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ABSTRACT

This study analyzed the relationship between Sensation Seeking (SS) and Optimism bias (OB) and their role in speeding among young adult participants (19-30). Sensation seeking is a personality trait characterized by an individual’s propensity to engage in risky and sometimes novel activities. Optimism Bias is a tendency for individuals to view themselves as more skilled and less prone to negative consequences than others in the population. Both, SS and OB have been linked to risky driving behavior such as speeding.

Two hundred sixteen participants (males = 101 and females = 115) were recruited from the lower mainland of British Columbia. Participants completed the Sensation Seeking Scale, Optimism Bias questionnaire and a demographic questionnaire, which included questions that provided a dependent variable quantified by the Mean Speed Ratio (MSR).

Participants were divided into high, moderate and low groups based on scores from the Sensation Seeking scale. The same categories were used to divide participants based on OB scores. It was hypothesized that participants high in SS would have higher MSRs than low or moderate SS participants. It was also hypothesized that high OB participants would also have higher MSRs than low or moderate OB participants.

The main hypothesis focused on the combination of High SS and OB. It was expected, based on theory, that this combination would provide higher MSR for participants high in SS and OB when compared to individuals low in SS and OB.

The results of the study found that there were significant differences between High SS and low or moderate individuals. Participants high in OB did not differ
significantly from those moderate or low in OB in their reported MSR. A significant
difference was found between High SS and OB participants and Low OB and SS
participants. Exploratory analyses were conducted looking at speeding citations and
levels of the independent variables. Age groups and gender were analyzed in post hoc
analyses.

The results of this study provide further support to the contention that sensation
seeking plays a role in speeding behaviour. The role of optimism bias did not seem to
play a significant role in reported speeding as measured by the MSR. The combination of
High OB and SS seemed to play a significant role in participants’ MSR score. Possible
explanations for the results were explored and implications for counselling psychology,
based on these finding, were discussed.
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CHAPTER 1 - INTRODUCTION

In British Columbia in 1995 there were 10,564 collisions, of those 8.2% were fatal (Insurance Corporation of British Columbia [ICBC], 1997). According to the U.S. Department of Health and Human Services (DHHS), 3.5 million people are injured annually in motor vehicle accidents (DHHS, 1991). These motor vehicle accidents are considered the number one killer of Americans between the age of one and thirty four and are second only to cancer in terms of economic cost. (National Committee on Injury Prevention and Control [NCIPC], 1989). Motor vehicle accidents result in high costs both in terms of human suffering and financial loss. Lost productivity, when an individual is disabled or killed at an early age, costs society an average of $425,000 per fatality (Miller, Luchter, & Brinkman, 1988). In a 1990 U.S. Department of Transport report, 47,093 people were killed on American roads. This is 19.1 deaths per 100,000. Similar figures can be found in Great Britain (9.1), France (20.6) and Japan (11.0) (Manstead, Parker, Stradling, Reason, & Baxter, 1992).

Speeding and Accidents

In 1995, unsafe speed was involved in 35% of all fatal collisions and 15% of all personal injury collisions, making unsafe speed the single most cited factor in fatal crashes (ICBC, 1997). Further statistics show that 86% of victims killed were in the vehicle traveling at unsafe speed, and 70% were injured while driving these vehicles (ICBC, 1997).

In a four year causation study in Great Britain, researchers concluded that driver and pedestrian error and impairment were the main contributory factors in 95% of the accidents investigated (Manstead et al., 1992). One driver error that receives a large
amount of scrutiny is speeding. This topic generates a large amount of controversy, from debates regarding speed limits to the use of radar and camera speed traps. Speed in and of itself does not kill but it is the main contributory factor in accidents and the severity of such accidents.

Compared to other roadways, few accidents happen on highways; but, 55% of accidents that do occur are severe or have fatal results (National Highway Safety Traffic Administration, 1991). High driving speed is the main cause for this severity (DeWaard & Rooijers, 1994). Studies have demonstrated that reductions in average speed of 2-5 Km/h can result in a reduction of up to 30% in injury and fatalities (Christensen, 1981; Wagenaar, Streff, Schultz, 1990).

Even though speed has been shown to be a major contributing factor in the likelihood and subsequent severity of accidents, compliance with speed limits is relatively low (DeWaard & Rooijers, 1994). Studies conducted in Europe have shown that, when a speed limit of 120 Km/h is in effect, 15% of motorists exceeded this limit; where this limit is 100 Km/h, more than 50% of drivers violate this limit (DeWaard & Rooijers, 1994).

Enforcement of speed limits has been shown to reduce speeding; it would seem that enforcement affects speeding behaviour but not the intention to speed (Rothengatter, 1988). Given the high cost of accidents related to speeding, in terms of human suffering and financial costs, the reduction in speed would seem to be a crucial endeavor. The ability to identify those with a propensity to speed would be an important first step in designing prevention and intervention programs.
This research focused on two variables that have been associated with speeding behaviour: sensation seeking (SS) and optimism bias (OB). Sensation seeking has been explored to greater extent than optimism bias within the speeding literature. Both variables have been linked with a greater propensity to engage in risky driving behaviour, of which speeding is one of many in a substantial body of literature. Yet, SS and OB have not been examined together when studying speeding behaviour. The purpose of this paper was to examine the role of SS and OB on speeding behaviour among young adult males and females. This was undertaken as a field study utilizing questionnaires measuring SS and OB and self-reported speeding behaviour.

It was expected, based on the literature, that a relationship between SS, OB and speeding behaviour would be found, and provide a better understanding of who is more likely to speed and to some extent why they speed.

**Implications for Counselling Psychology**

The results of this study have implications for Counselling Psychology. The first was theoretical in nature, as knowing who was likely to speed. This could help in developing a theoretical framework that could be utilized to develop educational, preventative and therapeutic strategies.

Identifying individual clients who were high in SS and OB may help in focusing educational programs to these individuals and tailoring these programs to make them more accessible and relevant. Guidance counsellors within the school system could be important assets in providing information on alternative, safer ways of expressing the need to seek novel experiences and sensations; as well as helping individuals understand
the possible repercussions of being overly optimistic. This information could also be targeted to young adults by Government agencies or insurance companies.

In a broader scope, the results of this study may help to develop or modify therapeutic practice when dealing with those that engage in risky behaviour. SS and OB have been associated with numerous types of risky behaviour such as unprotected sex, smoking, drug use, and reckless driving of which speeding is one example. Risky behaviour could be addressed within a clinical setting and the use of the sensation seeking scale and/or the optimism bias questionnaire could be utilized as diagnostic tools to help therapists in establishing treatment plans.

The propensity to engage in risky behaviour, such as speeding, may be a portent of future risky behaviour, which may be more self-destructive, and be part of other psychological issues. Sensation seeking has been examined within the literature to a greater amount than both optimism bias and speeding behaviour. The literature review will look at these three areas in depth.
CHAPTER 2- LITERATURE REVIEW

This review of the literature will survey past research in driving behavior. Relevant theories associated with risk taking and their association with driving will be addressed. Specific factors associated with speeding, such as gender and age will be surveyed and results from previous studies examined. The constructs of optimism bias and sensation seeking will be addressed with respect to risk taking and more specifically with their possible role in speeding behavior.

Accidents and High Risk Driving

The examination of accidents and their causes have been undertaken from various perspectives: mechanical, road engineering, and physical limitations (e.g., depth of field perception). Within the social sciences, much has been written on the causes of accidents and what precipitates them. A primary finding of this body of research is that the risk of crash involvement differs from individual to individual, with some common threads (Brown & Copeman, 1975; Parker et al., 1995).

The roles of personality, attitude and perceptions with relation to risky driving have all been investigated in the literature. In some of the early research on driving, individual attributes such as gender, age and personality variables and prior accident involvement have been shown to be correlated with accident involvement (Forbes, 1939; Tillmann & Hobbes, 1949).

In an extensive review of high-risk driving, Donavan, Marlatt, and Salzberg (1983) highlighted a number of broad categories of psychosocial variables: demographic characteristics (age, gender), personality traits, and driving related attitudes/perceptions. This review will examine the research relevant to these categories.
Two main methodological approaches have been used to examine these variables and their relationship to high risk driving. One approach has been to look at individuals involved in automobile accidents and then focus on identifying characteristics that differentiate high and low risk drivers. The experimental approach has endeavored to control factors by studying driving behaviour within a controlled environment. Looking at high and low risk drivers with simulations is an example.

Individual Factors and Accident Involvement

The risk of an accident arises from a complex and interwoven mix of variables. The degree of risk depends on many factors, such as the road conditions, type and condition of the vehicle, driver abilities, emotional state and motivations (Beirness, 1993). Given that 80-90% of accidents are a result of human factors, the examination of individual differences is an integral aspect of understanding accident involvement (Beirness, 1993).

Recent research has also focused on various aspects of personality, including “deviance” among those who drive recklessly. Many personality variables have been examined in relation to driving behaviour. One area that seems to underlie much of what has been studied is the area of risk and risk-taking.

Historical and Theoretical Examination of Risk-taking

Early accident causation studies.

In an early study, conducted in 1949, Tillman and Hobbes attempted to classify the “accident prone automobile driver.” They studied taxi and bus drivers and examined their accident histories, as well as a number of demographic characteristics. This “individual differences” approach was originally associated with the “accident
proneness” theory in research conducted by Farmer and Chambers (as cited in Tillmann, & Hobbs, 1949). This theory posited that a small number of individuals were responsible for a disproportionate number of traffic accidents because of some unspecified personality variable.

Tillmann and Hobbs (1949) found that drivers who were part of the "high accident" group had a constellation of common personality factors. The authors concluded that “high accident” taxi drivers came from a home marked by divorce and instability, their childhood was marked with disrespect for authority, their work record marked by short term employment, and that they were individuals “who place all emphasis on material values and who act only with thought for immediate satisfaction without any concern for tomorrow” (Tillmann & Hobbs, 1949 p.329). These authors concluded, “truly it may be said that a man drives as he lives.” Numerous other studies of that era also came to much the same conclusions (Farmer, 1945; Rawson, 1944). Despite Tillmann and Hobbes poetic axiom, the conclusions are admittedly over generalized. Yet, these studies have influenced present day studies.

Risk taking is an area that has generated a large amount of research. Risk taking may be defined as a “desire or propensity to engage in fun and exiting activities, new and unusual activities and behaviours that are often appraised as risky” (Beirness, 1993, pg. 130). This is one of many definitions of risk taking. It has been assumed that deliberately taking risks while driving can increase the chances of being involved in an accident. These risks include such behaviours as drinking and driving, overtaking, and speeding.

The study of risk and risk-taking has been central to the examination of reckless driving (e.g., drinking and driving, non-use of seatbelts and speeding). A number of
possible explanations for risk taking have been reported in the literature. The Risk Homeostasis theory is an example of a possible explanation for risk taking behaviour.

**Homeostasis Theory**

Wilde (1976) proposed a relationship between subjective and objective risk. The Risk Homeostasis Theory (RHT) argues that individuals have a certain desired level of risk. If the subjective level of risk is higher or lower than the desired level, an attempt will be made to alleviate this discrepancy (Wilde, 1982). Therefore, if a driver believes that the car he or she is driving is safer than other automobiles, the theory predicts that the driver will increase his or her level of risk to be commensurate with the perceived safety of the car.

According to this theory, fluctuations in accident rates are followed by adjustment actions such as driving slower or using seatbelts, which stabilize the average accident rate over time. This can be achieved by increasing a person’s desire to be safe (Wilde, 1982). It is further argued that this desire for safety is the only significant safety measure (Wilde, 1982). This controversial argument, therefore, rules out all other safety measures such as driver education, driver licensing standards, seat belt and helmet laws (McKenna, 1988). In fact, Wilde (1982) argued that the sole determining factor of accident rates is the target level of risk. The “target level of risk” is used interchangeably with the “accepted level of risk” but there is no independent measure of target level cited by Wilde (McKenna, 1988).

This allows the RHT to claim that the target level of risk corresponds to the observed accident rate currently operating (McKenna, 1988). Wilde (1982) cited a study undertaken by Taylor (1964) to support his theory. Subjects were asked to drive on a
variety of roads and their galvanic skin response (GSR) was measured, as was the speed. It was found that there was a high correlation ($r = .61$) between the GSR and the accident rate previously recorded for the roads used in the study. It was also found that the speed at which the subject drove was correlated ($r = -.67$) with the recorded accident rate; the argument being that the GSR is a measure of subjective risk. Furthermore, according to the RHT, drivers will adjust speed accordingly to compensate for the known accident rate of a given roadway.

Several researchers have challenged the validity of the RHT. Edelberg (1972) in previous studies looking at GSR argued that a number of psychological interpretations can be made for findings similar to those reported by Taylor, including defensive arousal or cognitive activation. Lindholm and Cheatham (1983) believe that the changes in GSR reflect the change in mental workload. Road sections imposing the greatest mental workload on drivers would be areas that have the greatest potential conflicts, such as road junctions. Therefore, the results of Taylor’s study could be interpreted as a reflection of the fact that more accidents occurred at junctions where there is a higher mental workload than on freeways, with relatively little mental workload (McKenna, 1988).

The risk homeostasis theory is inadequate to explain accident involvement because, contrary to its claims, conventional safety measurers do reduce accidents (Denton, 1980; Helliar-Symons, 1981). Numerous studies have examined speed limits and measures to reduce speed, with positive results (Denton, 1980; Salusjarvi, 1980). It has been shown that people increase their speed when driving on long straight roads because the perception of speed is distorted (Schmidt & Tiffin, 1969). Denton (1980) painted transverse yellow lines on a roadway in an increasing spatial frequency providing
an illusion of increasing speed. These lines help give drivers a truer indication of their speed and have been shown to reduce speed as well as accidents at similarly painted junctions (Helliar-Symons, 1981).

This study illustrates the inadequacy of RHT’s claim that conventional safety measures are ineffective. The study also supports McKenna’s claim that information available to a driver is insufficient, or prone to misperception, thus providing a very unreliable basis on which to make estimates of probability of involvement in accidents (McKenna, 1988). This contradicts the RHT contention that frequency of accidents is related to risk perception. The RHT does not take into account the complexity of risk perception and the variety of factors that determine a person’s perceptions (e.g., controllability, catastrophic potential). These shortcomings of the RHT make it inadequate to explain accident involvement.

