1395.
- Wood, R., & Griffiths, M. (1998). The acquisition, development and maintenance of lottery and scratchcard gambling in adolescence. *Journal of Adolescence*, 21, 265-272.
- Wynne, H., Smith, G., & Jacobs, D. (1996). Adolescent gambling and problem gambling in Alberta. Report prepared for the Alberta Alcohol and Drug Abuse Commission. Edmonton, AB: Wynne Resources.
- Zhang, L., Welte, J. W., & Wieczorek, W. F. (2002). Underlying common factors of adolescent problem behaviours. *Criminal Justice & Behaviour, 29*, 161-182.
- Zucker, R. A., Ellis, D. A., Fitzgerald, H. E. (1994). Developmental evidence for at least two alcoholisms: Biopsychosocial variation among pathways into symptomatic difficulty. In T. Babor & V. M. Hesselbrock (Eds.), *Types of alcoholics: Evidence from clinical, experimental, and genetic research. Annals of the New York Academy of Sciences, 708* (pp. 134-146). New York, NY: New York Academy of Sciences.
- Zucker, R. A. Fitzgerald, H. E., & Moses, H. D. (1995). Emergence of alcohol problems and the several alcoholisms: A developmental perspective on etiologic theory and life course trajectory. In D. Ciccetti & D. J. Cohen (Eds.), *Developmental Psychopathology* (pp. 677-711). New York, NY: Wiley.

# **APPENDIX A**

Instruments

All information is confidential and anonymous. We do not require any identifying information and only our research team at McGill University will have access to this information. Please do not indicate your name on this sheet.

For all of the following questions please fill in marks like this:								not like this: $\blacksquare \oslash \measuredangle$					
Grade	7	8	9	10	11	12	OAC		Se	ex	Male	Female	
	0	0	0	0	0	0	0				0	0	
Age	11	12	13	14	15	16	17	18	19	20			
	0	0	0	0	0	0	0	0	0	0			

Directions: A number of statements which children and adolescents have used to describe themselves are given below. Read each statement and then fill in the bubble to the right of the statement to indicate how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

		Almost Never	Sometimes	Often	Almost Always
1.	I feel pleasant	0	0	0	0
2.	I feel nervous and restless	0	0	0	0
3.	I feel satisfied with myself	0	0	0	0
4.	I wish I could be as happy as others seem to be	0	0	0	0
5.	I feel like a failure	0	0	0	0
6.	I feel rested	0	0	0	0
7.	I am "calm, cool, and collected"	0	0	0	0
8.	I feel that difficulties are piling up so that I cannot overcome them	0	0	0	0
9.	I worry too much over something that really doesn't matter	0	0	0	0
10.	I am happy	0	0	0	0
11.	I have disturbing thoughts.	0	0	0	0
12.	I lack self-confidence	0	0	0	0
13.	I feel secure.	0	0	0	0
14.	I make decisions easily.	0	0	0	0
15.	I feel inadequate	0	0	0	0
16.	I am content	0	0	0	0
17.	Some unimportant thought runs through my mind and bothers me	0	0	0	0
18	. I take disappointments so keenly that I can't put them out of my mind	0	0	0	0
19. 20.	I am a steady person I get in a state of tension or turmoil as I think over my	0	0	0	0
	recent concerns and interests.	0	0	0	0
Directions: The statements which follow refer to gambling behaviour. Please tell us how often each item has occurred: *Never, Once or Twice, Sometimes, Often.* Note that gambling refers to betting money on activities (e.g., lottery, cards, sports wagers, bingo, VLT/slot machines, casino type games, sporting events, racetrack betting, games of skill) with a chance of winning money.

For	For all of the following questions please fill in marks like this: $igoplus$		not like this: 📕 🛇 🗹					
		Never	Once or Twice	Sometimes	Often			
1. 2.	In the past year have you gambled for money? In the past year how often have you found yourself	0	0	0	0			
3.	thinking about gambling or planning to gamble? During the course of the past year have you needed to gamble with more and more money to get the amount of	0	0	0	0			
4.	excitement you want?	0	0	0	0			
5.	planned to on gambling? In the past year have you felt bad or fed up when trying to	0	0	0	0			
6.	cut down or stop gambling? In the past year how often have you gambled to help you	0	0	0	0			
7.	escape from problems or when you are feeling bad? In the past year, after losing money gambling, have you	0	0	0	0			
	returned another day to try and win back money you lost?	0	0	0	0			
8. 9.	In the past year has your gambling ever led to lies to your family? In the past year have you ever taken money from the following <i>without permission</i> to spend on gambling:	0	0	0	0			
	a) School dinner money or fare money?	0	0	0	0			
	b) Money from your family?	0	0	0	0			
10.	c) Money from outside the family? In the past year has your gambling ever led to arguments with	0	0	0	0			
	family/friends or others?	0	0	0	0			
11.	In the past year has your gambling ever led to missing school?	0	0	0	0			

12. To your knowledge do any of these people have: (you can have more than one answer)

A gambling problem?		A drinking/drug problem?	
mother/stepmother	0	mother/stepmother	0
father/stepfather	0	father/stepfather	0
sister	0	sister	0
brother	0	brother	0
other relative	0	other relative	0
friend	0	friend	0
classmate	0	classmate	0
other person in your life Please list	0	other person in your life Please list	0

Directions: The following questions ask about you and your experiences, including those with alcohol and other drugs. Some questions ask how often certain things have happened. Please read each question carefully. Fill in the bubble under the answer that is right for you. *Fill in only one response option for each question*.

Ηον	w often have you used alcohol or other drugs: no	ever	once or twice	sometimes	often	
1.	At home	•••••	0	0	0	0
1.	At places on the street where adults hang around		0	0	0	0
2.	With older friends		0	0	0	0
3.	At the homes of friends or relatives	•••••	0	0	0	0
4.	At school activities, such as dances or football games		0	0	0	0
5.	At work		0	0	0	0
6.	When skipping school	•••••	0	0	0	0
8.	To enjoy music or colors, or feel more creative		0	0	0	0
9.	While driving a racing boat	•••••	0	0	0	0
Ho	w often have you:					
10.	Made excuses to your parents about your alcohol or drug use		0	0	0	0
11.	Gotten drugs from a dealer		0	0	0	0
12.	Used alcohol or drugs secretly, so nobody would know you were u	ising	0	0	0	0
13.	Made excuses to teachers about your alcohol or drug use		0	0	0	0
14.	Been upset about other people talking about your using drugs or da	rinking.	0	0	0	0
15.	Lost your sense of taste for several days after using drugs		0	0	0	0
Wł	en using alcohol or other drugs, how often have you:					
16.	Spilled things, bumped into things, fallen down, or had		_	_	_	
	trouble walking around		0	0	0	0
17.	Seen, felt, or heard things that were not really there		0	0	0	0
18.	Spent money on things you wouldn't normally buy		0	0	0	0
19.	Found out things you said or did while using or		0	•	~	~
Tm	drinking that you did not remember		0	0	0	0
20	Sold drugs		$\circ$	$\circ$	$\circ$	$\sim$
20.	Doucht dates from a consister second	•••••	0	0	0	
21.	bought drugs from a security guard	•••••	0	U	0	U

