

Unsafe sex, substance use and dangerous driving:

Predicting adolescents' risk-taking.

A Thesis

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By

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Abstract

Adolescence involves heightened experimentation in risk-taking behaviours that are potentially health damaging. To prevent the negative consequences of increased engagement in risk-taking behaviours, it is necessary to understand the factors that influence adolescents' participation. This study investigated the extent to which late adolescents' sex, risk judgments, self-efficacy for sexual behaviour and substance use, and sensation seeking predict likelihood to engage in risk-taking behaviour.

Questionnaires were administered to 46 male and 43 female University of Canterbury students aged between 18 and 20 years. Results indicated that adolescent males have significantly lower perceptions of risk than females. However, there was a tendency for over-estimation of risk. There was the predicted negative relationship between risk perception and likelihood to engage in risk-taking behaviours. Stepwise regression analyses indicated that sensation seeking was the main predictor of risk-taking likelihood, accounting for 36.8% of the variance. The inclusion of risk perception explained an additional 4.7% of the variance. Lower self-efficacy was also significantly related to higher risk-taking likelihood. Implications for adolescent risk intervention and education programmes will be discussed.

1.0 Introduction:

1.1. Adolescence as a time of ‘experimentation’ and increased engagement in risk-taking behaviours:

Adolescence is a period of life that involves heightened levels of new experiences, challenges and experimentation. Census data indicate that the adolescent and young adult population (15 – 24 years) comprises approximately 15 to 16 per cent of the entire New Zealand population (Ministry of Youth Affairs 1996). These young people are heavily exposed to the temptations of health-damaging and risky behaviours during this time of extensive and turbulent physiological and biochemical change (Hamburg 1990). Adolescence is therefore a relatively unpredictable stage of life during which young people explore their own identity and actively choose to engage in various risk-taking activities (Arnett 1991; 1996; 2000).

Many studies have documented the significant increase in risk-taking behaviours during adolescence (e.g., Benthin, Slovic & Sevenson 1993; Bradley & Wildman 2002; Greene, Krmar, Walters, Rubin, Jerold & Hale 2000; Johnson, McCaul & Klein 2002; Kuther & Higgins-D’Alessandro 2000; Newcomb & McGee 1991; Parsons, Siegel & Cousins 1997; Quadrel, Fischhoff & Davis 1993; Shapiro, Siegel, Scovill & Hays 1998; Shedler & Block 1990). Risky activities in which adolescents often engage include sexual risk-taking i.e., having unprotected sex (Cooper 2002; Drummond & Bowler 1998; Gullone & Moore 2000; Irwin & Millstein 1990; Johnson et al., 2002; Ministry of Health 2002; Parsons, Halkitis, Bimbi, Borkowski 2000; Shapiro et al., 1998) and unsafe alcohol and drug use (Baer, Maclean & Marlatt 1998; Bennett & Coggan 2000; Benthin et al., 1993; Cooper 2002; Drummond & Bowler 1998; Hampson, Sevenson, Burns, Slovic & Fisher 2001; Irwin & Millstein

1990; Johnson et al., 2002; Johnson & Raskin White 1989; Kuther & D'Alessandro 2000; Ministry of Health 2002; Moore, Gullone & Kostanski 1997; Quadrel et al., 1993; Shedler & Block 1990). Another risk-taking behaviour in which young people commonly participate is dangerous driving (Arnett 1991, 1996, 1998; Drummond & Bowler 1998; Irwin & Millstein 1990; Johnson et al., 2002; Johnson & Raskin White 1989; Mundt, Ross & Harrington 1992; Shapiro et al., 1998; Williams 1998).

Adolescence is a time of transition where young people face the challenges of distinguishing themselves from their parents and family and establishing a unique and individual identity (Shedler & Block 1990). Risk-taking has been viewed by some as a method of coping with normative developmental tasks such as the exploration of new roles (Newcomb & McGee 1991; Shedler & Block 1990 Drummond & Bowler 1998; Kuther & Higgins-D'Alessandro 2000; Parsons et al., 2000), achievement of autonomy (Irwin & Millstein 1990; Kuther & Higgins-D'Alessandro 2000; Rolison & Scherman 2002) and having to make important decisions (Furby & Beyth-Marom 1992; Rolison & Scherman 2002). Such experimentation is heightened by the increased freedom that complements the years of adolescence (Arnett 2000).

Findings by Shedler and Block (1990) of 101 18 year-olds studied longitudinally from preschool through to age 18 showed that adolescents who had never experimented with any drug were relatively anxious, emotionally restricted, and lacked social skills. Adolescents who had engaged in some drug experimentation, mostly with marijuana, were the most well adjusted in the sample. Importantly, however, adolescents who reported frequent drug use were maladjusted and showed poor impulse control and manifested emotional distress.

Taken together, evidence from this literature suggests that risk-taking during adolescence may be considered a natural part of maturation (Baer et al., 1998; Benthin et al., 1993; Drummond & Bowler 1998; Hamburg 1990; Irwin & Millstein 1990; Karci 1998; Kuther & Higgins-D'Alessandro 2000; Shapiro et al., 1998). The presumed normative nature of adolescent risk-taking adds to the difficulty faced by educators and intervention workers attempting to reduce young people's participation in risky behaviours. Furthermore, the fact that some risk-taking behaviours can also be non-risky as a function of degree of participation and safety precautions taken increases the complexity of addressing adolescent risk-taking. Messages delivered to young people need to differentiate between normative and non-risky alcohol use and unhealthy or excessive consumption. Similarly, messages about safer sex need to deliver the message that using condoms does not involve the same level of risk as the dangers of unprotected sex.

What must be acknowledged and emphasised to young people overall is that the possible negative outcomes of excessive or dangerous involvement in risk-taking behaviours such as contracting a sexually transmissible infection, pregnancy, drug and alcohol overdose or addiction and death far outweigh any normative or positive developmental consequences. No studies to date have found positive effects of persistent risk-taking (Moore & Parsons, 2000).

1.2. Understanding risk and researching adolescent risk-taking behaviour:

Researchers differ in the ways they conceptualise understandings of risk, however most refer to constructs such as goals, values, options, and outcomes (Byrnes, Miller & Schafer 1999). Some researchers prefer broad definitions of risk that view risk-taking as the implementation of decisions that might lead to negative consequences, resulting in a wide range of behaviours qualifying as risk-taking (e.g., gambling, intellectual risk-taking on tests and exams, smoking, having unprotected sex, drunk driving) (Byrnes et al., 1999). For the purpose of the current research, risk-taking behaviours are considered as those that are unsafe and may result in potentially harmful and damaging consequences for oneself and/or others (e.g., Unsafe drug and alcohol use, risky sexual behaviour, dangerous driving).

Some have suggested that research on risk-taking behaviour should address specific risks (Greene et al., 2000; Kuther & D'Alessandro 2000). Most findings, however, indicate that it is more appropriate to research risk-taking as a whole because risky behaviours are often inter-related rather than being a group of independent activities (Benthin et al., 1993; Cooper 2002; Millstein, Irwin, Adler, Cohn, Kegels & Dolcini 1992; Irwin & Millstein 1990; Moore & Gullone 1996; Moore et al., 1997; Moore & Parsons, 2000; Newcomb & McGee 1991; Smith & Rosenthal, 1995; Stanton, Li, Cottrell & Kaljee 2001).

Evidence supporting this notion has shown that few adolescents engage in only one single risk-taking behaviour (Irwin & Millstein 1990; Jessor, 1998), and are more likely to engage in a variety (Cooper 2002; Irwin & Millstein 1990; Newcomb & McGee 1991; Parsons et al., 1997; Siegel, Cousins, Rubovits, Parsons, Lavery &

Crowley 1994). For example, Cooper's (2002) review of studies investigating the connection between alcohol use and risky sexual behaviour among youth and University students supported the conclusion that there is a link between the two. The research review found that the probability that an individual had consumed alcohol predicted the likelihood that he or she had engaged in sexual activity, and that level of alcohol consumption predicted sexual involvement. Other researchers (Jessor & Jessor cited in Irwin & Millstein 1990; Metzler, Noell and Biglan 1992) have found similarly high correlations between unsafe sexual behaviour and health damaging behaviours such as alcohol and marijuana use.

Overall, researchers investigating young people and their risk-taking behaviours must understand that risk-taking is a complex phenomenon that is neither simple nor straightforward to understand (Jessor 1998; Silbereisen 1998). Young people differ in their frequency of risk-taking, and in their reasons that underlie such behaviours (Shapiro et al., 1998). The current study measures the complexity of a range of risky behaviours instead of focusing on single risks in order to research appropriately the interconnectedness of common adolescent risk-taking behaviours.

1.3. Examining the notion of 'adolescent invulnerability':

Adolescents have been viewed by some as perceiving themselves as invulnerable to harm (e.g., Burger & Burns 1988; Elkind 1967; Morrison 1985). Elkind (1967) used the expression 'personal fable' to describe what he argued is the common belief among adolescents' that they are unique and invulnerable to the risk and harm associated with risk-taking behaviours.

This notion of ‘adolescent invulnerability’ has not, however, been supported by more recent studies that have shown adolescents do perceive the risks connected with such behaviours (Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel 1993; Johnson et al., 2002; Millstein & Halpern-Felsher 2002a; 2002b; Quadrel et al., 1993; Smith and Rosenthal 1995; Whitely & Hern 1991). Research has found that adolescents do express concern about their own vulnerability to being infected by a sexually transmissible infection (Millstein & Halpern-Felsher 2002a; 2002b) or becoming sick from alcohol consumption (Finn & Brown 1981; Millstein & Halpern-Felsher 2002a; 2002b).

Studies have revealed that many young people are capable of recognising and identifying the dangers and consequences of engagement in risk-taking behaviours (Graber & Brooks-Gunn 1995; Johnson et al., 2002; Millstein & Halpern-Felsher 2002a). Millstein and Halpern-Felsher’s (2002a) research examining age differences in risk judgments and perceptions of invulnerability in adolescents and young adults found that only a small minority of adolescents showed any perceptions of invulnerability. The majority of participants, particularly adolescents, was in fact inaccurate and significantly overestimated the risk pertaining to natural hazards and behaviour-related risks. High over-estimates were obtained from adolescents even when their skills in understanding and using percentages were controlled. Underestimating the competence of adolescents’ in making decisions regarding risk-taking activities may result in misdiagnosing the actual causes of their risky behaviour and failure to provide appropriate education and intervention (Quadrel et al., 1993).

The evidence discussed above indicates that young people may be aware of the risks involved in risk-taking behaviours. Despite having this knowledge however, adolescents' continue to participate in risky activities. Most young people are provided with education about how to protect themselves and methods for health promotion, but fail to act accordingly (Greene et al., 2000; Karci 1998). The fundamental concern is that adolescents have an awareness of the possible negative consequences of participating in risky activities, yet this does not reduce or prevent their involvement. This research aims to further current understanding about psychological factors that contribute to the increase in risk-taking behaviour during the years of adolescence. This study is only investigating late adolescents, between the ages of 18 and 20 years. Whether or not the same factors influence risk-taking likelihood in younger and older individuals awaits further research.

1.4. Prevalence of risk-taking behaviour and its negative consequences among youth and adolescents:

Risk-taking behaviour during adolescence is a research area that has received extensive worldwide investigation. The fact that so many young people commonly engage in activities of potential harm is of great concern.

The types of risky behaviours in which adolescents' participate and the prevalence rates of such activities are similar among O.E.C.D countries. Studies have documented the high rates of adolescent engagement in behaviours involving unsafe drug and alcohol use (e.g., Alcohol Advisory Council 1997, cited in Bennett & Coggan 2000; Arnett 1992; Benthin et al., 1993; Cooper 2002; Graber & Brooks-

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Gunn 1995; Greene et al., 2000; Hampson et al., 2001; Johnson et al., 2002; Kuther & Higgins-D'Alessandro 2000; Shapiro et al., 1998), dangerous driving (Arnett 1992; Benthin et al., 1993; Johnson et al., 2002) and sexual risk-taking (Arnett 1992; Benthin et al., 1993; Cooper 2002; Graber & Brooks-Gunn 1995; Greene et al., 2000; Johnson et al., 2002; Kuther & Higgins-D'Alessandro 2000).

Statistics have shown that participation in different types of risky behaviours is common among New Zealand youth and adolescents. Fifty per cent of young people aged 14 – 18 drink alcohol approximately once a week, and one in 50 drink almost every day (Alcohol Advisory Council, cited in Bennett & Coggan 2000).

Furthermore, 11% of New Zealand teenagers aged between 12 and 18 have tried Ecstasy, hallucinogens, narcotics, stimulants, or cocaine at some time (Welham 2003).

Nationwide figures in 1998 indicated that 46% of males and 36% of females' aged between 18 and 20 had used cannabis within the previous year (Ministry of Health 2002). Recent research on cannabis use by the Christchurch School of Medicine and Health Sciences tracking 1265 children for 25 years has found robust evidence that cannabis use is associated with the use of other drugs (Ross 2003). Among 17 to 18 year-olds, weekly cannabis users were almost 53 times more at risk of using other dangerous drugs compared to those who did not use cannabis. By the age of 25, three-quarters of the young people had used cannabis, and 42.2% of the sample had used other illicit drugs such as amphetamines, LSD and Ecstasy. One in 10 had a history of drug abuse or dependence.

Other research has shown similar trends for participation in different risky activities. A recent study of 834 high school students aged between 12 and 18 at nine randomly selected Christchurch high schools found that one in four reported having been in a car driven by a drunk driver in the past four weeks (Brooker 2003). In the same study, almost half (45%) of boys and 35% of girls said they had been in a car driven dangerously in the last four weeks, and 46% of boys and 38% of girls reported having engaged in binge drinking in the last four weeks. Results also found that 20% of teenagers within the study reported being sexually active.

Risk-taking behaviour places a young person at risk for poor mental and physical health (Graber & Brooks-Gunn 1995) and at the mercy of a range of potentially damaging consequences. Adolescents are over-represented in nearly every type of risk-taking behaviour (Arnett 1992) and it is their engagement in these activities that most negatively affects their health (Moore et al., 1997).

Recent statistics indicate that the negative consequences of risk-taking behaviours are highly prevalent among New Zealand youth and adolescents. Young people report a range of negative consequences pertaining to their unsafe alcohol consumption including vomiting, memory gaps, injuries, physical violence, and experiencing unpleasant sexual situations (Alcohol Advisory Council 1997, cited in Bennett & Coggan 2000). The fiscal costs of adolescent risk-taking behaviour are also high with the costs of treating sexually transmissible infections other than HIV and AIDS within the United Kingdom an estimated \$882 million per year (Gans, Alexander, Chu, & Elster 1995 cited in Millstein & Halpern-Felsher 2002a).

Research on the transmission of sexually transmissible infections (STIs) among New Zealand adolescents by the Dunedin Multidisciplinary Health and Development Research Unit (cited in Ministry of Health 2002) found that by the age of 20, 7.5% of males and 15.9% of females report having contracted an STI at some time. When the proportion of 15-24 year olds in the New Zealand population is compared with their proportion of the total number of visits to sexual health clinics, results show that young people are over-represented in clinic visits (ESR 2001, cited in Ministry of Health 2002). Excessively high amounts of sexually transmissible infections are diagnosed in young people in their late teens or early twenties. At sexual health clinics in 2000 for example, 71% of chlamydia, 69% of gonorrhoea and 61% of genital warts diagnoses were among people under the age of 25 (ESR 2001, cited in Ministry of Health 2002).

Unsafe sexual behaviour also results in a large number of unplanned pregnancies among young people. In comparison with statistics of other Western nations, New Zealand adolescents have a considerably high teenage pregnancy rate (Drummond & Bowler 1998). Approximately 7% of New Zealand young females between the ages of 15 and 19 become pregnant every year (Dickson, Sporle, Rimene, & Paul 2000; cited in Ellis, Bates, Dodge, Fergusson, Horwood, Petit & Woodward 2001).