In an attempt to integrate different factors associated with risky driving, Donovan Umlauf, Queisser, and Salzberg (1983) formulated a model based on the results of a comprehensive literature review. They hypothesized that deficient coping skills and/or a hostile aggressive trait disposition, augmented by high quantity and frequency of alcohol use, could lead to increased frustration and tension. The use of alcohol, or driving to release stress, could increase high-risk driving and consequently higher probability of accidents or violations. This model, although hypothetical, fails to take into account that any one of these factors could be sufficient to cause an accident or violation.

Theory of Planned Behavior

Ajzen and Madden (1985) formulated a theory that seeks to integrate intentions and behaviours. The theory of planned behaviour (TPB) states that intentional behaviours
are mediated by the attitudes, perceived norms about the behaviour and a belief that these behaviours can be undertaken. This theory provides an intriguing way of examining driving violations (Parker, Manstead, Stradling, Reason & Baxter, 1992). It has been shown that although behaviours can be changed, the attitudes and intention to engage in such behaviours are more difficult to change (Delhomme, 1991). The TPB can be utilized to examine driving violations such as speeding. One of the major contributions of TPB is that it takes into account behaviours that have non-volitional components, unlike its precursor, the theory of reasoned action, (Fishbein & Ajzen, 1975).

**Speeding and the TPB.**

Speeding violations have both internal and external non-volitional components such as knowledge of the speed limit, pressure from traffic on the road and the capabilities of the vehicle being driven (Parker, Manstead, Stradling, Reason, 1992). In a study designed to assess the ability of the TPB to account for driver’s intentions to commit violations, the researchers found that perceived behavioural control was a useful predictor of behavioural intention (Parker et al., 1992).

An individual’s perceived behavioural control, along with a positive or negative attitude towards the behaviour, and subjective norm, all mediated the intention to perform a given behaviour. Considering the range of variables included in the model, it could provide a useful framework in examining speeding violations. It has been shown that attitudes towards speeding are a component of the propensity to engage in such behaviour. Normative beliefs and perceived behavioural control have all been examined individually with respect to speeding violations. This model serves to incorporate all these factors into a cohesive whole.
Personality Factors

The search for a personality variable(s) that can predict accident involvement has been the topic of research. Pelz and Schuman (1968) interviewed several hundred young drivers and found that, of those who had been involved in accidents, more than 50% had engaged in risky driving behaviour. Mayer and Treat (1977) administered questionnaires to 600 college students. It was found that there was a large difference in willingness to engage in risk taking. Students who had been involved in three or more crashes were more likely to engage in risky driving than a matched sample with no crash history.

Most of the research in the area of high-risk drivers has compared differences in demographic, attitudinal, personality and driving skill/knowledge with those of the general population. These studies have produced an extensive list of possible contributing factors, particularly in the area of demographics, attitudes and perceptions.

These variables have been examined within a number of interesting theories. The "social maladjustment theory" proposes that poor driving is one facet of a more general pattern of antisocial or irresponsible behaviour and attitudes (e.g., Mayer & Treat, 1977; Tillmann & Hobbs, 1949). The "personal maladjustment theory" posits that people undergoing personal stress or difficult times in their lives are more likely to engage in risky driving (Brown & Bohnert, 1968; Donovan et al., 1986).

Klein (1974) believes that risky drivers are less likely to resist risk-taking impulses while driving; according to this view driving becomes an emotional release. The "information processing defect theory" hypothesizes that poor drivers lack efficient perceptual and/or motor speed and accuracy.
Mayer and Treat (1977) examined these various theories and concluded that there was modest support for the idea that high-risk drivers differ from their low risk counterparts. These authors found that social and personal maladjustment were related to extreme accident rate (Mayer & Treat, 1977). These findings are equivocal, as Mayer and Treat cautioned. Their use of extreme measures and a small sample size render the findings difficult to generalize.

**Young Driver's Attitudes and Perceptions**

In 1984, the single most common cause of death among young people 16-24 in both Canada and the United States was traffic accidents (Statistics Canada, 1984). Within the Canadian population, youth (16-24) represent 17% of the population, yet account for 31% of all traffic fatalities and 33% of all traffic injuries (Transport Canada, 1984). It is clear that young drivers are at a much higher risk of becoming traffic casualties. In an extensive examination of the literature, Jonah (1986) came to a number of conclusions: young drivers take greater risks by driving faster than older drivers; they place themselves in driving situations where they will come into conflict with other drivers; and that the major factor in accident involvement is risk taking.

Gregersen and Berg (1994) examined the lifestyles and accident rates of 3,000 Swedish 20 year olds. They found that those in a high-risk group were seldom active in sport, had an interest in cars, and drove more frequently at night and drove to parties. The researchers concluded that there is a high probability of relationship between lifestyle and accident risk in traffic.

Although many studies have supported the claim that young drivers tend to engage in risky driving behaviour, there are some flaws in the methodology. Jonah
identified three areas of methodological difficulties. The first is the wide variation in defining “young driver.” Commonly, the ranges have been 16-26, 16-20, or 18-25. It is relatively rare to see a specific year of age examined. The second problem has been the failure to control for driving experience when comparing youth to older drivers. However, this may be problematic, as it is difficult to find a 16 or 17-year-old driver with five years experience. The third area of contention has been the variation in operational definition of risk, which may have led to contradictory findings.

Given that there are common characteristics among high-risk drivers, what are the factors that increase risk? Research on driving behaviour has shown that inexperience alone is not the sole factor in the overrepresentation of youth in car accidents (Jonah, 1986). The way youth drive, the kinds of risks they take, and their tendency to drive faster and while under the influence of alcohol when compared to their older counterparts all contribute (Arnett, Offer, & Fine, 1997). A consensus exists that young drivers take more risks; what leads them to take these risks? One theory that has received attention in the literature is that of sensation seeking (SS). It has been argued that those high in SS are more likely to be involved in risky behaviours including risky driving (Jonah, 1997).

Sensation Seeking

Sensation seeking (SS) is viewed as a personality trait characterized by an individual’s propensity to seek out novel events and the intensity of such experience(s). Zuckerman (1994) defined SS as a “trait defined by seeking of varied, novel, complex and intense sensations and experiences and the willingness to take physical, social, legal and financial risks for the sake of such experiences” (p.27). The majority of studies looking at sensation seeking have emphasized the genetic and biological components of
the trait. Results from twin studies have reported that the heritability of the trait was 58% (Fulker, Eysenck, & Zuckerman, 1980). These results have been replicated and additional studies, using twins, have shown that 70% of the variance was genetic (Eysenck, 1983).

Zuckerman (1994) believes that neurotransmitters are the basis for the biological determinant of SS, specifically, dopamine, norepinephrine, and serotonin. These neurotransmitters are involved in the transmission of neural messages from the brain to the rest of the body (Jonah, 1997). These neurotransmitters all seem to have roles in how humans interact with the environment. Dopamine seems to be linked with exploration of the environment and providing a positive stimulus when encountering new and intense stimulation; the norepinephrine seems to amplify these reactions and serotonin provides an inhibiting factor in the case of dangerous stimuli (Jonah, 1997).

Studies have shown that subjects high in SS have lower levels of norepinephrine (Zuckerman, 1994). Studies by Zuckerman have also examined Monoamine Oxidase (MAO) which serves to regulate the neurotransmitters; he found that MAO levels to be lower in low sensation seekers than high sensation seekers (Zuckerman, 1994). This seems to be a consistent finding, according to the review of the literature (Jonah, 1997). These studies provide some support for the contention that sensation seeking is a trait with both biological and genetic precursors.

Sensation seeking scale.

Sensation seeking is operationalized by a scale developed by Zuckerman, Kolin, Price & Zoob in 1964, The Sensation Seeking Scale (SSS). This measure has undergone a number of revisions, the most current and commonly used is the Form V version (Zuckerman, 1994). The scale contains forty forced choice items. The sensation seeking
scale consists of four sub-scales: Thrill and Adventure Seeking (TAS); Experience Seeking (ES); Boredom Susceptibility (BS); and Disinhibition (Dis). Psychometrically the scale is quite good. Internal consistency reliabilities range between 0.83 and 0.86 and test-retest reliability is reported to be .94 over a three week period (Zuckerman, 1994). SS tends to be higher in males than females and seems to decline with age (Jonah, 1997).

The sensation seeking scale has been used in various studies examining risk taking. Risky behaviours such as sexual activity, smoking and driving behaviour being some of the behaviours studied in the literature (Jonah, 1997). There has been considerable research undertaken looking at the SS and risky driving behaviour. In an extensive review, of the literature Jonah cited drinking and driving (the most studied), non-use of seatbelts and speeding, as well as the potential consequences of these risky behaviours as the main areas of research (Jonah, 1997).

**Speeding and sensation seeking.**

The study of speeding behaviour and its possible consequences (e.g., accidents, violations) is a fruitful area in the driving literature. A number of studies have shown that speeding and high SS scores are positively correlated. Zuckerman and Neeb (1980), looking at smoking and driving habits, concluded that speeding and SS were positively related. This was further supported by a study that examined adolescents attitudes towards reckless driving behaviours; the students scoring higher on the sensation seeking scale were more likely to admit to driving over 80 mph (Arnett et al., 1997). The connection between SS and speeding has been replicated in other countries, with varied participants.
Studies in Finland, Great Britain and Sweden have reported positive correlations between speeding behaviour and high SS scores (Jonah, 1997). These results provide cross-cultural evidence for SS. Studies in Western cultures have shown that participants from Italy, USA, and England have higher SS scores than their counterparts in Eastern cultures such as Thailand and Japan (Ball, Farnill & Wangeman, 1984).

Horvath and Zuckerman (1993) examined participants speeding behaviour and their risk appraisal. The authors concluded that individual with high SS who are able to engage in risky behaviour and not suffer consequences have a lowered perception of risk for that particular behaviour (Horvath & Zuckerman, 1993). It would seem that “getting away” with risky behaviours strengthens high sensation seekers perception of invulnerability.

Horvath and Zuckerman (1993) believe that risk perception may mediate the relationship between risky driving and SS; those with high SS may not see their behaviour as being risky and therefore engage in behaviour such as speeding. This risky driving behaviour, which does not usually result in accidents and/or violations, may serve to bolster high sensation seekers optimism about not suffering consequences.

Jonah (1997) summarized the literature pertaining to risky driving by reporting that the majority of the studies supported the positive relationship between SS and risky driving. Specifically, Jonah concluded that, according to the literature, high sensation seekers are more likely to commit traffic violations than low sensation seekers.

It would seem that one of the motivations for taking risks while driving is that the experience provides a sensation seeking thrill for some (Arnett, 1994). There has been support for this hypothesis (e.g., Beirness & Simpson, 1988; Jaccard & Turrisi, 1987).
Jonah (1997) reviewed 40 studies that examined sensation seeking and risky driving. Only four of the studies did not find a significant positive relationship between SS and some aspect of risky driving.

**Limitations of the sensation seeking scale.**

Arnett et al. (1997) have pointed out that one of the weaknesses of studies done with SS is the almost exclusive use of the sensation seeking scale (Zuckerman, Eysenck, & Eysenck, 1978). The scale has a number of psychometric weaknesses; most problematic is that the items are often confounded with the behaviour predicted by the scale. An example is the use of the scale to establish a relationship between SS and sexual behaviour, even though the SS contains items on sexual behaviour (Arnett, 1994). The dated language and forced choice nature of the scale also contribute to its psychometric weakness.

Arnett (1994) modified the existing SS to overcome some of the problems he found with the scale. The Arnett Inventory of Sensation Seeking (AISS) is a twenty-item measure using a likert scale format. Arnett (1994), in a study to compare the AISS and the SS, reported that the internal reliability of the AISS was 0.70 as compared to the SS, which has internal reliabilities ranging from 0.83-0.86. The AISS was correlated higher with risk behaviour than the SS, but was similar to the SS in that young males tend to exhibit higher scores (Arnett, 1994).

The lack of data comparing the psychometric properties of the AISS with that of the sensation seeking scale is a limitation of the AISS, as it lacks the research that the sensation seeking scale has undergone in past 24 years. Whether the dated language in two of the forty questions and the forced choice nature of the sensation seeking scale
weakens its utility is debatable. One solution to the dated language has been to use more contemporary words (Jonah, Thiessen, and Vincent, 1997). In the absence of more concrete information supporting the sensation seeking scale’s shortcomings, it would seem that the sensation seeking scale is still the most appropriate to measure sensation seeking.

Risk Perception and Young Drivers

A relevant area of research has focused on risk perception as a mediator of risk taking. The perception of accident risk while driving is subjective (Jonah, 1986). Risk perception can be subdivided into the overall perceived risk of an accident and the perceived risk of specific driver behaviours or driving situations. It can also refer to the perceived likelihood of an event occurring or that the event will result in negative consequences.

Bragg and Finn (1982), in a comprehensive paper, looked at age and risk-perception. Using various modalities such as videotapes, questionnaires, photographs and on the road testing, they found that drivers between the ages of 18-25 perceived speeding and tailgating as less risky than did older subjects (38-50). Younger drivers also saw their peers as being at higher risk than themselves. Bragg and Finn (1982) hypothesized that the lower perceived risk was due to the greater confidence of the young drivers when it came to driving skill and in a belief that hazardous situations could be handled with competence.

This hypothesis received indirect support when young drivers gave lower estimates of risk when driving than when passengers. This heightened optimism among
young drivers was also found in several other studies (e.g., Matthews & Moran, 1986; McKenna, Stanier, & Lewis, 1991).

In a Canadian study, there was no relationship found between age and general concern about accident injuries (Jonah & Dawson, 1982). Yet, when compared to older drivers, young drivers (16-25) rated the importance of safety features lower and the importance of appearance higher when deciding on a car to buy (Jonah, 1986). One study asked subjects to estimate their probability of being involved in an accident within the next year. Young people (16-25) perceived themselves as being more likely to be in an accident than older people, which was consistent with Berger and Persinger's (1980) and Jonah and Dawson's (1982) findings.

In contrast, several studies found that young drivers (18-24) perceived themselves less likely to be involved in an accident than did older drivers (Finn & Bragg, 1986). Jonah and Dawson (1982) found that young drivers were less likely to view speeding as a major cause of motor vehicles accidents, as well as ranking speeding lower in risk than older drivers. Brown and Copeman (1975) had drivers rate the seriousness of traffic offenses; young male drivers rated all offenses as less serious than older drivers. This suggests that young male drivers commit more traffic offenses because they do not perceive them as having serious consequences (Jonah, 1986). There is a large body of research that has shown that young male drivers are more optimistic and that older drivers, as well as believing that they are less at risk from various driving behaviours (e.g., Jonah & Dawson 1982; Svenson et al., 1985).
Gender and Speeding

These studies, for the most part, have focused exclusively on young men and have excluded young women. The studies that have compared both sexes have produced inconsistent results (DeJoy, 1992). In a study designed to directly compare young males' and females’ risk perception, Dejoy reported some interesting findings. He concluded that among young male and female drivers (18-24), males tended to be more optimistic, especially with respect to their driving skill; furthermore, males and females had similar perceptions about the consequences of risky driving (accidents) but males saw their behaviour as less serious and less likely to result in an accident (DeJoy, 1992). These results provide support for the research that has shown that young male drivers differ from young women with respect to their risk perception and specifically their optimism regarding possible negative consequences.