Directions. Read each sentence and ini in the bubble that most accura	Almost	Once in	Some-	Frequently	v Almost
	Never	a While	times	requent	Always
1 Family members are supportive of each other during difficult times	0	0	$\circ$	$\cap$	$\circ$
2. In our family, it is easy for everyone to express higher eminion	Ő	0	Ö	Ő	0
<ol> <li>If our family, it is easy for everyone to express his/her opinion</li></ol>	0	0	0	0	0
the family than with other family members	0	0	0	0	0
4. Each family member has input regarding major family decisions	0	0	0	0	0
5. Our family gathers together in the same room	0	0	0	0	0
6. Children have a say in their discipline	0	0	0	0	0
7. Our family does things together	0	0	0	0	0
8. Family members discuss problems and feel good about the solutions	0	0	0	0	0
9. In our family, everyone goes his/her own way	0	0	0	0	0
10. We shift household responsibilities from person to person	0	0	0	0	0
11. Family members know each other's close friends	0	0	0	0	0
12. It is hard to know what the rules are in our family	0	0	0	0	0
13. Family members consult other family members on personal decisions.	0	0	0	0	0
14. Family members say what they want	0	0	0	0	0
15. We have difficulty thinking of things to do as a family	0	0	0	0	0
16. In solving problems, the children's suggestions are followed	0	0	0	0	0
17. Family members feel very close to each other	0	0	0	0	0
18. Discipline is fair in our family.	0	0	0	0	0
19. Family members feel closer to people outside the					
family than to other family members	0	0	0	0	0
20. Our family tries new ways of dealing with problems	0	0	0	0	0
21. Family members go along with what the family decides to do	0	0	0	0	0
22. In our family, everyone shares responsibilities	0	0	0	0	0
23. Family members like to spend their free time with each other	0	0	0	0	0
24. It is difficult to get a rule changed in our family	0	0	0	0	0
25. Family members avoid each other at home	0	0	0	0	0
26. When problems arise, we compromise.	0	0	0	0	0
27. We approve of each other's friends.	0	0	0	0	0
28. Family members are afraid to say what is on their minds	0	0	0	0	0
29. Family members pair up rather than do things as a					-
total family	0	0	0	0	0
30. Family members share interests and hobbies with each other	0	0	0	0	0

Directions: Read each sentence and fill in the bubble that most accurately describes your family.

		Never	Rar	rely	Occasionally		Often		Daily or more	
										l
		0	1	2	3	4	5	6	7	8
1.	Driving a car	0	0	0	0	0	0	0	0	0
2.	Driving 15 mph over the speed limit	0	0	0	0	0	0	0	0	0
3.	Having sex	0	0	0	0	0	0	0	0	0
4.	Drinking	0	0	0	0	0	0	0	0	0
5.	Having sex without a condom	0	0	0	0	0	0	0	0	0
6.	Sunbathing	0	0	0	0	0	0	0	0	0
7.	Cutting class	0	0	0	0	0	0	0	0	0
8.	Getting drunk	0	0	0	0	0	0	0	0	0
9.	Walking alone at night	0	0	0	0	0	0	0	0	0
10.	Contact sports	0	0	0	0	0	0	0	0	0
11.	Riding without seatbelts	0	0	0	0	0	0	0	0	0
12.	Not studying for an exam	0	0	0	0	0	0	0	0	0
13.	Riding with a drunk driver	0	0	0	0	0	0	0	0	0
14.	Smoking cigarettes	0	0	0	0	0	0	0	0	0
15.	Crash dieting/diet pills	0	0	0	0	0	0	0	0	0
16.	Cheating on exam	0	0	0	0	0	0	0	0	0
17.	Binge eating	0	0	0	0	0	0	0	0	0
18.	Misusing prescription drugs	0	0	0	0	0	0	0	0	0
19.	Smoking marijuana	0	0	0	0	0	0	0	0	0
20.	Taking speed	0	0	0	0	0	0	0	0	0
21.	Having sex with more than one partner.	0	0	0	0	0	0	0	0	0
22.	Riding a motorcycle	0	0	0	0	0	0	0	0	0
23.	Betting money on a card game	0	0	0	0	0	0	0	0	0
24.	Taking cocaine/crack	0	0	0	0	0	0	0	0	0
25.	Shoplifting	0	0	0	0	0	0	0	0	0
26.	Accepting a ride from a stranger	0	0	0	0	0	0	0	0	0
27.	Buying a scratch or lottery ticket	0	0	0	0	0	0	0	0	0

Directions: Fill in the bubble that indicates HOW OFTEN you have done these activities over the past 12 months.

		Not risky	Slig risi	htly ky	N	loderatel risky	у	Very risky	1	Extremely risky
		0	1	2	3	4	5	6	7	8
1.	Driving a car	0	0	0	0	0	0	0	0	0
2.	Driving 15 mph over the speed limit	0	0	0	0	0	0	0	0	0
3.	Having sex	0	0	0	0	0	0	0	0	0
4.	Drinking	0	0	0	0	0	0	0	0	0
5.	Having sex without a condom	0	0	0	0	0	0	0	0	0
6.	Sunbathing	0	0	0	0	0	0	0	0	0
7.	Cutting class	0	0	0	0	0	0	0	0	0
8.	Getting drunk	0	0	0	0	0	0	0	0	0
9.	Walking alone at night	0	0	0	0	0	0	0	0	0
10.	Contact sports	0	0	0	0	0	0	0	0	0
11.	Riding without seatbelts	0	0	0	0	0	0	0	0	0
12.	Not studying for an exam	0	0	0	0	0	0	0	0	0
13.	Riding with a drunk driver	0	0	0	0	0	0	0	0	0
14.	Smoking cigarettes	0	0	0	0	0	0	0	0	0
15.	Crash dieting/diet pills	0	0	0	0	0	0	0	0	0
16.	Cheating on exam	0	0	0	0	0	0	0	0	0
17.	Binge eating	0	0	0	0	0	0	0	0	0
18.	Misusing prescription drugs	0	0	0	0	0	0	0	0	0
19.	Smoking marijuana	0	0	0	0	0	0	0	0	0
20.	Taking speed	0	0	0	0	0	0	0	0	0
21.	Having sex with more than one partner.	0	0	0	0	0	0	0	0	0
22.	Riding a motorcycle	0	0	0	0	0	0	0	0	0
23.	Betting money on a card game	0	0	0	0	0	0	0	0	0
24.	Taking cocaine/crack	0	0	0	0	0	0	0	0	0
25.	Shoplifting	0	0	0	0	0	0	0	0	0
26.	Accepting a ride from a stranger	0	0	0	0	0	0	0	0	0
27.	Buying a scratch or lottery ticket	0	0	0	0	0	0	0	0	0

Directions: Fill in the bubble that represents how BENEFICIAL it is to do the following activities.

		Not beneficial	Slig bene	ghtly eficial	Moderately beneficial		Very beneficial		Extremely beneficial	
		0	1	2	3	4	5	6	7	8
1.	Driving a car	. O	0	0	0	0	0	0	0	0
2.	Driving 15 mph over the speed limit	. O	0	0	0	0	0	0	0	0
3.	Having sex	. 0	0	0	0	0	0	0	0	0
4.	Drinking	. O	0	0	0	0	0	0	0	0
5.	Having sex without a condom	. O	0	0	0	0	0	0	0	0
6.	Sunbathing	. O	0	0	0	0	0	0	0	0
7.	Cutting class	. O	0	0	0	0	0	0	0	0
8.	Getting drunk	. O	0	0	0	0	0	0	0	0
9.	Walking alone at night	. 0	0	0	0	0	0	0	0	0
10.	Contact sports	. 0	0	0	0	0	0	0	0	0
11.	Riding without seatbelts	. O	0	0	0	0	0	0	0	0
12.	Not studying for an exam	. 0	0	0	0	0	0	0	0	0
13.	Riding with a drunk driver	. 0	0	0	0	0	0	0	0	0
14.	Smoking cigarettes	. 0	0	0	0	0	0	0	0	0
15.	Crash dieting/diet pills	. O	0	0	0	0	0	0	0	0
16.	Cheating on exam	. O	0	0	0	0	0	0	0	0
17.	Binge eating	. O	0	0	0	0	0	0	0	0
18.	Misusing prescription drugs	. O	0	0	0	0	0	0	0	0
19.	Smoking marijuana	. O	0	0	0	0	0	0	0	0
20.	Taking speed	. 0	0	0	0	0	0	0	0	0
21.	Having sex with more than one partner	. O	0	0	0	0	0	0	0	0
22.	Riding a motorcycle	O	0	0	0	0	0	0	0	0
23.	Betting money on a card game	O	0	0	0	0	0	0	0	0
24.	Taking cocaine/crack	O	0	0	0	0	0	0	0	0
25.	Shoplifting	O	0	0	0	0	0	0	0	0
26.	Accepting a ride from a stranger	O	0	0	0	0	0	0	0	0
27.	Buying a scratch or lottery ticket	O	0	0	0	0	0	0	0	0

Directions: Please read each statement and fill in the bubble below the answer that best describes how true the statement is for you. (There are no right or wrong answers.

