RISKY DRIVING BEHAVIOUR AS ANTICIPATED BY DRIVER ANGER AND ATTITUDES

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Abstract

Traffic accidents have been identified as one of the three main causes of death and disability, worldwide. Approximately 1.25 million individuals die each annually, and 20 to 50 million people are injured as a result of road traffic accidents. Research exploring factors most associated with traffic accidents has found that human (individual) factors such as risky driving, road rage and driver anger are most robustly associated with road traffic accidents. While the link between risky driving behaviour and car accidents is well documented, the underlying predictors of risky driving behaviour are less well-understood, particularly in the South African context. The present study sought to explore whether attitudes towards traffic safety and driver anger are predictors of risky driving behaviour in a sample of licenced drivers in and around various provinces of South Africa. A secondary aim was to determine whether driver anger and driving attitudes serve as predictors of risky driving behaviour in this sample. Moreover, the research included the exploration of insurance-related rewards and penalties for driving behaviours. Finally, this research sought to explore whether risky driving behaviour, age, driver anger and attitudes towards traffic safety are associated with likelihood to report a car accident over the preceding five-year period. The study planned to address these aims using a quantitative non-experimental, cross-sectional research design.

A sample of adult South African drivers aged (N= 171) completed a series of online questionnaires assessing driver anger (the DAS), risky driving behaviour (the DBQ), attitudes towards traffic safety (the ATTS) and other demographic variables. These participants were recruited using social media platforms, such as WhatsApp and Facebook as well as students from the University of the Witwatersrand

Various analyses were performed. A stepwise multiple regression analysis found that the strongest predictors of risky driving behaviour were driver anger, and permissive attitudes towards traffic violations, drunk driving and speeding. Age was found to be associated with

risky driving. Age was also found to be associated with an increased likelihood to report a traffic accident, where the younger the driver was (18 to 29 years old) the more likely to report accident involvement, as opposed to older drivers (aged 29 to 63 years).

These findings suggest that driver attitudes and driver anger are very strongly associated with risky driving practices, in this sample, and should probably be addressed in behavioural interventions aimed at reducing risky driving behaviour. The findings also suggest that age is an important factor, which should probably be incorporated in intervention strategies. Limitations of this research and directions for future research are discussed.

Keywords: driving behaviour, risky driving behaviour, driving attitudes, driver anger, attitudes, anger, insurance, insurance rewards, insurance penalties.

Declaration

I, Kayleigh Green, declare that this research report is my own unaided work outside of the acknowledgements stated prior. No other person's work has been used without due acknowledgement in the main text of this report. It is submitted in partial fulfilment of the requirements for a Master's degree in Clinical Psychology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination at any other university.

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List of Abbreviations

AA	Automobile Association of South Africa
ANOVA	Analysis of Variance
MVA	Motor Vehicle Accident(s)
PBT	Problem Behaviour Theory
RMTC	Road Traffic Management Corporation
SA	South Africa(n)
SANRAL	South African National Roads Agency Ltd
SLT	Social Learning Theory
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
WHO	World Health Organisation
Wits	University of the Witwatersrand

1. CHAPTER ONE: Introduction and Rationale

1.1. Background & Rationale

Traffic psychology is a relatively young scientific discipline. While psychologists in Europe have worked in this area of research the longest (approximately 60 years), the field remains new in other parts of the world. Traffic psychology is the study of road users' behaviours, and the psychological processes that underlie these driving behaviours (Rothengatter, 1997). According to this definition, traffic psychology aims to identify and understand the causes of different driving behaviours. The purpose of this area of research is to encourage the development of interventions, encourage changes in driving behaviours and/or driving values, as a way of lessening motor vehicle accidents (MVAs) (Rothengatter, 1997; Uzumcuoglu et al., 2016).

Traffic accidents have become a significant concern globally, and have been identified as one of the three main causes of death and disability, worldwide (WHO, 2004). Approximately 1.25 million individuals die each year, and 20 to 50 million people are injured as a result of road traffic accidents (WHO, 2015). Each day, an estimated 3,700 people are killed due to road traffic crashes worldwide. Individuals today, are more likely to die from motor vehicle accidents (MVA) than from HIV/AIDS (Centers for Disease Control and Prevention, 2019). The World Health Organisation (WHO, 2015) global status report on road safety indicated that, more than 90% of road traffic deaths occur in developing countries. Amongst reported low to middle-income countries, Africa was identified as the region with the highest death rates due to road accidents. Typically, most of the focus on MVAs has been centred on transport systems, such as the physical environments, lighting and the road quality, as well as the vehicle engineering itself, such as safety belts. However, little progress

has been made to understand and ultimately intervene at the level of human factors associated with driving behaviours, and therefore influencing the occurrence of MVAs.

Human characteristics have been recognised as one of the biggest contributors to MVAs and are thought to increase MVA deaths by the year 2030 (WHO, 2015). MVAs have been referred to as an alarming global trend, a 'hidden epidemic' and have been predicted to become the fifth leading cause of death by 2030 due to increasing rates of road accidents occurring each year (WHO, 2015). It is therefore, crucial that research should investigate factors which may influence driving behaviour as it may shed light into ways of managing road carnage.

In South Africa, road fatalities continue to increase over time. In 2007, 14,920 traffic fatalities were recorded. In 2015, road fatalities showed a minor decrease to 12,944 fatalities. However, this record increased to 14,071 deaths in 2016; a significant 9% increase of road traffic accident fatalities (Road Traffic Management Corporation (RTMC), 2016). Despite the costly efforts of the longstanding Arrive Alive Road Safety campaign, statistics indicate that road traffic accident rates have not decreased and campaigns have not shown a significant impact; death and injury rates due to MVAs remain significantly high in South Africa (RTMC, 2016). Furthermore, South Africa recorded 1 714 deaths over the 2016/2017 festive season alone, as a result of road traffic accidents. This record of fatalities accounted for a 5% increase against the previous festive period of 2015 (Ngcobo, 2017). In the recent Road Traffic Management Corporation (RMTC, 2018) report, South Africa's road traffic accident fatalities have fallen over the 2017/2018 festive period to 1,433 fatalities. In spite of these fluctuations, the road accident fatality rates remain exceptionally high.

Several studies on traffic and transport have concluded that the human factor is responsible for up to 85 to 90% of road accidents globally (Iversen & Rundmo, 2002; Jonah,

1997; Sabey & Taylor, 1980). This is where the behaviour of drivers have outweighed the impact the environment and vehicle engineering may have in influencing MVAs. Instead, individual characteristics, such as driving behaviours, styles, attitudes, anger and personality, have been posited to influence driving and road safety (Stephens, Hill, & Sullman, 2016; Ulleberg & Rundmo, 2003). A more recent Road Traffic Management Corporation (RMTC, 2018) report has mentioned an increase in human factors being the cause of accidents from 86.5% in 2017 to 90.2% in 2018. Thus, the core of traffic psychology is to investigate the human behaviours of drivers and how it relates to the environment and the impact human characteristics may serve in driving and road safety. Likewise, in South Africa, individuals are guided by individual characteristics, where drivers behave in particular ways on the road in response to environmental factors (Esterhuyse, 2017).

Driver behaviour is the interaction between the driver (human factor) and the environment or roads and its contents (Özkan & Lajunen, 2011). However, investigating driver behaviour can be complex, as the human contribution to MVA is a multifaceted factor, which contributes the most variance in accidents (Herrero-Fernandez, 2016). Traffic psychology, therefore, predominantly focuses on individual characteristics of the driver, such as attitudes, values and personalities, which are collectively known as 'driving behaviour' (Herrero-Fernandez, 2016). Driving behaviour is the style of driving an individual driver adopts, which can be classified as risky driving or safe driving, aggressive or non-aggressive driving or low anger driving. These are posited to play a significant role in predicting MVAs (Dahlen, Martin, Ragan & Kuhlman, 2005; Dahlen & White, 2006). Anger, in particular, is a powerful emotion associated with negative feelings that are often directed to the cause of the anger (Zhang & Chan, 2016). These negative feelings are often directed towards others in the form of risky driving in retaliation. Anger is most likely to cause MVAs due to the uncontrollable and illogical position it places the driver in (Bogdan, Mairean & Havarneanu,

2016; Herrero-Fernandez, 2016). Anger influences driver attitudes towards upholding or rejection of road safety practices. Attitudes are also implicated in driving behaviours with aggressive attitudes being particularly implicated in risky driving behaviours and MVA involvement (Rothengatter, 2000; Stradling, 2000). It is therefore important to explore the role of human factors such as the drivers' attitudes towards road safety, favourable or unfavourable, and driving behaviour in order to understand their impacts on road safety (Ulleberg & Rundmo, 2003).

1.2. Research Aims of the Study

Based on understanding the process of driver behaviour, both affectively and cognitively produced, the present study seeks to explore individual predictors of risky driver behaviour in a sample of drivers living in and around various provinces of South Africa. Specifically, this study will aim to explore whether driver anger and driving attitudes serve as predictors of risky driving behaviour in this sample. Additional variables will also be explored in relation to risky driving practices and these include age, gender, length of driving experience, prior experience of MVAs, and whether or not rewards-based insurance products impact on driving behaviour.

1.3. Relevance of the Study

The present research seeks to contribute to the existing yet limit knowledge on traffic psychology in South Africa, and more so in the Gauteng region. In addition, the findings may prove informative for road safety interventions about human factors influencing driving behaviours and possibly MVA involvement in a South African sample. This study may hopefully bridge the existing gap in traffic psychology research in the South African context. It is hoped that this study will expand on knowledge and understanding of the role of human factors in road driving behaviours of drivers on roads. Furthermore, to gain an understanding

of the patterns of different driver's behaviours, both young and old, male or female and the road safety. This information in turn, may be used to inform road safety campaigns and possibly reduce MVA fatalities on local roads.

1.4. Outline of Chapters

The following chapters of this research paper include:

Chapter one: Introduction and Rationale: This chapter provides a brief introduction of the study, outlines the importance and significance of this research topic and its constructs. The chapter also briefly contextualises constructs under investigation in this research. The chapter concludes with the aims of the study.