The Base Rate Fallacy and Driving Behavior

Self-protective behaviour is generally considered voluntary (Cohen, Smith, & Anger, 1979). The steps individuals will take to protect themselves from hazards depends to a large extent on how the risk is appraised (DeJoy, 1989). Furthermore, it has been shown that the appraisal of risk is based more on subjective estimates than on objective estimates (Janz & Becker, 1984). The research in risk perception has focused on finding the systematic sources of bias in these subjective conclusions. Ignoring objective appraisal of risk is relatively common (Bar-Hillel, 1980).

The base rate fallacy is a tendency to ignore base rates in favor of individuating information; that is, information that is more salient and relevant to the individual is used as opposed to the objective rate. With respect to driving, it can be argued that road travel
and its attendant risks are an everyday part of life and accepted as such; thus, perceptions of risk for accidents are low (Kidd & Huddleston, 1994). Support for this can be found in the fact that motor vehicle crashes are consistently ranked lower in terms of risk than are nuclear accidents (Slovic, 1987).

As a society we are inundated with base rate information about risk. The sources vary: print and visual media, medical reports, doctors, to name a few. Greening and Chandler (1997) conducted a study examining base rates and the effects they had on optimism. The authors looked at how objective risk affected subjective risk perception.

Greening and Chandler found that people underestimated their risk because they overestimated their skill compared to others in the population. People tend to underestimate their own risk if they are the agents (e.g., driver) as compared to when another is the agent. People also tend to estimate risk with respect to the “average” person; the risk of a negative outcome in such cases appears to be adjusted downward because some people tend to see themselves as having better than average skills (Greening & Chandler, 1997).

There is some evidence that we use base rate information to estimate personal risk (Perloff, 1983). Yet, studies have also found that base rate information is taken into account when it emphasizes the general population as opposed to a subset of a population (Bar-Hillel, 1980). The base rates are seen to be relevant for a person having “average” skill and being part of a stereotypical “average” group. They are not seen as relevant for an individual who views him or herself as being “better” than the group. These findings have been replicated with drivers. When drivers see themselves as “above average” in
skill, the propensity to engage in risky driving, such as speeding, would increase thus also increasing the likelihood of severe accidents.

**Optimism Bias**

One area that has been explored in the risk perception literature is that of optimism, specifically unwarranted optimism or "unrealistic optimism" which can be seen as an amalgam of optimism and comparative optimism (Weinstein, 1980). Optimism bias can be defined as, "the tendency of people to be excessively and unrealistically optimistic and overconfident when judging the degree of personal risk associated with various events and situations" (DeJoy, 1989, pg. 333). Comparative optimism is defined as the tendency to perceive positive events as more likely for the self than for others and negative events as more likely for others than for the self. The research has shown considerable support for unwarranted optimism being a strong source of bias in risk perception (DeJoy, 1992).

In terms of traffic accidents, it has been found that most drivers possess accurate perceptions of risk as a whole; but, they tend to believe that these risks do not apply to them personally (e.g., Lichtenstein, Slovic, Fischhoff, Layman & Combs, 1978; Svenson, 1981). Optimism seems to be a stable characteristic of risk perception but little is known about what influences or produces this effect.

An interesting perspective on the OB may be that it is a form of denial on the part of an individual. It has been shown that people tend to be accurate with their judgements of potential risk, but some choose to disregard this information and continue on a potentially dangerous course (Svenson, 1981).
Controllability and optimism bias.

One area of interest has been the concept of controllability in optimism. It seems that individuals tend to believe they are more in control over events, even chance events, than the average person. Although the evidence has been indirect, this seems to be an intriguing area of research (Harris, 1996).

With respect to driving, individuals believe that they have more control over their driving than do others in a comparable group (Holland & Conner, 1996). A number of studies examining these perceptions have been cited in the literature. Svenson, Fischhoff, and MacGregor (1985) found that judgment of driving safety, skill, and accident likelihood all showed an optimism bias. Matthews and Moran (1986) showed that young male drivers’ optimism was most prevalent in situations involving car handling and driving reflexes.

Weinstein (1982) found that controllability was a major predictor of optimism when subjects were asked to rate the controllability of various health threats. DeJoy (1989) concluded that, among a college student sample, optimism was high in evaluating the risk of being involved in a motor vehicle accident. This optimism was increased if students perceived the accident as being controllable.

Harris (1996) has examined the relationship between perceived controllability and optimism bias. He concluded that there was an association between controllability and optimism bias, especially for negative events. Weinstein (1982) has suggested a number of possible mechanisms by which perceptions of controllability lead to an optimism bias: (1) people might be unaware of how to control events; (2) they may overestimate the effectiveness of their actions while underestimating those of others; (3) they may have
selective recall of things that promote their beliefs at the expense of actions which contradict them. These findings have been equivocal; in a review of the pertinent literature, Harris concluded that although there may be a link, a conclusive case has yet to be made empirically (Harris, 1996).

**Optimism Bias and Perceived Skill Level.**

Naatanen and Summala (1976) asserted that most drivers believe themselves to be more skilled than the average driver, thus more in control. Svenson (1981) gave both U.S. and Swedish students questionnaires regarding their driving habits/skills and asked them to compare themselves to others answering the questionnaire. The results showed that subjects believed themselves to be more skilled and less risky than others in the group. Slovic, Fischoff, and Lichenstein, (1977) reported that between 75-90% of drivers, interviewed in a number of countries, felt that their driving ability was better than average.

Preston and Harris (1965) compared two groups of drivers: half had been involved in accidents; the other half had no accident history. The mean score for self reported skill level was almost identical, with both groups judging themselves as more skillful than the other drivers. Furthermore, the accident group was found to be responsible for 68% of the accidents and had a higher frequency of previous traffic violations than the no accident group (Preston & Harris, 1965).

**Optimism bias and the perception of invulnerability.**

This concept of unique invulnerability has been studied in various areas. A number of studies have shown that people believe themselves to be less vulnerable to illness than others in the population. Harris and Gutten (1979) found that people judged
themselves less likely than others to become victims of diseases such as cancer and heart attacks. College students, when shown mortality statistics for their cohort, estimated that they would live 10 years longer than the actuarial average (Snyder, 1978).

Researchers have examined the concept of invulnerability and its relationship to controllability and the optimism bias. It has been hypothesized that those who are not victimized by negative life events, such as serious illness, accidents or crime, tend to see themselves as uniquely invulnerable (Perloff, 1983). By extension, if an individual were to be a victim, the belief of invulnerability would be shattered; the assumption being that the more severe the accident the longer lasting the effects. Perloff (1983) showed that being a victim shatters this illusion of invulnerability. In fact, having had a sense of invulnerability may make recovery all the more difficult.

**Resiliency of Optimism**

Involvement in an accident, even if severe, does not necessarily result in reduced optimism. A study conducted by Sheppard (1982) showed that, out of 160 drivers who had been involved in an accident, half had not modified their driving habits and 35% said they had not learned anything from the accident. Rajalin and Summala (1997) found that drivers that had been involved in fatal car crashes reduced their amount of driving yet there seemed to be little change in their driving habits. A possible interpretation of this result appears to be related to the perception of the drivers involved in the accident; those who felt they were to blame for the accident reported a change in their driving behaviour (Rajalin & Summala, 1997), but there was little decrease in violations, specifically, speeding violations.
The authors of the study concluded that drivers who have survived a fatal crash learned to avoid similar situations, but did not seem to learn to avoid speeding. It would seem that the drivers in this study did not see speeding as a contributory variable in their accident involvement.

Arnett (1991) also reported the transient nature of consequences. He found that there was no difference in reckless behaviour among young adults who had suffered various consequences (car accident, ticket for driving while drunk, serious automobile accident) in the year following an incident.

Rajalin and Summala (1997) believe that “near misses” should be sufficient in modifying behaviour, specifically with respect to driving. It has also been found that sufficient frequency of deterrence, such as fines and/or speeding tickets appear to be more important than the severity of the accident in modifying driving behaviour (Epperlein, 1987). The results have been equivocal; some researchers have found a “learning effect” (e.g., Echterhoff, 1987; Foechler, Hutchenson, Williams, Thomas & Jones, 1978). Others, such as Sheppard (1982), believed that accidents have little, if any effect on driving habits. He found that 50% of his subjects had not altered their driving and 35% said they had not learned anything from their accident.

**Speeding**

In the province of British Columbia, statistics have shown that unsafe speed was a factor in more than 35% of all fatal collisions and 15% of all personal injury collisions (ICBC, 1997). In fact, unsafe speed was identified as the single most common factor in fatal crashes. Speed is an important factor in traffic accidents, yet it is the most commonly infringed traffic violation (Manstead et al., 1992). Research has shown that
habitual driving speed is one of the most important factors for traffic accidents (French, West, Elander & Wilding, 1993), yet relatively little research has been done in this area.

Sivak (1997) conducted a bibliographic study on driving behaviour. He found that the main topics of research were: driver, environment, vehicle and vehicle system. In the subtopics, alcohol and driver performance were the areas most cited. Speeding or related topics were not listed (Sivak, 1997). It would seem that the topic of speeding is subsumed under another category.

Despite the evidence that increased speed increases the risk of accidents, drivers are reluctant to acknowledge the risks inherent in speed (Lawton, Parker, Stradling & Manstead, 1997). There seems to be a large amount of evidence that speeding is not only a common violation but regarded with tolerance by many (Lawton et al., 1997). Parker et al. (1992) found that, of four driving violations, speeding was found as the least undesirable when compared to drinking and driving, tailgating and risky overtaking. The author also found a weaker intention to avoid speeding than the other three violations. It has also been shown that those with high intentions to speed also showed the least amount of appreciation for possible negative consequences (Parker et al., 1992). Two similar studies found that exceeding the speed limit was the most committed offense on a self-report of 20 violations (Reason et al., 1990) and 31 violations respectively (Brown & Copeman, 1975).

Guerin (1994) has suggested that speeding is perceived as a normal event when moderate but, when excessive, is deemed reckless. It would seem that people might believe that “everybody does it” and that, therefore, it is acceptable. A poll conducted in 1981 found that 77% of American drivers said they obeyed the speed limit “all the time”
and only 13% admitted speeding. These same drivers estimated that 42% of other drivers observed the speed limit and that 49% violated the limit (Perloff, 1983).

Aberg, Larsen, Glad & Beilinsson, (1997) provide further support for this contention: they found that drivers in their study overestimated the speed of others, wanted to drive like others and believed other drivers thought they were driving too slowly. General attitudes towards speeding and belief about the consequences of such violations have been shown to play an important role in the intention to speed and actual speed behaviour (Kimura, 1993). It has been shown that speeding is perceived as socially acceptable, with people believing that most others speed, peers approve and that the likelihood of an infraction or accident is unlikely (Holland & Conner, 1996).

Demographics of Speeding

Gender and speeding.

According to the United States National Highway Traffic Safety Administration: 6,319 youth aged 15-20 died in motor vehicle accidents, and nearly 40% of male drivers who were involved in fatal accidents were speeding (USNHTSA, 1997). These statistics highlight pervasive and stable findings in the literature: there are a disproportionate amount of young men involved in accidents. Hyman (1968) also found that adult men were more frequently involved in accidents. These results may be confounded by the fact that in the 1960’s, men typically drove more than women.

When the differential exposure to driving was taken into account, women were more likely to be involved in accidents (Hyman, 1968). A study by Storie (1977) examined 2654 drivers involved in 2036 accidents over a four-year period and concluded that there was little difference between males and females in their blameworthiness.
In British Columbia, of all drivers traveling at unsafe speed, 74% were male and 21% were female, lending support to some of the early studies (BCTCS, 1995). Few studies have specifically dealt with women and driving; the focus has been predominantly on those more likely to be involved and cause accidents: men (Mckenna, Stanier & Lewis, 1991). The reason for the dearth of literature on women drivers has been speculated upon within the literature. Some possible explanations have been gender bias in research, or more plausibly, that women have driven less than men traditionally and consequently have been underrepresented in the accident statistics (Wylie, 1995). These discrepancies have been shrinking. Statistics from some Western countries support the fact that women are driving more and consequently being involved in more accidents in the U.S. In 1991, 24% of fatal crashes involved women drivers (Wylie, 1995). Other studies that have examined male and female drivers have shown that women are less often involved in accidents (Williams, 1985).

Furthermore, when women were involved in accidents there appear to be differences in terms of accident causation. Accidents involving women tend to be attributed to perceptual and judgment errors; men tend to be involved in accidents primarily caused by violations: speeding, drinking and unwarranted risk-taking (Storie, 1977). Broughton (1988) also reported that accidents due to violations rather than cognitive or perceptual errors are more likely among young, male drivers. Male drivers are more likely to be involved in an accident per mile driven than female drivers, although female drivers are more likely to be injured (Holland, 1996).

A study that looked at sex differences in risk taking showed that males tend to underestimate the amount of risk taken by females. Conversely, females attributed equal
amount of risk taking to both themselves and males. It would seem that there is a discrepancy between the amount of risk females take and males' beliefs about female risk taking (Kogan & Dorros, 1978). Yet, every measure for accident involvement in fatal crashes in the United States during the 1980s showed that men's involvement doubled that of women (Evans, 1991).

Males drive faster than females on average; but, the extent to which this can explain the discrepancy is debatable. A study which took into account the relationship between crashes and mileage found that females were at lower risk of crashing at all ages, but the differences were greatest for young and inexperienced drivers, where the women crashed 30% less than males (Maycock et al., 1991). The most robust and widely accepted finding in the literature is that young male drivers are involved in more accidents (Maycock et al., 1991). The reason for such high representation among young males has been extensively examined. Specific areas of investigation have been alcohol use, risk-taking behaviour, perception of risk and perception of skill.