Continuing with an unplanned pregnancy during adolescence often results in a young female being less likely to complete her education, gain employment, and earn a high salary (Drummond & Bowler 1998; Hamburg 1990, Hayes 1987, cited in Steven-Simons & McAnarney 1996; Levine 2001), and more likely to be reliant on welfare support (Hayes et al., 1987). New Zealand research has found that the

consequences of teenage pregnancy perpetuate disadvantages in socioeconomic status, social security benefits, educational and training opportunities, and adult health and achievement outcomes (Drummond & Bowler 1998).

More masked consequences of risk-taking during adolescence include the long-term health effects of damaging practices and the development of unhealthy behaviours and habits (Moore & Gullone 1996). Recent research has indicated for example, that regular or serious use of cannabis, particularly from a young age, is associated with increased risks of crime, depression, suicidal behaviour, psychosis, and educational problems (Ross 2003). Almost 10% of New Zealand young people are predicted to be dependent on cannabis by the age of 21 (Ministry of Health 2002).

These statistics indicate that risk-taking is an increasingly common and typical part of New Zealand adolescents' development. What is concerning is that every time a young person chooses to participate in a risk-taking behaviour, they open themselves to a wide range of potentially health-damaging and harmful consequences. Why do so many young people participate in behaviours that potentially cause considerable damage to the safety, health and well-being of themselves and others around them? An objective of the current study is to add to existing knowledge surrounding this question. Ongoing research is required in order to develop and inform intervention and education programmes that successfully address this important societal concern.

1.5. Overcoming methodological limitations of previous research on adolescent risk-taking behaviour: The prediction of likelihood to engage in risk-taking behaviour:

A major limitation of much of the research on adolescent risk perception and risk-taking behaviour to date is the use of retrospective self-report methodologies that are inherently subject to inaccuracies in participants' memory. This problem arises as a result of any type of research methodology that relies on participants' memory. The main concern of retrospective self-report measures in researching young people's risk-taking behaviour is that their reflections of events and situations are often very different to their actual decision-making at the time (Lavery & Siegel 1993; Rolison & Scherman 2002), and that it is difficult to establish whether adolescents may over-report or under-report their risk-taking engagement (Greene et al., 2000).

Retrospective report measures rely on memories of specific behaviours or events, and an individual's memory of these can be biased or forgotten. Furthermore, any type of research involving the measurement of sensitive and personal behaviours (e.g., alcohol and drug use and sexual behaviour) often encounters difficulties in accessing honest responses from participants about their participation (Siegel et al., 1994). As a result, the problem of socially desirable response patterns can arise (Greene et al., 2000; Gullone & Moore 2000; Moore et al., 1997; Moore & Parsons 2000; Rolison & Scherman 2002).

It has been suggested that future research should attempt to create procedures that are not as reliant on retrospective reports and perceptions (Lavery & Siegel 1993). Furthermore, few past studies have endeavored to control for the influence of socially desirable response patterns (Bradley & Wildman 2002). The measurement of risk-

taking likelihood rather than retrospective reports within this study avoids being dependent on participants' memories of events and their specific behaviour, and is less open to memory inaccuracies in responses. By asking a young person the likelihood that they would engage in risk-taking behaviours such as drug use, unprotected sex and dangerous driving, responses from adolescents are not open to the same problems of memory lapses or biased memories from specific situations and events that are inherent in retrospective reports of previous involvement.

The measurement of risk-taking likelihood used within this research may also be less open to monitoring and social desirability in participants' responses because instead of relying on the confessions from retrospective memories of their behaviour, participants will be asked to report the likelihood that they would engage in different behaviours. Adolescents' might feel more comfortable reporting the hypothetical likelihood that they would engage in risk-taking behaviour rather than their actual previous involvement. This may actually result in higher estimates of risk-taking by adolescents because they will be asked their hypothetical risk-taking likelihood rather than their actual previous behaviour.

The current study investigates the extent to which adolescents likelihood to engage in risk-taking behaviours can be predicted. Pryor (1987) developed a scale that provided the ability for the measurement of likelihood of behavioural performance to predict actual behaviour performance with relative ease of assessment. This novel concept used within the current study is based on the model of Pryor's (1987) likelihood to sexually harass scale. Three studies have provided evidence that the likelihood to sexually harass scale may be used to predict actual behaviour in a

laboratory setting (Pryor 1987; 1993; 1994; cited in Pryor et al., 1995).

Focusing on the likelihood of risk-taking participation rather than retrospective reports from adolescents advances current knowledge surrounding this issue because it may access more honest and objective responses that are not reliant on memory and personal responses about risky behaviour. Asking adolescents to estimate the likelihood that they will engage in different risk-taking behaviours rather than their actual previous involvement may provide reactions that are more direct with lower probability of manipulation, untruthfulness and inaccuracies in memory.

Other past research showing a strong relationship between behavioural intentions and actual behaviour also indicates that adolescent likelihood to engage in risk-taking behaviour is an interesting and important concept to measure. Azjen's (1986; 1991) theory of planned behaviour proposed that behavioural intentions and perceived control are predictive of actual behaviour. This theory was designed to predict and explain human behaviour in particular contexts. The principle idea underlying its foundations is that the immediate antecedent of any given behaviour is the individual's intention to carry out that behaviour (Azjen 1991; Azjen & Madden 1986).

Broadly speaking, the greater the intention to engage in a specific behaviour, the more likely should be its occurrence (Azjen 1991). Earlier evidence supporting the association between behavioural intentions and behavioural action has mostly come from research done in the framework of the theory of reasoned action, which was later modified to the theory of planned behaviour to include the addition of perceived

behavioural control in predicting behavioural intentions and actions (Ajzen 1991).

More recent findings supporting the relationship between behavioural intentions and actual behaviour have shown that behavioural intentions are strongly associated with condom use and safer sex behaviours (Bennett & Bozionelos 2000; Conner, Graham & Moore 1999; Fazekas, Senn & Ledgerwood 2001; Hogben, St Lawrence, Hennessy & Eldridge; Rye, Fisher & Fisher 2000), and adolescents' alcohol use (McMillan & Conner 2003), and smoking behaviour (Higgins & Conner 2003; McMillan & Conner 2003). Other studies have found that behavioural intentions are related to high-risk UV radiation exposure-related behaviours (Hillhouse, Adler, Drinnon & Turrisi 1997), drivers' intentions to commit driving violations (Parker, Manstead, Stradling & Reason 1992) and females' initiation of breast cancer screening behaviour (Drossaert, Boer & Seydel 2003; Rutter 2000).

Within the current study, the influential factors that have previously shown to be significantly associated with risk-taking behaviour will be measured in relation to their impact on likelihood to engage in risk-taking behaviour.

These factors are: 1) *Risk judgments*; 2) *Sensation seeking*; 3) *Self-efficacy*; and 4) *Sex of adolescents*.

To date, many studies have found that these factors strongly relate to young people's perceptions of risk and reported engagement in risk-taking behaviour. Previous research regarding each will now be examined in turn to elucidate the importance of measuring these factors in predicting adolescents' likelihood to engage in risk-taking behaviour.

1.5.1.1. Risk judgments as a predictor of likelihood to engage in risk-taking behaviour:

The relationships and discrepancies between individuals' beliefs and actions is an area that has received a considerable amount of psychological research and investigation (e.g., Higgins 1987; Swim & Hyers 1999). Risk judgments will be measured as a predictor of likelihood to engage in risk-taking behaviour because past research has found that individual's perceptions about risk have a significant impact on the behaviours in which they choose to participate (Benthin et al., 1993; Gullone & Moore 2000; Halpern-Felsher, Millstein, Ellen, Adler, Tschann & Biehl 2001; Kuther & D'Alessandro 2000; Millstein & Halpern-Felsher 2002a; 2002b; Moore & Gullone 1996). Researchers have previously stated that it is surprising how little this area has been examined, considering the widespread implications of a strong relationship between risk judgment and risk-taking behaviour (Millstein & Halpern-Felsher 2002a). This association is a gap in the literature that requires investigation.

Much of the research to date has mainly looked at the differences between those who report participation in risk-taking activities, and those who do not (Halpern-Felsher et al., 2001; Millstein & Halpern-Felsher 2002a). A number of studies have supported the notion that individuals who report engagement in risk-taking behaviours perceive the risk of being involved in such activities as lower than those who do not (e.g., Benthin et al., 1993; Finn & Brown 1981; Gullone & Moore 2000; Millstein & Halpern-Felsher 2002a; Moore & Gullone 1996). Research for example has shown that adolescents who report participating more frequently in risk-taking behaviours are more likely to judge those behaviours as less risky (Gullone & Moore 2000), and perceive the associated risks to be smaller, better known, and more controllable than non-engagers (Benthin et al., 1993).

Importantly, the results from these studies have shown that risk perceptions are an influential factor of adolescents' reported engagement in risk-taking behaviours. This suggests that measuring and understanding young people's judgments of risk is fundamental to furthering current knowledge about their engagement in risk-taking behaviours. Findings so far have indicated that risk perceptions are an important requirement of research on young people's risky behaviour and education and behavioural intervention programmes which aim to get adolescents to identify and acknowledge their own vulnerability to negative consequences (Millstein & Halpern-Felsher 2002a).

Although these studies have revealed the significant association between risk judgments and risk-taking behaviour, their use of methodology involving retrospective reports creates potential problems of inaccuracies in participant responses, as have been previously discussed. An unanswered question that arises from reviewing this research is whether risk judgments are an important predictor of risk-taking behaviour that do not involve young people's reports of previous involvement. The present study addresses this gap in the research by utilising a novel and more creative measure of risk-taking behaviour that is not reliant on memory and retrospective reports.

1.5.1.2. Measurement of risk judgments within the current study.

Previous research on the measurement of risk judgments has shown that conditional risk judgments with highly detailed scenarios are the most appropriate tool for measuring perceptions of risk. Conditional or situation specific risk judgments are those in which explicit detail of an antecedent condition such as situation or behaviour

is made (e.g., how likely are you to contract a sexually transmissible infection if you have unprotected sex?) (Millstein & Halpern-Felsher 2002a). In contrast, nonconditional risk judgments focus solely on an outcome (e.g., how likely are you to contract a sexually transmissible infection?) and can pose a problem in being interpreted in different ways depending on the respondent's past experience with the described situation or behaviour (Millstein & Halpern-Felsher 2002a).

Using conditional risk judgments to measure perceptions of risk minimises variations in interpretations by participants and indicates that any results showing differences among participants are not the result of them having interpreted the specific scenarios and risk judgment questions differently (Millstein & Halpern-Felsher 2002a). For this reason, the measurement of risk judgments within this study (based on Millstein & Halpern-Felsher's 2002b measure of risk judgments) involved the use of conditional risk judgments with well-detailed scenarios to measure participants' perceptions of risk for a range of natural hazards and behaviour related risks. Millstein and Halpern-Felsher's (2002b) scale extends previous measures (e.g., Finn & Brown 1981), which examine a more restricted range of outcomes.

Other research on the measurement of perceptions of risk has found that the use of personal risk judgments can be problematic because people often make optimistic biases and view their own risk as lower than the risk for others in the same situation (Burger & Burns 1988; Johnson et al., 2002; Millstein & Halpern-Felsher 2002a; Quadrel et al., 1993; Shepperd, Helweg-Larsen & Ortega 2003; Weinstein 1980;). When respondents are asked to judge risks for themselves, they often provide lower judgments of risk than they would for another person in equivalent circumstances

(Millstein & Halpern-Felsher 2002a; Weinstein 1980). Furthermore, it is difficult to compare adolescents' perceptions of their own actual risk status because it is affected by many individual and environmental factors (Millstein & Halpern-Felsher 2002a).

Two people who consume the same amount of alcohol, then get into their car, and drive home can have very different perceptions of the risk of getting into a car accident depending on factors such as their body weight, alcohol tolerance level, weather conditions and food consumption (Millstein & Halpern-Felsher 2002a). The current study attempts to avoid these methodological concerns by asking adolescents to make hypothetical rather than personal risk judgments. Instead of making judgments of risk for themselves in the described situation, adolescents within this study will provide risk judgments for someone their age and sex living in New Zealand. These hypothetical risk judgments overcome the methodological concerns of personal risk judgments by avoiding young people's responses being influenced by personal and contextual factors influencing the perception of their own risk.

1.5.2. Sensation seeking as a predictor of likelihood to engage in risk-taking behaviour:

Sensation seeking will be examined as a predictor of likelihood to engage in risk-taking behaviour because it has previously been shown to be significantly related to risk-taking behaviour during adolescence (Arnett 1990, 1991, 1996; Bradley & Wildman 2002; Cohen & Fromme 2002; Greene et al., 2000; Gullone & Moore 2000; Hampson et al., 2001; Hansen & Breivik 2001; Newcomb & McGee 1991; Parsons et al., 1997; Parsons et al., 2000; Rolison & Scherman 2002; Satinder & Black 1984; Stanton et al., 2001). Sensation seeking is a trait defined by "the need for varied,

novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experience” (Zuckerman 1979, p. 10).”

As a construct, sensation seeking consists of four dimensions: Thrill and adventure seeking, disinhibition, experience seeking, and boredom susceptibility (Zuckerman 1971, 1979). Individuals high in sensation seeking are generally uninhibited, impulsive and are less likely to conform to society’s rules and regulations (Bradley & Wildman 2002).

Earlier studies have found that high levels of sensation seeking are significantly positively associated with risk-taking participation (Arnett 1991, 1996; 1998; Cohen & Fromme 2002; Bradley & Wildman 2002; Greene et al., 2000, Newcomb & McGee 1991; Rolison & Scherman, 2002; Stanton et al., 2001). Sensation seeking has been strongly associated with risky sexual activity (Arnett 1991, 1996, 1998; Cohen & Fromme 2002; Greene et al., 2000; Stanton et al., 2001), unsafe alcohol use (Arnett 1990; Cohen & Fromme 2002; Lagrange, Jones, Erb & Reyes 1995; Stanton et al., 2001), unsafe drug use (Arnett 1991, 1996, 1998; Cohen & Fromme 2002; Satinder & Black 1984; Stanton et al., 2001), and dangerous driving (Arnett 1991, 1996, 1998; Williams 1998).

Research evidence has shown that sensation-seeking scores are significantly lower among young people who report no participation in risk-taking activities (Stanton et al., 2001), and that sensation seeking is a more significant predictor of adolescents’ risk-taking frequency than are their perceptions of risk (Rolison & Scherman 2002). Furthermore, Arnett (1996) found that in two studies of high school and university

students, sensation seeking was associated with every type of risky behaviour including dangerous driving, risky sex, alcohol and drug use, vandalism and theft.

It appears that young people with high levels of sensation seeking have an increased need for exciting, stimulating, and pleasurable experiences, and that this leads to them participating more often in risk-taking behaviours. Together the findings discussed above suggest that sensation seeking is a significant influential factor explaining adolescents' risk-taking behaviour. This is important for the current study because it indicates that sensation seeking should be measured as a predictor of likelihood to engage in risk-taking behaviour. Results from previous research outlined above suggest that sensation seeking may be a central factor explaining adolescents' risk-taking likelihood. This relationship requires further investigation.