Chapter two: Literature Review: The following chapter explains and defines key constructs relevant to the study, namely driving behaviour, driver anger and driver attitudes, and its various components thereof. Their link to MVA involvement is further discussed. Moreover, demographic constructs and their associations with driving behaviours are highlighted in the review of literature. This chapter then provides a theoretical framework to explain driving behaviour in South Africa. This outlined framework will highlight the importance of attitudes and emotions in planned action and decision-making implicated in driving behaviours.

Chapter three: Methodology: This chapter identifies the use of a quantitative research design to answer the proposed research questions. Moreover, information concerning the research design, the sampling method used, data collection process, analysis of data and ethical considerations are discussed in detail.

Chapter four: Results: Here, the results of the study will be presented in accordance to the proposed research questions, pertaining to the drivers' anger and attitudes towards risky driving behaviours. Reliability statistics were run for all measures utilised in this study, to ensure the assumptions of parametric testing were upheld. Descriptive statistics are presented first. Followed by the results of the questions, regarding the relationship between driver behaviours, driver attitudes and driver anger and key demographic variables, using correlations, ANOVA, along with hierarchical multiple regressions were then used to address research questions.

Chapter five: Discussion: This chapter provides a summary of the main findings of the study, in relation to the suggested general aims. The main aim of this research was to explore predictors of risky driving behaviour in a sample of licenced drivers in South Africa, more so in Gauteng. A secondary aim was to determine whether driver anger and driving attitudes serve as predictors of risky driving behaviour in this sample. As well as, if additional variables, such as; age, gender, length of driving experience, prior experience of MVAs, and whether or not participants use rewards-based insurance products, are related to risky driving behaviour. This chapter also discusses the findings of the results section and examine the interpretations made thereof. The interpretation of results is succinctly presented, according to the proposed research questions. The research questions which guided the research. Namely;

1) Does demographic factors (age, gender, driving experience, prior involvement in MVA and insurer policies) predict risky driving behaviour?

2) Does demographical factors (age, gender, driving experience, prior involvement in MVA and insurer policies) predict negative driver attitudes?

3) Does demographical factors (age, gender, driving experience, prior involvement in MVA and insurer policies) predict driver anger?

4) Is risky driving behaviour, attitudes or driver anger a predictor of MVA(s) involvement?

5) What is the variance in risky driving behaviour, namely; errors, ordinary violations, aggressive violations and lapses that is attributable to driving attitudes, namely; violations, speeding, other drivers' risk taking, drinking, and driving, as well as driver anger?

Chapter six: Conclusion, Limitations and Recommendations for Future Studies: The final chapter highlights the limitations of this research, its weaknesses and shortcomings is discussed. This chapter will be concluded with a discussion of the implications of the research and recommendations for future research, which includes suggesting how this research could inform future research on South African driving behaviour and the human factors implicated.

2. CHAPTER TWO: Literature Review

2.1. Introduction

MVAs are a global leading cause of injury, death and disability, accounting for 23 percent of the world's fatality rate, alongside homicide and suicide, which account for 11 percent and 15 percent respectively (WHO, 2004). The number of road accident deaths continues to climb globally, now reaching a high of 1.35 million in 2016 (RMTC, 2018). Furthermore, the rate of road traffic accidents is predicted to increase significantly by 2030, especially in developing countries such as African countries (WHO, 2004). Specific to South Africa, statistical reports identified Gauteng and KwaZulu-Natal provinces as having the highest percentage of road fatalities in the country. In Gauteng alone, 2,700 people died due to of road traffic crashes and 2,715 in KwaZulu-Natal during 2016 alone (RTMC, 2016). Current reports continue to indicate that the highest road traffic deaths exist in Africa, where an approximation of 26.6 people per 100 000 die due to traffic accidents. This rate is exceptionally higher than the worldwide statistic of 18.3 per 100 000 people (RMTC, 2018). Research has begun to focus on understanding factors associated with road traffic accidents.

2.2. MVA's: Causal Factors

Road traffic accidents generally occur due to one or possibly the combination of three factors, namely environmental, vehicle and human factors (Jafarpour & Rahimi-Movaghar, 2014). Environmental factors include aspects such as the quality of roads and infrastructure, regulation structures and bodies, hazards (natural and man-made), road design, lighting and visibility, and weather conditions. Vehicle factors include factors such as security and safety maintenance of motor vehicles, the vehicle braking system, vehicle loading and design and its engineering specifications. These environmental and vehicle influencers only account for approximately 16.5 and 6 percent of road accidents respectively in South Africa (RTMC,

2016; Iversen & Rundmo, 2002; Jonah, 1997; Sabey & Taylor, 1980). The South African Road Traffic Act requires owners regularly check their vehicles to ensure roadworthiness and optimise safe driving on public roads. However, there is no way of regulating and ensuring that owners follow up and maintain necessary vehicle maintenance after purchase. Therefore motor vehicle accidents can occur as a result of older or outdated safety features in the vehicle, having implications for roadworthiness (Automobile Association of South Africa (AA, 2017; Ivers et al., 2009; Venter, 2014).

In reference to individual factors, which are human factors that assist in describing the behavioural actions of individuals. These elements often include both inter and intrapersonal characteristics. Some of which comprise of personality traits associated with impulsivity, deviance and self-control. Most often, the following factors in literature have shown possible influence on the driving behaviour of individuals and subsequently, on the occurrence of accidents. These factors include risky attitudes, state and trait anger, personality traits, cognitive processing, attention negligence, impaired health functioning, and limited driving experience (Herrero-Fernandez, 2016; Nayum, 2008; Özkan & Lajunen, 2011; Ulleberg & Rundmo, 2003; Ulleberg & Rundmo, 2002; Zhang & Chan, 2016). These individual factors, coupled with demographic factors such as gender and age, contribute to the driving behaviours of individuals and account for the majority of road accidents and fatalities in South Africa. Statistics state that individual factors should not be viewed in isolation. However, they accounted for 77.5% of road traffic crashes in 2016 and rose to 90.2% responsible for crashes in 2018, with vehicle and environmental factors contributing to the remaining balance respectively (RTMC, 2016, 2018).

2.3. Role of Individual Factors

From the literature, several studies, primarily conducted in Western countries, have found that individual driver factors, such as age, gender, attitudes and personality, anger and aggression, and affect or emotions, perceptions and cognitive processing, are all generally implicated in MVAs and risky driving behaviours.

In reference to gender and age factors, which have been found that risk-taking behaviours including risky driving are commonly associated with young drivers. More specifically young males as opposed to females, and are more likely to engage in negative attitudes towards road safety rules, such as drinking and driving (Bina, Grazziano, Bonino, 2006; Rundmo & Iversen, 2004; Vassallo et al., 2007; Vassallo et al., 2010).

As indicated in Iversen (2004) research, which investigated attitudes towards traffic safety and the preference to contribute to safe driving or risky driving was examined. In addition, found that the more negative attitudes drivers had towards safety rules, the more risky their driving behaviour and the more likely to have been involved in MVAs. More often, negative attitudes towards safe driving practices have been associated with younger drivers (Ulleburg & Rundmo, 2002, Ulleberg & Rundmo, 2003). In addition to this, further research has suggested that the relationship between risky driving behaviour and personality traits (which included normlessness, impulsivity, sensation-seeking, and aggression-hostility traits) mediated or were influenced by attitudes towards traffic safety, and in this attitudes as a construct was found to be a good predictor of risky driving behaviour, alongside age and gender (Nayum, 2008). Research has found that aggressive drivers, or drivers who found difficulty in managing or controlling their hostility towards other road users, tend to be involved in more traffic accidents (Lancaster & Ward, 2002). Stephens et al. (2015), further postulated that trait anger and the perceptions of aggravating situations on the road, a product

of intrapersonal origin, as opposed to state anger alone was found to better predict risky driving.

Other significant individual factors include cognitive processing and poor judgement and perceptions (Özkan & Lajunen, 2011; Turner & McClure, 2003). As well as, level of education, experience of previous motor vehicle accidents, and driving experience (Lancaster & Ward, 2002), as well as affect or emotional distress (Lawton, Conner & Parker, 2007; Loewenstein, Weber, Hsee, & Welch, 2001) are also found to be implicated in MVAs and risky driving behaviours.

More recent traffic psychology research from non-Western countries, predominantly in Asia and Africa, have further identified stress, risk perception, driving anger and personality (Esterhuyse, 2017; Ge, Qu, Jiang, Du, Sun & Zhang, 2014; Teye-Kwadjo, 2019) as individual factors that influence risky driving and MVAs. It is for this reason and for the purpose of this study, individual factors such as gender, age, driving experience, prior involvement in MVAs, driver attitudes and driving anger will be investigated alongside risky driving behaviour in this study.

According to a recent narrative review of determinants of risky driving behaviour, of the three predominant areas of influence in road traffic accidents, individual factors, remain the most significant determinant of accidents and crashes (Jafarpour & Rahimi-Movaghar, 2014). It has however been long postulated amongst traffic psychology research that, human factors are responsible for 85 to 95 percent of road accidents globally (Iversen & Rundmo, 2002; Jonah, 1997; Sabey & Taylor, 1980). In South Africa reports, human factors such as; jay-walking, speeding, overtaking inappropriately, intoxicated drivers, not following safe distances advised between vehicles, driver fatigue, disregard for traffic lights, yield or stop signs, cell phone usage whist and illegal driving behaviours such as ill-advised making of U-

turns (RMTC, 2018). These are targeted in the attitudes of drivers have towards road safety and obeying road rules.

As identified earlier, environmental and vehicle factors show the least influence in causing MVAs from occurring. The possible reasons for the significantly lower influence of environmental and vehicle factors in traffic accidents, as compared to individual factors, may be due to the various regulation laws and bodies operating in countries worldwide. In South Africa, it is warranted by law that every vehicle must pass a roadworthy test and vehicles are required to reassess for roadworthiness after a number of years (AA, 2017). Furthermore, drivers are issued with a certificate to ensure that, as much as possible, vehicles permitted on South African roads are safely engineered and well maintained and mechanically sound. The South African National Roads Agency Limited (SANRAL, 2016) assists with the maintenance of roads and infrastructure, ensuring optimal environmental driving conditions with accessible helplines to assist with identifying and repairing threats to road safety such as potholes. These aspects explain the low influence of environmental and vehicle factors, however these regulatory bodies do not explain the influence of individual (human) factors involved in MVAs.