**The link between speeding and accidents.**

Inappropriate speed has been found to be the main direct contributor to the occurrence and severity of road accidents in terms of serious injury and fatality (Johnson Klein, Levy & Maxwell, 1981). Reason et al. (1990) found that self-reported propensity to commit driving violations was predictive of accident rates. An American Automobile Association study found that the majority of drivers chose to drive unsafely or were not aware of the extent to which their behaviour put them at risk for an accident (Rolls, Hall, Ingham & Macdonald, 1991).
General attitudes and beliefs about consequences of speeding are important determinants of intention to speed and actual speeding behaviour (Parker et al., 1992). Given that speeding is perceived as socially acceptable and that people believe that most others are speeding, that peers would approve, and that it is unlikely to result in negative consequences, the widespread speeding seen on our roads is not surprising.

The statistics all seem to point towards the conclusion that speed and age are major factors in accident involvement and severity. Thirty-two percent of all drivers 15-24 years of age involved in fatal crashes were speeding; drivers involved in speed related fatal crashes are more likely to have a history of traffic violations, and nearly 40% of males involved in fatal crashes were speeding (United States National Highway Safety Administration, 1996).

Given that many drivers intentionally speed and tend to repeatedly speed, are there deterrents? Accidents may be salient and traumatic deterrents but, as the literature has shown, this does not deter most. Individuals who are high in sensation seeking have been shown to speed more that those with low SS. These findings have also been shown among those exhibiting high optimism bias. The role of both of these factors may serve to increase the propensity to speed and engage in other high risk driving behaviours.

Given that receiving a ticket for speeding is a relatively rare occurrence and involvement in an accident even less likely, the optimism bias may be reinforced for individuals who speed, as would the sensation seeking behaviour. Therefore, what effect would a speeding ticket have on these drivers, given that lessons learned from more serious incidents are transitory? Research needs to be undertaken which examines the role of sensation seeking and optimism bias on speeding behaviour.
Conclusion

The research on driving behaviour dates back to 1929, when researchers tried to ascertain the psychological components of the “accident prone” driver. Subsequent studies also looked to psychological factors in attempting to answer who was more likely to be involved in accidents (e.g., Rawson 1944; Tillman & Hobbs, 1949). The methodology used was case study and self-reports along with the administration of personality tests. Although the study of driving has diverged into many areas in the past fifty years, the questions still remain basically the same.

Studies have looked at cognitions and perceptions (Mayer & Treat, 1977), personality (Assum, 1997), social and demographic characteristics (Arnett, 1991) and attitudes and perceptions (Delhomme, 1991). All of these areas have produced useful and applicable findings. The area that has received the most attention is accidents and their causation. Given the high cost in human life and financial loses, this would seem to be the area in need of most research.

A main contributing factor in accidents and their severity is speed; surprisingly, this topic has received relatively little attention, given its impact on accidents. In a bibliographic study designed to evaluate the current state of the literature on driving behaviour, 90% of the topics covered involved the driver (Sivak, 1997). The two main sub-topics were alcohol (25%) and driver performance (17%); speeding was not listed among the 27 sub topics. Yet, studies can be found which examine speeding and driver characteristics (e.g., Aberg et al, 1997; DeWaard & Rooijers, 1994).

The studies that have examined driving violations with speeding as a subset have used the self-report method almost exclusively. Studies that have deviated from this norm have involved studies on the effectiveness of speeding interventions such as radar and
police checks, and the effectiveness of advertisements and educational programs (Aberg et al., 1997; DeWaard & Rooijers, 1994; Holland & Conner, 1996). Each of these studies have relied on self-reports to measure past speeding behaviour and the intention to commit speeding violation and attitudes towards speeding. Given the prohibitive costs to track and monitor drivers and their everyday behaviour, coupled with the exorbitant amount of time that it would consume, the self-report would seem to be a feasible alternative.

Optimism bias (OB) has been examined to some extent within the driving literature. Sensation seeking has been used a fair amount to examine driving behaviour and looked upon as a predictor of risky driving. The findings concerning SS have been fairly robust; this trait seems to be factor in speeding behaviour. The OB has also received support in the literature as a possible cognitive precursor to speeding. Yet, to the author's knowledge, the two have not been examined together within the driving literature. The current research will investigate the possible relationship between the optimism bias and sensation seeking and speeding in a sample of young adult drivers.
CHAPTER 3 - METHOD

Design

This quasi-experimental field study investigated the relationship between speeding (dependent variable) and two independent variables, those of optimism bias (OB) and sensation seeking (SS) in a sample of young adult male and female drivers.

Dependent variable.

In operationalizing the dependent variable of speeding, participants were asked to complete a self-report questionnaire asking them to record their typical speed in several different speed zones. The speeds used in the questionnaire were: 30, 50, 80, 100 Km/h. These correspond to various posted speed limits on roads and highways in British Columbia.

Independent variables.

Participants’ self-reported speed was analyzed in conjunction with the independent variables optimism bias and sensation seeking. Optimism bias is a tendency of people to be excessively and unrealistically optimistic when it comes to judging risks, skill and consequences. With respect to driving, this may be manifested by a driver’s belief that they are safer, and more skillful than other drivers and therefore less likely to be involved in an accident; this operational definition has been used in various studies (Dejoy, 1989; Delhomme, 1991).

Sensation seeking is considered to be a personality trait with social-biological origins. This trait is characterized by an individual’s propensity to seek out novel events and the subsequent intensity of such experience(s). Zuckerman (1994) defined SS as a “trait defined by seeking of varied, novel, complex and intense sensations and
experiences and the willingness to take physical, social, legal and financial risks for the sake of such experiences” (p.27).

The current study sought to replicate previous findings on the links between sensation seeking, optimism bias and speed in a western Canadian sample. In addition, the joint relationship between SS and OB and speed was investigated. It was predicted that individuals high in both SS and OB would report higher mean speeds than participants who were high in SS but low or moderate in OB. Finally, a number of exploratory analyses were conducted to explore the relationship between the number of speeding citations, gender and levels of SS and OB.

Participants

Participants for this study were recruited from the community, community colleges and local universities in an attempt to make the sample population as diverse as possible. Recruitment consisted of placing posters in universities and colleges, and soliciting participation at various sporting and social events. Participants were also recruited through word of mouth among past participants.

The sample consisted of males and females ranging in age from 19-30 who had valid drivers’ licenses. This has been shown to be the population which is most likely to speed and receives the most violation tickets (Elander et al., 1993). A total of 216 participants (101 male and 115 female) took part in this study. The mean age of the participants was 25.49 years old. The mean age (n=101) for males was 25.58 and for females (n =115) was 25.42 years.
Procedures

Participants were asked to complete self-report measures designed to assess their levels of optimism bias, sensation seeking and speeding behaviour. In addition, participants were asked to complete a demographic questionnaire that can be found in Appendix 1.

The demographic questionnaire provided information on the amount of driving undertaken in a given year by the respondents, years of driving, number of speeding violations in the past year, age, gender and level of education.

The aim of the study was to examine OB and SS in relation to speeding behaviour. The results of the questionnaire pertaining to each of the variables were statistically analyzed using ANOVAs, Chi-square and planned contrasts.

Measures

Optimism bias.

OB was measured by asking participants “how likely” they are to be involved in a number of different situations involving their car, other motorists and driving related scenarios in comparison to the “average” driver.

The 23 item Optimism Bias Questionnaire developed for this study is similar to the questionnaire developed by DeJoy (1989), with the addition of 12 items developed by the author. The question “Compared to the average driver how likely is it that you would be involved in the following situations?” was used to measure OB level. The questions were answered on a 7-point scale ranging from 1 to 7, where 1 is “not at all likely” and 7 is “very likely.”
The OB questionnaire was called the Driving Questionnaire; this was done so as not to influence the participants when they completed the questions. The Driving Questionnaire can be found in Appendix 2.

The reliability of the OB measure was calculated on the current sample using Cronbach’s Alpha (α). A strong internal-consistency reliability was found with α = .93. A split-half reliability was also calculated using Guttman Split Half showing a reliability of α = .91.

An ANOVA was used to determine if there were any significant gender differences on OB scores. There was no significant difference between males (M = 63.22, SD = 19.13) and females (M = 65.57, SD = 20.59) on optimism bias scores F(1, 214) = .747, p < .389. Therefore, the OB cutoff scores used in the sample were the same for both male and female participants.

Participants OB scores were categorized into three groups: low, moderate, and high. The Ntiles function in SPSS was used to divide the participants into three groups. This method provides three groups based on participants’ scores in relation to other participants’ scores and not on the absolute value of the measure as percentiles would.

Therefore, if a participant scored higher than the rest of the sample but not high enough to be in the 70th percentile of the scale they would still be considered in the top 30% of the sample. The following cut-off scores were used to place the participants in groups: 55 or less (n = 70) for the low group, 56-75 (n = 78) for the moderate group and 76 and above (n = 68) for the high group.
Sensation seeking.

Sensation seeking was operationalized by the scale developed by Zuckerman in 1964; The Sensation Seeking Scale (SSS). This measure has undergone a number of revisions; the most current and commonly used is the Form V version which was used in this study and can be found in Appendix 3. This scale was labeled Activities and Preferences so as not to influence respondents (Zuckerman, 1979).

The scale contains forty, forced choice items with each question having two options. There are no items referring to driving behaviour therefore minimizing any confounding effects. The SS consists of four sub-scales: Thrill and Adventure Seeking (TAS); Experience Seeking (ES); Boredom Susceptibility (BS); and Disinhibition (Dis). Internal reliabilities range between 0.83 and 0.86 and test-retest reliability is reported to be .94 over a three week period (Zuckerman, 1994). Scores on the sensation seeking scale have been shown to correlate positively with a number of risky behaviours such as gambling, smoking, and risky driving, therefore supporting the scale’s construct validity (Jonah, Thiessen, & Vincent, 1997).

Dividing the sample group into thirds has been used in the literature as a means of dividing participants into three categorical groups (Rowland, Fouts, & Heatherton, 1988). The Ntiles function was used to divide the groups into low, moderate and high. ANOVA was used to examine gender differences. There were significant gender differences between male’s (M = 21.66, SD = 7.04) and female’s (M = 16.66, SD = 7.39) SS scores F(1, 214) = 26.37, p < .001, so different cutoff scores were used for male and female participants.
Male participants were placed into the low group if SS scores were 19 and under \((n = 37)\), in the moderate group if scores were 20-26 \((n = 36)\), and in the high group if scores were 27 and above \((n = 28)\). Females were placed into the low group if scores were 14 and below \((n = 43)\), in the moderate group if scores were 15-20 \((n = 35)\) and in the high group if scores were 21 and above. This seems to provide a representative sample, as it does not differ much from prior established norms (Zuckerman, 1994).

**Speeding.**

Speeding was measured using a self-report questionnaire. Participants were asked to respond to the following question: “If you are driving on a clear day without much traffic, with the likelihood of speed traps being minimal, what speed would you typically be driving in the following speed limits?” A similar format has been used in past research (e.g., Lawton et al., 1997; Parker et al., 1992).

This question was designed to give the participants an unambiguous image where weather and speed enforcement were not factors. It was expected that it would provide an indicator of the participants’ usual behavior when driving in different speed zones.

The response options were based on speed limits on various provincial roads and highways. The speeds used in the questionnaire were 30, 50, 80, 100 Km/h.

Exceeding the 30 km/h speed limit by 10 km/h can not be assumed to be the same as exceeding the 50 km/h speed limit by the same margin. In a 30 km zone an individual travelling 40 Km/h would be exceeding the speed limit by 33%, if the individual were in a 50 Km zone and travelling 60 km/h the amount exceeding the limit would be 20% over the posted speed limit. To reflect these differences a Mean Speed Ratio (MSR) was calculated. Reported speed \((rs)\) – Posted Speed \((ps)\) divided by posted speed was
calculated for all four speeds. The ratios were summed and divided by 4 then multiplied by 100 to give one number that quantifies a participant’s average percentage of exceeding the speed limit. As an example,

\[
\frac{(40-30/30 + 60-50/50 + 90-80/80 + 110-100/100)}{4} \times 100 = \text{MSR}
\]

This number is used as a continuous score to index speed. When analyzing the data each score was recorded individually.

**Analysis**

**Preliminary analysis.**

All the analyses were conducted using an alpha level of .05. Means and standard deviations were calculated for the independent variables (OB, SS) and dependent variable (speeding) as well as for demographic information such as age, driving experience, mileage, violations, marital status, education levels and average speeds in the four speed zones. A factorial ANOVA for gender and OB, SS, and speeding was conducted to see if combining both males and females in one group was justified. Based on the literature, differences were expected. Therefore, it was anticipated that males and females would be analyzed separately. This was the case for sensation seeking but not for optimism bias. A reliability test for internal consistency and an item total correlation was conducted on the optimism bias questionnaire.

The mean sensation seeking score for the sample (N = 216) was (M = 18.97, SD = 7.64). The male (n = 101) mean was (M = 21.66, SD = 7.04) for females (n = 115) the mean was (M = 16.60, SD = 7.39). The optimism bias score for the total sample (N = 216) was (M = 64.47, SD = 19.09). The means for males and females (with standard deviation is parenthesis) were 63.22 (19.13), and 65.57 (20.59), respectively.
The Mean Speed Ratio for the sample was 20.91 with a standard deviation of 13.97. Gender MSR for males were \((M = 22.34, SD = 12.59)\) and females \((M = 19.66, SD = 15.03)\).

Analysis of Hypotheses

Hypotheses for sensation seeking.

1. Null Hypothesis: There will be no difference in reported MSR among low, moderate and high sensation seekers.

   Hypotheses: Drivers with high SS will report higher MSR than those with low or moderate SS.

   A factorial ANOVA was conducted to analyze the hypothesis.

Hypotheses for optimism bias.

2. Null Hypothesis: There will be no difference in reported MSR among those low, moderate and high on optimism bias.

   Hypotheses: Drivers with high OB will report higher MSR scores than those with low or moderate OB.

   A factorial ANOVA was conducted to analyze the hypothesis.

Hypothesis for sensation seeking and optimism bias.

3. Null Hypothesis: There will be no difference between reported MSR of individuals with high sensation seeking and high optimism bias and individuals with low SS and low OB.

   Hypotheses: Individuals with high sensation seeking and high optimism bias will report higher MSR than individuals with low SS and OB.
The theorized relationship between SS and OB was that participants reporting low or moderate OB and high SS would report lower MSR than those high in both SS and OB. Given the theoretical basis, a planned orthogonal contrast was used to analyze these hypotheses.

Hypothesis for sensation seeking, optimism bias and gender differences.

4. Null Hypothesis: There will be no proportional differences between males and females that are categorized as high on their respective SS and OB scores.

Hypothesis: There will be a higher proportion of male drivers who report high SS and OB than female drivers with high SS and OB.