1.5.3. Self-efficacy as a predictor of likelihood to engage in risk-taking behaviour:

Self-efficacy is important to consider as a predictor of likelihood to engage in risk-taking behaviour because previous studies have recognized it as a significant factor explaining adolescents' engagement in risk taking behaviours (Cohen & Fromme 2002; Goldman & Harlow 1993; Parsons et al., 2000; Stark, Tesselaar, O'Connell, Person, Galavotti, Cohen & Walls 1998; Wulfert & Wan 1993; Yzer, Fisher, Bakker, Siero & Misovich 1998). Self-efficacy can be conceptualised as an individual's belief in his/her ability and capacity to deal with specific conditions or situations that life puts before him/her (Reber & Reber 2001). An individual's level of self-efficacy relates to what one thinks he or she can do, irrespective of his/her knowledge or skills

(Bandura 1982).

According to the theory of planned behaviour (Ajzen 1991), behavioural performance is a joint function of behavioural intentions and perceived behavioural control. Within this theory, perceived behavioural control is compatible with Bandura's (1982) concept of perceived self-efficacy (Ajzen 1991). From this theoretical position, the relationship between behavioural intention and actual behavioural performance can be compromised by low perceived behavioural control. A number of studies have indicated that intentions and perceived behavioural control correlate well with actual performance of behaviours such as problem drinking, cheating, shoplifting, and lying (Ajzen 1991). Overall, this suggests that low self-efficacy, or perceived behavioural control may be an influential factor explaining an individual's failure to perform a specific behaviour (e.g., safer sex methods, avoiding drug overdose or sickness from alcohol consumption).

Research evidence has shown that self-efficacy is a significant influential factor in the practice of safer sex and condom use in particular (Cohen & Fromme 2002; Basen-Enquist & Parcel 1992; Goldman & Harlow 1993; Parsons et al., 2000; Sanderson & Jemmott 1996; Stark et al., 1998; Wulfert & Wan 1993). Studies have, for example, shown that self-efficacy has a stronger association with sexual risk-taking than outcome expectancies of engaging in such behaviours (Cohen & Fromme 2002), and that self-efficacy, or confidence in one's ability to practice safer sex is significantly related to consistency for condom use (Parsons et al., 2000).

Although research has shown that self-efficacy has the strongest influence on sexual risk-taking behaviour, Cohen and Fromme (2002) did still find that young people's substance use was negatively associated with self-efficacy. Even though this relationship was partially mediated by expectations of the positive outcomes of performing such behaviours, this finding suggests it is appropriate to examine the relationship between self-efficacy for sexual behaviour and substance use and likelihood to engage in risk-taking behaviour. Furthermore, the current study utilises Cohen and Fromme's measure, and hence it is suitable to follow their scale and measure self-efficacy for both sexual behaviour and substance use.

The differential findings by Cohen and Fromme (2002) for self-efficacy for sexual behaviour and substance use may be understood by considering the contexts in which sexual behaviour occurs. Cohen and Fromme argued that firstly, for safer sex to occur, forethought in buying and carrying condoms and other contraceptives is required. Secondly, they suggested that young people's ability in their beliefs to communicate with their sexual partner(s) about sexual history, contraceptives, and safer sex appears to be fundamental to the performance of safer sex behaviours. Although these issues may also apply to substance use (e.g., buying alcohol or drugs requires forethought and planning), it was concluded by Cohen and Fromme that these factors may particularly help to explain the strong association between self-efficacy and sexual behaviour. While research overall has indicated the need to study risk-taking behaviours as a whole, as discussed in section 1.2, these findings indicate that it is important to consider self-efficacy for sexual behaviour and substance use separately.

Taken together, the evidence discussed above indicates that individuals who have low self-efficacy are more likely to engage in risk-taking behaviours, and vice versa. These findings are important for the current study because they suggest that self-efficacy for substance use and sexual behaviour may be an influential factor explaining adolescents' likelihood to engage in risk-taking behaviour. The current study will explore this association further.

1.5.4. Adolescents' sex as a predictor of likelihood to engage in risk-taking behaviour:

Sex of adolescents will be measured as a predictor of likelihood to engage in risk-taking behaviour because males and females have previously shown significant differences in their absolute levels of risk perception and reported risk-taking behaviour (Bradley & Wildman 2002; Byrnes et al., 1999; Gullone & Moore 2000; Millstein & Halpern-Felsher, 2002a; 2002b; Mundt et al., 1992; Parsons et al., 1997; Smith & Rosenthal 1995). Studies have found that females perceive the risks associated with risk-taking behaviours as more probable than do males (Gullone & Moore 2000; Millstein & Halpern-Felsher 2002a; Mundt et al., 1992; Parsons et al., 1997; Smith & Rosenthal 1995). Adolescent females, for example, judge more risks and fewer benefits associated with risky drug and alcohol use and sexual behaviour than do adolescent males (Parsons et al., 1997), and across a range of specific driving situations, including situations involving alcohol consumption, perceive higher likelihood of being in a severe driving accident (Mundt et al., 1992).

A recent meta-analysis by Byrnes et al., (1999) of 150 studies that compared prototypical (e.g., reckless driving, unprotected sex) and nonprototypical (e.g.,

achievement tests that involve penalties for incorrect answers, climbing a steep embankment) risk-taking tendencies of male and female participants across different age groups indicated that male participants generally had higher absolute levels of risk-taking participation than females. The results showed that the transition from high school to University creates a sharper increase in alcohol and drug use in males than females. An overall 6% difference in different forms of risk-taking was found, with 53% of males taking risks compared to 47% of females.

This group of evidence is important to consider for the current study because it specifies the need to measure the difference between males' and females likelihood to engage in risk-taking behaviour. The fact that previous research has found evidence for sex differences in perceptions of risk and reported risk engagement suggests that this study may find sex differences in likelihood to engage in risk-taking behaviour. The current study will examine this with a newer type of methodology that overcomes previous methodological concerns.

1.5.5. Considering potential relationships between the predictor variables of likelihood to engage in risk-taking behaviour.

A psychological search within the risk-taking behaviour literature revealed that there have been very few studies that have measured the relationships between the predictor variables being measured within the present study. For example, only one published study was found that directly measured the relationship between sensation seeking and perceptions of risk (Rosenbloom 2003) in connection to the measurement of risk-taking behaviours. Findings from this study showed a negative relationship

between risk perception and sensation seeking. In carrying out a search on the association between sensation seeking and self-efficacy in the risk-taking behaviour literature, no studies were found. Although Cohen and Fromme (2002) measured this association indirectly, they did not find evidence for a strong relationship between these factors.

The present study advances existing knowledge by exploring further the possible relationships between risk judgments, self-efficacy and sensation seeking in relation to their impact on adolescent risk-taking behaviour. The results will offer more information about the interactions between each of the factors under investigation in understanding and explaining young people's risky behaviour. Findings will, for example, provide information about the nature of the relationship between self-efficacy and sensation seeking in relation to adolescents' risk-taking likelihood. Measurement of this association will provide information about whether low levels of self-efficacy are associated with high levels of sensation seeking in relation to young people's likelihood to engage in risk-taking behaviour. An advantage of considering the interaction of factors rather than analysing each individually is that the potential relationships among the predictor variables can be explored.

1.6. The current study.

The current study sought to investigate the extent to which adolescents' sex, risk judgments, sensation seeking and self-efficacy predict their likelihood to engage in risk-taking behaviours. Additional objectives were to assess whether adolescents under or over estimate the risk involved in risk-taking behaviours.

This methodology overcomes the difficulty inherent in measuring adolescents' actual risk-taking participation. It is impossible to create experimental simulations of the environments in which adolescents' engage in risky behaviours. It seems unlikely for example, that researchers would be able to replicate a realistic youth 'party' setting in order to measure young people's engagement in activities involving unsafe drug and alcohol use and sexual behaviour. Such research methodology may additionally create concern and caution for young people if they think their behaviour may be monitored, judged or evaluated by the researcher.

The capacity to predict and to measure adolescents' risk-taking likelihood has widespread implications for research and education and intervention programmes addressing this issue. Most importantly, this study will provide a more realistic picture of the factors that influence adolescents' risk-taking behaviour by measuring these relationships with a newer type of methodology that resists the use of retrospective self-reports.

If it is found the measured variables do predict adolescents' likelihood to engage in risk-taking behaviour, this study will highlight the factors that should be focused on in attempting to research and understand their risky behaviour. More accurate and honest responses provided by participants may provide a partial profile of adolescents who are more likely to engage in risk-taking behaviour. This, in turn, will enable educators and intervention workers to identify adolescents who are most at risk of the negative consequences from participating in these behaviours, and better able to meet young people's needs by delivering education and programmes that address the underlying sources of engagement.

1.7. Summary of predictions and major hypotheses for the current study.

Based on previous research and literature on adolescent risk-taking behaviour, it is expected that risk judgments and self-efficacy for sexual behaviour and substance use will show a significant negative relationship with likelihood to engage in risk-taking behaviour. Sensation seeking is predicted to show a significant positive association with risk-taking likelihood. Males are anticipated to show significantly lower risk judgments and significantly higher likelihood to engage in risk-taking behaviour than females. Lastly, it is predicted that adolescents will over-estimate the risk involved in specific risk-taking behaviours.

Hypothesis 1: Risk judgments will be significantly negatively correlated with likelihood to engage in risk-taking behaviour.

Adolescents with lower risk judgments will show higher likelihood to engage in risk-taking behaviour. Their higher likelihood to say they would be likely to participate in risk-taking behaviours will be related to their lower perceptions of the danger, harm or threat involved in risk-taking behaviours.

Hypothesis 2: Sensation seeking will be significantly positively correlated with likelihood to engage in risk-taking behaviour.

Adolescents with higher total sensation seeking scores will show higher likelihood to engage in risk-taking behaviour. Their higher likelihood to say they would participate in risk-taking will be related to their increased need for novel, exciting and pleasurable experiences.

Hypothesis 3: Self-efficacy for sexual behaviour and substance use will be significantly negatively related with likelihood to engage in risk-taking behaviour.

Adolescents with lower self-efficacy for sexual behaviour and substance use will have a higher likelihood to say they would engage in risk-taking behaviour. Higher risk-taking likelihood will be related to those who are low in self-efficacy having less confidence in their ability to avoid and overcome the negative effects of risky sexual behaviour and substance use. Based on past research evidence, it is expected that self-efficacy for sexual behaviour will show a stronger negative relationship with risk-taking likelihood than self-efficacy for substance use.

2.0. Method:

2.1. Participants:

Ninety undergraduate students (46 males; 43 females and 1 unknown) from the University of Canterbury aged between 18 and 20 years, volunteered to participate in the study in return for entry into a prize draw to win CD vouchers.

The number of participants required was established using a power analysis based on a medium effect size, an alpha level of 0.05 and 80% power. Populations squared multiple regression indicated that at least 36 females and 36 males should take part in the research.

2.2. Materials:

Three different versions of the questionnaire pack were created to minimise any order or fatigue effects. The versions were randomly distributed to students who agreed to participate in the research project.

The materials for use in the main study were pilot tested in a focus group of four adolescents aged between 18 and 20 who were current students at the University of Canterbury. Participants in the pilot study volunteered to meet with the researcher to discuss prevalent youth issues, in return for payment. Participants were informed that any information they provided would be kept strictly anonymous and confidential.

Information supplied by this group was used to determine the nature of the specific scenarios to be included in the likelihood to engage in risk-taking behaviour scale, to

ensure that these behaviours were ones with which the research population could identify. It has previously been argued that one major problem within the study of adolescent risk-taking is that the researcher has often been in the role of making decisions about what constitutes risky behaviour (Gullone & Moore 2000; Moore & Gullone 1996; Moore et al., 1997).

The focus group were read each of the scenarios from the likelihood to engage in risk-taking behaviour scale by the researcher and were asked to share whether they felt each represented a typical situation people their age encounter, and the different ways people their age often respond in such situations. The researcher read the first scenario which then followed with an informal discussion with the focus group about these issues before moving on to the next scenario. Following the completion of this for each of the five scenarios, the focus group participants were debriefed and thanked for their time. They were informed of when the results of the study would become available and were provided with contact details for the researcher.

Feedback from the focus group provided a more accurate picture of typical situations adolescents come across, which was in some cases slightly different to the scenarios that had been created by the researcher. The scenarios within the measure were modified accordingly to represent a more realistic and accurate picture.

2.2.1. Information and consent form (Appendix A).

An information and consent form was produced which participants were asked to read before consenting to take part in the research. The information form invited participants to take part in a Masters Research project investigating the relationship between adolescents' perceptions of risk and their likelihood to engage in risk-taking behaviours. Contact details for the researcher and the project supervisors were provided.

The information form explained to participants that their involvement in the study would require them completing a series of short questionnaires and scales. They were informed that participation in the study would take approximately 20 minutes in total.

The information form stressed the anonymity and confidentiality of the research, and told participants that their responses would not be analysed individually and that all participants' responses would be combined together for data analysis. The researcher verbally emphasised that participants would not be asked about their own past or current behaviours in any way, and discussed the importance of completing the questionnaires and scales honestly and independently.

Once participants had read the information form, they were given the opportunity to ask the researcher any questions they had regarding the research. Following this, they were asked to complete the attached consent form, which required their name, signature, and the date. Participants were told to keep the information form and were encouraged to make contact with the researcher if they had any questions or wished to discuss any concerns regarding their participation in the project.

2.2.2. Measure of risk judgments (Appendix B).

An adapted version of Millstein and Halpern-Felsher's (2002b) measure of risk judgments was developed to act as an index of perceived risk. This questionnaire involved participants' using probability assessments to estimate risk. Millstein and Halpern-Felsher found this measure had good face validity and controlled well for behavioural experience because it sufficiently described the conditions under which the risks were to be assessed. By producing highly specified scenarios, variability in participants' interpretations of the risk situation was minimised.

Millstein and Halpern-Felsher's (2002b) scale was slightly modified so that it measured participants' responses to hypothetical estimates of risk, rather than personal risk judgments. Participants were provided with full details and instructions for how to judge the risk involved in each scenario, which involved them using percentage scales to judge the likelihood of a specified outcome occurring.

Risk judgments for eight outcomes were examined. Two items asked about the probability of dying from natural hazards (lightning storm, earthquake) and six items asked about negative outcomes associated with personal behaviour. One of these focused on a relatively typical and safe behaviour (jogging) and five concerned outcomes related to personal behaviours of a more risky nature (alcohol and drug use and sexual behaviour).

An example of the type of scenario and instructions are as follows:

For each of these scenarios, imagine someone of your age and sex in this situation.

Try to estimate the chances that these things might happen to this person in this situation, by using any number from 0% to 100% (Millstein & Halpern-Felsher 2002b).

Example: Imagine that someone your age and sex is in love with his/her girlfriend/boyfriend. They have had sex a number of times before. One night, they have sex and do not use any form of protection. What is the chance that he/she will get a sexually transmitted infection? (Adapted from Millstein & Halpern-Felsher 2002b).

2.2.3. Likelihood to Engage in Risk-Taking Behaviour scale (Appendix C).

A likelihood to engage in risk-taking behaviour scale was developed, based on Pryor's (1987) likelihood to sexually harass scale. Pryor's series of three studies found this scale to be a reliable measure of the likelihood to sexually harass with good evidence for convergent, discriminant and predictive validity. Studies by Pryor and colleagues have established that the likelihood to sexually harass scale correlates well with related attitude and belief measures such as the acceptance of rape myths and an emphasis on sexual and social male dominance (Pryor 1987).

Participants were asked to read five hypothetical situations and imagine themselves in the role of the individual in each situation. They were told to imagine that, whatever their chosen course of action, no one would find out the way they had behaved. Participants were encouraged to be honest in their responses, and anonymity

was stressed. Following each scenario, three alternative courses of action were listed, one of which was a risk-taking alternative. Participants were asked to indicate the likelihood that they would perform each of the three behaviours on a 1-5 scale ranging from 1 (not at all likely) to 5 (very likely).