Given that the majority of MVAs have been found to be associated with individual or human factors, it is imperative to understand what these factors are and how they link to driver behaviour. A report on traffic fatalities in Central, Eastern, Northern, Western and Southern Africa identified human factors as most concerning and contributing to the occurrence of traffic accidents (Moyer, Eshbaugh, Torkelson & Maly, 2012). Amongst these individual factors, it was indicated that driver attitudes, including other human factors; age, gender, driving experience, and prior involvement in MVAs.

However, attitudes have been reported as the most concerning in relation to the likelihood of an accident occurring amongst African drivers (Moyer et al., 2012; Luke & Heyns, 2014). Furthermore, it was indicated that the key reasons for road accident fatalities in the African continent mostly lie amongst individual factors such as; not being trained and licensed drivers, possible impairments to the concentration skills of drivers, and the attitudes and behaviours of drivers (Luke & Heyns, 2014).

These individual factors alongside previously identified environmental, and vehicle factors implicate car accidents. However, since the earliest postulation of human factors, little is known about which human or individual factor of factors specifically, play a contributing role in the occurrence of MVAs and how much driver attitudes contribute to road traffic accidents amongst drivers specifically in the South African context, and more so, in Gauteng Johannesburg. The RTMC (2016) report indicated that the attitudes of drivers have continually worsened over time, and thus should be investigated.

2.4. Driving Behaviour

In an effort to understand individual factors contributing to the high MVA rates within the South African context, this study explored the concept of driving behaviour, specifically risky driving behaviour. The term “driving behaviour” generally refers to the acts that involve the driver and their driving environment (Özkan & Lajunen, 2011). Driver behaviour refers to a chosen style of driving which often involves acts such as speed, attention, performance or information processing abilities and the distance or spacing left between one vehicle and another (Özkan & Lajunen, 2011). The driver or road user initiates a particular style and/or habits of driving based primarily on individual or personal factors, the vehicle they drive, as well as the environment in which they travel (Esterhuyse, 2017;

Herrero-Fernandez, 2016). Of the three factors influencing driving behaviour (individual, vehicle and environment) individual factors have been identified as the most complex and significant factor in explaining the occurrence of traffic accidents (Herrero-Fernandez, 2016). Driver behaviour cannot, thus, be explained by any single theory, construct or factor. Driver behaviour is influenced by personal dispositions, individual characteristics and the specifics of the environment and vehicle driven by the individual. It is therefore important to explore risky driving behaviour and driving anger, as they are the main predictors of road traffic accidents (Chliaoutakis et al., 2002; Dahlen et al., 2005; Dahlen & White, 2006; Lancaster & Ward, 2002; Stephens & Sullman, 2015).

Reason, Manstead, Baxter, Stradling and Campbell (1990) characterised the construct of driving behaviour into three main categories; errors, lapses, and violations. Errors and lapses are synonymous with mistakes and are products of inattentiveness (Reason et al., 1990). Whereas, violations are the result of driving behaviours and practices that deliberately deviate from safe driving and strongly influence the occurrence of risky driving behaviours instead (Parker, Lajunen & Stradling, 1998). For the purposes of this study, risky driving behaviour will operationalised to include error, lapses and violations, the inattentiveness of drivers, as well as deliberate violations made whilst driving, such as, cell phone use and/or texting whilst driving, driving drunk, recklessly speeding, aggressive interactions with other vehicles and drivers, ignoring road rules and assuming self-interest whilst driving.

2.5. Understanding Driving Behaviour from a Theoretical Perspective

Various theorists have attempted to understand and explain driving behaviour as it is a complex construct and understandings should be integrated from different developed theories. The following section will particularly explore the Theory of Planned Behaviour, the Problem Behaviour Theory, and Social Learning Theory.

2.5.1. *Theory of Planned Behaviour*

The *Theory of Planned Behaviour* (TPB) is a theory which links the beliefs and behaviours of individuals (Azjen, 1991). It also explains the differences in driving behaviour as a result of the differences of individual personality traits, such as sensation seeking, attitudes, subjective norms, and self-control, which together shape an individual's behavioural intentions and actual driving practices. Often, the choices one makes depends on one's cognitions and attitudes towards the action (such as driving) and the subjective norms that exist (such as what society at large thinks about the action, such as speeding) (Taris, 1997). For example, it is commonly believed that speeding is often motivated by the excitement associated with breaking the law, by driving faster than the legally suggested speed limits (Fleiter, Lennon & Watson, 2010). In terms of personality-driven behaviours, high sensation seekers need the stimulation of novel and complex sensations and in turn, take more risks to gain such sensational experiences (Zuckerman, 1979). Combining behaviours initiated due to attitudes and personality, Yagil (2001), found that sensation-seeking may endorse riskier attitudes towards the violation of road traffic rules, specifically speeding. In turn, sensation-seekers tend to adopt risky driving behaviours. However, it is important to note that the same study concluded that attitudes were a better determinant in the commission of a traffic violations rather than the subjective social norms named 'sensation-seekers' (Yagil, 2001).

2.5.2. *Driving Behaviour from the Problem Behaviour Theory*

The *Problem Behaviour Theory* (PBT), understands problematic behaviours through a social cognitive lens. Risky behaviour, more specifically risky *driving* behaviour, is seen as anything which interferes with the successful psychosocial development and are problematic acts that elicit formal and/or informal consequences (for example, suspending an individual's license when apprehended for driving under the influence of a substance), which are designed

or intended to control the problem behaviour (Jessor & Jessor, 1977). Mann (2010, p.6) defines problematic behaviour as, "behaviour that is socially defined as a problem, as a source of concern, or as undesirable by the social and/or legal norms of conventional society and its institutions of authority; it is behaviour that usually elicits some form of social control response". In hopes of protecting society and the livelihood of individuals, rules and regulations are required to fit the society and its needs to guide behaviours. When individuals do not follow nor conform to these suggested guidelines, their behaviour is then seen as problematic (Mann, 2010). This is often the case with novice or younger drivers, who tend to have an unclear understanding of driving regulations, which implicate risky driving behaviours or problematic behaviour. This being said, the PBT indicates the factors which contribute to MVA(s), such as problematic beliefs, behaviours, poor attitudes towards driving safety, and societal norms which oppose legal rules as an explanation of MVA involvement.

2.5.3. *Social Learning Theory and Driving Behaviours*

The *Social Learning Theory* (SLT) suggests that learning and social behaviours are acquired by observing, imitating and modelling the behaviours observed by others (Akers, Krohn, Lanza-Kaduze & Radosevich, 1979). Moreover, that the process of learning occurs in the observation of both rewards and punishments, better known as reinforcement (Bandura, 1963). With this understanding, the fact that when young or novice drivers learn to drive a vehicle, they are exposed to positive and negative influences of peers, significant others, parents and older siblings. The persistence of deviant behaviour or risky driving behaviours, is based on the past experiences of reward or punishments received and/or observed. It is for this reason that rules and regulations work to punish risky driving violations of road rules. Similarly, innovative programmes like rewards programs offered by insurance companies aim to reward good driving practices in order to maintain standard and preferred driving behaviours. People learn through social interaction with significant others in their lives.

These significant groups of people define acceptable social norms, attitudes and values. The more the significant individual(s) defines the behaviour as 'good' or acceptable the more the individual will adopt and model the behaviour communicated either verbally, cognitively or actively witnessed. If deviant behaviour, such as risky driving is not addressed or punished, the behaviour is reinforced and maintained. Scott-Parker, Watson and King (2009, p. 472) explored the relationship between Social Learning Theory, Social Identity Theory and psychosocial factors including age, gender and exposure. They indicated that "Social Identity Theory asserts that in order to maintain positive self-esteem and social identity as a member of a certain group, an individual makes inter- and intra-group comparisons across important salient dimensions of attitudes, behaviours, and other characteristics that favour the individual belonging to that group". This influences young drivers to modify their driving behaviour, such as embracing violations like speeding, or driving and driving, in order to fit in and to develop their social identity and sense of belonging (Scott-Parker et al., 2009; Venter, 2014).

2.6. Driving Anger and Risky Driving Practices

Driving anger has been found to be associated with driving performance because anger is a powerful emotion which negatively impacts information processing, perception, attention skills, and essential cognitive functions involved in driving behaviour. A breakdown in these cognitive functions is often implicated in motor vehicle accidents (Herrero-Fernandez, 2016; Zhang & Chan, 2016). Researchers have suggested that each individual has a different level of propensity to become angry whilst driving; this propensity contributes to the concept of driver anger (Deffenbacher et al., 2000; Deffenbacher, Oetting & Lynch, 1994). Furthermore, that "people differ in the tendency to become angry when encountering frustration and provocation on the road (i.e. trait driving anger), predicting that trait driving anger leads to increased state anger responses" (Deffenbacher, Lynch, Oetting, & Yingling,

2001; Deffenbacher et al., 1996; Spielberger, 1988; Spielberger, Reheiser, & Sydeman, 1995). Trait anger is conceptualized as an intrapersonal personality characteristic of an individual that consistently presents itself in response to the slightest provocation, whereas state anger is operationalized as a more temporary and short-lasting anger state (Spielberger, 1988). Individuals with high trait anger are more likely to be involved in risky driving behaviours which are associated with unsafe driving, cognitive perception inaccuracy and may increase risk of MVAs (Deffenbacher et. al, 2001). Driving anger characterises driving behaviours which deviate from expected safety norms and often consist of rule violations and other risky driving behaviours or practices.

In their research exploring risky driving practices, Parker et al. (1998) described violations as either being ordinary or aggressive violations. Both ordinary and aggressive violations are deliberate acts of risky driving behaviours. Ordinary violations include acts such as speeding or overtaking on the wrong side of the road. Whilst aggressive violations include overtly aggressive acts such as racing, showing aggression towards other drivers on the road or forcing one's way into a lane of cars following at a safe distance (Parker et al., 1998). Drivers with high levels of anger often commit more traffic violations as compared to low-anger drivers, and are more likely to cause and be involved in motor vehicle accidents (Bogdan et al., 2016; Herrero-Fernandez, 2016). In a South African study, Bachoo, Bhagwanjee and Govender (2013) found that drivers with high levels of driver anger were more likely to report risky driving behaviours. This was often found amongst males and young drivers (Bachoo, et al. 2013). Moreover, research suggests that young male drivers may be more likely to commit violations, especially when they also have poor or negative attitudes and beliefs towards safety rules of driving (Nayum, 2008). It is therefore important to explore the role of gender in predicting risky driving behaviour, especially where attitudes, and driver anger are concerned.