	Very true	Fairly true	Partly true	Not true
	of me	of me	of me	of me
1. I like to attempt problems that I am not sure I will be able to solve	O	0	0	0
2. I like to try my hand at new, somewhat difficult tasks even when there is a				
risk that I will not succeed	O	0	0	0
3. When I am given a task that I have a fair chance of accomplishing, I like to start				
working on it immediately	0	0	0	0
4. I enjoy myself when I run into problems that are so difficult that I am not				
quite sure I will be able to solve them.	O	0	0	0
5. I am attracted to situations that give me a fair opportunity to find out how clever I am	O	0	0	0
6. I am attracted to tasks that are somewhat difficult for me.	0	0	0	0
7. I feel challenged in situations that give me the opportunity to test my abilities	0	0	0	0
8. I feel pleasure from working on tasks that are somewhat difficult for me.	0	0	0	0
9. I easily get involved in doing difficult things, even when they are not exactly useful	0	0	0	0
10. I feel engaged by situations which give me the opportunity to test my abilities	0	0	0	0
11. When a somewhat difficult job has to be done, I hope to be asked to do it	O	0	0	0
12. I like to be confronted with tasks that I have a chance of solving, if I do my very bes	t. O	0	0	0
13. When I am faced with something that I don't immediately understand, I				
easily take interest in it.	O	0	0	0
14. I am attracted to work that I am uncertain I will do well at	0	0	0	0
15. It is important to me to succeed at tasks which I find somewhat difficult,				
even when no one else knows about it	0	0	0	0
16. I don't like working in situations where I am very uncertain whether I will fail or no	t. O	0	0	0
17. I am afraid of failing in situations where the outcome is uncertain.	0	0	0	0
18. I am afraid of failing at tasks which I find somewhat difficult, even when				
no one else will hear about it	O	0	0	0
19. Just thinking about working on new, somewhat difficult tasks, makes me feel uneas	y. O	0	0	0
20. I don't like situations where my abilities are tested	O	0	0	0
21. I worry about work that I'm not sure I can manage	O	0	0	0
22. I don't like working on things that I don't know I can do well, even when no one				
else knows about it	O	0	0	0
23. Situations in which my abilities are tested make me feel worried.	O	0	0	0
24. When I am given a task which I have a good chance of accomplishing, I am afraid				

of failing	0	0	0	0
25. I feel worried about doing things which seem somewhat difficult.	0	0	0	0
26. I don't like working in unfamiliar situations, even when no one knows about it	0	0	0	0
27. If a somewhat difficult job has to be done, I hope to be spared from doing it	0	0	0	0
28. I dislike doing work which shows others how skilled or unskilled I am	0	0	0	0
29. I don't like working with things which I am uncertain I can manage	0	0	0	0
30. I become anxious when I meet a problem that I don't understand at first	0	0	0	0

Directions: Read the statements below. If a statement is true or mostly true, as applied to you, fill in the bubble under the TRUE column. If a statement is false or not usually true, fill in the bubble under the FALSE column.

	TRUE	FALSE
1. My teachers have it in for me.	0	0
2. I'm afraid to go to school.	0	0
3. I think school is a waste of time.	0	0
4. I have been suspended from school one or more times for bad behaviour.	0	0
5. I can read a long while without tiring my eyes	0	0
6. In school I have sometimes been sent to the principal for bad behaviour.	0	0
7. I am a slow learner in school.	0	0
8. In school I find it hard to talk in front of the class	0	0
9. I can remember "playing sick" to get out of a something.	0	0
10. I am often upset by things that happen in school.	0	0
11. My school grades are better or average.	0	0
12. Often I have not gone to school even when I should have.	0	0
13. In school my grades in classroom behaviour (conduct) are quite regularly bad	0	0
14. I think my teachers at school are stupid.	0	0
15. I would rather drive around with my friends than go to school activities or athletic events	0	0
16. I have missed a lot of school in my life because of sickness.	0	0
17. The only good thing about school is my friends.	0	0
18. Others tell me that I am crazy.	0	0
19. At school I am very often bored and sleepy	0	0
20. I like school	0	0

Directions: Read each of the statements below describing a behaviour for coping with problems. Decide *how often* you do each of the described behaviours when you face difficulties or feel tense. Even though you may do some of these things just for fun, please indicate ONLY how often you do each behaviour as a way to cope with problems.

When you face difficulties or feel tense, how	Never	Hardly	Sometimes	Often	Most of
often do you		ever			the time
1. Go along with parents' requests and rules	O	0	0	0	0
2. Read	O	0	0	0	0
3. Try to be funny and make light of it all	O	0	0	0	0
4. Apologize to people	O	0	0	0	0
5. Listen to music - stereo, radio, etc.	O	0	0	0	0
6. Talk to a teacher or counselor at school about what bothers you	u. O	0	0	0	0
7. Eat food	O	0	0	0	0
8. Try to stay away from home as much as possible	O	0	0	0	0
9. Use drugs prescribed by a doctor	O	0	0	0	0
10. Get more involved in activities at school	O	0	0	0	0
11. Go shopping; buy things you like	O	0	0	0	0
12. Try to reason with parents and talk things out; compromise	O	0	0	0	0
13. Try to improve yourself (get body in shape, get better grades,	, etc.)O	0	0	0	0
14. Cry	0	0	0	0	0
15. Try to think of the good things in your life	0	0	0	0	0
16. Be with a boyfriend or girlfriend	0	0	0	0	0
17. Ride around in the car	O	0	0	0	0
18. Say nice things to others	0	0	0	0	0
19. Get angry and yell at people	O	0	0	0	0
20. Joke and keep a sense of humor	O	0	0	0	0
21. Talk to a minister/priest /rabbi	O	0	0	0	0
22. Let off steam by complaining to family members	O	0	0	0	0
23. Go to church	O	0	0	0	0
24. Use drugs (not prescribed by doctor)	O	0	0	0	0
25. Organize your life and what you have to do	O	0	0	0	0
26. Swear	O	0	0	0	0
27. Work hard on schoolwork or other school projects	O	0	0	0	0
28. Blame others for what's going wrong	O	0	Ő	0	0
29. Be close with someone you care about	O	0	0	0	0

30. Try to help other people solve their problems	0	0	0	0	0
31. Talk to your mother about what bothers you	0	0	0	0	0
32. Try, on you own, to figure out how to deal with your problems					
or tension	0	0	0	0	0
33. Work on a hobby you have (sewing, model building, etc.)	0	0	0	0	0
34. Get professional counseling (not from a school					
teacher or school counselor)	0	0	0	0	0
35. Try to keep up friendships or make new friends	0	0	0	0	0
36. Tell yourself the problem is not important	0	0	0	0	0
37. Go to a movie	0	0	0	0	0
38. Daydream about how you would like things to be	0	0	0	0	0
39. Talk to a brother or sister about how you feel	0	0	0	0	0
40. Get a job or work harder at one	0	0	0	0	0
41. Do things with your family	0	0	0	0	0
42. Smoke	0	0	0	0	0
43. Watch TV	0	0	0	0	0
44. Pray	0	0	0	0	0
45. Try to see the good things in a difficult situation	0	0	0	0	0
46. Drink beer, wine, liquor	0	0	0	0	0
47. Try to make your own decisions	0	0	0	0	0
48. Sleep	0	0	0	0	0
49. Say mean things to people: be sarcastic	0	0	0	0	0
50. Talk to your father about what bothers you	0	0	0	0	0
51. Let off steam by complaining to your friends	0	0	0	0	0
52. Talk to a friend about how you feel	0	0	0	0	0
53. Play video games, pool, pinball etc	0	0	0	0	0
54. Do a strenuous physical activity (jogging, biking, etc.)	0	0	0	0	0

Directions: Please fill in the bubbles for the following questions about important adults in your life.