A scenario example and instructions from the created scale follows:

On the sheets that follow, you will find 5 brief scenarios that describe 5 different situations. In each case, please imagine you are the main character in the scenario and rate how likely it is that you would perform each of several different behaviours in the described social situation.

*Assume in each scenario that no matter what you choose to do, no one would find out how you had behaved. Try to answer each question as **honestly** as you can. Your answers will be **completely anonymous**. No one will ever try to discover your identity, no matter what you say on the questionnaire (adapted from Pryor 1987).*

Scenario: Imagine that you are at a party where you do not know very many people. You have stayed at the party for the evening, and have consumed approximately 7 standard drinks. Most people at the party have consumed the same amount of alcohol as you have. You decide that you are ready to go home, and as you say goodbye to a friend, one of his/her friends who you have not met before offers you a ride home. The person who has offered to drive you home has consumed approximately 4 standard drinks at the party, but appears sober. How likely are you to do the following things in this situation?

Remember that no one would find out about the way you had behaved.

A. Decline the offer of the ride home and find another alternative.

1	2	3	4	5
Not at all likely				Very likely

B. Accept the ride home.

1	2	3	4	5
Not at all likely				Very likely

C. Talk to some of this person's friends and watch their behaviour to find out how drunk they are and how trustworthy they are before making your decision about accepting the ride home.

1	2	3	4	5
Not at all likely				Very likely

2.2.4. Measure of Risk Perception Accuracy (Appendix D).

A measure was developed to assess the accuracy of participants' risk perceptions. This questionnaire acted as an index of the ability of participants to judge risk. The measure allowed for the comparison of participants' expectations of negative consequences arising from different risk-taking activities with New Zealand public health data. Four questions were listed in this measure. Two items asked participants to provide total number estimates for how many people their age and sex living in New Zealand they predicted would encounter various risk-taking outcomes within the next year, and two items asked for such predictions using percentage estimates. An example of the type of questions and instructions follows.

Please give your estimates of the TOTAL NUMBER for the following:

How many people your age and sex living in New Zealand do you think will encounter the following within the next year?

1. Die in an accident in which they were driving over the legal limit for blood alcohol levels for their age group within the next year?

Comparing participants' estimates for such outcomes with actual statistics allowed for the measurement of whether participants had a relatively accurate knowledge of such risks, or whether they significantly under or over estimated them.

2.2.5. Sensation Seeking scale (Appendix E).

An adapted version of Zuckerman's (1979) sensation seeking scale (V) was created for participants to complete. This scale has shown to be a reliable measure of sensation seeking which has highly significant convergent validity correlations with similar test constructs (Zuckerman 1979).

Two items from each of the thrill and adventure seeking, experience seeking, disinhibition and boredom susceptibility subscales were selected to create a scale consisting of 8 items. Items chosen for the sensation seeking scale were those that did not specifically regard alcohol use, drug use, or sexual behaviour because it has previously been suggested that a reported relationship between these sensation seeking items and reported engagement in such behaviours might be no more than an association between questions on different measures (Arnett 1996). In addition, items chosen from Zuckerman's (1979) sensation seeking scale (V) for the present measure

avoided the use of dated words (e.g., ‘hippies’, ‘jet sets’, ‘queer’) which reflected the idioms and slang used at the time when Zuckerman’s (1979) scale was developed. An example of the instructions and questions within this scale follows:

Directions: Each of the items below contains two choices, A and B. Please indicate which of the choices most describes your likes or the way you feel. In some cases, you may find items in which both choices describe your likes or the way you feel. Please choose the one that better describes your likes or feelings. In some cases, you may find items in which you do not like either choice. In these cases mark the choice you dislike least.

It is important that you respond to all items with only one choice, A or B. We are interested only in your likes or feelings, not in how others feel about these things or how one is supposed to feel. There are no right or wrong answers. Please give honest responses. (adapted from Zuckerman 1979).

1. A. I like to have new and exciting experiences even if they are a little unconventional or illegal.
- B. I am not interested in experience for its own sake (adapted from Zuckerman 1979).

2.2.6. Self-efficacy scale (Appendix F).

Cohen and Fromme’s (2002) self-efficacy questionnaire was used to assess participants’ self-efficacy for substance use and sexual behaviour. This questionnaire

required participants' using 7-point Likert scales ranging from 1 (*not at all confident*) to 7 (*extremely confident*) to respond to 6 questions.

Most established risk-taking self-efficacy measures are specific to either substance use or sexual behaviour (Cohen & Fromme 2002). This self-efficacy questionnaire (SEQ) allowed the assessment of adolescents' self-efficacy related to both substance use and sexual behaviour. Cohen and Fromme's series of experiments found the questionnaire to be a valid and reliable measure of self-efficacy for substance use and sexual behaviour. Their second experiment provided psychometric validation of the SEQ as a measure of adolescents' self-efficacy for sexual behaviour and substance use. Primary evidence for test-retest reliability was established, and validity of the scale was found through a strong relationship between the SEQ and a similar measure that assessed specific self-efficacy expectancies (i.e., confidence in ability to use condoms). An example and instructions from the created measure follows:

Please answer the following questions as honestly as possible.

1. How confident are you that you will be able to engage in behaviours that will prevent you from experiencing alcohol addiction?

1	2	3	4	5	6	7
<i>not at all confident</i>						<i>extremely confident</i>

2.2.7. Debriefing sheet (Appendix G).

A debriefing sheet was produced which thanked participants for their involvement and described the rationale and predictions of the study. The debriefing sheet provided contact details for the researcher and additionally supplied contact details for

the University Student Health Centre for students who wished to discuss any issues that may have arisen during their participation in the study.

2.3 Procedure.

Participants were recruited by personal approach from the researcher. Participants were recruited from areas with large numbers of students, such as outside lecture theatres, student cafes and the student association building on campus. After reading the information form and completing their consent form, participants received all the necessary information, instructions and measures, which they completed individually. Participants were encouraged to complete the measures at their own pace, and to talk to the researcher if they did not understand the instructions or requirements.

Demographic information about participants' sex was also obtained initially by the researcher once they had agreed to participate in the study. Participants were asked to mark their sex on the front page of the questionnaire pack.

Once participants completed the measures, they were given a debriefing form and a brief verbal overview of the background and motivation for the research. Participants were given the opportunity to ask any questions they had related to the research, and were informed of when the results would become available and of contact details for the researcher.

3.0. Results:

3.1. Data coding:

Inter-item reliability analyses were conducted on the risk judgments questionnaire and self-efficacy scale to investigate whether items from each could be collapsed into a single measure for further data analysis. Participants' responses for the eight items on the risk judgments questionnaire yielded a Cronbach's alpha score of 0.80, which indicates that the eight items had high internal reliability. Responses from this measure were collapsed accordingly to provide a mean risk judgments score for each participant ('risk judgment').

Items 1 - 4 on the self-efficacy questionnaire relating to substance use produced a Cronbach's alpha score of 0.79, indicating high internal reliability. Consequently, these four items were collapsed to provide a mean score for substance use self-efficacy for each participant ('substance use self-eff'). The two items related to sexual behaviour on the self-efficacy questionnaire were highly correlated ($r(90) = 0.78, p < .001$) and were subsequently collapsed to a mean for self-efficacy for sexual behaviour for each participant ('sexual behaviour self-eff').

Total sensation seeking scores were obtained for each participant by summing the number of sensation seeking responses made, following Zuckerman (1979). Details of the sensation seeking responses can be found in Appendix E.

A score for the likelihood to engage in risk-taking behaviours (RTB) was calculated for each participant ('likelihood to engage in RTB score') by summing their responses

to the “b” items for each of the five scenarios. This calculation method was consistent with the likelihood to sexually harass scale (Pryor 1987) on which the present measure was modelled.

For the risk accuracy measures, a ratio of the participant’s estimates to the actual New Zealand statistics figures was calculated. A ratio of 1 indicated an accurate estimation, a ratio above 1 indicated over-estimation of risk and a ratio below 1, under-estimation of risk. The statistics for overall numbers of deaths in a motor vehicle accident (Question 2) were not available so only 3 ratios were calculated for each participant. For responses regarding the number of individuals, of one’s own age living in New Zealand, who would die in an accident while driving over the legal blood alcohol limit for their age group within the next year, (‘deaths driving over alcohol limit accuracy ratio score’), participant’s estimates were divided by 7 (the number identified in the 2001 New Zealand statistics).

Participants’ percentage estimates of how many people their age and sex living in New Zealand would use cannabis within the next year were divided by 2002 New Zealand statistics (males: participant response/46, females: participant response/36) to provide ratio accuracy scores (‘cannabis use accuracy ratio score’) for Question 3. Percentage estimates for question four, on how many people the same age and sex living in New Zealand would report having had a sexually transmissible infection (STI) at some time, were again divided by 2002 New Zealand statistics (males: participant response/7.5, females: participant response/ 15.9) to produce ratio accuracy scores (‘contracting STI accuracy ratio score’).

3.2. Descriptive statistics:

Table 1 below indicates the number of participants', the range, and the means and standard deviations for each of the variables measured.

	Valid N	Mean	Minimum	Maximum	Std.Dev.
Risk judgment	90	19.15	1.63	57.50	12.94
Substance use self-eff	90	6.09	2.75	7.00	1.00
Sexual behaviour self-eff	90	5.75	1.50	7.00	1.16
Sensation seeking score	90	4.36	0.00	8.00	1.85
Likelihood to engage in RTB score	90	13.14	5.00	24.00	3.85
Deaths driving over alcohol limit accuracy ratio score	87	70.13	0.14	2857.14	341.56
Cannabis use accuracy ratio score	87	1.17	0.11	2.78	0.59
Contract STI accuracy ratio score	87	2.71	0.27	10.67	2.03

3.3. Comparisons between groups:

One-way ANOVAs were conducted on all of the variables under investigation to establish whether any effects of the three different versions of the questionnaire pack existed. The results showed no effect of version. Accordingly, this factor will not be considered further in the data analysis.

A series of independent t-tests were conducted to establish whether there were any sex differences for any of the dependent measures. There was a significant difference between males and females in their risk judgments ('risk judgment'), $t(87) = -4.38$, $p < 0.05$. The results showed that males made significantly lower risk judgments than females (male mean score = 13.98, female mean score = 24.94). Significant effects of sex were also found for cannabis use risk perception accuracy ('cannabis use accuracy ratio score') and STI risk perception accuracy ('contracting STI accuracy ratio score'). The results for cannabis use showed that females made significantly higher

(over) estimates for how many people their age and sex living in New Zealand would use cannabis within the next year than males, $t(84) = -2.10$, $p < 0.05$ (male mean ratio score = 1.04, female mean ratio score = 1.31). Findings on STI risk perception accuracy indicated that males made significantly higher (over) estimates of how many people their age and sex living in New Zealand would report having contracted an STI at some time than did females $t(84) = 2.82$, $p < 0.05$ (male mean ratio score = 3.27, female mean ratio score = 2.08).

3.4. Relationships among the variables:

Pearson product moment correlations were calculated to determine the patterns of relationships among the different variables: Risk judgment, likelihood to engage in RTB score, substance use self-efficacy, sexual behaviour self-efficacy, sensation seeking score, deaths driving over alcohol limit accuracy ratio score, cannabis use accuracy ratio score and contracting STI accuracy ratio score. These correlations are presented in Table 2.

Table 2: Correlations between all the variables under investigation (n = 84, casewise deletion of missing data). Significant correlations are in bold.

	Risk judgment	Substance use self-efficacy	Sexual behv self-efficacy	Sensation seeking score	Likelihood to engage RTBscore	Deaths driving over alcohol limit accuracy ratio score	Cannabis use accuracy ratio score
Substance Use self-efficacy	0.07 $p = .51$						
Sexual behaviour Self-efficacy	0.08 $p = .50$	0.50 $p = .00$					
Sensation seeking score	- 0.26 $p = .02$	- 0.38 $p = .00$	- 0.23 $p = .03$				
Likelihood to engage in RTB score	- 0.35 $p = .00$	- 0.35 $p = .00$	- 0.18 $p = .11$	0.62 $p = .00$			
Death driving over alc limit accuracy ratio score	0.30 $p = .01$	0.10 $p = .35$	0.13 $p = .24$	0.08 $p = .49$	0.15 $p = .18$		
Cannabis use accuracy ratio score	0.16 $p = .14$	- 0.27 $p = .01$	- 0.04 $p = .70$	0.28 $p = .01$	0.33 $p = .00$	- 0.02 $p = .84$	
Contract STI accuracy ratio score	0.10 $p = .35$	0.05 $p = .67$	0.03 $p = .80$	0.10 $p = .39$	- 0.01 $p = .94$	0.05 $p = .63$	0.24 $p = .03$

The predicted negative relationship between risk judgment and likelihood to engage in RTB was found, $r = -0.35$, $p < .05$. Higher likelihood to engage in RTBs was also significantly negatively related to self-efficacy for substance use ($r = -0.35$, $p < .05$) and positively correlated with sensation seeking ($r = 0.62$, $p < .05$). A significant positive relationship was found between cannabis use accuracy ratio score and likelihood to engage in RTB ($r = 0.33$, $p < .05$). The combination of these results indicate that higher likelihood to engage in RTB was significantly associated with lower risk judgment, lower self-efficacy for substance use, higher sensation seeking and a propensity to give higher (over) estimates of the number of people the same age and sex living in New Zealand who will use cannabis within the next year.

Risk judgments were significantly negatively correlated with sensation seeking ($r = -0.26$, $p < .05$), and significantly positively related to deaths driving over alcohol limit accuracy ratio score ($r = 0.30$, $p < .05$). These findings indicate that higher perceptions of risk were significantly related to lower levels of sensation seeking and a tendency to provide higher (over) estimates for the risk of death involved in driving over the alcohol limit for one's age group.

Higher sensation seeking was found to be significantly negatively correlated to self-efficacy for substance use ($r = -0.38$, $p < .05$) and sexual behaviour ($r = -0.23$, $p < .05$). These results indicate that higher sensation seeking is significantly related to lower levels of self-efficacy for both substance use and sexual behaviour.

The accuracy ratio for cannabis use was significantly positively correlated with sensation seeking ($r = 0.28, p < .05$) and negatively associated with substance use self-efficacy ($r = -0.27, p < .05$). These findings showed that participants' who gave significantly higher (over) estimates of how many people their age and sex living in New Zealand would use cannabis within the next year had significantly higher levels of sensation seeking and lower self-efficacy for substance use.

Analyses found that sexual behaviour self-efficacy and substance use self-efficacy were highly related ($r = 0.50, p < .05$), indicating that low levels of self-efficacy for sexual behaviour corresponded with low levels of substance use self-efficacy. In addition, cannabis use accuracy ratio score and contracting STI accuracy ratio score showed a significant correlation ($r = 0.24, p < .05$), showing that participants' who gave higher (over) estimates for cannabis use also gave higher (over) estimates of the number of people their age and sex living in New Zealand who would report having contracted an STI at some time.

For those measures on which there were sex differences (risk judgments; cannabis use risk perception accuracy; STI risk perception accuracy), separate correlations were conducted for male and female participants. These however revealed no differences in the nature of the relationships between variables as a function of participant sex.

3.5. Regression Analyses:

To assess which variables were the best predictors of likelihood to engage in RTB, regression analyses were conducted. Stepwise regression was used to produce a regression equation to predict likelihood to engage in RTB. Due to the lack of

significant sex differences for likelihood to engage in RTB, sex was not included in the regression as a factor.

The first step was to enter the variables that had first-order correlations with likelihood to engage in RTB into the regression using a forward stepwise method. The variables of risk judgment, substance use self-efficacy, sensation seeking and cannabis use accuracy ratio score were initially entered. This revealed a significant regression effect, $F(4, 82) = 18.85, p < .001$, which accounted for 47.90% of the variance in likelihood to engage in risk taking behaviour scores. Three of the four variables contributed significantly to the variance accounted for.