2.7. Driver Attitudes and Risky Driving Practices

Attitudes hold implications for driving behaviours. Studies have identified that drivers with aggressive attitudes as well as attitudes in favour of high-risk traffic violations, such as speeding, displayed significantly higher number of car accident involvement (Rothengatter, 2000; Stradling, 2000). The term "attitude" may be defined as the psychological tendency of an individual to react positively or negatively, by cognitively evaluating a specific object, situation, persons or instructions as favourable or unfavourable. Positive and permissive attitudes towards traffic violations, such as speeding, may be associated with driving behaviours and ultimately, outcomes. Specifically, permissive attitudes towards traffic violates may lead to risky driving behaviour and ultimately, motor vehicle accidents (Iversen, 2004; Parker, Reason, Manstead & Stradling, 1995; Ulleberg & Rundmo, 2003).

A study investigating attitudes towards traffic safety as a predictor of risky behaviour amongst road users found a high correlation between attitudes and the driving behaviours of drivers involved in MVAs. Furthermore, drivers involved in traffic crashes were found to take more risks whilst driving (Iversen, 2004). Yilmaz and Celik (2006) investigated risky driving attitudes amongst Turkish drivers and identified that risky driving attitudes explained the tendency for drivers to take more risks whilst driving, violate more road rules and most often are involved in MVAs. A study comparing by Sinclair (2013) attitudes and driving behaviour amongst young South African drivers and young drivers from Sweden found South African drivers not only displayed higher levels of risky driving behaviours, they also had poorer standards of driving and social norms which influenced poor attitudes towards safe driving practices. South African drivers found road rules and legislature to be less necessary than Swedish drivers (Sinclair, 2013). It has been indicated that careless and inconsiderate driving behaviours are often influenced by poor driver attitudes and the anger drivers' exert

in relation to other drivers (Feather & Deverson, 2000). Attributions of anger and aggression are mediated by attitudes towards risky driving behaviour (Feather & Deverson, 2000).

The Theory of Reasoned Action (TRA) is a framework that can be used to explain attitudes of drivers in relation to the type of driving behaviour implemented. The Theory of Reasoned Action explains driver behaviour as a result of attitudes. The TRA is a model that appears to predict the intentions and behaviours of others. The model consists of a choice of behaviour, an intention of behaviour to comply with subjective norms, and/or the existence or nonexistence of motivations to comply with suggested norms. Each of which is dependent on the nature of an individual's attitude. Fishbein and Ajzen (1975) suggest that behavioural intent is caused by an individual's attitudes and subjective norms. Attitude is dependent on the strength of a belief. Furthermore, the expectation in a given society to uphold the belief and act in accordance to the expected 'safe' way. Lastly, the motivation to comply with the norm and act according to the rules suggested by a society.

A behavioural intention measure will predict the performance and behaviour of a voluntary act unless the intention of the act changes before the performance of behaviour is executed (Fishbein & Ajzen, 1975). Behavioural intentions are a function of both the attitudes and subjective norms towards that specific behaviour, i.e. driving behaviour. Certain individual and situational factors may affect behavioural intentions differently. In that, different factors may motivate for positive or negative belief or disbelief and attitude towards a norm (Azjen & Madden, 1986; Miller, 2005). The behaviour of an individual can therefore be understood by considering an individual's thought process and affects, towards attitudes and subjective norms. Driving behaviour may be predicted, to be risky or not, based on influencing factors, namely a person's attitude. This attitude is motivated to be positive or negative to safety norms or rules depending on individual or situational factors. These may include, for the purposes of this research, the attitudes and anger of individuals.

The framework may explain risky driving behaviour, in that if an individual had a positive attitude towards safe driving norms of behaviour, they would more likely attempt to follow safe driving norms and less likely to commit violations (deliberate acts of risky driving). If an individual holds negative attitudes towards safe driving practices or permissive attitudes towards unsafe practices (such as drunk driving), they would be more likely to endorse risky driving behaviour and less motivated to drive safely. Hence, they will be more likely to commit traffic violations (both ordinary and aggressive violations). The TRA identifies the importance of an individual's attitude towards driving practices, either they endorse safe driving behaviours or risky driving behaviours depending on their attitudes. Moreover, an individual's attitude motivates their levels of anger or cooperation of road rules is expressed whilst driving.

2.8. Age, Gender and Risky Driving revisited

MVA fatalities are often found to be extremely high amongst youth age groups, as compared to older age groups (Center for Disease Control and Prevention (CDC), 2019; National Highway Traffic Safety Administration (NHTSA), 1995). Norris, Matthews, and Riad (2000) found that the younger the driver was, the more likely to predict MVAs. This research suggested that young adults aged 19 to 39, may be twice more likely to have an accident than older adults aged 56 to 88. Middle-aged adults were found at two extremes, either more or less likely to be involved in MVAs. Lawton, Parker, Stradling and Manstead (1997) investigated the effects of age in driving behaviour and found that younger drivers reported committing more violations whilst driving than older drivers. Young drivers, operationalised as 19 to 25 year olds, were found to be more likely to commit traffic violations , namely, speeding, drinking and driving, overestimate their driving ability and underestimate risks involved and more likely to be involved in motor vehicle crashes (Lancaster & Ward, 2002). Furthermore, younger drivers with higher violations were

significantly more likely to be involved in MVAs than older drivers who committed less violations (Lawton et al., 1997). Although older drivers tend to suffer with certain visual impairments and show a greater frequency of drowsiness, they were found to be less likely to crash, as they were more experienced and less concerned with fitting in socially, choosing to drive slower or rectify visual impairments (Lancaster & Ward, 2002). However, younger drivers who commit more driving violations tended to be male as opposed to female, and are often involved in MVAs (Nayum, 2008).

Literature has found robust gender differences in in risky driving behaviour and MVA involvement. It has been found that men are twice more likely to commit an offence and violate road rules in any given year as opposed to women. (Waller, Elliot, Shope, Raghunathan, & Little, 2001). Moreover, males have a higher MVA fatality rate than females, at every age group. Amongst 16 to 24 year old age groups, males were twice more likely to have MVAs than their female counterparts (NHTSA, 1995; WHO, 2020). Males tend to commit more violations, in turn drive more riskily, than females and therefore are involved in more MVAs as a result.

Herrero-Fernandez (2016) found that individuals with higher driver anger were between the ages 20 and 42 years, whilst drivers with lower anger were the older drivers extended to 55 years old. Gender findings indicated that women were found with both high and low driver anger, as opposed to men, no significant age difference was reported. Herrero-Fernandez (2016) further investigated the frequency of driving and the number of MVAs involved amongst high and low angry drivers. Both low and high anger drivers drove an average of four days a week. However, the involvement in MVA differed, in that higher anger drivers were more often involved in MVA, up to six MVA, as compared to low anger drivers who were involved in up to four MVAs. Age and gender differences have been found in driving anger, risky driving practices and attitudes towards road safety, and may therefore

explain the involvement in MVAs in SA. It is therefore important to explore gender and age when investigating attitudes, driver anger and risky driving practices, as research suggest they may play a moderating role.

2.9. Risky Driving in the South African Context

While there is a grave paucity of systematic research exploring driving behaviour in the South African context, there have been several levels of efforts to reduce carnage on the roads. One popular campaign is the "Arrive Alive" campaign, which began over 15 years ago with the aim of educating drivers to be proactive about road safety. The campaign addresses issues such as vehicle safety, road maintenance and human factors associated with attitudes and risky driving (whether deliberate or unintended). Beyond government-led programmes, insurance companies have also attempted to play their role.

According to insurance companies, introducing rewards and penalties for driving behaviour impacts the quality of one's driving (Discovery, 2018; Momentum, 2019; Ronning, 2013). In this model, a driver is rewarded or penalised depending on the frequency or absence of risky driving behaviours. Discovery (2018) for example identifies harsh accelerations, cornering, braking and speeding as risky driving practices and the more this is done the more an individual is penalised. Points are allocated for safe driving and for engaging, for doing annual vehicle safety checks and for completing online programmes geared towards improving road safety awareness and visual acuity. The points often result in a cash back reward at the end of the month. Statistics have shown that drivers identified in Cape Town recorded 87% less harsh accelerations or aggressive driving behaviours, 92% less harsh cornering, 25% less harsh braking, by braking with more control and 25% less speeding than other drivers (Discovery, 2018). Insurance rewards include factors such as lowered car insurance premiums, fuel rewards, and discounts or vouchers on other products – such as car washes and coffees (Discovery, 2018; Momentum, 2019). Incentivising good driving is a

major motivator in reducing accidents and risky driving behaviours (Discovery, 2018). Insurers not only influence driving behaviour but predict the risk a driver or drivers pose on the road by introducing rewards and penalty tallies (Ronning, 2013). Driver reward initiative programmes have found that young people who have driven for a longer period before getting their licences drove safely and were better rewarded than other young drivers (Ronning, 2013).

2.10. Summary

In sum, it can be concluded that driving behaviour cannot be understood in isolation nor can it be explained by one theory alone. There are a plethora of variables that may impact the occurrence of risky driving behaviour and subsequent MVA involvement. The complexities and variability associated with human factors, such as anger, attitudes, demographics and the understanding of the role they play in driving behaviour , specifically risky driving behaviour have been discussed briefly and will be explored further in this study, as the aim of the study stipulates.

2.11. Research Questions

The present study, aims to investigate whether attitudes towards traffic safety, driver anger, age and gender are associated with risky driving practices in this South African sample. Due to the exploratory nature of this research topic, a set of research questions were used to guide this study, as the hypothesis-testing paradigm was not entirely appropriate for this new area of research. This is partly due to the fact that the main aim of the research was to establish the relationship and perhaps the predictive utility of specified variables in predicting risky behaviour. The aim was therefore not to test specified parameters of the research variables per say, but rather to test which variables are the strongest predictors of risky driving behaviour. As such, the follow research questions were tested in this research.