A chi square analysis was run to measure differences between the groups.

Exploratory analyses.

Descriptive analyses and ANOVAs were used for the number of citations in the past year and reported speeding among the participants. Further exploratory analysis was conducted to examine other demographic variables.
CHAPTER 4 – RESULTS

Information from the demographic questionnaire as well as results from the sensation seeking scale, optimism bias scale and dependent variable of speeding were analyzed. Initial analysis was done on demographic information. The statistical analysis of hypotheses and results are presented. Results of the exploratory analyses are also presented.

Preliminary Analysis

This section examines a number of demographic variables that provide a description of the sample. Descriptive data, such as means and standard deviations are reported. Frequencies are used for nominal and categorical data. Some of the demographic questions were not completed by all the respondents; this was noted in the frequency tables as “missing.”

Demographic information.

The total sample size for this study was N = 216, males (n = 101) and females (n = 115). The range of ages was from 19 to 30. The mean age of the sample was 25.50 (SD = 3.50) years of age. The mean age of the males in the sample was 25.58 (SD = 3.41), for females the mean age was 25.41 (SD = 3.60). Tables 1 through 6 provide some of the descriptive data for the demographic information.
Table 1.

**Descriptive Statistics of Demographic Information**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Time Driving</td>
<td>209</td>
<td>1.00</td>
<td>20.00</td>
<td>8.75</td>
<td>4.17</td>
</tr>
<tr>
<td>Average Kilometers Driven in Year</td>
<td>195</td>
<td>500</td>
<td>100000</td>
<td>21010.77</td>
<td>15339.25</td>
</tr>
<tr>
<td>Speeding Citations In Year</td>
<td>215</td>
<td>0.00</td>
<td>12.00</td>
<td>0.92</td>
<td>1.99</td>
</tr>
<tr>
<td>Months a Year Drive</td>
<td>215</td>
<td>1.00</td>
<td>12.00</td>
<td>11.60</td>
<td>1.82</td>
</tr>
</tbody>
</table>

*Note.* Length of time driving was measured in years.

Table 2.

**Level of Education**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school</td>
<td>80</td>
<td>37.0</td>
<td>37.0</td>
<td>37.0</td>
</tr>
<tr>
<td>College</td>
<td>54</td>
<td>25.0</td>
<td>25.0</td>
<td>62.0</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>77</td>
<td>35.6</td>
<td>35.6</td>
<td>97.7</td>
</tr>
<tr>
<td>Graduate</td>
<td>5</td>
<td>2.3</td>
<td>2.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.

**Marital Status**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>143</td>
<td>66.2</td>
<td>66.2</td>
<td>66.2</td>
</tr>
<tr>
<td>Married</td>
<td>54</td>
<td>25.0</td>
<td>25.0</td>
<td>91.2</td>
</tr>
<tr>
<td>Separated</td>
<td>8</td>
<td>3.7</td>
<td>3.7</td>
<td>94.9</td>
</tr>
<tr>
<td>Divorced</td>
<td>11</td>
<td>5.1</td>
<td>5.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.

Country where Learned to Drive

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>205</td>
<td>94.9</td>
<td>95.3</td>
<td>95.3</td>
</tr>
<tr>
<td>Western Europe</td>
<td>8</td>
<td>3.7</td>
<td>3.7</td>
<td>99.1</td>
</tr>
<tr>
<td>Asia</td>
<td>2</td>
<td>0.9</td>
<td>0.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
<td>99.5</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.

Ethnic Background

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>65</td>
<td>30.1</td>
<td>31.9</td>
<td>31.9</td>
</tr>
<tr>
<td>Western Europe</td>
<td>96</td>
<td>44.4</td>
<td>47.1</td>
<td>78.9</td>
</tr>
<tr>
<td>Asia</td>
<td>39</td>
<td>18.1</td>
<td>19.1</td>
<td>98.0</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>4</td>
<td>1.9</td>
<td>2.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>204</td>
<td>94.4</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>12</td>
<td>5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.

Speeding Citations in a Year

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>129</td>
<td>59.7</td>
<td>60.0</td>
<td>60.0</td>
</tr>
<tr>
<td>1.00</td>
<td>52</td>
<td>24.1</td>
<td>24.2</td>
<td>84.2</td>
</tr>
<tr>
<td>2.00</td>
<td>15</td>
<td>6.9</td>
<td>7.0</td>
<td>91.2</td>
</tr>
<tr>
<td>3.00</td>
<td>7</td>
<td>3.2</td>
<td>3.3</td>
<td>94.4</td>
</tr>
<tr>
<td>4.00</td>
<td>2</td>
<td>0.9</td>
<td>0.9</td>
<td>95.3</td>
</tr>
<tr>
<td>5.00</td>
<td>2</td>
<td>0.9</td>
<td>0.9</td>
<td>96.3</td>
</tr>
<tr>
<td>6.00</td>
<td>2</td>
<td>0.9</td>
<td>0.9</td>
<td>97.2</td>
</tr>
<tr>
<td>8.00</td>
<td>2</td>
<td>0.9</td>
<td>0.9</td>
<td>98.1</td>
</tr>
<tr>
<td>12.00</td>
<td>4</td>
<td>1.9</td>
<td>1.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
<td>99.5</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Research Hypotheses

Analyses of the data obtained from hypotheses one and two were conducted using Factorial ANOVAs and chi-square. All the analyses were conducted using an alpha level of .05. The focus of the analyses was to investigate differences in mean speed ratio associated with differing levels of optimism bias and sensation seeking (see Table 7). Gender differences were explored specifically in the high OB and SS hypotheses. ANOVAs were used to give an overall test of significance. When significant main effects or interaction effects were found, Tukey's HSD test was used to analyze specific differences between the levels of the independent variables. A Chi-Square analysis was used to test the proportional difference of high OB and SS male and female participants.

Table 7.

Mean Speed Ratios by Levels of Sensation Seeking and Optimism Bias

<table>
<thead>
<tr>
<th>Sensation Seeking</th>
<th>Optimism Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>n</td>
</tr>
<tr>
<td>Low</td>
<td>80</td>
</tr>
<tr>
<td>Moderate</td>
<td>71</td>
</tr>
<tr>
<td>High</td>
<td>65</td>
</tr>
</tbody>
</table>

Hypotheses for sensation seeking.

Hypotheses: Drivers with high SS will report higher Mean Speed Ratio (MSR) than those with low and moderate SS. An ANOVA was used to see if any differences were evident between levels of optimism bias and sensation seeking on MSR (see Table 8).
Table 8.

ANOVA of MSR and Gender, Sensation Seeking and Optimism Bias (N = 216)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean Square</th>
<th>F value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (A)</td>
<td>1</td>
<td>302.09</td>
<td>1.59</td>
<td>0.21</td>
</tr>
<tr>
<td>Optimism Bias (B)</td>
<td>2</td>
<td>149.75</td>
<td>0.79</td>
<td>0.46</td>
</tr>
<tr>
<td>Sensation Seeking (C)</td>
<td>2</td>
<td>1159.15</td>
<td>6.08</td>
<td>0.003*</td>
</tr>
<tr>
<td>A X B</td>
<td>2</td>
<td>33.08</td>
<td>0.17</td>
<td>0.84</td>
</tr>
<tr>
<td>A X C</td>
<td>2</td>
<td>68.96</td>
<td>0.36</td>
<td>0.70</td>
</tr>
<tr>
<td>B X C</td>
<td>4</td>
<td>51.40</td>
<td>0.27</td>
<td>0.90</td>
</tr>
<tr>
<td>A X B X C</td>
<td>4</td>
<td>162.02</td>
<td>0.85</td>
<td>0.49</td>
</tr>
<tr>
<td>Error</td>
<td>198</td>
<td>190.63</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05

A. A main effect was found for SS levels, Tukey’s test was used to investigate the hypothesis that the MSR will be significantly higher for participants with high SS than those with moderate SS or low SS.

No significant difference was found between moderate sensation seekers (\(M = 20.39, SD = 11.87\)) and high sensation seekers (\(M = 25.68, SD = 14.11\)) on MSR, \(F(2, 198) = 6.08, p < .066\). There was significant difference between those in the low (\(M = 17.49, SD = 14.64\)) and high (\(M = 25.68, SD = 14.11\)) categories, \(F(2, 198) = 6.08, p < .001\). High sensation seekers reported higher mean speeds than those low in SS but not participants moderate in SS.

The null hypothesis that there is no difference between high and low sensation seekers for MSR was rejected.

Hypotheses for optimism bias.

Hypotheses: Drivers with high OB will report higher MSR scores than those with low and moderate OB.
An ANOVA was used to examine any differences between high OB and low and moderate OB participants on MSR. The overall F was not significant $F(2, 198) = .786, p < .457$ (see Table 8).

Given the lack of significant differences between high, moderate and low OB participants, the null hypothesis was not rejected. There was no evidence that differences in OB level are associated with differences in MSR.

**Hypothesis for sensation seeking and optimism bias.**

To explore whether optimism bias had an effect on sensation seeking and speed, different levels of optimism bias were examined in conjunction with high and low sensation seeking. Participants who scored high in both sensation seeking and optimism bias were grouped together in the high sensation seeking and optimism bias group. Participants low in both sensation seeking and optimism bias were placed in the low SS and OB group.

Hypotheses: Individuals with a combination of high sensation seeking and high optimism bias will report higher MSR than individuals with a combination of low SS and low OB.

Planned orthogonal contrasts were used to analyze the hypotheses. The contrasts were:

- High SS and OB compared to high SS and low OB
- High SS and OB compared to high SS and moderate OB
- High SS and OB compared to low SS and low OB

The allowable degrees of freedom for the analyses were five but only three analyses were necessary.
Significant differences in MSR were found between participants who were high in SS and OB (n = 30, $M_1 = 23.26$, $SD = 14.10$) when compared to those low on SS and OB (n = 60, $M_2 = 17.03$, $SD = 13.15$), $t(125) = 2.04$, $p < .043$. Analyses of male and female participants who were high in OB and SS were compared to those who were high in SS and low in OB (n = 14, $M = 23.94$, $SD = 13.37$). There was no significant difference found between the MSR of the two groups $t(125) = -.155$, $p < .877$.

Male and female participants in the high SS and OB group were then compared to participants in the high SS and moderate OB group (n = 25, $M = 27.82$, $SD = 14.32$). No significant differences were found on the groups reported MSR scores $t(125) = -1.24$, $p < .219$. Significant differences in MSR were found when comparing the low OB and SS group to the high SS and moderate OB group $t(125) = -3.33$, $p < .001$.

The results of the planned contrasts supported the hypothesis that the combination of high SS and OB would predict higher MSR than the combination of low SS and OB. Significant results were also found when looking at participants low in SS and OB compared to those high in SS and moderate in OB. However, the comparison between the high SS and OB group and the high SS and low OB group did not produce significant differences. No significant gender differences were found in the analyses.

**Gender and sensation seeking and optimism bias.**

Hypothesis: There will be a higher proportion of male drivers who report high SS and OB than female drivers with high SS and OB. A Chi-square test of equal proportions was used to analyze the data. The Fisher’s Exact test was used to test significance and found that $\chi^2 (1, N = 61) = .47$ (see Table 9). There was no significant proportional difference between the two groups. The null hypothesis was not rejected.
Table 9.

Chi-Square Test of Proportional Differences between High Sensation Seeking and High Optimism Bias Females and Males

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>0.12</td>
<td>1</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction</td>
<td>0.01</td>
<td>1</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>0.12</td>
<td>1</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>0.80</td>
<td></td>
<td>0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>0.12</td>
<td>1</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exploratory analysis for levels of optimism bias and sensation seeking.

Analysis were conducted on the number of speeding citations in the past year and reported speeding among the participants. Gender and level of OB and SS were compared using citations as the dependent variable. These analyses were also done with MSR as the dependent variable. This exploratory analysis was intended to expand on the preliminary hypotheses by examining gender differences in more depth.

Sensation Seeking, Optimism Bias and Gender differences in Mean Speed Ratio

An ANOVA was used to analyze differences in MSR between male participants \(n = 101\) of differing sensation seeking levels (see Table 10). A main effect was found for levels of sensation seeking groups \(F(2, 92) = 3.12, p < .049\). Tukey’s test was used when comparing those individuals who were high in SS \(n = 26, M = 27.52, SD = 14.25\) to those low \(n = 37, M = 20.06, SD = 11.99\), it was found that there was a significant difference in MSR between the two groups \(F(2, 92) = 3.12, p < .047\). When high SS males were compared to the moderate SS males \(n = 36, M = 20.64, SD = 10.88\), no significant result was found \(F(2, 92) = 3.12, p < .075\).
Table 10.

Males Mean Speed Ratios by Levels of Sensation Seeking and Optimism Bias

<table>
<thead>
<tr>
<th>Sensation Seeking</th>
<th>Optimism Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>n</td>
</tr>
<tr>
<td>Low</td>
<td>37</td>
</tr>
<tr>
<td>Moderate</td>
<td>36</td>
</tr>
<tr>
<td>High</td>
<td>28</td>
</tr>
</tbody>
</table>

A similar analysis was conducted on the female sample (n = 115) see Table 11. A significant main effect was found for levels of sensation seeking F(2, 106) = 3.48, p < .034. High SS females (n = 37, M = 24.29, SD = 14.05) were compared to low SS females (n = 43, M = 15.28, SD = 16.40) on MSR. A significant difference was obtained F(2, 106) = 3.48, p < .023. The high SS group was then compared to those in the moderate group (n = 35, M = 20.14, SD = 12.98). There was no significant difference between the two groups F(2, 106) = 3.48, p < .469.
Table 11.

**Females Mean Speed Ratios by Levels of Sensation Seeking and Optimism Bias**

<table>
<thead>
<tr>
<th>Level</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>43</td>
<td>15.28</td>
<td>16.40</td>
<td>36</td>
<td>17.37</td>
<td>17.82</td>
</tr>
<tr>
<td>Moderate</td>
<td>35</td>
<td>20.14</td>
<td>12.98</td>
<td>40</td>
<td>22.40</td>
<td>10.37</td>
</tr>
<tr>
<td>High</td>
<td>37</td>
<td>24.29</td>
<td>14.05</td>
<td>39</td>
<td>18.96</td>
<td>16.17</td>
</tr>
</tbody>
</table>

Significant differences were found for MSR when high SS males were compared to males in the low SS group, but not for moderate SS males. Females high in SS differed significantly than females in the low sensation seekers group but not the moderate SS participants.