		YES	NO
1.	a. Is there an adult in your life (apart from you parents) that you feel cares about you? If YES, please do questions b, c, and d.	0	0
	<ul> <li>b. Can you trust this person to be there for you in the future?</li> <li>c. How long have you had a close relationship with this person?</li> <li>d. Which activities have you done with this person in the <i>PAST 4 WEEKS</i>?</li> <li>Gone shopping</li> <li>O</li> <li>Played a sport</li> </ul>	0	0
	Gone to a religious service or church-related activity		
	Talked about someone you're dating or a party you went to		
	Gone to a movie, play, museum, concert, or sports event		
	Had a talk about a personal problem you were having		
	Had a serious argument about your behaviour		
	Talked about your school work or grades		
	Worked on a project for school.		
2.	Talked about other things you're doing in school		
	Parental divorce and/or remarriage of parents		
	Death of friend or family member you are close to		
	Moving to a new town or city O		
	Physical/sexual abuse O		
	Parent lost his/her job O		
	A close family member had/has serious mental/physical illness O		
	Arrest of family member O		
	You have had a serious illness in the past few years O		
	You have been pregnant O		

Directions: Here is a list of clubs, organizations, and teams found at many schools and communities. Fill in the bubble for any that you are participating in this year, or that you plan to participate in later in the school year.

- O Language or Ethnic club
- O Orchestra/choir/band
- O Debate team
- O Cheerleading/dance team O Newspaper
- O Sports teams in school O Sports teams not in school.
- O Other clubs (ie. Guides, Scouts)
- O Computer club
- O Math/science clubs
- O Student yearbook
- O Church/religious youth groups
- O Volunteering in your community
- O Drama club
- O Others not mentioned

Di	ections: How much do you agree or disagree v	vith the f	ollowing state	ments?		
		Strongl	y Agree	Neither agree	Disagree	Strongly
1.	You feel close to people at your school	0	0	0	0	0
2.	You feel like you are a part of your school	0	0	0	0	0
3.	Your teachers care about you.	0	0	0	0	0
4.	You are happy to be at your school	0	0	0	0	0
5.	The teachers at your school treat students fairly	0	0	0	0	0
6.	You feel safe in your school	0	0	0	0	0
			Below average	Average	Above Av	erage
7.	Overall, my grades are		0	0	0	
Но	w often have you had trouble	Never	Just a few times	Once a week	Almost every day	Every day
8.	Getting along with other students?	0	0	0	Ó	0
9.	Getting along with other teachers?	0	0	0	0	0

## Thank-you for taking the time to fill this out!

For Office use c	only	
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## **APPENDIX B**

## Additional Tables

	Gambling Group	Mean	
	Comparisons <sup>1</sup>	Difference	P P
PESQ-PS Substance Use Score			
	Non vs. Social	-3.43	<.001
	Non vs. At-Risk	-7.53	< .001
	Non vs. PPG	-11.83	<.001
	Social vs. At-Risk	-4.10	< .001
	Social vs. PPG	-8.41	< .001
RIPS-I Score			2
	Non vs. Social	-10.87	< .001
	Non vs. At-Risk	-19.23	<.001
	Non vs. PPG	-35.56	< .001
	Social vs. At-Risk	-8.35	< .001
	Social vs. PPG	-24.69	<.001
	At-Risk vs. PPG	-16.33	<.001

 Table B1. Gambling Group Differences on Substance Use and Involvement in Multiple Risk

 Activities

*Note*: only significant Tamahane's T2 Post Hoc test differences are presented. <sup>1</sup>Categorized by the DSM-IV-MR-J.

RIPS-Involvement Score	Grade Comparisons	Mean Difference	р
	Grade 7 vs. 8	-6.73	<.001
	Grade 7 vs. 9	-11.40	<.001
	Grade 7 vs. 10	-14.56	<.001
	Grade 7 vs. 11	-22.97	<.001
	Grade 7 vs. 12	-27.13	<.001
	Grade 7 vs. 13	-26.85	<.001
	Grade 8 vs. 9	-4.47	<.01
	Grade 8 vs. 10	-7.83	<.001
	Grade 8 vs. 11	-16.24	<.001
	Grade 8 vs. 12	-20.40	<.001
	Grade 8 vs. 13	-20.12	<.001
	Grade 9 vs. 11	-16.19	<.001
	Grade 9 vs. 12	-20.40	<.001
	Grade 9 vs. 13	-20.96	<.001
	Grade 10 vs. 11	-8.41	<.001
	Grade 10 vs. 12	-12.56	<.001
	Grade 10 vs. 13	-12.29	<.001

Table B2. Grade Differences in RIPS-I Scores

Note: only significant differences in Tamahane's T2 Post Hoc Tests are presented.

	RIPS-I Groups <sup>1</sup>	Mean Difference	p
DSM-IV-MR-J Gambling Score			
	Low vs. Moderate	21	<.001
	Low vs. High	96	<.001
	Moderate vs. High	75	<.001
PESQ-PS Substance Use Score			
	Low vs. Moderate	-3.74	<.001
	Low vs. High	-14.18	<.001
	Moderate vs. High	-10.45	<.001

*Note*: only significant differences in Tamhane's T2 Post Hoc Tests are presented. <sup>1</sup>Categorized by the RIPS-Involvement Scale.

Sample $(N = 2137)^2$	Reporting Presence of a Mentor <sup>1</sup>				
	Total Sample	Non- gambler	Social gambler	At-Risk gambler	PPG
Total	74.0	74.1	76.2	79.6	71.4
Sex***					
Male	70.4	69.4	69.0	78.7	70.9
Female	79.1	75.7	82.8	81.4	73.7
Grade*					
7	76.9	76.5	77.3	81.0	60.0
8	81.8	81.2	81.8	89.3	76.2
9	73.9	71.4	73.7	78.9	100.0
10	71.0	66.7	74.9	66.7	66.7
11	74.6	74.8	74.1	87.5	63.3
12	73.6	76.5	73.4	72.7	61.1
13	76.7	65.9	79.4	76.9	100.0

Table B4. Mentorship: Developmental and Sex Differences for Total Sample and Gambling Severity

<sup>1</sup>Percentage within gambling groups categorized by the DSM-IV-MR-J. <sup>2</sup>42 Participants had not indicated whether or not they had a mentor. \*p < .05. \*\*\*p < .001.

	Percentage Reporting Presence of a Mentor <sup>1</sup>				
	Substance U	Substance Use Groups <sup>2</sup> RIPS-I Groups <sup>3</sup>			
	Non-risk	Non-risk At-risk <sup>a</sup>		Moderate	High⁵
Total	75.1	75.8	75.8	73.2	77.4
Sex*** <sup>ttt</sup>					
Male	70.5	67.3	69.5	69.5	72.0
Female	78.4	81.7	79.4 75.9		82.4
Grade					
7	76.7	100.0	76.7	77.8	75.0
8	80.8	91.7	81.5	78.8	90.0
9	73.7	73.1	75.6	73.5	71.7
10	71.3	67.8	73.1	66.4	74.1
11	76.0	71.1	74.5	73.7	75.3
12	70.5	78.0	55.6	74.1	75.6
13	72.4	83.3	50.0	66.7	85.3

Table B5. Mentorship: Differences in Substance Use and Multiple Risk Involvement Groups

<sup>1</sup>Percentage. Analyses involving PESQ-PS had a total sample size of 2025 due to 113 participants who endorsed the INF scale being excluded from analyses and 42 participants not missing information on mentorship. All other analyses had a sample size of 2137. <sup>2</sup>Identified as at-risk on the PESQ-PS.

<sup>3</sup>Participants scoring in the high risk category on the RIPS-I. \*\*\*p < .001 in non risk and at-risk substance use groups; <sup>ttt</sup>p < .001 in high multiple risk involvement group.