1) How much of the variance in Risky Driving Behaviour is uniquely attributed to each of the following; Age, Gender, Driver Anger and Attitudes towards Traffic Safety?
2) Are Age, Gender, Driver Anger, Driver Attitudes and Risky Driving Behaviour associated with the likelihood of being involved in a MVA(s) as a driver?
3) Are insurance rewards for good driving associated with involvement in MVAs, as a driver?

3. CHAPTER THREE: Methodology

3.1. Introduction

Traditionally, driver behaviour and associated factors are primarily investigated via the use of self-report studies, epidemiological studies, simulation studies, and controlled experiments. Most appropriate and feasible for this research study, self-report investigations were conducted. This includes the use of questionnaires in order to research specific areas of behaviours. These questionnaires include validated question batteries (Van Nes, Backer-Grøndahl & Eenink, 2010). Personal factors such as age, gender, emotions or attitudes in relation to aspects of driver behaviour and safety, as well as motor vehicle accident involvement were included.

The methods used in the study will be outlined in this chapter. The research study used a quantitative exploratory design to attempt to answer the following research questions and hypotheses follow below. Thereafter, information regarding the research design, sample and sampling method, data collection procedure and the instruments used in the study will be outlined. Followed by the data analysis approach used to answer the research hypotheses that follow below. Finally, the ethical considerations made will also be presented herein.

3.2. Research Design

The research design used in this study was a quantitative, non-experimental, cross-sectional research design, as the independent variable was not manipulated in this study, nor was there a control group nor random assignment of participants. The study has chosen a quantitative methodology, as this was considered to best fit the research questions indicated. A cross-sectional design was used as the study was only conducted at one point in time (Barker, Pistrang & Elliott, 2002). A cross-sectional research design allowed the researcher to

create a broad image of a specific phenomenon in a single sitting for each participant (du Plooy-Cilliers, Davis & Bezuidenhout, 2014; Gravetter & Forzano, 2009). The advantages of a cross-sectional design is that it is economical and easier to manage the data as it is collected at one point in time, reducing the possibility of testing and maturation effects. The advantages of a non-experimental design are that they are less expensive and time-consuming than other designs, making this design easier to replicate over various regions and areas, increasing its external validity. A non-experimental design is also more ethically sound than other designs (Barker et al., 2002). However, Creswell (2013) outlines limitations to the use of this method, as it has possible validity concerns, and threats to statistical validity. Self-report studies mostly include human errors and biases, as they often rely on the participants' own interpretation of their own behaviour. As a result, such studies are open to recall or memory bias, social influences, possible misunderstanding of questions and halo or social desirability effects (where respondents possibly want to appear morally correct and as good people) (Van Nes et al., 2010). However, the advantage remains, that the best way to examine a number of people in a short amount of time is through self-report and non-experimental design, as the indirect observation of the measures a researcher is interested in investigating is implemented to numerous amounts of participants at once (Backer-Grøndahl, Phillips, Sagberg, Touliou & Gatscha, 2009). As a result, efficiency remains a key advantage.

3.3. Sample and Sampling

The sample consisted of various licenced drivers above the age of 18 years old, distributed in and around various SA provinces. These participants were recruited using social media platforms, such as WhatsApp and Facebook. The sample also included a convenience sample of university student sample from the University of the Witwatersrand. A non-probability convenience sampling strategy was used to gain access to a diverse sample of participants (du Plooy-Cilliers et al., 2003) and their characteristics such as age, gender,

location, driving experience and MVA involvement. However, a significant number of participants who participated in the research were first year psychology students from Wits. The selection and aim of a varied sample group was included for several reasons including, the exploratory nature of the study, the diversity of drivers on various roads of SA, and the differing amounts of driving experience.

As stipulated by the South African government, the Department of Transport mentions that individuals applying for a motor vehicle licence must be 18 years or older to apply or test and be passed as a licenced driver in SA (South African Government, 2015). Furthermore, participants who had left the online questionnaire largely incomplete were excluded. As a result, 34 cases were removed from the analyses for this study. The final sample consisted of 204 subjects. The demographic information of the sample is presented in Table 4.1.

3.4. Measures

This study used three self-administered questionnaires as well as a demographic information questionnaire. All measures were administered online. The online questionnaire therefore consisted of four sections. The first section of the questionnaire, the demographic information (see Appendix A) section, asked participants to provide their demographic information as well as to ascertain information concerning driving experience and MVA involvement, including information about whether or not they had insurance policies that offer rewards or punish driving behaviour.

3.4.1. *Driver Behaviour Questionnaire (DBQ) (Appendix B)*

The DBQ was taken from Reason et al. (1990) and adapted for a South African sample by changing phrases that made references to driving on the right-side of the road, or used American terminology to local language (e.g “honk” was changed to “hoot”). This

questionnaire assesses driving behaviours and can be used to measure risky driving behaviour. The 27-item measure asks participants to indicate how often they have committed various risky driving behaviours using a five-point Likert scale, ranging from; 1 "*never*" to 5 "*nearly all the time*". The measure consists of four dimensions that assess driving behaviour. These include 1) Human Errors, 2) Ordinary Violations, deliberate risky actions or 3) Aggressive Violations and 4) Harmless Lapses (Harrison, 2009; Reason et al., 1990; Sullman et al., 2002; Zhang et al., 2011). The *Errors* dimension taps into respondents' driving mistakes that are typically seen as misjudgements and failures of observation, due to inattention and inexperience in driving. These errors, although these violate safe driving practices, are however non-deliberate behaviours from the driver. *Ordinary Violations* measures illegal driving behaviours, which go against safety regulations, such as speeding, which are deliberately committed, however without anger as an intent or expression. Whilst *Aggressive Violations* denotes the tendency to deliberately go against safe driving practices, violating rules of the road, however in an angry manner. Aggressive driving behaviour includes the intent to injure or harm other road users physically or psychologically. Aggressive violations may include persistent light flashing, hooting, yelling at another driver or showing obscene hand-gestures. Lastly, the *Lapses* dimension assesses absent-minded behaviours that have consequences primarily to the perpetrator or driver and do not pose a threat toward other drivers. This includes driving off in the wrong gear or cutting off at the robot. These subscale scores range from 12 to 60 and a total is provided as an overall risky driving behaviour score, where scores closer to 0 means none to minimal risky driving behaviours, and scores closer to 135 means very to extremely risky driving behaviours. Overall, the DBQ has demonstrated a respectable level of internal consistency and test-retest reliabilities (Cronbach α= 0.65 to 0.79) (Harrison, 2009) across all four dimensions. This has also shown validity for many populations with different cultural and driving backgrounds and

different types of roads and environments (Lajunen et al., 2004; Sullman et al., 2000; Yilmaz & Celik, 2005). The DBQ is not commonly used in a South African context and cannot as a result be compared to other South African studies in reference to driving behaviours.

3.4.2. *Attitudes towards Traffic Safety – Short Form (ATTS) (Appendix C)*

The *Attitudes Towards Traffic Safety – Short Form (ATTS)* (Iversen, Rundmo, & Klempe, 2005) is a 14-item measure of drivers' attitudes towards road safety and violations of traffic safety conventions. Participants are asked to rate the extent to which each item describes the appropriateness towards a range of driving behaviours across a five-point Likert scale, ranging from 1 "*fully agree*" to 5 "*fully disagree*" (Iversen et al., 2005). The scale consists of four subscales, namely; 1) Attitude toward the Acceptability of Rule Violations (Violations), which consists of five items. 2) Attitude toward Speeding (Speeding), consisting of four items. 3) Attitudes toward Other Drivers' Risk-Taking Behaviour (Others Risk-taking), which consists of three items, and 4) Attitudes toward Drinking and Driving (Drinking and Driving), consisting of two items. The subscale scores range from 5 to 25 each. Interpretations are made using the total scores of these subscales. Higher scores closer to 25 are indicative of permissive attitudes towards violating road safety conventions. The ATTS has relatively fair reliability across its four scales (Cronbach $\alpha = 0.65$ and 0.68 to 0.74 and 0.83) (Iversen & Rundmo, 2004; Iversen et al., 2005). An alpha level of 0.70 or higher is considered satisfactory (Nunnaly, 1978). Unfortunately this measure is not usually used in a South African context, although it is used in various countries, from the US to Norwegian settings.

3.4.3. *Driving Anger Scale – Short Form (DAS) (Appendix D)*

The *Driving Anger Scale – Short Form (DAS)* (Deffenbacher et al., 1994) is a 14-item measure of drivers' self-reported experiences of anger in various driving scenarios. The

items, which are descriptions of their experiences in specified driving situations, are answered on a five-point Likert scale ranging from 1 "*Not at all*" to 5 "*Very much*". The scores for each item are added to form a total score, ranging from 14 to 70. A score closer to 70 indicates higher levels of driver anger, whereas scores closer to 14 indicate no driver anger or aggressiveness. The DAS demonstrated strong reliability (Cronbach $\alpha = 0.80$ to 0.92) (Deffenbacher et al., 1994; 2002). This has also shown good validity through its correlations with the Trait Anger Scale and can be used to calculate a state and trait anger score (Deffenbacher et al., 1994; Villieux & Delhomme, 2007). The driving anger scale has been used in an African population, such as a study conducted by Esterhuyse (2017), which investigated driver anger, the role of personality attributes, emotional intelligence, gender and age.

3.5. Procedure

After ethical clearance to commence the study was obtained (MCLIN/18/003 IH) (Appendix F), an online survey link was shared to various public platforms, such as various Facebook groups such as resident/residential groups and community group forums. Furthermore, psychology co-ordinators were contacted and requested to share the link via the students' study and learning portal, called *SAKAI*. Each interested participant was met by a landing page on the link that provided all the information about what participation entailed (Appendix E). The letter explained that participants would remain anonymous and no identifying information was requested in the survey. The questionnaire was made available through the online portal through *Survey Monkey*. The four components of participation (the demographic questionnaire, the DBQ, ATTS and DAS) yielded 72 items in total and took approximately 15 minutes to complete. The link of the survey remained open for two months before being shut. A survey collector was then initiated, and the data was analysed accordingly.

3.6. Data Analysis

Data was cleaned, totalled and scored, thereafter imported into SAS 9.4 statistical analysis software. All data were analysed using SAS software. First, descriptive statistics such as means and standard deviations were performed for all continuous variables and frequency counts were tallied for all categorical variables. A series of bivariate correlations were then run to determine the bivariate relationships between age, levels of risky driving behaviour, attitudes towards traffic or road safety and driving anger. Parametric assumptions of the Pearson's correlation coefficient were tested prior to use of this statistical procedure.