**Optimism Bias.**

The above analyses were also conducted on different levels of optimism bias. No significant main effect were found for males' levels of optimism bias and MSR, \( F(2, 92) = .340, p < .713 \). No significant main effect was found for females' OB levels and MSR, \( F(2, 106) = .638, p < .531 \).

**Optimism Bias, Sensation Seeking, Gender and Speeding Citations**

An initial analysis was conducted to see if there were gender differences in the number of citations in a one-year period. Male \( n = 101 \) and female \( n = 114 \) participants were compared using ANOVA. A significant difference between males \( \bar{M} = 1.25, \text{SD} = 2.01 \) and females \( \bar{M} = .56, \text{SD} = 1.9 \) was found \( F(1, 197) = 5.19, p < \)
.024. The two age groups of 25 and under and 26 and over were also compared to see if there were any differences between the two groups. It was found that the 25 and Under group (n = 105, M = 1.18, SD = 2.34), when compared to the 26 and Older group (n = 106, M = .69, SD = 1.60), did not differ significantly on the number of citations, F(1, 207) = 2.87, p < .092.

Further analysis examined differences between participants with differing levels of SS and reported citations in year. It was found that male and female participants' (n = 64) sensation seeking levels did not differ significantly for the amount of citations in a year F(2, 197) = .828, p < .438. The above analysis was conducted on OB levels as well (see Table 12).

A significant main effect was found for OB levels F(2, 197) = 3.73, p < .026. Tukey’s post hoc revealed that male and female participants in the high OB group (n = 68) reported a significantly higher amount of citations (M = 1.46, SD = 2.83) in a year than the low (n = 70) group’s reported citations (M = .47, SD = .94), F(2, 197) = 3.73, p < .009. This was not the case when the moderate (n = 77) group’s reported citations (M = .84, SD = 1.70) were analyzed. There was no significant difference between moderate and high OB groups on the amount of citations in a year F(2, 197) = 3.73, p < .145.
Table 12.

ANOVA of Citations and Gender, Sensation Seeking and Optimism Bias (N = 216)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (A)</td>
<td>1</td>
<td>19.90</td>
<td>5.19</td>
<td>0.02*</td>
</tr>
<tr>
<td>Optimism Bias (B)</td>
<td>2</td>
<td>14.32</td>
<td>3.73</td>
<td>0.03*</td>
</tr>
<tr>
<td>Sensation Seeking (C)</td>
<td>2</td>
<td>3.18</td>
<td>0.828</td>
<td>0.44</td>
</tr>
<tr>
<td>A X B</td>
<td>2</td>
<td>2.21</td>
<td>0.576</td>
<td>0.56</td>
</tr>
<tr>
<td>A X C</td>
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<td>3.11</td>
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<tr>
<td>B X C</td>
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<tr>
<td>Error</td>
<td>197</td>
<td>3.84</td>
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*p < .05

Age Groups and Sensation Seeking

The sample was divide into two age groups using the Ntiles function. The two groups were those 25 and under (n = 106) and those 26 and over (n = 106). When analyzing differences between sensation seeking scores, it was found that the 25 and under group had significantly higher SS scores (M_ = 20.6, SD = 7.76) than the 26 and over group (M_ =17.63, SD = 7.31); F(1, 208) = 9.47, p < .002.

In this study, male participants differed significantly from females on SS scores. Therefore it was decide to examine differences within each gender. Male’s who were 25 and under (n = 49) did not have SS scores (M_ = 22.55, SD = 7.29) which were significantly different than those in the 26 and over (n = 48) group (M_ = 20.75, SD = 6.95), F(1, 95) = 1.55, p < .217.

Females who were in the 25 and under group (n = 57), contrary to males, differed significantly in their SS scores (M_ = 18.74, SD = 7.78) when compared to females’ SS score (M_ = 14.5, SD = 6.38) in the 26 and over group (n =57), F(1, 113) = 10.22, p < .002.
Optimism Bias and age groups.

The OB mean and standard deviation for the 25 and under group, men and women combined, was 69.12 and 20.98. The 26 and over group had an OB mean of 59.95 and standard deviation of 18.10. The groups were compared on OB scores and a significant difference was found; the 25 and under group had a higher mean OB score than the 26 and over group, $F(1, 208) = 11.30, p < .001$.

The groups were then analyzed based on gender. Males who were 25 and under ($n = 49$) were compared on their OB scores ($M = 67.31, SD = 21.14$) to males 26 and over ($n = 48$) ($M = 59.25, SD = 16.92$). The OB scores for the 26 and over group were significantly lower than their younger counterparts, $F(1, 95) = 4.28, p < .041$.

The female 25 and under ($n = 57$) and 26 and over ($n = 58$) were also compared on their OB scores ($M = 70.68, SD = 20.91; M = 60.53, SD = 19.14$) respectively. A significant difference was found between the two age groups $F(1, 113) = 7.38, p < .008$.

Age groups and mean speed ratio.

The age groups were compared on their MSR. No difference was found between the older ($n = 106, M = 20.97, SD = 13.70$) and younger ($n = 106, M = 21.00, SD = 14.49$) groups, $F(1, 208) = .002, p < .962$.

The results of the primary analysis provided results that for the most part are supported in the literature. Some results differed from what had been previously reported. Follow up analyses was done to clarify and provide a possible explanation for these results.
Driving experience and optimism bias.

A theorized component of OB is that, with experience, OB may increase or decrease depending on experiences and how individuals process them. Within this study length of time driving and total kilometers per year were used to give a general measure of experience. ANOVA results showed a significant difference between levels of OB and length of time driving $F(2, 206) = 9.39$, $p < .001$. Tukey's post hoc test was used to examine specific differences in OB levels.

When participants high in OB ($n = 29$) were compared to those low in OB ($n = 30$) on the length of time driving, it was found that those in the low group ($M = 10.43$, $SD = 3.6$), had significantly more driving experience than those in the high group ($M = 6.93$, $SD = 3.67$), $F(2, 206) = 9.39$, $p < .001$. The moderate group ($n = 37$, $M = 9.00$, $SD = 4.3$) also significantly differed from the high group, $F(2, 206) = 9.39$, $p < .016$, and had significantly less driving experience.

When comparing average kilometers driven in a year, no main effect was found for levels of OB $F(2, 194) = 2.21$, $p < .112$.

The results of the analysis have provided some interesting findings. Some, such as the significant differences between the SS groups and MSR were expected given what has been reported in the literature. The lack of significant differences between the OB groups was unexpected given the theoretical assumptions expressed in this paper and the literature. It was also surprising to not obtain significant differences between age groups on MSR, which seems to differ from both conventional wisdom and numerous studies and surveys. The following section will integrate and attempt to explain the findings based on theory and the existing literature.
CHAPTER 5 - DISCUSSION

The purpose of this study was to examine sensation seeking (SS) and optimism bias (OB) and their role in speeding. Sensation seeking has been the topic of numerous articles related to driving behaviour (Jonah, 1990). There is little doubt that SS is associated with a variety of risk taking activities. SS has been linked specifically to speeding behaviour (Zuckerman & Neeb, 1980) and results seem to indicate a positive relationship between level of SS and speed. Based on its prevalence in the literature and the consistency of the findings with regard to risky driving behaviour, SS was chosen as one of the variables in this study.

Optimism bias has also been the topic of study, but not to the extent of the sensation seeking variable. Optimism bias, like sensation seeking, has also been cited in the driving literature as a possible factor in speed behaviour. Zuckerman (1979) found that high sensation seeking people underestimate risks when speeding. When looking at specific health risks such as smoking, low and high SS people have the same risk perception, but high SS are more likely to engage in the risky behaviour (Horvath & Zuckerman, 1992). Arnett (1990) found that people high in sensation seeking who drove drunk believed they could do so on more occasions before being involved in an accident or being stopped by the police than those low in sensation seeking. Arnett believed this suggests an optimism bias on the part of high sensation seeking participants.

Encouraging as some of the results linking OB and SS to speeding have been, to the author’s knowledge, no studies have looked specifically at SS and OB as possible joint factors in speeding behaviour. The primary focus of this study was to examine if SS and OB play a role in the magnitude of speeding.
Sensation Seeking

It was hypothesised that high sensation seekers would differ from moderate or low sensation seekers on their reported mean speed ratios (MSR). This study found that when individuals with high SS were compared to those with low levels of SS, the high sensation seekers reported a higher mean speed ratio. In fact, high sensation seekers exceeded the posted speed limits by an average of 26%. These results support what has been found in the literature. High SS do differ in their likelihood of engaging in risky driving behaviour and, specifically, speeding more than low SS (Jonah, 1996)

Sensation seeking and gender.

Gender differences in SS have been reported in the literature. The sensation seeking scale has been normed separately for men and women (Zuckerman, 1994). This study found a significant difference between male and female SS scores. As a result, categorisation of males and females into separate SS groups was done using different SS cut off scores. Given that males and females differ in SS, it is interesting to note that many previous studies that examined driving behaviour (including speed) focused predominantly on males (Wylie, 1995)

This study found that males who were high in SS reported higher MSR than their counterparts in the low SS group. An 8% difference was found between the groups, with the males in the high group exceeding the posted limits by 28% and the males in the low group by 20%. No significant result was found for males when the high group was compared to the moderate group. Females in the high group were found to drive, on average, faster than their counterparts in the low group but not the moderate group. Females in
the high group exceeded the speed limit by an average of 24%, whereas the females in
the low group exceeded these limits by 15%.

It would seem that the majority of drivers exceed the speed limit to some extent,
in that 93% of the participants in this study had positive MSR scores indicating driving
behaviour that exceeded the speed limits.

An individual's SS score might be related to the magnitude by which the speed is
exceeded and from the results of this study it would seem that those who have high SS
scores tend to exceed the speed limit by a greater amount than those in the low SS
groups. These results were found for both male and female participants. Males exceeded
by an average of 28% compared to females who exceeded by 24%.

These results indicate that if an individual male or female is a high SS they are
more likely to exceed the posted speed limit by a greater amount than those who are low
in the trait. Interesting as well is that even those low in SS exceed the speed limit by a
20% margin if they are male and 15% if they are female. Given these findings, SS levels
seem to play a role in how fast people drive over posted speed limits.

The effect of SS was most apparent among those high in the trait. This study
found that male or female participants who were in the high SS group exceeded the
posted speed limits by a significantly greater amount than the low group.

A possible explanation for this may be found in the literature. It has been reported
that those high in SS believe they are able to engage in risky activities without
repercussions compared to those low in SS; pointing to a possible optimism bias (Jonah,
1997). It has been suggested in the literature that those high in SS may engage in risky
behaviour, and if no negative repercussions occur, the perceived risk of the behaviour is
diminished. Those who are low in SS may "retain their apprehension" (Jonah, 1997, p. 657). Therefore a bias is created (negative or positive) as a consequence of the behaviour and not as the cause of the behaviour. This seems to support the contention that OB may have an effect on the expression of SS.

Optimism Bias

Optimism bias, to certain extent, is relatively new concept in the driving literature. Consequently, few articles have looked at this construct and its possible role in speeding behaviour. One of the hypotheses of this study was that differing levels of OB would yield significant results with respect to speeding behaviour. Specifically, it was hypothesised that high OB would result in significantly greater MSR when compared to low or moderate OB participants.

Extending the definition of optimism bias to driving behaviour, an assumption can be made that individuals high in OB would consider themselves more skilled, proficient drivers than others on the road. In addition to their perceived skill level, these individuals may also see themselves as less likely to be involved in an accident or be caught contravening the motor vehicle act. For those who speed, this cognitive "blinker" might increase the likelihood of the speeding, because they do not see themselves as vulnerable to accidents or police enforcement.

This study examined participants in three distinct groups, high, moderate and low OB. This is a departure from the literature, which has looked at OB as either high or low. Contrary to the hypothesis and the theoretical assumption that high OB participants would report higher MSR than low or moderate OB participants, there were no significant differences between these groups. Similar results were found when examining
gender. Neither males nor females in the three OB groups differed on MSR. The lack of gender difference on optimism bias has been cited in the literature and seems to be a consistent finding (DeJoy, 1985; DeJoy, 1992).

**Moderate and high optimism bias.**

An intriguing result was found when looking at the MSR of the moderate and high groups. Theoretically it would be assumed that the higher the OB the greater the magnitude of exceeding the speed limit since this group would have a more optimistic appraisal of their skills and ability to avoid negative consequences. Yet, this study found the moderate group exceeded the posted speed limits by an average of 23% compared to those in the high group who exceeded the limit by 21%. Although not statistically significant, and likely an effect of the sample, it does raise questions about the necessary level of OB needed to have an effect on someone’s willingness to engage in a risky behaviour.

Low OB does not seem to be an influential factor in increased speed. This is expected given that these individuals would be more realistic or in fact pessimistic about possible outcomes. When an individual is in the middle of the OB continuum we could theorise that they would have a more commonly held and widespread belief in one’s abilities and possibility of negative outcomes. People in the moderate level of OB may know the risks but choose to proceed with a risky activity when it may benefit them, like many others.

Those high in OB are those who believe that they posses greater skills and to some extent luck, than their fellow drivers. Therefore it was predicted that, as OB increases so does the willingness to engage in risky activity. In this study the differences
between the groups were not statistically significant. On their own, levels of OB do not seem to play a significant role in speeding.

High SS and High OB

SS and OB have been associated with speeding. In this study it was hypothesised that OB might influence those high in SS to go faster, as measured by the mean speed ratio. Specifically, participants who were high in OB as well as SS would report higher mean speeds when compared to those who were high in SS but low or moderate in OB.

When examining the SS and OB variables separately, those high in SS exceeded the speed limit by an average of 26%, which was significantly different than those low in SS. Those high in OB exceed the same limits by 21%; those with moderate OB by 23%; these did not differ significantly between OB groups. This was surprising result as it was hypothesised that a higher level of OB would result in higher reported MSR among participants.

Levels of OB do not seem to provide any significant differences in MSR among male and female participants. What was found is that, when male or female participants who were high in optimism bias and sensation seeking were compared to those male and female participants low in both variables, those high in SS and OB reported significantly higher MSR scores than the low SS and OB group.

When participants high in SS and low or moderate in OB were compared to those high in SS and high OB, no significant difference in MSR was found. It was hypothesised that if an individual was high in SS and OB the MSR scores for this group would be significantly greater than groups whose participants had high SS score but low or moderate OB scores. The lack of significant differences was unexpected based on the
optimism bias theory and what has been cited in the literature. It would seem sensation seeking level plays the major role in speeding behaviour when compared to optimism bias.