Sensation seeking (Beta = .44) was the main predictor of likelihood to engage in RTB, individually accounting for 36.8% of the variance. The inclusion of risk judgment (Beta = -.28) explained an additional 4.7% of the variance. Adding cannabis use accuracy ratio score (Beta = .23) into the regression increased the explained variance by an additional 5.6%. Substance use self-efficacy explained no significant additional variance and was consequently omitted from further analyses. A summary of the regression results is presented in Table 3.

Figure 1 shows the unique variance in likelihood to engage in risk-taking behaviour explained by sensation seeking, risk judgments, and cannabis use accuracy ratio score. Due to multicollinearity among these variables, 15% of the explained variance for likelihood to engage in risk-taking behaviour could not be uniquely attributed to any specific variable.

Table 3: Stepwise regression summary for likelihood to engage in RTB including all factors.

	Step	R-square overall	F overall	p-overall level	R-square change	F change	p-change level
Sensation seeking	1	0.38	50.69	0.00	0.38	50.69	0.00
+ Risk judgment	2	0.42	29.46	0.00	0.04	5.47	0.02
+ Cannabis use accuracy ratio score	3	0.47	23.77	0.00	0.05	7.59	0.01
+ Deaths driving over alcohol limit accuracy ratio score	4	0.51	20.96	0.00	0.04	7.09	0.01

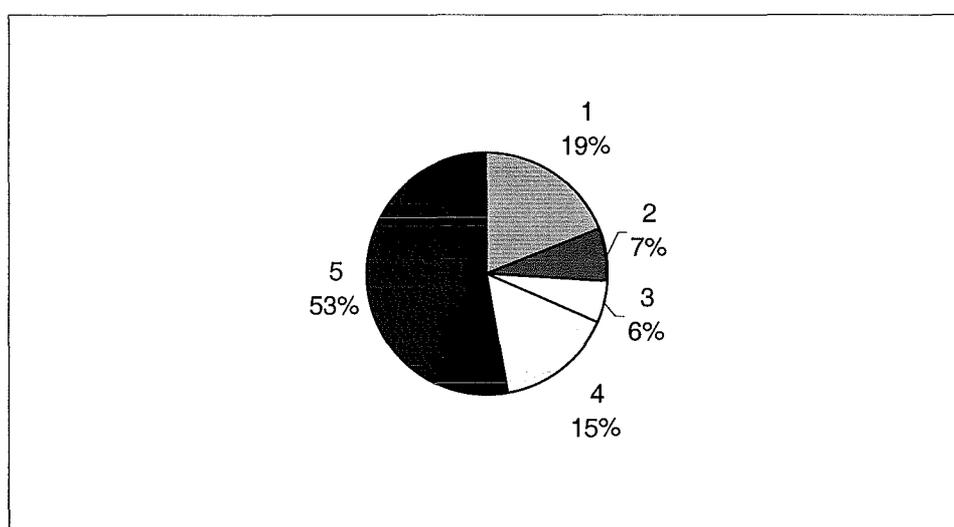


Figure 1: Pie graph showing unique variance in likelihood to engage in RTB explained by sensation seeking, risk judgment and cannabis use accuracy ratio score.

Pie graph key:

- 1 = Sensation seeking
- 2 = Risk judgment
- 3 = Cannabis use accuracy ratio score
- 4 = Variance not uniquely explained
- 5 = Unexplained

The other measured variables were regressed one at a time in addition to sensation seeking, risk judgment and cannabis use accuracy ratio score. Deaths driving over alcohol limit accuracy ratio score was the only variable found to contribute any

significant additional variance (4.0%) in predicting likelihood to engage in RTB, as seen in Table 3.

The final regression equation for likelihood to engage in RTB including significant predictors was:

Likelihood to engage in RTB = 9.24 + 0.0025 (deaths driving over alcohol limit accuracy ratio score) + 1.95 (cannabis use accuracy ratio score) + 0.92 (sensation seeking) – 0.11 (risk judgment) + error.

4.0 Discussion.

4.1. Summary of research objectives and findings: Characteristics of the high risk-taking adolescent.

The primary purpose of this research was to examine the extent to which individual factors predict adolescents' likelihood to engage in risk-taking behaviour. Factors measured in relation to their association with likelihood to engage in risk-taking behaviour included adolescents' sex, their levels of risk judgments, sensation seeking and self-efficacy for sexual behaviour and substance use. This study only investigated late adolescents, between the ages of 18 and 20 years. Whether or not the same factors influence likelihood to engage in risk-taking behaviour in younger and older individuals awaits further research.

A further objective of the study was to investigate whether adolescents have relatively accurate knowledge of the risk involved in risk-taking behaviours or whether they under or over estimate such risks. The findings related to the three main hypotheses of the present study will be discussed first, followed by a discussion of additional, secondary findings from the research.

Using the more novel and creative measure of likelihood to engage in risk-taking behaviour and focusing on the measurement of likelihood to perform a behaviour rather than previous behaviour involvement avoided the methodological concerns of retrospective reports. Analyses identified three major predictors - sensation seeking, risk judgments and self-efficacy. These will be considered in more detail below.

From the present results, a profile of the high likelihood to engage in risk taking behaviour adolescent can be constructed. Some have stated that a common limitation of past research has been the examination of single contributing factors to risk-taking behaviour (Gullone & Moore 2000). The current study extended previous research by investigating the inter-relationships between risk judgments, sensation seeking and self-efficacy in relation to likelihood to engage in risk-taking behaviour. This approach provided the ability to reveal the relative dominance of each of the different factors in explaining adolescents' risk-taking likelihood.

Analyses revealed that there are some specific characteristics of the high risk-taking adolescent. Findings show that a young person between the ages of 18 and 20 who has a higher likelihood to engage in risk-taking behaviour has elevated levels of sensation seeking, lower perceptions of risk, and lower self-efficacy for substance use. The most striking finding from this study is the dominance of sensation seeking in explaining adolescents' risk-taking likelihood.

4.2 Risk judgments and likelihood to engage in risk-taking behaviour.

Hypothesis 1: Risk judgments will be significantly negatively correlated with likelihood to engage in risk-taking behaviour.

The results provided support for this hypothesis. Risk judgments showed a significant negative relationship with likelihood to engage in risk-taking behaviour. Adolescents with lower perceptions of risk were more likely to say they would engage

in risk-taking behaviour. Those with higher judgments of risk were more likely to say they would not engage in risky activities.

Within this study, adolescents who gave lower risk judgments for the risk involved in natural hazards and negative outcomes associated with personal behaviours had a higher likelihood to say they would engage in risk-taking activities involving dangerous driving, drug and alcohol use, hazardous behaviour, and unsafe sexual activity. This corresponds with previous findings (e.g., Benthin et al., 1993; Finn & Brown 1981; Gullone & Moore 2000; Millstein & Halpern-Felsher 2002b; Moore & Gullone 1996) that have shown adolescents who engage more frequently in risk-taking behaviours have lower perceptions of risk.

The same negative relationship between risk perceptions and risk-taking has been found in a number of studies exploring young people's engagement in different types of risky behaviours. Research, has for example, indicated that adolescent alcohol use and perceived danger from drinking alcohol are inversely related (Finn & Brown 1981), and that risk judgments are significantly negatively associated and are an important predictor of adolescents' reported engagement in antisocial, rebellious and reckless behaviours (Gullone & Moore 2000).

It makes sense that people who perceive more associated risk in risk-taking behaviours are less likely to say they would engage in such activities. Having higher perceptions of risk would most likely be accompanied by feelings of anxiety, discomfort or fear in situations where one is subjected to the decision as to whether to participate in risky behaviours. If individuals perceive more risk or danger involved in

these circumstances, it seems appropriate that they would be less likely to engage in such behaviour. Adolescents within this study who made higher risk judgments did perceive more danger associated with risky behaviours. Those with elevated risk judgments specifically gave significantly higher (over) estimates of the risk involved in driving over the legal alcohol limit for one's own age group.

The methodology used within this study advanced previous research findings by providing the ability to examine which of the measured factors were more influential in predicting adolescents' likelihood to engage in risk-taking behaviour. Although sensation seeking was found to be a stronger predictor of adolescents' risk-taking likelihood within this study, risk judgments did show a significant negative association with participation in such activities. What is difficult to determine, however, is whether the relationship between risk judgments and risk-taking behaviour is a function of judgments influencing behaviour, or the reverse (Gullone & Moore 2000). Benthin et al., (1993) proposed it might in fact be that young people's risky behaviour drives their perceptions of risk. If this is the case, perhaps adolescents who are high risk-takers are motivated to rationalise their actions by making their perceptions and beliefs consistent with their behaviour.

Despite the difficulty in determining the direction of causation in this relationship, the current results show evidence that perceptions of risk are an important factor explaining adolescents' likelihood to engage in risk-taking behaviours. This finding supports previous suggestions that future studies should investigate this association to determine whether changes in risk perceptions brought about by education and intervention do, in fact, result in corresponding changes in behaviour (Gullone &

Moore 2000). The current study has advanced preceding research on adolescents' risk-taking behaviour by using a newer measure of risk-taking behaviour that may have been less open to social desirability and memory inaccuracies in participants' responses.

4.3 Sensation seeking and likelihood to engage in risk-taking behaviour.

Hypothesis 2: Sensation seeking will be significantly positively correlated with likelihood to engage in risk-taking behaviour.

The results strongly supported this hypothesis. Within this study, sensation seeking was a more influential factor of adolescents' risk-taking likelihood than were their sex, perceptions of risk, and self-efficacy for substance use and sexual behaviour. Utilising analyses that provided the ability to examine the predictive nature of each of these factors has added to existing knowledge by revealing the dominance of sensation seeking as a major contributing factor of adolescents' risk-taking likelihood. Sensation seeking also showed a significant negative association with risk judgments. The advantage of measuring the different relationships among the predictor variables was the ability to determine the ways in which they interact in relation to adolescents' risk-taking likelihood, such as in this particular finding that individuals with higher levels of sensation seeking also had lower perceptions of risk. Overall then, high sensation seekers showed higher risk-taking likelihood and also showed significantly lower perceptions of risk. The strength of sensation seeking in predicting likelihood to engage in risk-taking behaviour indicates that future research on adolescent risk-

taking should include this construct because it has been shown in this study to be an important influential factor.

Adolescents within this study who had higher total sensation seeking scores for thrill and adventure seeking, experience seeking, disinhibition and boredom susceptibility had significantly higher risk-taking likelihood. Those with lower sensation seeking scores were significantly less likely to engage in risky behaviours. Caution must again be taken in determining the direction of causation for this relationship. From the current findings, it cannot be concluded whether it is sensation seeking that leads to higher risk-taking likelihood or if, in fact, higher likelihood to engage in risk-taking behaviour eventuates in elevated levels of sensation seeking.

The positive relationship between sensation seeking and risk-taking likelihood is consistent with findings from a number of studies that have shown a positive correlation between sensation seeking and adolescent risk-taking behaviour (Arnett 1990; 1991; 1996; Bradley & Wildman 2002; Cohen & Fromme 2002; Greene et al., 2000, Newcomb & McGee 1991; Rolison & Scherman, 2002; Satinder & Black 1984; Stanton et al., 2001). The present results are in line with findings that sensation seeking is positively associated with young people's cannabis and LSD use (Satinder & Black 1984), driving under the influence of alcohol (Arnett 1990; 1991; 1996) and high-speed driving (Arnett 1991; 1996). Other research similarly showing the strength of sensation seeking (Levine and Kozak 1979; cited in Arnett 1992) found that indirectly, adolescents reported sensation seeking reasons such as "out of curiosity" and "to see what it was like" (cited in Arnett 1992, p. 345) as their strongest reason for trying illegal drugs.

Results from the current study corroborate the predominant finding in many studies by Arnett (e.g., 1990; 1991; 1992; 1996) that sensation seeking is a major contributing factor influencing young people's engagement in risk-taking behaviours. Based on his research evidence showing that sensation seeking is higher during adolescence than adulthood and that within adolescence, higher sensation seekers report elevated levels of risky and reckless behaviour, Arnett (1992; 1996) has, in fact, proposed sensation seeking forms part of the developmental basis of risk-taking and reckless behaviour. If this is the case, it seems crucial that investigation and research on adolescent risk-taking behaviour include the sensation seeking construct in attempting to understand and explain young people's participation in risky activities. The present results support Arnett's argument for the need to consider sensation seeking as a major contributing factor in the explanation of young people's risk-taking behaviour.

The significant positive relationship between sensation seeking and risk-taking likelihood found within this study also corresponds with a body of research evidence that has shown young people's risk-taking behaviour to be strongly influenced by their perceptions of the benefits associated with participation (e.g., Benthin et al., 1993; Hampson et al., 2001; Millstein & Halpern-Felsher 2002a; Moore & Gullone 1996; Parsons et al., 2000; Siegel et al., 1994). For example, Parsons et al., (2000) found that among 704 University students', sexual risk-taking behaviours were strongly influenced by perceptions of the associated benefits of engagement, including feelings of excitement and pleasure. Similarly, Moore and Gullone (1996) found that, in general, young people did not report many reasons for their risk-taking, with the most frequently reported potential positive outcome regarding feelings of pleasure. The increased need for optimal arousal and stimulation inherent in sensation

seekers may explain the perceived benefits of risk-taking behaviours that, in turn, result in increased risk-taking (Parsons et al., 2000).

The current results replicate those by Rolison and Scherman (2002) that showed sensation seeking was surprisingly a more significant predictor of older adolescents' risk-taking behaviour than were their perceptions of risk. The large influence of sensation seeking in the present findings is therefore consistent with past research. The current results do however extend those by Rolison and Scherman (2002) by using a more novel measure of risk-taking likelihood, which avoided being reliant on participants' self-reports of frequency of risk involvement.

The strength of the positive association between sensation seeking and likelihood to engage in risk-taking behaviour might be explained by past evidence that high sensation seekers have lower arousal levels and need stronger, newer and more stimulating messages for holding attention (Donohew, Palmgren, and Lorch 1994, cited in Greene et al., 2000). In contrast, low sensation seekers have high arousal levels and avoid such stimuli (Donohew et al., 2000). Consequently, individuals high on sensation seeking are more impulsive, antisocial, extraverted and nonconformist, (Zuckerman & Link 1968; cited in Newcomb & McGee 1991), and have an intense aversion to routine and greater need for unpredictable, adventuresome and exciting experiences (Arnett 1991). The fact that biological factors are connected to the drive for sensation seekers to engage in risk-taking may explain why sensation seeking was a more influential predictor of adolescents' risk-taking likelihood than were their perceptions of risk or self-efficacy within the present study.

From the current findings, risky drug and alcohol use, unprotected sex and dangerous driving appeared to provide outlets for adolescents' with high sensation seeking needs. Arnett (1996) has previously stated that sensation seeking may lead to engagement in risk-taking behaviours because these behaviours often offer the novel and intense feelings that high sensation seekers enjoy. For example, driving at fast speeds provides powerful stimulation and using drugs leads to novel changes in mood and state of mind. The positive physical and emotional results connected to these types of risky behaviours such as relaxation, excitement and pleasure are often a direct result of the behaviour (Moore & Gullone 1996). The present findings indicate that the attractiveness of these feelings and emotions may play an important role in determining adolescents' risk-taking likelihood.

Results from this study also established that those with higher levels of sensation seeking had significantly lower levels of self-efficacy, or confidence, that they would be able to avoid the negative consequences of substance use and sexual behaviour. The analyses used extended previous research by providing the ability to examine the inter-relationships among the predictor variables. In particular, results from this study showing a significant negative relationship between sensation seeking and self-efficacy have furthered current knowledge because to date there are limited published empirical studies examining this association in relation to adolescent risk-taking behaviour.