In order to address the study's research questions, the parametric assumptions of the Multiple Regression procedure were calculated. A Stepwise Linear Regression analysis was used determine the best predictor of risky driving behaviour and to account for unique variance contributed by each variable in predicting risky driving behaviour in this sample. Finally, post-hoc analyses were conducted using Logistic Regression analyses to determine the likelihood or odds of being involved in a MVA as a driver, given variations in driver anger, insurance rewards status, gender and age (among others).

4. CHAPTER FOUR: Results

4.1. Introduction

The results of the study are presented in order of the previously outlined research questions. The following chapter systematically presents the findings of the data analytic procedures, in accordance with the study's research questions and aims.

4.2. Descriptive Data Analyses

The total sample consisted of 204 participants, with 150 (73.5%) who identified as female and 50 who identified as male. An additional four participants identified as gender non-confirming. Almost all participants had achieved at least a high school matric level of education, and the majority of participants were licenced drivers living in the Gauteng province (92%). Most reported that they regularly drive on city type roads (96%).

Looking at motor vehicle accident involvement (MVA), more than half of the participants (63.3%) in the study have been involved in a MVA over the past five years, with 43.6% of participants indicating that they were driving when the MVA occurred. Although the majority of participants (80.9%) reporting having vehicle insurance cover, only a few had insurance policies that rewarded good driving (22%) or enforced penalties for bad risky driving behaviours (17%).

Table 1: Demographic Frequencies.

Variable		*N*	*%*
Gender	Male	50	24.5
	Female	150	73.5
	Non-conforming	4	2
Education	Not completed high school	1	0.5
	High school/ matriculated	86	42.2
	College diploma	37	18.1
	Bachelor's degree	57	27.9
	Post-graduate degree	23	11.3
Province	Gauteng	188	92
	Other provinces	16	8
MVA history	Yes	129	63.3
	No	75	36.7
MVA role	Driver	89	43.6
	Passenger	40	19.6
	Onlooker	2	1
	Not applicable	73	35.8
Car Insurance	Yes	165	80.9
	No	39	19.1
Insurance Rewards	Yes	45	22
(Good driving)	No	115	56.4
	Not applicable	44	21.6
Penalties	Yes	35	17
(Bad driving)	No	85	42
	Not applicable	84	41

Looking at Table 2 below, the mean age of participants was 29.42 years (*SD*= 11.88) with a range of 18 years to 63 years old. The table also depicts the means, standard deviations and ranges for overall DBQ and its four domains (Ordinary Violations, Aggressive

Violations, Lapses and Errors), for the four domains of ATTS and for Driver Anger are depicted below.

Table 2: Means and Standard Deviations of Key Variables

	N	Mean	SD	Min	Max
Age	204	29.42	11.88	18	63
Driver Behaviour (DBQ)	*171*	*49.14*	*10.28*	*30*	*89*
Errors	171	19.76	4.21	12	34
Ordinary Violations	171	12.76	4.10	6	27
Aggressive Violations	171	7.01	2.41	4	16
Lapses	171	9.61	2.86	5	18
Driver Attitudes (ATTS)	-	-	-	-	-
Violations	171	18.70	3.76	0	25
Speeding	171	12.71	3.025	0	19
Others Risk-taking	171	9.076	2.12	0	14
Drink Driving	171	3.50	1.94	0	8
Driver Anger (DAS)	171	43.07	10.70	0	70

In summary, this sample consisted of 18- 63 year- old predominantly female drivers (although still well represented by male drivers), education, from the greater Gauteng region who frequently travel on city roads, which are often tarred, marked and/or painted adequately. It is also important to mention that almost all participants had completed a high school level of education, in this sample.

4.3. Bivariate Correlational Analyses

A Pearson product moment correlation was conducted to test the bivariate relationships between pairs of all key variables in this study. Table 3 below presents the intercorrelation matrix of these findings.

4.3.1. *DBQ and Age*

As expected, the overall Risky Driving Behaviour score was strongly correlated with each of its four factors, namely Errors, $r(171)= .82$, $p <.01$, Ordinary Violations, $r(171)= .77$, $p <.01$, Lapses, , $r(171)= .72$, $p <.01$ and Aggressive Violations, $r(171)= .66$, $p <.01$. Additionally, the bivariate correlations between all four factors of DBQ were significant.

Looking at the relations of variables with DBQ (risky driving behaviour), a significant negative correlation was found between Age and Risky Driving Behaviour, $r(171)= -.20$, $p < .01$, Ordinary Violations, $r(171) = - .21$, $p < .01$ and Errors, $r(171) = - .18$, $p < .01$. This finding suggests that as the age of participants increased, they reported fewer incidences of risky driving overall, and particularly fewer (deliberate) ordinary violations and fewer driving errors in this sample. Age was not significantly correlated with aggressive (deliberate) violations or lapses in this sample.

4.3.2. *DBQ and ATTS*

Overall Risky Driving Behaviour (DBQ) was also significantly associated with all four domains of Attitudes Towards Traffic Safety (ATTS) as follows: DBQ was negatively correlated with Violations, $r(171)= -.36$, $p <.01$, Speeding, -.24, $p <.01$, and Others Risk-Taking, $r(171)= -.20$, $p <.01$, but positively associated with the Drunk Driving factor, $r(171)= .31$, $p <.01$. These findings suggest that drivers who reported higher levels of risky driving behaviour overall were more likely to report negative attitudes towards road safety rules and had permissive attitudes towards violations of rules, towards speeding and towards other drivers taking risks in their driving. They were also more likely to have positive attitudes towards drinking and driving.

4.3.3. *Driver Anger Correlations with DBQ, ATTS and Age*

Driver Anger was significantly positively correlated with overall risky driving behaviour $r(171)= .33$, $p < .01$, suggesting that drivers with higher levels of anger whilst driving were more likely to report more risky driving overall. Furthermore, Driver Anger was found to be positively associated with three factors of Risky Driving, namely with Ordinary Violations, $r(171)= .28$, $p < .01$, with Lapses, $r(171)= .22$, $p < .01$ and with Aggressive Violations, $r(171)= .42$, $p < .01$. Driver Anger was not significantly associated with the Errors domain of Risky Driving Behaviour. This suggests that drivers reporting higher levels of driving anger reported making more deliberate violations (ordinary and aggressive), and more lapses while driving. However, driving anger was not associated with reported levels of (unintended) driving errors on the road.

In relation to attitudes towards traffic safety, Driver Anger was only significantly correlated with the Drunk Driving factor of the ATTS $r(171)= .20$, $p < .01$. Driver Anger was not significantly correlated with Violations, Speeding and the Driver Risk-Taking domains of the Attitudes towards Traffic Safety variable. In other words, drivers who reported higher levels of anger whilst driving were also more likely to report more permissive attitudes towards drinking and driving in this sample. No other attitudes towards traffic safety were related to levels of driver anger in this sample. Lastly, age was not found to be associated with Driver Anger in this sample.

4.3.4. *ATTS – Additional Correlations*

Lastly, looking at the ATTS variable, there were significant positive associations between Violations and Speeding, $r(171)= .50$, $p < .01$ and between Violations and Drivers Risk-Taking, $r(171)= .43$, $p < .01$. The Speeding domain of ATTS was also significantly associated with Drivers Risk-Taking, $r(171)= .48$, $p < .01$. Interestingly, the Drunk Driving domain of ATTS was not significantly associated with any of the other three domains of

ATTS in this sample. Additionally, Age was not found to be associated with any of the attitudes towards road safely in this sample

Table 3: Intercorrelation Matrix Table of All Key Variables

	Age	*DBQ*	*DAS*	*Violations*	*Speeding*	*Others Risk-taking*	*Drink Driving*	*Errors*	*Ord Violations*	*Lapses*	*Agg Violations*
Age	1.00	-0.20**	-0.13	0.11	0.02	0.14	0.03	-0.18*	-0.21**	-0.08	-0.08
DBQ	-	1.00	0.33**	-0.36**	-0.24**	-0.20**	0.31**	0.82**	0.77**	0.72**	0.66**
DAS	-	-	1.00	0.12	0.01	0.06	0.20**	0.14	0.28**	0.22**	0.42**
Violations	-	-	-	1.00	0.50**	0.43**	-0.09	-0.30**	-0.32**	-0.22**	-0.22**
Speeding	-	-	-	-	1.00	0.48**	0.04	-0.09	-0.30**	-0.07	-0.28**
Others Risk-taking	-	-	-	-	-	1.00	0.03	-0.04	-0.33**	-0.06	-0.15*
Drink Driving	-	-	-	-	-	-	1.00	0.22**	0.30**	0.18*	0.21**
Errors	-	-	-	-	-	-	-	1.00	0.41**	0.58**	0.36**
Ord Violations	-	-	-	-	-	-	-	-	1.00	0.33**	0.47**
Lapses	-	-	-	-	-	-	-	-	-	1.00	0.34**
Agg Violations	-	-	-	-	-	-	-	-	-	-	1.00

*$p < .05$ **$p < .01$

4.4. Main Data Analyses

This section will report on all the analyses that were conducted in order to answer the core research questions for this study. Due to the exploratory nature of these relationships, the hypothesis testing paradigm was not adopted. The analyses were, therefore, guided by three core research questions. Before these analyses were conducted, additional parametric assumptions were tested, namely linearity, multicollinearity and homoscedasticity. No gross violations to any of these assumptions were found so parametric analyses were conducted.

4.4.1. *Stepwise Linear Regression Analyses*

A stepwise multiple regression was run to test the unique variance in Driving Behaviour (DBQ) attributed to Age, Driver Anger (DAS) and the four Attitudes towards Traffic Safety (ATTS; namely attitudes towards Violations, Speeding, Others Risk-taking and Drunk Driving). The regression was run using SAS PROC REG with the Forward Elimination option in SAS. Results are depicted in Table 4 below. At Step 1, the ATTS variable Violations was entered and it explained 13.11% of the variance in overall Driving Behaviour (DBQ) (R^2= 0.1311, $F_{(1, 167)}$ = 25.05, p<.0001).