A possible explanation for these results may be found in variables linked with optimism bias such as age and experience. The moderate OB participants, who were also high in SS, \((M = 27.82)\) did not differ on MSR from the high OB and SS group \((M = 24.56)\). This may be explained by the fact that individuals who are either high or moderate in OB do not have a significant difference in age. Where the mean age for the low OB is 27, the moderate and high have mean ages of 25 and 24 respectively; both differ significantly in age when compared to those in the low OB group.

It is also possible that there may not be a strong enough differentiation in age between the moderate and high OB groups. Those high in SS who have low OB have lower MSR, but not significantly less than those high or moderate in OB. Conversely, if an individual is high SS and is also moderately or highly optimistically biased the magnitude of the MSR increases. This may be due to the strength of the sensation seeking variable accounting for the significant differences. Further research may be needed to ascertain at what age(s) moderate OB becomes high if it indeed does.

There is little doubt that, within this sample SS has a primary role in speeding magnitude. A further indication that SS may effect magnitude is evident when one notes that, as the SS level decreases and OB is still high, there is a significant decrease in mean speed from when both SS and OB are high. What can be concluded from these finding is that SS seems to play an important role in speeding behaviour. The level of OB in participants did not play a role on the magnitude of speeding in this sample.
It was hypothesised that OB may act as either a restraint or a release for those who have a high SS level. Given the results, an individual who has high SS seems to be inclined to speed. It was theorized that the likelihood of speeding might increase or decrease depending on the individual’s level of OB. As an example, if an individual has low OB but high SS they would exceed the speed limit by a lesser amount than if they were either moderate or high in optimism bias. The findings of this study did not support these theoretical assumptions.

Given the results of this study, one could conclude that if an individual is high in SS they are likely to exceed the posted speed limit by a greater amount than individuals who are low in both SS or OB. If an individual is high in sensation seeking the level of optimism bias does not seem to make a significant difference in speeding magnitude.

**Speeding Tickets, Sensation Seeking and Optimism Bias**

A concrete indicator of speeding behaviour is the number of speeding tickets in a given period of time. In this study that time period was one year, and 40% of the sample received 1 ticket a year. This may not be a very accurate indicator of magnitude nor frequency, as people may speed but not get caught. When looking at gender males’ mean number of tickets in a year was 1.6, females received .6 tickets in a given year, which was significantly lower than males. Given Provincial statistics is not surprising that males receive more tickets than females. Whether this is a reflection of speeding behaviour or gender dynamics is debatable.

Those high in SS did not receive significantly more speeding tickets than those who were low in SS. Those high in OB reported significantly more tickets than the low group. A possible explanation for this result may be age. Individuals who are low in OB
had a mean age of 27 compared to those in the high category whose average age is 24. Age may play a dual role: experience with driving may have lessened the OB but also allowed individuals to know when it is “safe” to speed and avoid detection. The high OB participants are younger which may make them less skillful and experienced. One could speculate that the high OB participants may have received more tickets but not a sufficient number to alter their optimism.

Driving Experience

Experience seems to play a role with respect to OB and may help explain the results. Those participants low in OB tend to drive significantly more kilometres in a year and have been driving for a longer period of time than both high and moderate OB participants. Those moderate in OB also drive more and have done so for a significantly longer period of time than high OB participants.

Therefore, those low in OB have had more experience than the other groups due to the fact they drove on average 24,000 km per year and have been driving for 10 years. This amount of time and travel may result in more citations, exposure to negative experiences on the road, or a better appreciation of what is involved in safe driving. Smiley (1999, pg. 3) stated that the more an individual drives the more likely they are to get demerits “probably because of speeding tickets” and an increase in the likelihood of being involved in accident.

The moderate group also reported significantly more length of time driving than those in the high OB group. For this group this experience may be a double-edged sword. It can be hypothesised that although the moderate group has more experience it may not be enough driving to curtail the cognitive “blind spots” associated with OB, but it may be
enough experience to strengthen the OB. As an example, a driver who is moderate in OB may have been exposed to more negative consequences either directly or indirectly than those high in OB but this may be counteracted by the possibility that they may have also been able to avoid as many or more consequences.

Participants high in both OB and SS averaged speeds 23% greater than the posted limits, whereas those low in OB and SS exceeded the same limits by 17%. These results are intriguing in light of the findings for SS and OB. When only SS is considered, high SS participants, both males, females and as a group, reported larger and significantly higher MSR scores than the low group. Conversely when only OB is considered, the high OB groups did not show any significant differences when compared to the low, moderate OB groups. This was also consistent among males, females.

When high OB was paired with the high SS group, no significant differences were found compared to the other groups. Participants who were high in both SS and OB were compared to participants who were high in SS but low in OB no significant differences were found in MSR. Participants high in SS and moderate in OB did not differ significantly on MSR when compared to those in the high SS and OB group. Given that SS has significant association with speeding on its own, and OB doesn’t, it might be that the strength of SS might be accounting for the significant results.

High SS participants showed a significantly higher MSR than the high OB participants. It can be theorised that SS may increase the magnitude of the MSR and OB the willingness to engage in the behaviour. This idea has some support in the literature. Moes and Jenssen (1990) found that drivers in a high SS group drove faster and had a
higher opinion of their driving skills and appraised their risk as less than those in the low group.

**Gender, Optimism Bias and Sensation Seeking**

Male and female participants in the high SS and OB group were compared to those in the low SS and OB group; there was no significant difference in MSR based on gender. Analysing further, males who were high in OB and SS did not have a significantly different MSR than their low OB and low SS counterparts. This lack of significance was also found when comparing females high in OB and SS to those low OB and low SS.

In past research, SS has been shown to differ based on gender, whereas the OB has not shown such differences. In this sample gender differences were found for SS but not OB, replicating findings in the literature (Zuckerman, 1994). When males and females were categorized into the three levels of sensation seeking, different cut-off scores were used based on gender. When a male was categorized as a high sensation seeker the cut off score was higher than that used to categorise females as a high sensation seeker. Different cut-off scores were also used to categorise participants into the moderate or low SS group. The categorisation into the different optimism bias levels was the same for both males and females as the cut-off scores were the same for both genders.

When looking at male participants who were in the high SS and OB group compared to males in the low SS and OB group no significant results were found on MSR. Female participants in the high SS and OB group were also compared to females in
the low SS and OB group with no significant differences found between the two groups for MSR.

A lack of significance for MSR was also found when males or females high in sensation seeking and optimism bias were compared to same gender individuals high in SS and OB. A lack of significant differences in MSR were also found when males or females high in SS and OB were compared to those with high SS and with either low, moderate or high levels of OB.

The literature has shown that there is a significant difference between males and females on SS (Jonah, 1997). In British Columbia, there is a significant gender difference in speeding, where males tend to speed more than females (Cooper, 1997). In the few articles relating Speed and OB, most reported no significant differences based on gender (DeJoy, 1992). The results of this study seem to confirm the finding for sensation seeking and optimism bias with respect to gender differences.

Age and Optimism Bias and Sensation Seeking

Another factor that has been linked to both OB and SS is age. The research is robust in reporting that as an individual get older, SS decreases (Jonah, 1997). The particular age group at which this occurs is still debatable. It is fairly certain that those under 25 do have higher SS than those over (Jonah, 1997). With OB, the results are equivocal, some report that OB decreases as we get older, peaking at the age of 24 (Jonah, 1990; Svenson et al., 1985). If an individual has largely positive experiences, then OB might be reinforced and increase with age; conversely, with negative experiences, it may decrease (Dejoy, 1992).
In this study’s sample, those 25 and under had higher SS scores than those 26 and older, supporting the literature. However, males’ SS scores did not differ significantly by age; the difference seems to be in the female sample. Females 25 and under scored higher on the SS scale than those older than 26.

The results for the males are surprising given that the SS literature indicates that both male and female’s SS increases with age but declines in the mid twenties (Jonah, 1997). The results of this study may be due to the relatively low number of high SS males \((n = 28)\) compared to high SS females \((n = 43)\).

The total group results for OB mirrored those of the SS scores; those under 25 had higher OB scores than those over 26. With respect to OB, Males under 25 had significantly higher scores than those over 26. This was also the case for females in the high OB group.

**Optimism bias and experience.**

Those high in OB have the least experience operationalized as length of time driving. Thus, the OB may not be challenged to extent that would be expected for someone with more experience driving. This does have support in the literature. Spolander (1982) found that after one year most drivers already saw themselves as more skilled than the average driver except for defensive driving skills; after three years of driving most saw themselves as above average in skill. Brown (1982) showed that young drivers, when first learning to drive, acquire perceptual motor skills easily and thus have a higher level of confidence in their abilities. Older drivers with greater experience are better able to appreciate the difficulties involved in driving and therefore have a more congruent level of appraisal between confidence and skills.
OB may also have a life span. Kunda (1987), citing the literature, believes that most individuals tend to be optimistic. Extending Kunda’s assertion, we can assume that an individual may begin at the moderate level of optimism. Given that OB is a cognitive construct, then the assumption can be made that as children we tend to be optimistic and when we reach adolescence this may reach its peak, as evidenced by Elkind’s theories of the Personal Fable and Egocentrism (Elkind, 1985). Thus, the possibility that we start at a moderate level of optimism is not improbable.

From moderate levels, depending on experience, we may become more optimistically biased. Within this sample, those that are low in OB are older and more experienced drivers than those who are moderate, who in turn are more experienced and older than those in the high category. The continuum may begin at moderate or high but depending on experience may decrease or increase.

Conclusion

Given that sensation seeking is widely regarded as a genetic trait and OB as a cognitive construct, we can begin to see the possibility of a relationship between the two. This study has shown that SS plays a strong role on the magnitude of speeding. OB alone did not seem to have a significant role in speeding.

The results of this study confirm the literature that age and gender differences are evident for SS. The lack of significant gender differences in optimism bias and the significant age differences support the optimism bias literature.

This study has shown that sensation seeking alone plays a more prominent role in speed behaviour than does optimism bias. Optimism bias alone does not seem to play as important a role as was hypothesised in both the literature and this study.
Future research

Optimism bias needs to be the subject of more systematic studies that examine OB and speeding behaviour. It may also be of use to extend and refine the measure for optimism bias, thus helping to identify more precisely who can be considered high, moderate or low in this construct. The validity and reliability of the measure needs to be addressed to make it a useful measure of OB. Age and gender differences should also be examined to better understand gender differences in risk driving behaviour and in particular speeding. Specifically more research should be done on female driving and risk taking activity.

Limitations

A limitation of the present study is the use of self-reports. The data were collected from participants using self-report measures and therefore the results may be confounded by self-report bias. This may be counteracted by the fact that the reports were anonymous and there is some support in the literature that people tend to be “honest” when self-reporting speeding behaviour (Lajunen, Corry, Summala & Hartley, 1997).

The use of non-standardized questionnaires is another limitation. The questions in the optimism bias questionnaire were developed in part by the author and some taken from previous studies. This lack of standardization and the issue of construct validity makes generalizability of the findings difficult.

Participants in this study were divided into three OB groups. This does not seem to have precedence in the literature. The division of the groups was conducted using the Ntiles function in SPSS. This provided a relatively even distribution among the three
groups. The lack of norms for optimism bias and standardized cut point for low, moderate or high makes it difficult to negate possible overlap between the three levels.

The age range that was examined in this study was limited to between 19-30 years of age and restricted to the lower mainland area of British Columbia; restricting generalization to this group. The sample size of 216 was sub-divided into differing level of OB and SS as well as by gender for the purposes of conducting statistical analysis. This diminished the number of possible participants in certain groups like the high SS and OB male groups that had sample size of 14. This may decrease the power of the study and may lead to Type II error in the results.

This study has focused on two main variables, but the existence of other intervening variables is a distinct possibility. The area of perceptions and risk-taking and, in fact, human behavior can not be distilled into a discreet number of variables. Yet, for obvious logistical, monetary and time constraints this had to be done. The examination of the two variables in this study may provide impetus for further study and elaboration on what has been undertaken in this study.
Implications for Counselling and Education

This section will discuss potential implications of this research for the practice of counselling psychology. The results of this study have confirmed what has been cited in the literature with regard to sensation seeking. The optimism bias theory has not received the support that was expected based on the literature and theoretical assumptions of optimism bias. This section will integrate what has been found in the literature and the result of this study, emphasizing both sensation seeking and optimism bias to provide possible implications for the practice of counselling psychology.

Clients susceptible to risk taking.

This paper examined two specific variables: optimism bias (OB) and sensation seeking (SS). These have been studied individually in the social psychology and health behavior literature. Sensation seeking has been cited in numerous journals ranging from psychology to genetics. OB and SS have received little attention in the counselling psychology literature. This would seem to be an unfortunate omission.

Sensation seeking is theorized to be a personality trait based in part on genetic predisposition and biochemical influences, and thus less malleable within a therapeutic framework.

Optimism bias, on the other hand, seems to be a cognitive mechanism, possibly a defense mechanism or a form of denial. It would seem that both influence a person’s actions and behaviours, both areas that counselling psychology is well suited to address. The use of counselling psychology to examine these personality factors would provide further insight into possible therapeutic interventions and prevention in the form of education.
The number of risks individuals engage in on a daily basis are numerous; we all
take risks both voluntary and involuntary. This paper looked at a volitional risk behavior:
speeding. It would seem, from the results and the literature that certain individuals are
more likely to engage in this behavior than are others in the population. Therefore, in
examining the constructs of optimism bias and sensation seeking in relation to
demographic information, we have at our disposal a set of variables associated with
speeding behavior.

The current research in health behavior and attitudes was examined within a
counselling psychology framework; therefore creating the possibility of developing
and/or using existing interventions that may prevent or change risky behavior.
Counselling Psychology is based on many areas of psychology and specifically informed
by an educational model. This diversity allows counselling psychology to contribute to
the design, implementation and evaluation of treatment programs (Thoresen, 1985). The
educational perspective of the discipline emphasizes the teaching aspect and the
remediation of faulty thought process, assumptions, problem solving and decision making
(Thoresen, 1985). These areas are important components in driving behavior; all are
required to reduce risk when driving.

Although speeding is one of many risk-taking behaviors, the study of this
behavior in young adults may provide a clue as to what “type” of individual is
predisposed to excessive speeding. Knowing that an individual is likely to engage in one
risk taking behavior is a fairly good predictor of engaging in other risky behavior (drugs,
The results of this study seem to indicate that males 25 and under, who were high in sensation seeking reported exceeding the speed limit by a greater amount and received more speeding tickets in a year than individuals low or moderate in SS or OB. This study also found that males and females high in sensation seeking tended to drive faster than those who were low or moderate in SS. High SS individuals of both genders also reported more speeding tickets per year than low or moderate groups and males high in SS had more tickets than females high in SS. These results may give us a "snap shot" of who is likely to engage in risky behavior. Knowing this may help in developing pertinent and specific therapeutic goals focusing on the risk taking as part of the whole therapeutic process.