This relationship might be explained by the need for optimal arousal and stimulation inherent in high sensation seekers, as previously discussed. According to Azjen's (1991) theory of planned behaviour, an individual's perception of their behavioural

control has a significant impact on their behavioural intentions and actions. Within the current findings, the significant relationship between sensation seeking and self-efficacy is in line with the theoretical position that perceived behavioural control plays an important role in determining an individual's behavioural performance. Lower perceptions of behavioural control, or self-efficacy, have shown within the current findings to be related to higher levels of sensation seeking among adolescents who have a strong need for exciting and stimulating experiences.

Adolescents with high levels of sensation seeking may have less perceived behavioural control in their ability to avoid the negative outcomes of substance use and sexual behaviour, perhaps because they have some level of awareness that such activities involve the exciting and stimulating experiences they seek. Within the present findings, this appears to result in high sensation seekers having lower self-efficacy for avoiding the negative consequences regarding these behaviours.

Past researchers have made similar suggestions by stating that it is likely that adolescents who have a desire for highly stimulating sex doubt the ability to have these needs met through safer sex activities (Parsons et al., 2000). Similarly, it could be expected that high sensation seekers would report greater situational temptation for unsafe sex and less confidence in their ability to resist such behaviours in these situations (Parsons et al., 2000). While some adolescents with high levels of sensation seeking may have low levels of self-efficacy in their ability to avoid the negative consequences of risk-taking even though they would like to, it is also feasible that other high sensation seekers simply do not want to avoid the risks inherent in risk-taking.

4.4 Self-efficacy and likelihood to engage in risk-taking behaviour.

Hypothesis 3: Self-efficacy for sexual behaviour and substance use will be significantly negatively related with likelihood to engage in risk-taking behaviour.

A significant negative relationship was found between self-efficacy for substance use and likelihood to engage in risk-taking behaviour. Adolescents with lower self-efficacy for substance use were more likely to say they would engage in risk-taking behaviour. Those with higher self-efficacy for substance use showed lower risk-taking likelihood. No significant relationship was found, however, for sexual behaviour self-efficacy and likelihood to engage in risk-taking behaviour.

These findings are inconsistent with past research, that has found self-efficacy to have the most influence on sexual risk-taking and condom use in particular (Basen-Enquist & Parcel 1992; Cohen & Fromme 2002; Goldman & Harlow 1993; Parsons et al., 2000; Sanderson & Jemmott 1996; Stark et al., 1998; Wulfert & Wan 1993). The current study shows differential results by indicating that self-efficacy has a significant negative association with substance use but no significant relationship with sexual behaviour.

The inconsistency between the present results and past research findings might be explained by the newer methodology used within this study. The difference in the measurement of risk-taking likelihood might explain why the present results regarding risk-taking and self-efficacy for sexual behaviour and substance use are dissimilar to those of past research that have mostly analysed young people's retrospective reports of risk involvement. Measuring risk-taking likelihood may have resulted in a different

pattern of responding from participants compared to previous retrospective report measures. Perhaps, for example, a significant relationship was found between substance use self-efficacy and likelihood to engage in risk-taking behaviour because adolescents within this study felt comfortable to respond more honestly about their likelihood of participating risky substance use, rather than reporting their actual previous involvement. It is difficult, however, to determine why the present results show a lack of significant relationship for sexual behaviour self-efficacy.

A possible explanation for the prevalence of a significant inverse relationship for substance use self-efficacy, but not for sexual behaviour self-efficacy, might be in the consideration of how these behaviours are thought about by society and the different types of messages that are delivered to young people in sexuality and drug and alcohol education programmes. Participants within this study were between 18 and 20 years of age. The legal age in New Zealand for consensual sex is 16 years of age (Collins 2000). Furthermore, research has shown that by the age of 18, 58% of males and 68% of females report having engaged in sexual intercourse in the past year (Dickson, Paul, Herbison & Silva 1998). It would therefore be appropriate to assume that the majority of participants within this study had engaged in some form of sexual activity.

Social attitudes to sexuality and sexual health have become more liberal (Collins 2000) and sex is not a 'taboo' subject to discuss with people aged between 18 and 20. Moreover, these adolescents have reached an age where they have received a great deal of information, education and resources about safer sex methods and the negative consequences of unprotected sex. Most young people within this age group would

have participated in high school health and sexuality classes and received education about contraception methods and condom use for protection against sexually transmissible infections.

Sexual health and sexuality education can result in feelings of empowerment and control for young people who feel they are better equipped with the knowledge and resources to avoid the negative consequences of risky sexual behaviour (Agha 2002; Visser & van Bilsen 1994). The fact that most adolescents within the current study probably have such feelings of control regarding their sexual risk-taking due to their knowledge about safer sex practices and resource availability may explain the lack of significant relationship between sexual behaviour self-efficacy and risk-taking likelihood.

In contrast to sexuality education programmes, many adolescent drug and alcohol education programmes still focus on teaching young people about the negative consequences of substance use in an attempt to reduce consumption (Spooner & Hall 2002). More recent researchers of young people's risky substance use have argued that intervention and education programmes must move away from focusing on the delivery of messages to young people to "Just say no" (Safer & Harding 1993; Spooner & Hall 2002). Many of these prevention programmes still focus on encouraging young people to avoid substance use and might not center on teaching self-control and coping skills in the way that sexuality education programmes do. Adolescents within this study have probably not received a great deal of information and education about self-control and how to cope in situations involving substance

use. This might explain why a significant relationship was found between substance use self-efficacy and risk-taking likelihood.

Most studies to date examining the influence of self-efficacy on adolescents' risk-taking behaviour have investigated the impact of self-efficacy on sexual behaviour. Cohen and Fromme (2002) suggested that self-efficacy might be less important in the establishment and continuation of risky behaviours involving drug and alcohol use. The current results suggest this is not the case. Adolescents with lower levels of confidence in their ability to prevent them from experiencing alcohol addiction, arrest for drunk driving, drug addiction and hospitalisation from drug overdose were more likely to say they would engage in risk-taking behaviours. These findings indicate that the relationship between adolescents' self-efficacy for substance use and their risk-taking behaviour requires further examination.

4.5 Other Findings.

A number of other findings also emerged from this research. Results showed that adolescent males have significantly lower judgments of risk than adolescent females, although there was the propensity to provide (over) estimations for the risk involved in risk-taking behaviours. Sex differences were found for adolescents' accuracy of risk perception regarding sexually transmissible infections and cannabis use. This section will discuss these findings and other more minor results that were not specifically connected to the three main hypotheses of the study.

4.5.1. Sex differences in risk perception.

The results have shown that sex of adolescents is an important influential factor on their perceptions of risk. Within this study, adolescent females made significantly higher risk judgments for negative outcomes such as contracting a sexually transmissible infection, contracting HIV/AIDS, dying from a drug overdose and vomiting from alcohol consumption than males. These results are consistent with previous research that has indicated females have significantly higher perceptions of the risk associated with risk-taking behaviours than males (Gullone & Moore 2000; Millstein & Halpern-Felsher 2002a; Mundt et al., 1992; Parsons et al., 1997; Smith & Rosenthal 1995). Such findings inform us that male and female adolescents think differently about the risk associated with risk-taking behaviours.

Although males and females showed a significant difference in their perceptions of risk, no sex difference was found for likelihood to engage in risk-taking behaviour. This result differs from those of previous studies that have shown females report engaging less frequently in risk-taking behaviours than males (Bradley & Wildman 2002; Byrnes et al., 1999; Gullone & Moore 2000; Millstein & Halpern-Felsher, 2002a; 2002b; Smith & Rosenthal 1995).

The present findings indicate there is no significant difference among adolescent males and females in their risk-taking likelihood. Shapiro et al., (1998) made a similar conclusion from their research investigating risk-taking patterns of female adolescents. Their findings in fact showed that at times, female participants reported higher engagement than mixed sex samples in behaviours traditionally thought of as male-dominated, such as drinking and driving fast. They concluded that females

engage in similar rates of risk-taking as comparative sample populations of both males and females. Earlier research by Finn and Brown (1981) had similarly established that many girls get drunk as often as boys do.

The current results, along with findings that are more recent such as Shapiro et al. (1998), challenge the widely held view of adolescent males as the 'risk takers.' This study found it is not only young males who are likely to engage in risky drug and alcohol use, sexual activity, dangerous driving, and hazardous behaviour. The predicted lower level levels of likelihood to engage in risk-taking behaviour by females were not supported by the findings.

This result might be explained by the measurement of risk-taking behaviour within this study. This research measured adolescents' likelihood to engage in risk-taking behaviour, compared to previous studies that have mainly investigated self-reports of frequency of involvement. Society typically views it as less socially acceptable for females to participate in risky behaviours by casting males in the roles of the 'risk takers.' The use of self-reports for frequency of risk-taking behaviour used by previous researchers may have lead to females often underestimating their participation. The more novel approach this study took by measuring likelihood to engage in risk-taking behaviour might have captured a truer and more realistic picture of adolescents' behaviour, in particular females' participation in risky activities. The lack of a significant sex difference in risk-taking likelihood may also be connected to changes across time as young women gain more freedom and consequently engage in risk-taking behaviours to the same extent as do young men.

4.5.2. Adolescents' over-estimation of risk.

Findings supported the prediction that adolescents would over-estimate the risk involved in specific risk-taking behaviours. Adolescents within this study over-estimated the risk associated with driving over the legal alcohol limit for their age group, using cannabis and contracting a sexually transmissible infection.

These results support the argument that we must move away from believing that adolescents perceive themselves as invulnerable to the harm associated with risk-taking behaviours (Millstein & Halpern-Felsher 2002a; 2002b; Quadrel et al., 1993). The current findings, in line with more recent studies, (Johnson et al., 2002; Millstein & Halpern-Felsher 2002a; 2002b; Quadrel et al., 1993; Smith and Rosenthal 1995) confirm that adolescents perceive these risks and often make over estimates of such risks. The present results, in fact, indicate that adolescents have a relatively inaccurate (over) estimated perception of the risk involved in risk-taking behaviours. The reasons for why young people are inaccurate at assessing risk and make (over) estimates of risk could be investigated in future research.

The current results are similar to those by Halpern-Felsher et al. (2001) that found adolescents consistently provided over estimates of the risk involved in various types of risk-taking behaviours. In the same way to this research, Halpern-Felsher et al. (2001) compared adolescents' quantitative estimates with approximate probability estimates and found that, on average, participants' risk perceptions were constant overestimates of actual risk status. Their results showed that participants who had driven drunk themselves estimated the chance of getting into an accident if driving drunk as 41%. Those who had no experience with driving drunk estimated the

probability of an accident as 61%. Participants who had experienced sexual intercourse without a condom estimated the chance of getting an STI after having sex one time without a condom as 14%. Those who had not experienced sexual intercourse without a condom estimated the chance of contracting an STI as 43%.

In addition to indicating the tendency for young people to (over) estimate the risk involved in risk-taking behaviours, Halpern-Felsher et al.s (2001) results also suggest that behavioural experience with risk-taking behaviours is associated with lower perceptions of risk. It must, however, be noted that the direction of causation in this relationship cannot be established (Halpern-Felsher et al., 2001). Future research should investigate this relationship further by examining longitudinally the impact of risk-taking participation on risk perception over time.

Results showed that in addition to providing (over) estimates of the risk involved in risk-taking behaviours, adolescent males and females showed significant differences in their perceptions of the risk involved in cannabis use and the transmission of STIs. Females made significantly higher (over) estimates for how many people their age and sex living in New Zealand would use cannabis within the next year. Males made significantly higher (over) estimates for the transmission of STIs among their sex and age group.

Females' tendency to (over) estimate cannabis use more than males may be explained by the sex difference in actual cannabis use among New Zealand adolescents. Nationwide statistics have shown that cannabis use and dependence are more common among young males than females. For example, in 1998, among those

aged 18 and 19 years of age, 46% of males and 36% of females had used cannabis in the previous year (Ministry of Health 2002). The fact that adolescent males have a higher rate of cannabis use would most likely result in them having a more accurate perception of cannabis use within their age group, explaining why females made higher overestimates within this study. Research evidence has shown that those who have experience with risk-taking behaviours make lower (over) estimates than those with no experience. Across two natural hazard related risks and a range of negative consequences arising from risky sex and alcohol use, Halpern-Felsher et al. (2001) found that adolescents who had experienced a natural disaster or had engaged in a specific risky behaviour made lower (over) estimates for the probability of experiencing a negative consequence eventuating from that event or behaviour than did those with no experience.

Interestingly, the results showed the opposite pattern for STI risk perception accuracy for which males made significantly higher (over) estimates of how many people their age and sex living in New Zealand would report having contracted an STI at some time. This result might be explained by the fact that females generally talk about personal issues regarding sex and contraception with their friends, peers, and adults more openly and freely than do males. Previous research has shown, for example, that sexually active young women have a particularly high rate of self-disclosure about sexual and contraceptive concerns to their best friends (Herold & Way 1988; cited in Whitely & Hern 1991). Males may have a more inaccurate perception of STI transmission for their age groups because they do not communicate about these issues as liberally, and hence, have a less realistic picture of the prevalence of STIs among their age group.

Higher (over) estimates for cannabis use were significantly related to lower levels of self-efficacy for substance use, elevated levels of sensation seeking and increased risk-taking likelihood. This finding may be explained by the fact that cannabis use is connected to more positive and concrete outcomes than the other risk-taking behaviours measured in the risk perception accuracy measure. The immediate effects foreseeable in cannabis use by 'getting high', or feeling relaxed and mellow may have been easy for participants to anticipate.

In comparison, providing estimates for deaths related to car accidents involving alcohol use and for the transmission of STIs might have been more difficult to predict due to their lack of positive instantaneous outcomes. This may have led to the positive consequences of cannabis use being more salient for those with low substance use self-efficacy, high sensation seeking or high risk-taking likelihood than the other two items in the measure regarding negative consequences. In turn, this may have resulted in a tendency for these participants to over estimate the amount of people within their age group who would use cannabis within the next year.

4.5.3. Secondary findings related to the research methodology.

More minor results indicated that self-efficacy for sexual behaviour and substance use were highly related, most probably explained by the fact that they were measuring a similar construct. Findings also showed that adolescents' accuracy in their estimates for cannabis use and transmission of STIs among their age group were significantly related. Adolescents who gave higher (over) estimates for cannabis use also gave

higher (over) estimates for STI contraction. Lower estimates for cannabis use corresponded with lower estimates for the transmission of STIs.

Measurement issues within the study might explain why the first item on the risk perception accuracy measure regarding deaths from driving over the legal alcohol limit was not significantly correlated with these two items. Participants were asked to provide percentage estimates for the items regarding cannabis use and transmission of STIs. These two items may have shown a significant relationship because they were measured in the same manner and provided approximations that are more realistic by using percentage estimates. Previous researchers have stated that an advantage of using percentage scales is that results show less inconsistency of use among participants (Millstein & Halpern-Felsher 2002b). The item concerning alcohol related driving deaths that asked participants to provide a total number estimate, may have produced a different pattern of responding, causing this item to be unrelated to the other two within this measure, and overall, to produce higher (over) estimates and inaccuracy.

4.6. Practical implications.

Ultimately, the predominant question surrounding this study was ‘Why do adolescents’ engage in risk-taking behaviours that harm the health and well-being of themselves and those around them?’ Findings from this research have firstly suggested that education and intervention programmes about the risk involved in risk-taking behaviours are delivering effective messages. Adolescents have an awareness of the risk involved in risk-taking behaviours and, in some cases, over estimate such

risks. These results indicate that society must move away from presuming that adolescents perceive themselves as invulnerable. The continuation of such beliefs will not only under-estimate the competence of adolescents' ability to understand that risk-taking behaviours involve potential danger and harm but will also result in education and intervention programmes failing to address all of the underlying causes of young peoples risky behaviour.