At Step 2, Driver Anger (DAS) was added and accounted for an additional 14.21% of the total variance in DBQ. The model with Violations and DAS predicted a total of 27.32% of the variance in DBQ (R^2= 0.2732, $F_{(2, 167)}$ = 31.01, p< .0001).

At Step 3 the addition of the ATTS variable, Drunk Driving, contributed significantly to the overall model, with unique variance of 4.10% (See Table 4) of the variance in DBQ. The model with Violations, DAS and Drunk Driving predicted a cumulative 31.42% of the variance in DBQ (R^2=0.3142, $F_{(3, 167)}$ = 9.80, p< .0001).

At Step 4, Age was added and accounted for a further 1.43% of unique variance in DBQ. The addition of Age did not result in a significant change in the variance accounted for

in the model, which totalled 32.85% (R^2=0.3285, $F_{(4, 167)}$ = 3.48, p=0.0641). However, its contribution was very close to significance (p= 0.06).

At Step 5, the addition of attitudes towards Speeding (ATTS variable) explained a further 0.71% (See Table 4) of the variance in DBQ but this addition was not significant (*p*= 0. 1899). However, at this point, the contribution of Age in the model was significant (*p* = 0.05). The full model with Violations, DAS, Drunk Driving, Age and Speeding accounted for a total of 33.56% of the variance in DBQ.

Table 4: Stepwise Regression predicting Risky Driving Behaviour (DBQ)

	B	**SE b**	**F**	**Sig. (*p*)**	***R*²**
Step 1					*0.1311*
Violations	-0.99045	0.19788	25.05	0.000	
Step 2					*0.2732*
Violations	-1.11264	0.18280	37.05	0.000	
DAS	0.36714	0.06465	32.25	0.000	
Step 3					*0.3142*
Violations	-1.0501	0.17923	34.33	0.000	
DAS	0.3238	0.0645	25.2	0.000	
Drunk Driving	1.10391	0.35267	9.8	0.0021	
Step 4					*0.3285*
Violations	-1.0048	0.17954	31.32	0.000	
DAS	0.30098	0.06518	21.33	0.000	
Drunk Driving	1.15817	0.35125	10.87	0.0012	
Age	-0.1105	0.05925	3,38	0.0641	
Step 5					*0.3356*
Violations	-0.8644	0.2085	17.19	0.000	
DAS	0.29349	0.06528	20.21	0.000	
Drunk Driving	1.21421	0.35304	11.83	0.0007	
Age	-0.1152	0.05923	3.78	0.0535	
Speeding	-0.3343	0.25394	1.73	0.1899	

In sum, these findings suggest that attitudes towards deliberate driving violations were most strongly associated with overall risky driving behaviour in this sample. Driver Anger contributed a significant proportion of variance in risky driving behaviour as well. A third of risky driving behaviour could be explained by attitudes towards violations and drunk driving, and driver anger in tandem.

4.5. Logistic Regression Analyses

In order to explore variables associated with the likelihood of being involved in an MVA as a driver (vs. as an onlooker or passenger), the MVA Involvement variable was coded with 1 (history of involvement in an MVA as a driver) and 0 (no history of an MVA as a driver). The logistic regression is used when the outcome is measured dichotomously; hence, it was deemed the most suitable statistic. This allowed for testing to explore the likelihood to report a history of MVA involvement (in the last 5 years) as a driver in relation to age, gender, Driving Behaviour (DBQ), Driver Anger, and the four Attitudes towards Traffic Safety.

Firstly, to test whether age and gender contributed to the likelihood of MVA involvement as a driver, a binary logistic regression was run with Maximum Likelihood Estimates and Odds Ratio Estimates. These findings are depicted in Table 5 below. Analyses were conducted using Proc LOGIT in SAS (version 9.4). Gender was not found to significantly affect the likelihood of MVA involvement as a driver: the log of the odds of reporting an MVA as a driver was not significantly associated with gender (p= 0.37). However, the odd of reporting an MVA was negatively associated with Age (p <.0001). This suggests that the higher the age of participants, the less likely they were to report MVA as a driver in the last five years.

Secondly, to test whether DBQ and DAS contribute to the likelihood of MVA involvement as a driver, a binary logistic regression was run with Maximum Likelihood Estimates and Odds Ratio Estimates. DAS and DBQ were not found to significantly affect the likelihood of MVA involvement as a driver ($p = 0.921$) and ($p = 0.907$) respectively. In other words, the driver anger and risky driving behaviour did not influence the likelihood nor odds of reporting an MVA whilst driving in the preceding five year period in this sample.

In order to test whether the four attitudes towards traffic safety domains (violations, speeding, other driver's risk-taking and drunk driving) contribute to the likelihood of MVA involvement as a driver, a binary logistic regression was run with Maximum Likelihood Estimates and Odds Ratio Estimates. The four ATTS domains were not found to significantly affect the likelihood of MVA involvement as a driver (violations $p = 0.171$, speeding, $p = 0.504$, drivers risk-taking, $p = 0.758$ and drunk driving $p = 0.419$). In other words, driver attitudes towards traffic safety did not significantly increase or decrease the likelihood or odds of being involved in an MVA (as a driver) in this sample.

Lastly, to test whether having insurance rewards and insurance penalties contributed to the likelihood of MVA involvement as a driver or not, a binomial logistic regression was run with Maximum Likelihood Estimates and Odds Ratio Estimates. Both insurance rewards and penalties were not found to significantly affect the likelihood of MVA involvement as a driver (insurance rewards, $p= 0.645$ and insurance penalties, $p= 0.372$). In other words, participants who had insurance that rewards good driving and/ or penalises bad driving were equally likely to report having an MVA as a driver when compared with those that didn't in this sample.

Table 5: Logistic Regression predicting Likelihood to report MVA as a driver

Predictor	β	SE β	Wald's x^2	df	p	e^{β}
Gender	0.3255	0.3663	0.7896	1	0,3742	1.385
Age	-0.0701	0.0149	22.2318	1	<.0001	0.932
DAS	0.00151	0.0154	0.0096	1	0.9218	1.002
DBQ	-0.00186	0.0159	0.0137	1	0.9068	0.998
Violations	0.0691	0.0505	1.8773	1	0.1706	1.072
Speeding	-0.0426	0.0638	0.4466	1	0.504	0.958
Others Risk-taking	0,0266	0.0863	0.0952	1	0.7577	1.027
Drunk Driving	-0.0653	0.0809	0.651	1	0.4197	0.937
Ins Rewards	0.186	0.404	0.213	1	0.645	1.205
Ins Penalties	-0.412	0.461	0.798	1	0.372	0.662

4.6. Conclusion

The present study explored factors associated with risky driving behaviour in a sample of South African drivers. The analyses found that age was negatively associated with overall risky driving, especially with deliberate ordinary violations and driving errors (but not with aggressive violations or lapses. Risky driving behaviour was also associated with more negative attitudes towards road safety rules. The study also found that driver anger was associated with overall risky driving behaviour and with more permissive attitudes towards drinking and driving. A Stepwise Regression found that the strongest predictors of risky driving behaviour were age, driver anger and the violations and drunk driving domains of the attitudes towards traffic safety measure. Logistic Regression analyses found that only age was significantly associated with an increased likelihood for reporting an MVA as a driver where younger drivers were found to be more likely to report having had a car accident over the previous 5 years.

5. CHAPTER FIVE: Discussion

5.1. Introduction

This chapter contains the main findings of the study in relation to its general aims indicated in the synopsis. This chapter discusses the findings of the results section further and the interpretations thereof. As indicated in the methodology section of this research study, the data was collected using various instruments for the various factors included in the analyses, these will be highlighted in this chapter and interpreted. The primary aim of this research was to determine the relationships between age, gender, driver anger and attitudes towards traffic safety. A secondary aim was to determine the best predictor of risky driving behaviour from all the variables implicated as factors in road accidents in the literature.

5.2. Discussion of Preliminary Findings

Given the increasing levels of Motor Vehicle Accidents (MVAs) in South Africa, specifically in Gauteng and other neighbouring provinces, this study aimed to establish the relationship and perhaps the predictive utility of specified variables in predicting risky driving as well as MVA involvement. Furthermore, the study aimed to examine closely, the influences on driving behaviour, more specifically risky driving behaviour. The study also explored whether gender and age are also associated with risky driving behaviour. Lastly, the study explored whether or not factors such as insurance rewards and/or penalties, driver anger and attitudes towards traffic safety were predictors of MVA involvement in the past five years, in South African drivers.

The final sample of this research was mostly female drivers in the greater Gauteng province with almost all reporting at least a high school matric level of education. Participants' ages ranged from 18 to 63 with a mean age of 29.4. It is important to note that

these sample descriptors may not fully accord with the South African driving population. However, interpretation of the findings should be done with these parameters in mind.

5.2.1. *Role of Attitudes towards Traffic Safety*

The findings of this study suggested that attitudes towards traffic safety are strongly associated with risky driving behaviour. Specifically, participants who endorsed permissive attitudes towards traffic violations were significantly more likely to report risky driving practices across all four domains: they reported making more human errors or mistakes on the road, more ordinary or illegal driving violations, more (unintentional) lapses and absent-minded mistakes whilst driving and more deliberately aggressive violations. In keeping with the Theory of Planned Behaviour (TPB), driving choices are dependent on attitudes towards traffic safety violations and subjective norms. As this sample showed poor attitudes and subjective norms to safe driving practices. Yilmaz and Celik (2006) who investigated risky driving attitudes and violation of road rules (risky driving practices), found that a significant relationship existed between risk taking behaviours and risky driver attitudes. It was also found that risky driving behaviour increases as risky attitudes did. The finding is also corroborated by the findings of Iversen and Rundmo (2011) who found that attitudes towards traffic violations and speeding were most strongly associated with risky driving behaviour. Additionally, drivers who reported permissive attitudes towards drinking and driving also reported higher levels of risky driving behaviours across all four domains in this sample.

Interestingly, permissive attitudes towards other drivers risk-taking behaviour and attitudes towards speeding were associated with both ordinary and aggressive violations, but not with errors of lapses. It is important to note that errors and lapses are operationalised as non-intentional risky driving practices, while violations are often considered as deliberate. Therefore, permissive attitudes towards violations of road safety violations (speeding and drunk driving) predict driving behaviour. This finding corroborates the predictions of the

Theory of Reasoned Action (TRA) which that states that a person's attitudes are associated with and influences behaviour. The TRA helps explain that this samples behaviour according to their poor attitudes towards safety. In order to change behaviour, from this perspective, the underlying attitudes need to be addressed and changed to ones that are associated with desirable behaviours. This highlighted the importance of addressing attitudes towards road safety in interventions that target and aim to reduce deliberate acts of risky driving (Fishbein & Ajzen, 1975).