The aim of this study was to examine the role of OB and SS on speeding behavior. OB and SS were hypothesized to play an important role in predicting speeding behavior. The sensation seeking hypothesis seems to have been confirmed in this study. OB on its own did not seem to play an important role as predicted.

As a group those individuals that were high in both OB and SS had higher significant Mean Speed Ratio (MSR) than individuals low in OB and SS. The effect of OB on SS and participants’ MSR seems to be limited to when comparing those high in both SS and OB to those low in both SS and OB.

Therefore in these specific circumstances, health care professionals may have at their disposal the sensation seeking scale and possibly the optimism bias questionnaire. Both of which may be utilized to help identify as well as possibly explain the behavior of those likely to speed and possibly endanger their life or the lives of others.
Given the results of this study there seems to be no empirical support for the role of optimism bias in speeding behaviour. Theoretically, the optimism bias may be viewed as being adaptive, in that it provides a positive outlook but this may be a risky mindset. Young adults who tend to speed would have to undergo a basic shift in their mind set. The tendency for some to see themselves as uniquely invulnerable, and to see their risk of being in an accident as less than others in the community, would need to be addressed.

Therapists can focus on messages aimed at the individual as opposed to a global message of possible risk. It is likely that verbal interventions should be age specific, and directed at the risk the individual faces, as opposed to the “average other.” Factors such as environment, driving conditions and unexpected events need to be highlighted as the individual has little if any control over such variables.

The intention to commit a traffic violation such as speeding is for the most part a volitional act. Therefore intervention could look at improving young adults decision making process and examining possible outcomes of a given decision.

Driver Education and Counselling Psychology

Sensation seeking may also be influenced by therapeutic or educational interventions. It is generally accepted that young drivers know and appreciate the dangers involved in driving (Dejoy, 1989). This may be the reason why, typically, educational measures emphasizing statistics and dire warnings have not been very effective at reducing speeding (DeJoy, 1991).

An important role of counselling psychology has been education, starting from elementary school and upwards. Integration of counselling psychology into health and social psychology and the health prevention model would be a fruitful combination.
Traditionally, the role of changing public attitudes has been the domain of social psychology. This social-educational role would seem to be an excellent area for counselling psychology to transfer what is traditionally confined to therapy, helping clients' address, examine and change maladaptive attitudes, to an educational model dealing with speeding behavior. A combination of client centered interventions and an educational model, which incorporates the literature on sensation seeking and optimism bias in conjunction with the findings of this study, may be an effective modality for preventing or redirecting risk taking.

Individuals high in sensation seeking need to reach an optimal level of stimulation as described by Zuckerman (1971) and their belief that tragedy will not befall them should be the target of therapy and education. It is, therefore, important to look at the motivation for engaging in risky activity and not so much on the activity itself.

Individuals need to be exposed to information that helps personalize risk and makes it relevant to their lives. Alternative risk taking activities should also be explored, such as sports or outdoor activities. Stacy, Newcomb and Bentler (1991) found that social support had a long term effect on levels of SS in adulthood. They reported that being part of a "conventional" social group provided a certain "protection" against involvement in unacceptable risky activities. This may be difficult, as young adults seem to resist having to "change" friends. The use of team sports may provide individuals with another and alternative social support system. In fact, any groups that can provide a feeling of risk may be of use, not just sports; a public speaking group may be an example.

The variables examined in the study seem to provide an insight into the "type" of driver who is likely to speed excessively. We have specific criteria that have been shown
to be associated with speeding: age, gender, and level of SS. This provides a focus for interventions and may increase the possibility of change the young adult’s mind set when it comes to speeding.

This maybe a difficult task; given that societal attitudes towards speeding are ambivalent, at best. In British Columbia, only 18% believe that any speed over the limit is speeding (Vavrik, 1996). According to the same survey, 40% of British Columbians don’t feel that the posted limits are relevant and the same percentage believe citations are a “cash grab” by the government. Ironically, 92% of people surveyed believe that police enforcement is a “good way to prevent speed related crashes” (Vavrik, 1996, pg. 2).

When we can reach the level of public awareness and reproach that accompanies drinking and driving, the task will be made easier.
REFERENCES


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APPENDIX ONE

Background Information

Please answer the following questions, all your responses will be confidential:

1. Age:_____
2. Male □ Female □
3. What is the highest level of education completed?____________________
4. Is English your primary language? Yes □ No □
5. What is your current marital status: Single □ Married □ Separated □ Divorced □
6. Do you have a valid Canadian drivers' license? Yes □ No □
7. In what country did you learn to drive?____________________
8. How long have you been driving? _______ years.
9. What is your ethnic background? ____________________________
10. On average, how many Kilometers do you drive in a given year? _________
11. As a driver, how many times have you been ticketed for speeding in the past year ______?
11. How many months of the year do you drive ______?
12. Do you use your car mainly for driving to:

Check all that apply

A) School □
B) As part of work □
C) To and from work □
D) Pleasure □

14. Do you drive as part of your job? Yes □ No □
15. Do you usually drive with children in the car? Yes □ No □
16. Do you drive a:

(A) Car □ (B) Truck □ (C) Sport utility □ (D) Van □
As part of this study we need to know your driving patterns. To give us an idea of your driving behavior you need to be as accurate as possible. All information is confidential. Please answer the question below to the best of your ability.

"If you are driving on a clear day without much traffic, with the likelihood of speed traps being minimal, what speed would you typically be driving in the following speed zones":

Record your answer as a single typical or average speed in each zone. Do not record your answer as a range of speeds.

In a 30 Km/h zone, I usually drive ______ km/h
In a 50 Km/h zone, I usually drive ______ km/h
In a 80 Km/h zone, I usually drive ______ km/h
In a 100 Km/h zone, I usually drive ______ km/h

What percentage of your driving is done in each zone?

In a 30 Km/h zone, I usually drive ______% of the time
In a 50 Km/h zone, I usually drive ______% of the time
In a 80 Km/h zone, I usually drive ______% of the time
In a 100 Km/h zone, I usually drive ______% of the time

100%
APPENDIX TWO

Driving Questionnaire

Please complete the questions below. All responses are confidential.

Compared to the average driver how likely is it that you would be involved in the following situations:

Circle a number between 1 (Not at all likely) and 7 (Very Likely).

(1) Not at all likely, (4) Just as Likely, (7) Very Likely

*1. Scraping the side of your car while driving up to a restaurant drive through window.

1 2 3 4 5 6 7
( Not at all likely ) ( Just as likely ) ( Very Likely )

*2. Being involved in a serious accident caused by an inexperienced driver.

1 2 3 4 5 6 7
( Not at all likely ) ( Just as likely ) ( Very Likely )

*3. Being killed in an accident because you failed to yield the right-of-way.

1 2 3 4 5 6 7
( Not at all likely ) ( Just as likely ) ( Very Likely )

*4. Being bumped from behind while waiting at a stop sign.

1 2 3 4 5 6 7
( Not at all likely ) ( Just as likely ) ( Very Likely )

*5. Being killed by another motorist who was driving under a suspended license.

1 2 3 4 5 6 7
( Not at all likely ) ( Just as likely ) ( Very Likely )
APPENDIX TWO (Cont.)

6. Having a flat tire/blow out while driving at a high rate of speed.
   1 2 3 4 5 6 7
   (Not at all likely) (Just as likely) (Very Likely)

*7. Backing into another vehicle while pulling out of a parking space.
   1 2 3 4 5 6 7
   (Not at all likely) (Just as likely) (Very Likely)

*8. Having your vehicle struck by a speeding hit and run driver.
   1 2 3 4 5 6 7
   (Not at all likely) (Just as likely) (Very Likely)

*9. Causing a serious accident while driving under the influence of alcohol.
   1 2 3 4 5 6 7
   (Not at all likely) (Just as likely) (Very Likely)

10. Receiving a ticket for speeding.
    1 2 3 4 5 6 7
    (Not at all likely) (Just as likely) (Very Likely)

11. Spilling hot coffee/drink on your lap as you are driving and you rear end the car in front
    of you.
    1 2 3 4 5 6 7
    (Not at all likely) (Just as likely) (Very Likely)

12. Having your brakes fail as you approach a stop sign hitting the car in front of you.
    1 2 3 4 5 6 7
    (Not at all likely) (Just as likely) (Very Likely)

13. Driving over the concrete meridian because your steering failed/does not respond
    1 2 3 4 5 6 7
    (Not at all likely) (Just as likely) (Very Likely)
APPENDIX TWO (Cont.)

14. Skidding on slippery black ice when you try to brake for a curve in the highway.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)

*15. Being cutoff by another car and forced into oncoming traffic.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)

16. Injuring a child who runs out in front of your car.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)

*17. Causing an accident when you back out of a parking space without looking.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)

18. A driver talking on a cell phone cuts you off and you skid into the side of the road.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)

*19. Losing control of your car in difficult, dangerous weather conditions.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)

20. Hitting a bike rider who stumbles and swerves in front of your car.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)

21. While changing radio stations you rear end the car in front of you.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)
APPENDIX TWO (Cont.)

22. Unintentionally stepping on the accelerator instead of the brake causing you to crash your car.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)

23. Coming around a highway curve you see two cars crashed in front of you and you can’t stop in time to avoid hitting them.

1 2 3 4 5 6 7
(Not at all likely) (Just as likely) (Very Likely)


* Accident Analysis & Prevention, 21, 333-340.
APPENDIX THREE

Activities and Preferences Questionnaires*

Interest and preference questions

Directions: Each of the items below contains two choices A and B. Please circle the letter that indicates 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 feelings. Please choose the one, which 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. Do not leave any items blank. 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. Be frank and give your honest appraisal of yourself.

1. A. I like “wild” uninhibited parties.
   B. I prefer quiet parties with good conversation.

2. A. There are some movies I enjoy seeing a second or even third time.
   B. I can’t stand watching a movie that I’ve seen before.

3. A. I often wish I could be a mountain climber.
   B. I can’t understand people who risk their necks climbing mountains.

4. A. I dislike all body odors.
   B. I like some of the earthy body smells.

5. A. I get bored seeing the same old faces.
   B. I like the comfortable familiarity of everyday friends.

6. A. I like to explore a strange city or section of town by myself, even if it means getting lost.
   B. I prefer a guide when I am in a place I don’t know well.

7. A. I dislike people who do or say things just to shock or upset others.
   B. When you can predict almost everything a person will do and say he or she must be a bore.

8. A. I usually don’t enjoy a movie or play where I can predict what will happen in advance.
   B. I don’t mind watching a movie or play where I can predict what will happen in advance.
APPENDIX THREE (Cont.)

9. A. I have tried marijuana or would like to  
   B. I would never smoke marijuana.

10. A. I would not like to try any drug which might produce strange and dangerous effects on me.  
      B. I would like to try some of the drugs that produce hallucinations.

11. A. A sensible person avoids activities that are dangerous  
      B. I sometimes like to do things that are a little frightening.

12. A. I dislike “swingers” (people who are uninhibited and free about sex).  
      B. I enjoy the company of real “swingers”.

13. A. I find that stimulants make me uncomfortable.  
      B. I often like to get high (drinking liquor or smoking marijuana).

14. 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.

15. A. I enjoy looking at home movies, videos, or travel slides.  
      B. Looking at someone’s home movies, videos, or travel slides bores me tremendously.

16. A. I would like to take up the sport of water skiing.  
      B. I would not like to take up water skiing.

17. A. I would like to try surfboard riding.  
      B. I would not like to try surfboard riding.

18. A. I would like to take off on a trip with no preplanned or definite route, or timetable.  
      B. When I go on a trip I like to plan my route and timetable fairly carefully.

19. A. I prefer the “down to earth” kinds of people as friends.  
      B. I would like to make friends in some of the “far-out” groups like artists or “ punks.”

20. A. I would not like to learn to fly an airplane.  
      B. I would like to learn to fly an airplane.
APPENDIX THREE (Cont.)

21. A. I prefer the surface of the water to the depths.  
    B. I would like to go scuba diving.

22. A. I would like to meet some persons who are homosexual (men or women).  
    B. I stay away from anyone I suspect of being “gay” or “lesbian”.

23. A. I would like to try parachute jumping.  
    B. I would never want to try jumping out of a plane, with or without a parachute.

24. A. I prefer friends who are excitingly unpredictable.  
    B. I prefer friends who are reliable and predictable.

25. A. I am not interested in experience for its own sake.  
    B. I like to have new and exciting experiences and sensations even if they are a little frightening, unconventional, or illegal.

26. A. The essence of good art is in its clarity, symmetry of form, and harmony of colors.  
    B. I often find beauty in the “clashing” coloring and irregular forms of modern paintings.

27. A. I enjoy spending time in the familiar surroundings of home.  
    B. I get very restless if I have to stay around home for any length of time.

28. A. I like to dive off the high board.  
    B. I don’t like the feeling I get standing on the high board (or I don’t go near it at all).

29. A. I like to date persons who are physically exciting.  
    B. I like to date persons who share my values.

30. A. Heavy drinking usually ruins a party because some people get loud and boisterous.  
    B. Keeping the drinks full is the key to a good party.

31. A. The worst social sin is to be rude.  
    B. The worst social sin is to be a bore.
APPENDIX THREE (Cont.)

32. A. A person should have considerable sexual experience before marriage.
   B. It's better if two married persons begin their sexual experience with each other.

33. A. Even if I had the money, I would not care to associate with filthy rich persons in the “jet set.”
   B. I could conceive of myself seeking pleasure around the world with the “jet set.”

34. A. I like people who are sharp and witty even if they do sometimes insult others.
   B. I dislike people who have their fun at the expense of hurting the feelings of others.

35. A. There is altogether too much portrayal of sex in movies.
   B. I enjoy watching many of the “sexy” scenes in movies.

36. A. I feel best after taking a couple of drinks.
   B. Something is wrong with people who need liquor to feel good.

37. A. People should dress according to some standard or taste, neatness, and style.
   B. People should dress in individual ways even if the effects are sometimes strange.

38. A. Sailing long distances in small sailing crafts is foolhardy.
   B. I would like to sail a long distance in a small but seaworthy sailing craft.

39. A. I have no patience with dull or boring persons.
   B. I find something interesting in almost every person I talk to.

40. A. Skiing 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.