Sample $(N = 2179)$	Involvement in Conventional Activities <sup>1</sup>				
	Total Sample	PPG <sup>2</sup>	PPG <sup>2</sup> At-risk Substance Abuse <sup>3</sup>		
Total	90.4	87.0	85.1*	87.2*	
Sex*			-		
Male	88.8	86.4	82.1	85.7	
Female	91.6	90.0	87.2	88.5	
Grade*					
7	95.7	100.0	100.0	88.9	
8	96.8	90.5	91.7	94.0	
9	92.9	87.5	100.0	90.9	
10	87.7	86.7	83.1	86.2	
11	86.6	83.9	83.3	87.2	
12	85.2	77.8	81.2	83.3	
13	87.2	100.0	90.0	90.2	

## Table B6. Involvement in Conventional Activities: Grade and Sex Differences in Total Sample and Within At-Risk Groups

<sup>1</sup>Percentage of youth reporting involvement in at least one conventional activity.

<sup>2</sup>DSM-IV-MR-J score ( $\geq$  4).

<sup>3</sup>Identified as at-risk on the PESQ-PS.

<sup>4</sup>Participants scoring in the high risk category on the RIPS-I. \*< .05. Statistical significance in total sample.

Table B7. Sex Differences i	n Effective	Coping in	<b>High-Risk</b>	Behaviour	Groups
		1 0	Ų		1

Sex Differences	df	t	р
Gambling <sup>1</sup>			
Non-gambler	329.340	-3.225	.001
Social gambler	1046.729	-4.925	< .001
At-Risk gambler	168	-1.875	.063
Probable Pathological gambler	106	1.838	.069
Substance Use <sup>2</sup>			
No risk	1428.122	-5.704	< .001
At-risk	395	-2.259	.024
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	489.429	-4.971	< .001
Moderate	731	-3.691	< .001
High	722	-2.231	.026

Note: only significant differences in independent samples t-tests are presented.

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

Developmental Differences	df, N	F	p
Gambling <sup>1</sup>	<b>-</b>		•
Non-gambler	6,827	3.687	.001
Social gambler	6,1074	1.690	.120
At-Risk gambler	6,170	.869	.519
Probable Pathological gambler	6,108	1.233	.296
Substance Use <sup>2</sup>			
No risk	6,1669	4.139	< .001
At-risk	6,397	.712	.640
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	6,722	6.094	< .001
Moderate	6,733	.484	.820
High	6,724	.728	.627

Table B8. Developmental Differences in Effective Coping in High-Risk Behaviour Groups

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

Table B9.	Grade	Differences	in	Effective	Cot	oing	for	High	-Risl	ςΒ	ehav	/iours	Group	s
					~~								OI C WP	<u> </u>

ACOPE-Effective Coping Score	Substance Use Group Comparisons <sup>1</sup>	Mean Difference	p
Substance Abuse Group: No risk	Grade 7 vs. 10	6.84	<.001
	Grade 7 vs. 11	6.54	< .01
	Grade 7 vs. 12	5.57	<.05
RIPS-I: Low involvement	RIPS-I Group		
	Comparisons <sup>2</sup>		
	Grade 7 vs. 10	11.54	<.001
	Grade 7 vs. 11	10.29	< .01
	Grade 7 vs. 12	13.03	<.05

Note: only significant differences in Tamhane's T2 Statistic Pos Hoc Tests are presented. <sup>1</sup>Categorized by the PESQ-PS. <sup>2</sup>Categorized by the RIPS-I.

Family Cohesion Score	Gambling Group Comparisons <sup>1</sup>	Mean Difference	р
	Non vs. Social	2.04	< .001
	Non vs. At-Risk	5.27	<.001
	Non vs. PPG	8.46	<.001
	Social vs. At-Risk	3.23	< .01
	Social vs. PPG	6.42	< .001
	RIPS-I Group	Mean	<b>n</b>
	Comparisons <sup>2</sup>	Difference	<i>p</i>
	Low vs. Moderate	4.45	<.001
	Low vs. High	8.48	<.001
	Moderate vs. High	4.03	<.001

Table B10. High-Risk Group Differences on Family Cohesion

*Note*: only significant differences in Tamhane's Post Hoc Tests are presented. <sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the RIPS-I.

Family Cabasian Saara	Gambling Group	Mean	
Faining Conesion Score	Comparisons <sup>1</sup>	Difference	p
Non Gamblers	Grade 7 vs. 8	3.62	< .05
	Grade 7 vs. 9	5.09	<.001
	Grade 7 vs. 10	5.99	<.001
	Grade 7 vs. 11	6.54	<.01
	Grade 7 vs. 12	5.38	<.01
Social Gamblers	Grade 7 vs. 10	3.62	<.01
	Grade 7 vs. 11	6.25	<.001
· · · · · · · · · · · · · · · · · · ·	Grade 7 vs. 12	5.75	<.001
	Grade 8 vs. 11	3.50	< .01
	Substance Use Group		
	Comparisons <sup>2</sup>		
Non-Risk for Substance Abuse	Grade 7 vs. 8	3.11	< .01
	Grade 7 vs. 9	3.85	<.001
	Grade 7 vs. 10	3.82	< .001
	Grade 7 vs. 11	6.34	<.001
	Grade 7 vs. 12	4.20	<.001
	Grade 7 vs. 13	4.38	< .01
	Grade 8 vs. 11	3.11	<.01
	RIPS-I Group	Mean	n
	Comparisons <sup>3</sup>	Difference	
Low Involvement Group	Grade 7 vs. 10	3.44	<.05
	Grade 7 vs. 11	5.07	<.01

Table B11. Grade Differences in High-Risk Behaviour Groups on Family Cohesion

 Image: Crade / vs. 11
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 Note: only significant differences in Tamhane's T2 Statistic Pos Hoc Tests are presented.
 1

 Categorized by the DSM-IV-MR-J.
 2

 Categorized by the PESQ-PS.
 3

 Categorized by the RIPS-I.
 3

Sex Differences	df	t	p
Gambling Groups <sup>1</sup>			
Non-gambler	825	1.836	.067
Social gambler	1072	2.091*	.037
At-Risk gambler	168	.998	.320
Probable Pathological gambler	106	.237	.813
Substance Use <sup>2</sup>			
Non-risk	1573.05	.90	.928
At-risk	395	019	.985
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	720	126	.900
Moderate	698.44	.154	.877
High	721.25	2.390*	.017

Table B12. Sex Differences in Family Cohesion within High-Risk Behaviour Groups

Note: only significant differences are presented. <sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS.

<sup>3</sup>Categorized by the RIPS-I.

Table B13. Developmental Differences in Family Cohesion within High-Risk Behaviours

	10.37	<u> </u>	
Developmental Differences	df, N	<u> </u>	<u>p</u>
Gambling Groups <sup>1</sup>			
Non-gambler	6, 827	6.73	< .001
Social gambler	6, 1074	6.64	< .001
At-Risk gambler	6, 170	1.37	.228
Probable Pathological gambler	6, 108	.72	.625
Substance Use <sup>2</sup>			
Non-risk	6, 1669	9.78	< .001
At-risk	6, 397	1.04	.399
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	6, 721	4.25	< .001
Moderate	6, 732	1.38	.221
High	6, 723	.55	.772

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

School Connectedness Score	Gambling Group	Mean	D
	Comparisons	Difference	1
	Non vs. Social	.14715	< .01
	Non vs. At-Risk	.5619	<.001
	Non vs. PPG	.6288	<.001
	Social vs. At-Risk	.4147	<.001
	Social vs. PPG	.4816	< .01
	RIPS-I Group	Mean	
	Comparisons <sup>2</sup>	Difference	
	Low vs. Moderate	.1434	< .01
	Low vs. High	.4991	<.001
	Moderate vs. High	.3557	<.001

Table B14. High-Risk Behaviour Group Differences in School Connectedness

*Note*: only significant differences in Tamhane's T2 Statistic Post Hoc Tests are presented. <sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the RIPS-I.