Because the predicted significant negative relationship between risk judgments and likelihood to engage in risk-taking behaviour was found, this indicates that perceptions about risk should continue to be included in education and intervention programmes aimed towards reducing adolescent risk-taking behaviour. Doing so however does present some challenges.

Within this study, adolescents over estimated the risk involved in various risk-taking activities. Allowing them to continue with large over estimations of risk may be a dangerous strategy. Providing young people with information about the actual risks might however lead to them minimising their prevalence and importance (Millstein & Halpern-Felsher 2002a). Teaching about the probability of negative outcomes may also prove counterproductive by resulting in increased risk-taking as young people become aware that most risk-taking behaviours do not lead to negative consequences (Millstein & Halpern-Felsher 2002b). Conversely, continuing to predominantly focus on potential negative outcomes appears ineffective if young people are aware of the negative consequences of risk-taking behaviours (Benthin et al., 1993; Finn & Brown 1981; Millstein & Halpern-Felsher 2002a).

Despite these difficulties, the current results provide information that perceptions of risk are an influential factor explaining risk-taking likelihood, and should therefore continue to be included in intervention and education programmes. A more appropriate strategy in educating youth about health risks may be to move toward emphasising and making apparent the realistic negative consequences of risk-taking behaviour (Finn & Brown 1981; Millstein & Halpern-Felsher 2002a; 2002b). Such interventions might encourage adolescents to understand the widespread implications that participation in one risky behaviour can have on the rest of their lives. It has been suggested that programmes that attempt to personalise negative outcomes, such as including guest speakers living with HIV/AIDS stress the real-life impact of the consequences of risk-taking rather than the probability of their occurrence (Millstein & Halpern-Felsher 2002a; 2002b).

Further investigation is required to attempt to understand the reasons underlying adolescents' over estimation of risk. One possible factor may be that (over) estimates provided by adolescents aged between 18 and 20 within this study are a reflection of the messages of high risk they have received from school and risk-taking behaviour education programmes.

A second potential explanation for adolescents' (over) estimates of risk may be the possible existence of an inverse vicious cycle whereby adolescents' engagement in risky behaviours may be connected to their lack of experience with the negative consequences that correspond with high perceptions of risk. Despite making (over) estimates of the risk involved in cannabis use, driving over the legal alcohol limit and

the transmission of STIs, adolescents still said they were likely to engage in risk-taking behaviours.

This may be connected to them not having experienced the corresponding negative consequences (e.g., death from alcohol related car accident, drug addiction, contraction of STIs) themselves, which may then result in higher levels of risk-taking participation. Although research by Halpern-Felsher et al., (2001) found no significant difference in risk judgments between adolescents and young adults who had versus those who had not experienced behaviour-linked negative consequences of risk-taking, the current results suggest that this relationship requires further examination. Future research could investigate the impact behaviour-linked outcomes have on risk perception and behaviour over time.

Education and intervention programmes invest a huge amount of money, energy and resources into educating young people and attempting to influence their judgments of risk and risk-taking behaviour. The prevailing assumption is that provided with the knowledge of the risk involved in these activities, adolescents will avoid participation in such behaviours. Findings from this study indicate this is not the case. Adolescents within this study had an over estimated and unrealistic perception of the risks associated with cannabis use, sexual activity and driving over the legal alcohol limit. What is concerning is that despite having such high perceptions of risk, adolescents still said they would participate in risky behaviours.

From the current findings, sensation seeking appears to be the factor underlying this drive to engage in risk-taking behaviour. The results show that sensation seeking is in

fact a more important predictor of older adolescents' risk-taking likelihood than are their perceptions of risk. Some have argued that cognitive theories of risk-taking, which imply that having factual knowledge about risks is a major protective factor against risk-taking, neglect other motives for engagement such as the need for excitement, stimulation and challenge (Siegel et al., 1994). The present results support this argument. While sensation seeking showed to be the most important factor explaining adolescents' risk-taking likelihood within this study, measuring the relationships between the predictor variables additionally revealed that those with higher levels of sensation seeking had significantly lower perceptions of risk and also had significantly lower substance use self-efficacy.

The strength of sensation seeking in predicting adolescents' risk-taking likelihood found from this research suggests that in addition to teaching about the knowledge of risks, education and intervention efforts need to attempt to find alternative and less destructive outlets that fulfil young people's sensation seeking needs but do not involve the danger inherent in risk-taking behaviours. Evidence from previous research indicating that risk-taking behaviours serve developmental needs such as experimentation and identity formation also supports the requirement for intervention and education strategies to include ways to meet these needs while avoiding the negative consequences of risk-taking (Irwin & Millstein 1990). It is important to acknowledge that because participants in this study were aged between 18 and 20, the current results do not provide information about whether sensation seeking plays the same important role in predicting younger adolescents' risk-taking behaviour.

One research paradigm has attempted to identify the physiological and biological links to sensation seeking, and has provided evidence that, for example, high sensation seekers exhibit greater electrodermal reactivity to novel stimuli (Robinson & Zahn 1983, cited in Greene et al., 2000), and greater cortical arousal (Hauri & Olmstead 1989, cited in Greene et al., 2000) compared to low sensation seekers. Given the presumed biological basis of sensation seeking (Zuckerman 1979), it seems unlikely that direct intervention on levels of sensation seeking will be successful (Hampson et al., 2001). According to Zuckerman however, a range of different activities can satisfy sensation seeking. The present findings suggest that substitution of adolescents' risk-taking behaviours for safer behaviours that still satisfy their sensation seeking needs is an appropriate intervention goal.

Previous research has shown that for high-risk adolescents, drug-free alternative activities designed by peers are effective in changing dangerous drug use behaviours (Bennett & Coggan 2000). Others have suggested that young people could be taught that competing in a sporting race is as physically gratifying as competing in a drinking competition (Moore & Gullone 1996). For these interventions to be successful, the alternatives offered to young people must be perceived to have similar benefits of risk-taking behaviours (Kuther & Higgins-D'Alessandro 2000). Continuing with zero-tolerance messages which emphasise the dangers of risk-taking and encourage young people to "just say no" to participation will be ineffective because they only consider the negative consequences (Resnicow, Smith, Harrison & Drucker 1999; Siegel et al., 1994). Furthermore, these types of messages may be counterproductive because adolescents will be likely to rebel against the ideas presented in these programmes

and will be more likely to engage in the risky behaviour (Marlatt & Witkiewitz 2002).

The current results suggest that in instances where risk-taking behaviour is inevitable, educational programmes should aim to teach adolescents skills for engaging in these activities safely and with more moderation. Sexuality education programmes could teach young people how condom use and safer sex can be pleasurable, and drug and alcohol programmes could educate about healthy limits and safety guidelines for alcohol and drug use. This harm reduction (or harm minimisation) approach encourages adolescents to have the fulfilling, exciting and pleasurable experiences they seek while teaching them how to avoid the negative outcomes of frequent and harmful engagement in risky activities. For harm reduction interventions to be successful, it is crucial that teachers, educators and intervention workers move away from the misconception that discussing risky behaviours will result in higher rates of participation by young people (Marlatt & Witkiewitz 2002).

Harm reduction methods are increasingly being used by New Zealand health promotion strategies and focus on an appreciation of adolescent psychosocial development in which needs for experimentation come into play (Bennett & Coggan 2000). Research on young people's alcohol consumption has shown that these types of harm reduction approaches which aim to reduce alcohol use and its negative consequences among adolescents result in increased awareness of the harmful outcomes of substance use, decreased positive outcome expectancies for substance use and lower levels of alcohol consumption and alcohol related problems (Marlatt & Witkiewitz 2002). Harm reduction is based on the idea that mood-altering substances

have been, and will most likely continue to be, a normative part of human behaviour, and that there are benefits to acknowledging the reality of substance use rather than criticising it (Resnicow et al., 1999).

The significant inverse relationship between self-efficacy for substance use and likelihood to engage in risk-taking behaviour suggests that drug and alcohol education programmes should specifically attempt to increase self-efficacy as a means of reducing high-risk substance use. Educators could use role-play techniques that allow young people to experiment with different ways of responding and methods to protect themselves from the negative consequences associated with high-risk alcohol and drug use. Previous studies have shown that role-play is a useful tool for encouraging the development of young people's skills in making safer and healthier decisions concerning risk-taking (Out & Lafreniere 2001; Perlini & Ward 2000; Safer & Harding 1993). Large-scale inoculation programmes have also shown that role-play is an effective method for young people to practice skills to deal with peer pressure to conform to behaviours such as smoking (e.g., Perry, Killen, Slinkard, & McAlister 1980).

Role-playing techniques could aim to teach adolescents effective coping skills to use in social situations where they find it difficult to avoid harmful alcohol and drug use. Evidence has demonstrated that adolescent drug prevention programmes that facilitate the development of interpersonal and communication skills are more effective than non-interactive lecture-based prevention programmes that focus on knowledge of the consequences of drug use (Tobler, Roona, Ochshorn, Marshall, Streke & Stackpole 2000). The use of role-play methods to increase young people's substance use self-

efficacy may encourage them to feel empowered and positive about practicing new and more appropriate skills to apply in risky situations involving substance use. For adolescents to feel comfortable about practicing such skills regarding drug and alcohol consumption, educators must provide them with supportive and encouraging feedback.

Basen-Enquist and Parcel (1992) suggested that increasing self-efficacy requires role modelling and successful practice with the desired behaviour. Past evidence has shown that involving peer leaders who are liked, respected, and exhibit valued characteristics in risk behaviour education programmes can be influential in encouraging young people to undertake new patterns of behaviour or modify old ones (Muuss 1990). Programmes employing role-play techniques and practice of the desired behaviour might then need to take a step further and involve older trained peer leaders who act out the desired behaviour (e.g., Role-playing the negotiation of safer drug and alcohol use with friends in 'party' situations) and then work with small groups of adolescents to encourage them to practice the demonstrated behaviour.

Findings from this research related to sex differences in adolescents' perceptions of risk and their risk-taking likelihood inform us that we need to move away from viewing adolescent males as higher risk-takers than adolescent females. Although it was found that males have significantly lower risk judgments than females, no sex difference was found for likelihood to engage in risk-taking behaviour. Society focuses on adolescent males as the main instigators and participants in risky activities such as dangerous driving and harmful alcohol and drug use. The current findings highlight the need to recognise that adolescent females are just as likely to engage in

risk-taking behaviours. This recognition is important for presenting a more accurate and realistic picture of the scope of risk-taking behaviour among adolescents. This, in turn, will provide better ability for education and intervention programmes to effectively meet young people's needs.

Overall, results from this research inform us that the prevalence of young people's risk-taking is a concern that needs to be realistically acknowledged and addressed by society as a whole. It is not a minority of young people who say they would engage in risk-taking behaviour. Within this study, despite having an over estimated perception of the risk involved in these activities, well-educated and resourced university students still said they would participate. It has previously been suggested that broad-based intervention and education efforts including education in schools, increased availability of resources and mass media information campaigns must effectively be implemented to address the high prevalence of adolescent risk-taking behaviour (Basen-Enquist & Parcel 1992).

Implementation of any education or intervention strategies to reduce adolescent risk-taking behaviour must be delivered in a non-judgemental and engaging manner, with the building of rapport a primary goal. Previous research has shown that the probability that a young person will pay attention to health-promotion alcohol-related messages is dependent upon the style of delivery used by the health promotion messenger (Bennett & Coggan 2000). Delivery techniques that make adolescents feel subordinated or of less than adult status are perceived by young people as ineffective and inappropriate (Bennett & Coggan).

It is important that researchers, educators, and intervention workers understand that young people have different reasons for engaging in risk-taking behaviour.

Intervention and educational programmes should specifically aim to tailor the messages delivered to young people about risk-taking behaviour to their stage of development. While this study has informed us of some important factors that predict adolescents' risk-taking likelihood, caution must be taken in generalising the results. Overall, any intervention aimed toward decreasing young people's risk-taking behaviour must acknowledge the complexity and uniqueness of their physical, psychological and emotional needs underlying participation.

4.7. Limitations and future research.

Findings from this study may not be generalisable to the wider population because the sample consisted of predominantly White, European, middle class university students with more access to education, resources and intervention programmes than those from different ethnic and socio-economic groups. It is not possible to know whether the same results from the sample within this study would emerge in other populations. Despite this limitation, the results indicate that risk-taking behaviour is prevalent in this well-educated and resourced sample and suggest that ongoing research and investigation is required in order to determine the causes of adolescents' risk-taking behaviour.

Future research should attempt to use more representative samples from the general population in investigating adolescent risk-taking behaviour. Studies using more ethnically diverse samples from different socio-economic groups are needed in order

to necessitate whether the same relationships found in this study between adolescents' sex, risk judgments, sensation seeking, self-efficacy and likelihood to engage in risk-taking behaviour exist among different groups.

This study used pen and paper questionnaire measures. Using solely questionnaires for the measurement of variables within the study may have meant that the underlying processes of adolescents' risk-taking behaviours were not fully examined. Such measures do not fully capture the possible influences of social pressures or social support on engagement in risky behaviour. Maintaining complete anonymity of participants' responses may have encouraged openness and honesty in their completion of the questionnaires used in this research. It would be interesting to see if similar results were found for different methodologies and procedures that, for example, asked participants to respond to scenarios and questions in a group discussion situation.

Caution must be taken in interpreting the results because the research methodology used within this study does not give us a truly accurate depiction of how adolescents perceive risks and respond in real risk-taking situations. This study, for example, used hypothetical risk judgment scenarios, that do not entail the true values, beliefs, and emotions that potentially come into play in real risk-taking situations. Similarly, measuring self-reports of risk-taking likelihood did not capture information about young people's decision points along the process toward engaging in risk-taking. This study did not examine what factors determine an individual deciding to go to a party involving drug and/or alcohol use, or what factors relate to a young person putting oneself in a risky situation to begin with.

While this study found sensation seeking to be a major predictor of risk-taking likelihood through questionnaire measures, other factors may show more influence at different stages of the risk-taking process. Past research findings suggest that factors such as expectations of the outcomes of risk-taking (e.g., Cohen & Fromme 2002), personality factors (e.g., Gullone & Moore 2000) and adolescents' ethnicity (e.g., Faryna & Morales 2000) are influential in determining their risk-taking behaviour.

Jessor's problem behaviour theory (Jessor & Jessor 1977) posits that the underlying cause of problem behaviours such as drug use and risky sexual behaviour during adolescence is unconventionality in the young person's personality and his or her social environment. According to Jessor, unconventional individuals in unconventional environments have a higher likelihood to engage in risk-taking behaviour. Future research should examine the extent to which sensation seeking and other psychological (e.g., personality factors) and contextual factors (e.g., stability of home and family environment, socioeconomic status) are related to adolescents' decision-making and behaviour at different stages of the risk-taking process.

Although the need for more realistic simulations investigating adolescent risk-taking behaviour has been argued (Millstein & Halpern-Felsher 2002a; Rolison & Scherman 2002), effectively replicating the environments in which young people participate in these activities appears a major research challenge. One difficulty that seems considerably apparent is the inability for researchers to create settings that would allow for the measurement of adolescents' 'real-life' decisions concerning unsafe sexual activity and alcohol and drug use. The fact that these behaviours are often incredibly personal (e.g., sexual behaviour) and in some cases illegal (e.g., drug use)

adds to the complicatedness of attempting to produce settings and environments comparable to those in which young people engage in these types of activities.