Table B15. Developmental	<b>Differences in RIPS-I</b>	Groups on School	Connectedness
<b>▲</b>		1	

School Connectedness Score	RIPS-I Group Comparisons <sup>1</sup>	Mean Difference	р
RIPS-Moderate Involvement	Grade 7 vs. 10	4473	< .01
Group			
	Grade 7 vs. 11	4684	< .01
	Grade 7 vs. 12	5775	< .001
	Grade 7 vs. 13	5910	< .01
RIPS-High Involvement Group	Grade 7 vs. 11	-1.002	< .01
	Grade 7 vs. 12	9214	< .01
	Grade 7 vs. 13	-1.321	<.001
	Grade 8 vs. 13	8164	<.001
	Grade 10 vs. 13	6171	<.001
	Grade 12 vs. 13	.3995	< .05

Note: only significant differences Tukey HSD Post Hoc Tests are presented. <sup>1</sup>Categorized by the RIPS-I.

Sex Differences	df	t	p
Gambling Groups <sup>1</sup>			
Non-gambler	825	-0.721	0.471
Social gambler	1072	-2.576	0.010
At-Risk gambler	168	-0.843	0.400
Probable Pathological gambler	106	2.676	0.009
Substance Use <sup>2</sup>			
Non-risk	1667	-4.863	< .001
At-risk	395	-0.120	0.904
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	501.47	-5.127	< .001
Moderate	731	-2.580	0.010
High	722	1.070	0.285

Table B16. Sex Differences in High-Risk Behaviour Groups on School Connectedness

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

Table B17. Developmental Differences in High-Risk Behaviour Groups on School
Connectedness

Developmental Differences	df, N	F	р
Gambling Groups <sup>1</sup>			
Non-gambler	6, 827	0.98	0.441
Social gambler	6, 1074	0.98	0.437
At-Risk gambler	6, 170	1.41	0.213
Probable Pathological gambler	6, 108	1.39	0.228
Substance Use <sup>2</sup>			
Non-risk	6, 1669	1.97	0.067
At-risk	6, 397	1.74	0.111
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	6, 722	1.53	0.166
Moderate	6, 733	4.66	< .001
High	6, 724	6.84	<.001

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

	AMS-Subscale <sup>1</sup>				
	Motive to Approach		Motive t	o Avoid	
	Suc	cess	Fail	ure	
	М	SD	М	SD	
Gambling Groups <sup>2</sup>					
Non-gambler	36.89	9.12	34.28	9.83	
Social gambler	37.38	8.70	33.30	9.36	
At-Risk gambler	38.05	8.66	33.51	9.55	
Probable Pathological					
gambler	38.03	10.04	35.07	10.19	
Substance Use Groups <sup>3</sup>					
No risk	37.59	8.89	33.60	9.56	
At-risk	36.08	8.89	34.46	9.29	
Multiple Risk Involvement					
Low	26.04	8.02	22.96	0.57	
LOW	30.94	8.92	33.80	9.57	
Moderate	38.08	8.79	33.36	9.46	
L High	36.81	9.05	34.11	9.80	

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Table B18. Achievement Motivation Subscales: Differences in High-Risk Behaviour Groups

<sup>1</sup>Range 15-60, the higher the score the greater the motive. <sup>2</sup>Categorized by the DSM-IV-MR-J. <sup>3</sup>Categorized by the PESQ-PS. <sup>4</sup>Categorized by the RIPS-I.

	Achievement Motivation Groups <sup>1</sup>		
	Low	Average	High
Gambling Groups <sup>2</sup>			
Non-gambler	21.5	59.1	19.3
Social gambler	18.3	60.5	21.1
At-Risk gambler	17.1	58.8	24.1
Probable Pathological			<u>-</u>
gambler	16.7	65.7	17.6
Substance Use Groups <sup>3</sup>			
No risk	18.6	59.9	21.4
At-risk	21.9	61.2	16.9
Multiple Risk Involvement Groups <sup>4</sup>			
Low	17.9	64.0	18.1
Moderate	18.3	57.3	24.4
High	22.0	59.1	18.9

Table B19. Achievement Motivation in High-Risk Behaviour Groups

<sup>1</sup>Percentage. Achievement motivation groups created by ranking all scores. Low achievement group = bottom quartile; Average group = middle two quartiles; High group = top quartile.  $^{2}$ Categorized by the DSM-IV-MR-J.

<sup>3</sup>Categorized by the PESQ-PS.

<sup>4</sup>Categorized by the RIPS-I.

Individual with Gambling	bling Substance Use Groups <sup>1</sup>		
Problem	Not at Risk	At-risk	
Family Member			
Mother or Stepmother**	2.7	5.0	
Father or Stepfather	2.8	4.5	
Sister	0.5	0.5	
Brother***	1.6	4.3	
Other Relative*	12.5	17.1	
Peers			
Friend***	8.0	23.4	
Classmate***	5.7	16.9	
Significant Other*	4.4	6.8	

Table B20. Perceived Familial and Peer Gambling Problems: Substance Use

<sup>1</sup>Percentage. \*\*\*\*p < .001.

Individual with Substance Use	Substance Use Groups <sup>1</sup>		
Problem	Not at Risk	At-risk	
Family Member			
Mother or Stepmother***	2.6	8.6	
Father or Stepfather***	7.5	18.4	
Sister	2.0	3.0	
Brother***	3.7	10.3	
Other Relative***	19.8	37.0	
Peers			
Friend***	20.7	50.9	
Classmate***	16.7	31.5	
Significant Other***	8.5	15.4	

Table B21. Perceived Familial and Peer Substance Abuse Problems: Substance Use

<sup>1</sup>Percentage. \*p < .05. \*\*p < .01. \*\*\*p < .001

Table B22. Perceived Familial and Peer Gambling Problems: RIPS-I

Individual with Gambling	RIPS-I Groups <sup>1</sup>		
Problem	Low	Moderate	High
Family Member			
Mother or Stepmother***	1.5	3.5	5.1
Father or Stepfather**	2.1	3.5	5.1
Sister	0.3	0.7	1.2
Brother***	1.0	2.0	4.7
Other Relative***	10.2	14.7	16.7
Peers			
Friend***	3.6	9.5	23.2
Classmate***	3.6	6.1	15.9
Significant Other***	3.6	4.5	7.9

Significant Other\*\*\* <sup>1</sup>Percentage.  ${}^{*}p < .05. {}^{**}p < .01. {}^{***}p < .001.$ 

Individual with Substance Use	RIPS-I Groups <sup>1</sup>		
Problem	Low	Moderate	High
Family Member			
Mother or Stepmother***	1.1	3.0	8.0
Father or Stepfather***	3.3	9.1	18.8
Sister***	0.8	2.7	4.3
Brother***	1.5	5.3	9.9
Other Relative***	16.3	22.2	31.6
Peers			
Friend***	11.4	26.3	47.7
Classmate***	11.2	21.3	30.5
Significant Other***	6.9	9.7	15.6

Table B23. Perceived Familial and Peer Substance Abuse Problems: RIPS-I

<sup>1</sup>Percentage.

 $p^* < .001.$ 

Table B24. Stressful Life Experiences: Substance Abuse and RIPS-I

Stressful Life Event	Substance Abuse Groups <sup>1</sup>		R	IPS-I Groups	2
	Non-risk	At-risk	Low	Moderate	High
Parental divorce or remarriage*** <sup>ttt</sup>	20.0	29.5	16.9	22.5	28.0
Death of friend or family member you are close to*** <sup>ttt</sup>	61.4	70.8	58.4	63.4	68.6
Moving to a new town or city***	27.7	36.0	26.9	30.0	31.6
Physical or sexual abuse*** <sup>ttt</sup>	5.8	12.3	2.9	6.8	13.8
Parent lost his or her job*** <sup>ttt</sup>	16.9	25.4	13.2	18.1	25.7
Close family member had/has serious mental or physical illness*** <sup>ttt</sup>	31.4	40.1	28.1	32.5	40.1
Arrest of family member*** <sup>ttt</sup>	10.2	22.7	7.5	11.9	21.5
You have had a serious illness in the past few years*** <sup>ttt</sup>	9.2	14.9	8.2	9.5	14.5
You have been pregnant (females only)** <sup>tt</sup>	1.2	3.8	0.7	1.9	4.0

Note: Percentage.

 $^{1}N = 2066$  due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.  $^{2}N = 2179$ . Participants scoring in the high risk category on the RIPS-I  $^{**}p < .01$   $^{***}p < .001$  in substance use groups.  $^{**}p < .01$   $^{**}p < .001$  in RIPS-I groups.

Diele Security Course	Stressful Life Event <sup>1</sup>		
Risk Seventy Groups	Not Present	Present	
Substance Use <sup>2***</sup>			
No or low-risk	17.1	82.9	
At-risk	8.6	91.4	
RIPS-I Group <sup>3***</sup>			
Low	18.8	81.2	
Medium	15.7	84.3	
High	11.6	88.4	
Gambling Group <sup>4**</sup>			
Non-gambler	18.1	81.9	
Social gambler	14.7	85.3	
At-Risk gambler	8.2	91.8	
Possible Pathological gambler	12.0	88.0	

Table B25. Stressful Life Events in High-Risk Behaviour Groups

<sup>1</sup>Percentage.

 $^{2}N = 2066$  due to exclusion of 113 participants who endorsed the PESQ-PS INF scale.  $^{3}N = 2179$ . Categorized by the RIPS-I.

 $^{4}N = 2179$ . Categorized by the DSM-IV-MR-J. \*\*p < .01. \*\*\*p < .001.

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	Tukey HSD. Gambling Group	Mean	
STAI-Trait Anxiety Score <sup>1</sup>	Comparisons <sup>2</sup>	Difference	P
	Non vs. At-Risk	-3.51	<.001
	Non vs. PPG	-5.36	<.001
	Social vs. At-Risk	-2.59	<.001
	Social vs. PPG	-4.44	<.001
	Tamhane's T2 Statistic. RIPS-I	Mean	
	Group Comparisons <sup>3</sup>	Difference	P
	Low vs. Moderate	-2.06	<.001
	Low vs. High	-4.33	<.001
	Moderate vs. High	-2.27	<.001

Note: only significant differences in post hoc test results are presented.

<sup>1</sup>STAI Trait subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater trait anxiety.

<sup>2</sup>Categorized by the DSM-IV-MR-J.

<sup>3</sup>Categorized by the RIPS-I.

Sex Differences	df	t	p
Gambling <sup>1</sup>	¥		
Non-gambler	410.62	-1.82	.070
Social gambler	1071.12	-3.44**	.001
At-Risk gambler	168	-1.95	.053
Probable Pathological gambler	106	.054	.957
Substance Use <sup>2</sup>			
No risk	1667	344	.73
At-risk	395	-3.01*	.003
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	720	.331	.57
Moderate	731	-1.20	.273
High	722	-3.927**	< .001

Table B27. Sex Differences in High-Risk Behaviour Groups on Anxiety

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

Tab	le B28.	Devel	opmental	Dif	fferences in	High-Risk	Behaviour	Groups or	n Anxiety
			1			0			

Developmental Differences	df, N	F	p
Gambling <sup>1</sup>			
Non-gambler	6, 827	4.19*	< .001
Social gambler	6, 1074	1.95	.069
At-Risk gambler	6, 170	1.36	.235
Probable Pathological gambler	6, 108	.84	.540
Substance Use <sup>2</sup>			
No risk	6, 1669	3.79*	.001
At-risk	6, 397	.292	.941
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	6, 722	4.20*	< .001
Moderate	6, 733	.854	.528
High	6, 724	1.91	.077

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

School Problems T-Score <sup>1</sup>	Gambling Group Comparisons <sup>2</sup>	Mean Difference	р
	Non vs. Social	-2.14	<.001
	Non vs. At-Risk	-8.17	<.001
	Non vs. PPG	-13.05	<.001
	Social vs. At-Risk	-6.03	<.001
	Social vs. PPG	-10.91	<.001
	RIPS-I Group	Mean	-
	Comparisons <sup>3</sup>	Difference	p
	Low vs. Moderate	-4.24	<.001
	Low vs. High	-10.03	<.001
	Moderate vs. High	-5.78	<.001

Note: only significant differences in Tamhane's T2 Statistic Post Hoc Tests are presented. <sup>1</sup>MMPI-School Problems subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater school difficulties.

<sup>2</sup>Categorized by the DSM-IV-MR-J.

<sup>3</sup>Categorized by the RIPS-I.

Sex Differences	df	t	p
Gambling <sup>1</sup>			
Non-gambler	825	-0.505	0.614
Social gambler	1071.497	-0.575	0.565
At-Risk gambler	168	-1.710	0.089
Probable Pathological gambler	106	-2.604	0.011
Substance Use <sup>2</sup>			
No risk	1667	2.219	0.027
At-risk	395	-1.037	0.301
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	720	2.574	0.010
Moderate	731	0.355	0.723
High	722	-1.276	0.202

Table B30. Sex Differences in High-Risk Behaviour Groups on School Problems

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

Developmental Differences	df, N	F	р
Gambling <sup>1</sup>			
Non-gambler	6, 827	5.03	<.001
Social gambler	6, 1074	2.02	0.060
At-Risk gambler	6, 170	2.32	0.036
Probable Pathological gambler	6, 108	2.35	0.037
Substance Use <sup>2</sup>			
No risk	6, 1669	5.54	< .001
At-risk	6, 397	7.07	< .001
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	6, 722	1.30	0.256
Moderate	6, 733	12.23	< .001
High	6, 724	11.88	< .001

Table B31. Developmental Differences in High-Risk Behaviour Groups for School Problems

<sup>1</sup>Categorized by the DSM-IV-MR-J.

<sup>2</sup>Categorized by the PESQ-PS.

<sup>3</sup>Categorized by the RIPS-I.

Table B32. Developm	nental Differences	in Substance I	Use Group	s for Schoo	l Problems
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S	chool Problems <i>T</i> -Score <sup>1</sup>		
Substance Use Groups <sup>2</sup>	Pairwise Comparisons	Mean Difference	p
Non-risk			
	Grade 8 vs. 10	2.61	< .05
	Grade 8 vs. 12	2.90	< .05
	Grade 8 vs. 13	4.62	<.001
	Grade 9 vs. 10	2.87	<.05
	Grade 9 vs. 12	3.16	<.05
	Grade 9 vs. 13	4.88	<.001
	Grade 11 vs. 13	4.16	<.001
At-risk			
	Grade 8 vs. 10	11.83	< .05
	Grade 8 vs. 11	14.35	< .01
	Grade 8 vs. 12	13.09	< .01
	Grade 8 vs. 13	18.75	<.001
	Grade 12 vs. 13	5.66	<.01

*Note*: only significant differences in Tamhane's T2 Statistic Post Hoc Tests are presented. <sup>1</sup>MMPI-School Problems subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater school difficulties.

<sup>2</sup>Categorised by the PESQ-PS.

Sc	hool Problems <i>T</i> -Score <sup>1</sup>		·····
RIPS-I Groups <sup>2</sup>	Pairwise Comparisons	Mean Difference	р
Moderately Involved Group			
	Grade 7 vs. 10	5.99	< .01
	Grade 7 vs. 11	5.03	< .05
	Grade 7 vs. 12	6.87	<.001
	Grade 7 vs. 13	10.17	<.001
	Grade 8 vs. 10	5.73	<.001
	Grade 8 vs. 11	4.78	< .01
	Grade 8 vs. 12	6.62	<.001
	Grade 8 vs. 13	9.92	<.001
	Grade 9 vs. 13	7.14	<.001
	Grade 10 vs. 13	4.18	< .01
	Grade 11 vs. 13	5.14	< .01
Highly Involved Group			
	Grade 7 vs. 11	12.67	< .05
	Grade 7 vs. 12	13.51	< .05
	Grade 7 vs. 13	17.38	< .001
	Grade 8 vs. 11	7.98	<.01
	Grade 8 vs. 12	8.82	<.01
	Grade 8 vs. 13	12.68	<.001
	Grade 9 vs. 12	6.99	< .001
	Grade 9 vs. 13	10.86	<.001
	Grade 10 vs. 13	7.87	<.001
	Grade 11 vs. 13	4.71	<.01
	Grade 12 vs. 13	3.87	<.05

Table B33. Grade Differences in RIPS-I Groups on School Problems

*Note*: only significant differences in Tamhane's T2 Statistic Post Hoc Tests are presented. <sup>1</sup>MMPI-School Problems subscale scores have a mean of 50 and a standard deviation of 10 where higher scores indicate greater school difficulties. <sup>2</sup>Categorized by the RIPS-I.