This study examined all factors under investigation simultaneously and it is not possible to infer any causal relationships from the findings. It is impossible to determine whether high sensation seeking causes greater risk-taking likelihood, or if higher likelihood to take risks results in increased levels of sensation seeking. Despite this limitation, the results have provided more information about influential factors that predict adolescents' likelihood to engage in risk-taking behaviour.

Further investigation is required regarding why adolescents who have a higher likelihood to engage in risk-taking behaviours differ from those who do not in their perceptions of the risk involved in such activities. Achieving this effectively would require conducting longitudinal studies that measure the development of risk perceptions and determine whether such perceptions develop prior to engagement in these behaviours (Benthin et al., 1993). This would provide the ability to forecast the onset of engagement in risk-taking behaviours.

The current study did not investigate the extent to which peer pressure impacts on adolescents' likelihood to engage in risk-taking behaviour. The likelihood to engage in risk-taking behaviour measure created for this research actually stressed to participants that nobody would find out about their behaviour. This was included in the scale to encourage openness and honesty in participants' responses. It is important to acknowledge that this may, however, be unrealistic in everyday settings because young people commonly discuss their own and others behaviour with peers, and in

many cases, against an individual's wishes, others do 'find out' and become aware of their personal behaviour. These types of factors may well impact on their risk-taking behaviour, by either inhibiting desired actions or increasing their likelihood due to peers and other social pressures.

It has been recognised for a considerable amount of time that adolescence is a time of great susceptibility to peer influence (Arnett 1992). Given that perceptions about whether peers approve or disapprove influences young people's engagement in risk-taking behaviour (Benthin et al., 1993; Boyer, Shafer, Wibbelsman, Seeberg, Teitle & Lovell 2000; Smith & Rosenthal 1995), future research should examine the impact peer pressure has on risk-taking behaviour. Previous researchers have suggested that the influence of peer pressure might be investigated by examining the influence of peer confederates in a simulated risk-taking task (Rolison & Scherman 2002).

Finally, the likelihood to engage in risk-taking behaviour scale created and used within the present study would benefit from some validation in future research. This is required in order to establish that those who have high scores on this likelihood scale are indeed those who are most likely to engage in risk-taking behaviours.

4.8. Conclusion:

This study examined the extent to which older adolescents' sex, risk judgments, sensation seeking and self-efficacy for substance use and sexual behaviour predict their likelihood to engage in risk-taking behaviour. The risk-taking likelihood measure created for this research measured young people's risk-taking behaviour with

a newer type of methodology that avoided some of the problems inherent in the use of retrospective report measures. Results indicated that adolescent males have significantly lower perceptions of risk than adolescent females. There was, however, an inclination for adolescents to provide over estimates of the risk associated with cannabis use, driving over the legal alcohol limit, and the transmission of sexually transmissible infections. The predicted negative relationship between risk judgments and risk-taking likelihood was found, however sensation seeking was found to be the major predictor of adolescents' likelihood to engage in risk-taking behaviour within this study. Self-efficacy for substance use also showed a significant negative relationship with adolescents' risk-taking likelihood. The findings from this research particularly add to existing knowledge by revealing the dominance of sensation seeking as an important influential factor of adolescents' likelihood to engage in risk-taking behaviour.

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APPENDIX A

University of Canterbury

Department of Psychology

INFORMATION SHEET AND CONSENT FORM

You are invited to participate as a subject in the research project “Adolescent Risk-Taking: The relationship between risk judgments and risk behaviour.”

Adolescence is a period of life involving heightened levels of new experiences, challenges and experimentation. Along with this experimentation comes a significant increase in risk-taking behaviours, such as unprotected sex and alcohol and drug use. These risk-taking behaviours may compromise and potentially damage adolescents’ health. The proposed study will investigate this further. Your responses will provide useful information about this important societal issue.

The aim of the project is to investigate the relationship between adolescents’ perceptions of risk and their likelihood to engage in risk-taking behaviours. We are not in any way seeking to find out about your individual thoughts or behaviours. We are instead seeking to establish some of the trends and relationships among perceptions of risk and risk-taking behaviour. **You will not be asked about your own past or current behaviours.**

Participants’ responses will not be analysed individually. All responses will be combined together for data analysis. Please provide *honest* responses and remember that any information you provide will remain *anonymous and confidential* throughout the course of the study.

Your involvement in this project will involve completing a series of short questionnaires and scales. The entire task should take approximately 20 minutes. You have the right to withdraw from the project at any time.

The results of the project may be published, but you may be assured of the complete anonymity and confidentiality of data gathered in this investigation. To ensure anonymity and confidentiality, no identifying information will be collected from you.

The project is being carried out as a requirement for a MA thesis in Psychology by Kirsty Pillay under the supervision of Dr Lucy Johnston and Dr Mark Byrd. Kirsty may be contacted via email at kjp55@student.canterbury.ac.nz. In addition, Lucy and Mark can be contacted via email at:

l.johnston@psyc.canterbury.ac.nz or m.byrd@psyc.canterbury.ac.nz

The project has been reviewed *and approved*
by the University of Canterbury Human Ethics Committee.

CONSENT FORM

Please read and sign the following to indicate your agreement to take part in the above named research. All responses will be kept anonymous and confidential. Some questions within the study may seem similar, but they are not. Please provide your true feelings to each question.

I have read and understood the description of the above-named project. On this basis, I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved.

I understand that I may withdraw from the project at any time, without penalty, and have returned to me any information I have provided. I understand that I will be given the opportunity to review my decision after the purpose of the study has been fully explained to me.

YOU ARE ENTITLED TO HAVE A COPY OF THIS FORM, IF YOU WISH

NAME (please print): _____

Signature: _____ Date: _____

APPENDIX B

For each of these scenarios, imagine someone of your age and sex in this situation. Try to estimate the chances that these things might happen to this person in this situation, by using any number from 0% to 100%.

1. Imagine someone of your age and sex is at a picnic when a lightning storm strikes. What is the percent chance that this person will die in the lightning storm?

2. Imagine someone of your age and sex is at a picnic when an earthquake strikes. What is the percent chance that he/she will die from the earthquake?

3. Imagine someone of your age and sex is at a party. She/he stays at the party for 3 hours. During the party, they have 7 standard drinks. What is the percent chance that she/he will get sick from the drinks and throw up?

4. Now imagine that this person leaves the party to go home. It will take him/her 15 minutes to get home. This person rides their bicycle home alone. What is the percent chance that he/she will get into an accident on the way home?

5. Imagine that someone of your age and sex is in love with his/her girlfriend/boyfriend. They have had sex a number of times before. One night, they have sex and do not use any form of protection. What is the percent chance that he/she will get a sexually transmissible infection?

6. What is the percent chance that someone of your age and sex will contract HIV/AIDS?

7. What is the percent chance that someone of your age and sex will die from a drug overdose?

8. Imagine that a person of your age and sex goes for jog with a friend every day. One sunny morning, they go to a quiet park for a 30-minute jog on the jogging path. What is the percent chance that the person of your age and sex will get a serious injury during this jog?

APPENDIX C

On the sheets that follow, you will find 5 brief scenarios that describe 5 different situations. In each case, please imagine you are the main character in the scenario and rate how likely it is that you would perform each of several different behaviours in the described social situation.

Assume in each scenario that no matter what you choose to do, no one would find out how you had behaved. Try to answer each question as honestly as you can. Your answers will be completely anonymous. No one will ever try to discover your identity, no matter what you say on the questionnaire.

1. Imagine that you are at a party where you do not know very many people. You have stayed at the party for the evening, and have consumed approximately 7 standard drinks. Most people at the party have consumed the same amount of alcohol as you have. You decide that you are ready to go home, and as you say goodbye to a friend, one of his/her friends who you have not met before offers you a ride home. The person who has offered to drive you home has consumed approximately 4 standard drinks at the party, but appears sober. How likely are you to do the following things in this situation?

Remember that no one would find out about the way you had behaved.

D. Decline the offer of the ride home and find another alternative.

1	2	3	4	5
Not at all likely				Very likely

E. Accept the ride home.

1	2	3	4	5
Not at all likely				Very likely

F. Talk to some of this person's friends and watch their behaviour to find out how drunk they are and how trustworthy they are before making your decision about accepting the ride home.

1	2	3	4	5
Not at all likely				Very likely

APPENDIX C

2. Imagine that you are visiting a good friend one day. Your friend has invited a group of her/his friends to hang out at her/his flat and have a few drinks together. After a couple of hours everyone is relaxed and having fun together. Your friend's flatmate goes into his/her room and comes back with some marijuana that they begin to pass around the group. How likely are you to do the following things in this situation?

Remember that no one would find out about the way you had behaved.

- A. Decline the offer of marijuana politely but stay and chat for a while longer.

1	2	3	4	5
Not at all likely				Very likely

- B. Accept the offer of marijuana.

1	2	3	4	5
Not at all likely				Very likely

- C. Politely leave your friend's flat without giving everyone a lecture about the marijuana, and go home.

1	2	3	4	5
Not at all likely				Very likely

APPENDIX C

3. Imagine that you are in a relatively new relationship with your girlfriend/boyfriend and you have recently started having sex. You have only had sex together a few times. One night, you are about to have sex and realise that neither of you have any form of protection. How likely are you to do the following things in this situation?

Remember that no one would find out about the way you had behaved.

A. Stop having sex because you have no form of protection.

1	2	3	4	5
Not at all likely				Very likely

B. Feel in the mood so continue to have sex and not worry about having no form of protection.

1	2	3	4	5
Not at all likely				Very likely

C. Fool around a little bit, but avoid anything that you perceive as risky in any way.

1	2	3	4	5
Not at all likely				Very likely

APPENDIX C

4. Imagine that you are at a small party with a few close friends and are having a wonderful night. Everyone has been consuming many different types of alcohol. After a few hours, everyone is quite drunk and a friend suggests having a drinking competition with the remaining liqueurs and spirits. How likely are you to do the following things in this situation?

Remember that no one would find out about the way you had behaved.

- A. Decide not to join in the drinking competition but still hang out and watch for a little while longer, before going home.

1	2	3	4	5
Not at all likely				Very likely

- B. Join in with your friends for the drinking competition.

1	2	3	4	5
Not at all likely				Very likely

- C. Join in for the first round but then stop because you think you've had enough. Slow down your drinking and have a glass of water between drinks for the rest of the night.

1	2	3	4	5
Not at all likely				Very likely

APPENDIX C

5. Imagine that you are out with your best friends one Saturday night in town celebrating your good friend’s birthday. After visiting several bars and nightclubs and having a fair bit to drink, you are all discussing what to do next. Your good friend suggests playing a dare game and knocking down some of the local road signs for a laugh and a bit of an adrenalin rush. How likely are you to do the following things in this situation?

Remember that no one would find out about the way you had behaved.

- a. Suggest a different alternative like going for a coffee or something to eat.

1	2	3	4	5
Not at all likely				Very likely

- b. Go along and join in with the dare game.

1	2	3	4	5
Not at all likely				Very likely

- c. Decide that you don’t really want to take part, but go along with your friends and watch.

1	2	3	4	5
Not at all likely				Very likely

APPENDIX D

Please give your estimates of the TOTAL NUMBER for the following.

How many people your age and sex living in New Zealand do you think will encounter the following within the next year?

1. Die in an accident in which they were driving over the legal limit for blood alcohol levels for their age group within the next year?

2. Die in a motor vehicle accident within the next year?

Please give your PERCENTAGE ESTIMATES for the following.

What percentage of people your age and sex living in New Zealand do you think will encounter the following within the next year?

3. Use cannabis within the next year?

4. Report having had a sexually transmissible infection at some time?

APPENDIX E

Directions: Each of the items below contains two choices, A and B. Please indicate which of the choices most describes your likes or the way you feel. In some cases, you may find items in which both choices describe your likes or the way you feel. Please choose the one that better describes your likes or feelings. In some cases, you may find items in which you do not like either choice. In these cases mark the choice you dislike least.

It is important you respond to all items with only one choice, A or B. We are interested only in your likes or feelings, not in how others feel about these things or how one is supposed to feel. There are no right or wrong answers. Please give honest responses.

1. A. A sensible person avoids activities that are dangerous
B. I sometimes like to do things that are a little frightening.
2. A. Skiing fast down a high mountain slope is a good way to end up on crutches.
B. I think I would enjoy the sensations of skiing very fast down a high mountain slope.
3. A. I would like to take off on a trip with no pre-planned or definite routes or timetables.
B. When I go on a trip I like to plan my route and timetable fairly carefully.
4. A. I like to try new foods that I have never tasted before.
B. I order the dishes with which I am familiar, so as to avoid disappointment and unpleasantness.
5. A. I like wild “uninhibited” parties.
B. I prefer quieter parties where I can have good conversation.
6. A. I like to have new and exciting experiences even if they are a little unconventional or illegal.
B. I am not interested in experience for its own sake.
7. A. I don’t mind watching a movie or a play where I can predict what will happen in advance.
B. I usually don’t enjoy a movie or a play where I can predict what will happen in advance.
8. A. I prefer friends who are excitingly unpredictable.
B. I prefer friends who are reliable and predictable.

APPENDIX F

Please answer the following questions as honestly as possible.

1. How confident are you that you will be able to engage in behaviours that will prevent you from experiencing alcohol addiction?

1	2	3	4	5	6	7
<i>not at all</i>						<i>extremely</i>
<i>confident</i>						<i>confident</i>

2. How confident are you that you will be able to engage in behaviours that will prevent you from experiencing arrest for drunk driving?

1	2	3	4	5	6	7
<i>not at all</i>						<i>extremely</i>
<i>confident</i>						<i>confident</i>

3. How confident are you that you will be able to engage in behaviours that will prevent you from experiencing drug addiction?

1	2	3	4	5	6	7
<i>not at all</i>						<i>extremely</i>
<i>confident</i>						<i>confident</i>

4. How confident are you that you will be able to engage in behaviours that will prevent you from experiencing hospitalisation from drug overdose?

1	2	3	4	5	6	7
<i>not at all</i>						<i>extremely</i>
<i>confident</i>						<i>confident</i>

5. How confident are you that you will be able to engage in behaviours that will prevent you from contracting a sexually transmissible infection?

1	2	3	4	5	6	7
<i>not at all</i>						<i>extremely</i>
<i>confident</i>						<i>confident</i>

6. How confident are you that you will be able to engage in behaviours that will prevent you from contracting HIV/AIDS?

1	2	3	4	5	6	7
<i>not at all</i>						<i>extremely</i>
<i>confident</i>						<i>confident</i>

APPENDIX G

**Department of Psychology
University of Canterbury**

**Adolescent Risk-Taking:
The relationship between risk judgments and risk behaviour.**

Thank you very much for your participation in the above named research. Without the help of individuals such as yourself, scientific research would be impossible.

The aim of this research is to gain more information about the relationship between adolescent perceptions of risk and risk-taking behaviour.

Previous research has shown that adolescent judgments of risk and their risk-taking behaviours influence each other. In addition, past research has shown that sensation seeking and self-efficacy are related to adolescent risk-taking behaviour. This study explored these relationships further. Each participant completed identical scales and questionnaires that investigated the relationships among these factors.

Prior research has indicated that adolescence is a period of life involving a significant increase in risk-taking behaviours, such as having unprotected sex, and alcohol and drug use. All of these risk-taking behaviours may compromise and potentially damage adolescents' health.

The results of the current study, based on the questions answered, will provide insight about the relationship between adolescents' risk judgments and risk-taking behaviour. It is predicted that sensation seeking and self-efficacy will be related to risk-taking behaviour. In addition, a strong relationship between risk judgment and risk behaviour is expected.

If you have any questions or require more information, please contact either Kirsty Pillay or Mark Byrd who may be reached at 366-7001, ext. 7194.

If you wish to discuss any issues that may have been raised during your participation in the study, please contact the University of Canterbury Student Health Centre on 364 2402.

Thank you again for your help.