Risk Propensity Score <sup>1</sup>	Gambling Group Comparisons <sup>2</sup>	Mean Difference	р
	Non vs. Social	1211	<.001
	Non vs. At-Risk	3207	<.001
	Non vs. PPG	6370	< .01
	Social vs. At-Risk	1996	< .001
	Social vs. PPG	5159	< .05
	RIPS-I Group		
	Comparisons <sup>3</sup>		
	Low vs. Moderate	1417	<.001
	Low vs. High	4219	<.001
	Moderate vs. High	2802	<.001

Table B34. Risk Propensity Differences in High-Risk Behaviour Groups

*Note*: only significant differences in Tamhane's T2 Statistic Post Hoc Tests are presented. <sup>1</sup>Risk propensity = Perceived risks/perceived benefits. Scores range from 0-17.83, where higher scores indicate greater dispositions to risk-taking.

<sup>2</sup>Categorized by the DSM-IV-MR-J.

<sup>3</sup>Categorized by the RIPS-I.

Risk Propensity	Gambling Groups <sup>2</sup>						
Score <sup>1</sup> (N = 2179)	Total Sample	Non- gambler	Social gambler	At-Risk gambler	Probable Pathological gambler		
	М	М	M	M	М		
Sex							
Male	.4894	.3243	.4780	.6675	.7482		
Female	.3674	.2959	.3747	.5459	1.8220		
Grade							
7	.2687	.2359	.2491	.5582	.4513		
8	.3928	.2574	.3478	.4968	1.5298		
9	.4544	.3616	.5062	.5832	.8679		
10	.4452	.3189	.4723	.7074	.8881		
11	.4771	.3438	.4751	.5837	.8474		
12	4522	.3611	.4517	.5695	.7547		
13	.4894	.2827	.4546	1.1877	.9580		
Total	.4194	.3032	.4246	.6239	.9489		

Table B35. Risk Propensity: Sex, Developmental, and Gambling Severity Differences

<sup>1</sup>Risk propensity = Perceived risks/perceived benefits. Scores range from 0-17.83, where higher scores indicate greater dispositions to risk-taking.

<sup>2</sup>Categorized by the DSM-IV-MR-J.

Risk	Substance Abuse <sup>2</sup>		RIPS-I Groups <sup>3</sup>		
Propensity Score <sup>1</sup>	No risk	At-risk	Low	Moderate	High
	М	М	М	М	M
Sex					
Male	.3821	.7610	.2497	.4171	.7405
Female	.2983	.5118	.2215	.3406	.5744
Grade					
7	.2632	.4985	.2101	.3960	.4787
8	.3124	.8409	.2149	.4039	1.0086
9	.3878	.8659	.2469	.4189	.8724
10	.3309	.6710	.2571	.3767	.7339
11	.3844	.6140	.2662	.3898	.5944
12	.3605	.5449	.3066	.3010	.5537
13	.3636	.5505	.2523	.2973	.6257
Total	.3333	.6135	.2319	.3733	.6544

Table B36. Risk Propensity: Sex, Developmental, Substance Abuse and Risk Involvement

<sup>1</sup>Range from 0-17.83, where higher scores indicate greater dispositions to risk-taking. <sup>2</sup>N = 2066. Due to exclusion of 113 participants who endorsed the PESQ-PS INF scale. <sup>3</sup>N = 2179. Categorized by the RIPS-I.

Table B37. Sex Differences in Risk Propensity Score on High-Risk Behaviours

Sex Differences	df	t	p
Gambling <sup>1</sup>			
Non-gambler	340.604	1.021	.308
Social gambler	995.300	3.636	< .001
At-Risk gambler	168	1.266	.207
Probable Pathological gambler	19.360	-1.250	.226
Substance Use <sup>2</sup>			
No risk	1324.423	4.228	< .001
At-risk	246.493	4.455	< .001
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	511.102	1.413	.158
Moderate	692.904	2.505	.012
High	721	2.581	.010

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

Sex Differences	df	t	p
Gambling <sup>1</sup>			
Non-gambler	6, 827	3.156	.005
Social gambler	6,1073	5.142	<.001
At-Risk gambler	6,170	2.436	.028
Probable Pathological gambler	6,107	.472	.828
Substance Use <sup>2</sup>			
No risk	6,1668	3.628	.001
At-risk	6,397	2.206	.042
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	6, 721	1.274	.267
Moderate	6, 733	1.311	.250
High	6, 723	2.892	.009

Table B38. Sex Differences in High-Risk Behaviours on Risk Propensity Score

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS.

<sup>3</sup>Categorized by the RIPS-I.

Table B39. Ineffective Coping Differences in 1	High-Risk	Behaviour	Groups
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Gambling Group Comparisons <sup>1</sup>	Mean Difference	p
Non vs. Social	2.76	<.001
Non vs. At-Risk	6.48	<.001
Non vs. PPG	8.39	<.001
Social vs. At-Risk	3.72	<.001
Social vs. PPG	5.63	<.001
RIPS-I Group		
Comparisons <sup>2</sup>		
Low vs. Moderate	4.67	<.001
Low vs. High	10.50	<.001
Moderate vs. High	5.83	<.001

Note: only significant differences in Tamhane's T2 Statistic Post Hoc Tests are presented. Differences in scores on the ACOPE.

<sup>1</sup>Categorized by the DSM-IV-MR-J.

<sup>2</sup>Categorized by the RIPS-I.
Sex Differences	df	t	р
Gambling Groups <sup>1</sup>			
Non-gambler	825	6.123	< .001
Social gambler	1072	6.743	< .001
At-Risk gambler	168	3.840	< .001
Probable Pathological gambler	106	1.448	.151
Substance Use <sup>2</sup>			
No risk	1667	4.225	< .001
At-risk	310.285	4.471	< .001
Involvement in Multiple Risk Activities <sup>3</sup>			
Low	720	2.739	.006
Moderate	731	4.852	<.001
High	722	6.828	<.001

Table B40. Sex Differences in Coping by High-Risk Group

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

Table B41.	Developmental	Differences in	Ineffective C	Coping by	High-Risk	Behaviour
	1			· · · · · · · · · · · ·		

Developmental Differences	df, N	F	р
Gambling Groups <sup>1</sup>			
Non-gambler	827,6	16.259	< .001
Social gambler	1074,6	14.021	< .001
At-Risk gambler	170,6	1.986	.070
Probable Pathological gambler	108,6	.616	.717
Substance Use <sup>2</sup>			
No risk	1669,6	13.008	< .001
At-risk	397,6	.926	.476
Involvement in Multiple Risk Activities <sup>3</sup>			.476
Low	722,6	3.049	.006
Moderate	733,6	1.350	.232
High	724,6	1.484	.181

<sup>1</sup>Categorized by the DSM-IV-MR-J. <sup>2</sup>Categorized by the PESQ-PS. <sup>3</sup>Categorized by the RIPS-I.

## **APPENDIX C**

## Ethics Certificates and Consent Forms

*Note*: This study is part of a larger study funded by the Ontario Problem Gambling Research Centre. As such, Ethics was originally obtained by Drs. Derevensky & Gupta, to whom funding was granted.