5.2.2. *Driver Anger*

The present study found that driver anger was not associated with attitudes towards traffic safety, driving violations, speeding or other drivers' risk-taking behaviours. However, participants who endorsed permissive attitudes towards drinking and driving were more likely to report higher levels of driving anger. This finding corroborates the findings of a study conducted by Farrow and Brissing (1990), who had found that participants' attitudes and behaviours were associated whilst driving intoxicated. These participants also appeared to have held socially acceptable views and attitudes towards driving under the influence of alcohol. Several studies found that drivers reporting higher levels of driving anger were more likely to report more MVA(s) and more aggressive and risky driving behaviour (Deffenbacher et al., 1994; Deffenbacher et al., 2000; Deffenbacher, Huff, Lynch, Oetting, & Salvatore, 2000; Deffenbacher et al., 2003; Lajunen & Parker, 2001; Lynch, Deffenbacher, Filetti & Dahlen, 1999). These studies investigated driver anger with those who acknowledged their anger and made predictions on driving behaviour and MVA(s).

Driver anger was found to be associated with risky driving behaviours in this sample, more specifically with ordinary or illegal driving violations, with lapses or absent-mindedness and with aggressive violations. Driver anger was not associated with unintentional errors. Taken together, angrier drivers reported making more intentional

violations of traffic safety laws (both ordinary and aggressive violations) and they reported more lapses in their driving. It is possible that cognitive preoccupation associated with angry thoughts and affect may limit capacity to remain focused and present whilst driving, resulting in greater risk of lapses in angrier drivers. These findings are corroborated by a study investigating personality, risky driving and accident involvement among Norwegian drivers. Iversen and Rundmo (2002) found that those who scored higher on driver anger were also found to report more risky driving behaviours. Fernandes, Hatfield and Job (2010) reported findings which indicated a relationship between driver anger and risky driving behaviours, behaviours such as not wearing a seatbelt and speeding (both intentional and ordinary violations).

5.2.3. *The Role of Age*

The present study found that risky driving behaviour was negatively associated with age, suggesting that younger drivers were more likely to report risky driving behaviours overall. More specifically, age was associated with two risky driving behaviour domains; ordinary violations and human errors. Younger drivers made more intentional ordinary violations and also made more unintentional driving errors (possibly due to relative inexperience). These findings corroborate those of Fergusson, Swain-Campbell and Horwood (2003), who had found that more than 90% of a sample of young drivers engaged in risky driving behaviours. Furthermore, both young males and females were found to engage in risk-taking behaviours equally whilst driving (Begg & Langley, 2001). Authors such as Lancaster and Ward (2002) as well as Lawton et al. (1997) had found that younger drivers were more likely to violate driving rules and engaged in risky driving behaviours. Furthermore, younger drivers were more likely to commit driving violations or risky driving behaviour than older people (Dobson, Brown, Ball, Powers & McFadden, 1999). Dobson et al. (1999) found that individuals aged 18 to 23 were more likely to make errors in driving and

violate road rules and drive riskily. This finding suggests that the younger the driver the more risky driving behaviours are endorsed.

5.3. Discussion of Findings of Main Analyses

As previously indicated by Jafarpour and Rahimi-Movaghar (2014), risky driving behavioural practices which influence motor vehicle accidents include individual factors, remain the most significant determinant of accidents and crashes. It is for this reason that the current study questioned the following human factors; age, gender, driver attitudes and risky driving behaviours of the sample to be included in predicting the likelihood of MVA(s).

The first research question in this study aimed to determine which variables contributed the most unique variance in risky driving behaviour. Predictor variables were age, gender, driver anger and attitudes towards traffic safety. Results found that attitudes towards traffic violations, driver anger, and attitudes towards drinking and driving were the strongest predictors of risky driving behaviour, and accounted for a third of the variance. Age was also a significant predictor of risky driving behaviour, although to a lesser extent, age accounted for just under 2% of the total variance.

These findings highlight the absolute importance of addressing driver attitudes towards road traffic safety rules and conventions as these attitudes have a strong impact on behavioural choices. Driver anger also emerged as a critical predictor of risky driving in this sample.

These findings gave partial support for the second research question, which was to assess whether age, gender, driver anger, driver attitudes and risky driving behaviour are associated with MVA involvement as a driver, however it was rejected, except for age. Age was found significant in this regard. The literature reviewed consistently shows that in terms of age, younger drivers are more likely to be involved in MVA(s) than older age groups

(Norris et al., 2000; Dobson et al., 1999; Lawton et al., 1997). Youth in their early 20's, primarily males, have been found to have the highest MVA involvement rate (NHTSA, 1995). It has been noted that one of the predictors of future MVA involvements is those young in age, between ages 19 to 39 being twice more likely to have a MVA than older adults between the ages of 56 to 88 (Norris et al., 2000). A study conducted by Maycock, Lockwood and Lester (1991 in Lancaster & Ward 2002) found that "17 year-old drivers have 50% more crashes per year than 25 year olds, who have 35% more crashes per year than 50 year-olds". Similarly, Dobson et al. (1999) reported that of the average number of accidents in the past 3 years, individuals aged 18 to 23 were three times more likely than individuals aged 45-50 to be involved in MVA(s).

Most research conducted on driver anger and MVA involvement has indicated that aggressive drivers were more likely to be involved in MVA(s) (Matthews & Moran, 1991; Norris et al., 2000; Beirness & Simpson, 1997). Matthews and Moran (1991) concluded that the involvement in MVA(s) was associated with drivers being more aggressive and impatiently overtaking another vehicle causing crashes. However, this was not found to be the case in this study. Furnham and Saipe (1993) support this in their study which failed to find a significant relationship between aggression, anger and accident involvement. Nayum (2008) mentioned that angry drivers also have poor attitudes towards driver safety and obeying road rules, and these attitudes could be the reason for being involved in MVA(s).

It has been indicated that attitudes towards traffic safety is a strong predictor of risky driving behaviour as well as MVA(s) involvement (Iversen, 2004). Rothengatter (2000) found that individuals with positive attitudes towards committing violations, such as speeding, were more likely to be involved in MVA(s). Stradling (2000) also investigated the likelihood of being involved in a car accident based on attitude and skill and found that attitudes towards driver violations of road rules was a strong predictor of MVA involvement.

A study conducted by Yilmaz and Celik (2006) found that amongst Turkish drivers, risky driving attitudes were often associated with MVA(s). However, attitudes towards traffic safety was not found to be a significant predictor of MVA involvement. Although Schuster and Guilford (1962; in Elander, West & French, 1993) found that a relationship existed between car crash involvement and driver attitudes. This association was however less strong a predictor than demographic factors, such as age and gender.

Authors such as Alm and Lindberg (2000) have indicated that those who drove riskily were more likely to have experienced an accident(s). Other studies have also indicated that risky driving behaviour was a key predictor of MVA(s) (Chliaoutakis et al., 2002; Dahlen et al., 2005; Lancaster & Ward, 2002). A study conducted by Fergusson et al. (2003) which examined risky driving behaviour amongst young people, found that more than 90% of young drivers engaged in risky driving behaviour and males were more likely to be involved in MVA(s) of the 90%. A strong association was found between risky driving behaviour and MVA involvement (Fergusson et al., 2003). Further studies indicated that violations of road rules, i.e. risky driving behaviour, resulted in MVA(s) (Lawton et al., 1997; Meadows et al., 1998). Meadows and Stradling (1996) found that younger drivers who took more risks whilst driving were involved in more car accidents. The PBT indicates that problematic acts, like that of risky driving behaviour is contributed by poor adherence to rules as well as poor attitudes, which is significantly correlated in this study.

In addition, the third research question was rejected, indicating that insurance penalties and rewards were not found to significantly affect the likelihood of being involved in a MVA as a driver. It has been suggested that the rewarding of good driving behaviours reduces the involvement of MVA and creates safer roads (Discovery, 2018; Ronning, 2013). Although there are not many studies which investigate the value of insurance on driving behaviour, Discovery (2018) reported that if all South African drivers were according to their

standards, gold and diamond status drivers, it is predicted that a reduction of MVA of 70% to 90% will occur. Furthermore, a total saving of R120 billion to R155 billion annually will occur. It is then suggested from the article that the more people belong to a driving behaviour programme with rewards and/or penalties the less likely they would be involved in MVA(s) as a driver (Discovery, 2018; Momentum, 2019; Ronning, 2013). However, these findings indicate that the driving behaviour indicated by this sample cannot be explained by the PBT, as this theory indicates that risky driving behaviour and MVA involvement is reduced or controlled by laws and regulations or enforced consequences, such as insurance rewards and penalty policies. However, this non-significant finding could be explained by the fact that not all participants had insurance programmes.

Findings suggest that although there were significant relationships between risky driving with age, driver anger, violations and drunk driving, however, the likelihood of these variables increasing the odds of having a MVA as a driver could not be predicted. According to this, apart from age, regardless of one's gender, level of anger whilst driving, risky driving behaviours and attitudes towards traffic safety it could not have predicted the involvement in MVAs for this sample. However, depending on one's age, the likelihood of being involved in a MVA is significant, where the younger one is the greater the odds of being involved in a MVA.

5.4. Limitations and Methodological Considerations

A list of some key considerations must be made in considering the findings of this study. The first consideration that needs to be made pertains to the sample parameters. The sample consisted of a greater representation of female identified drivers, whose educational background was greater than the average South African. Most of these drivers were also geographically located in the Gauteng Province of South Africa. It is not possible to ascertain whether or not this sample is representative of the population of South African drivers, or

even the drivers within the Gauteng province, as those data were not readily available. The sample selection biases included lower levels of MVA involvement overall amongst the sample. The generalisability of these findings may therefore, be confined to these stated parameters. Additionally, given the paucity of research in this field in the South African context, the measures have not undergone extensive scrutiny for use in this context. However, the measures have been used extensively in other developing countries and their multicultural validity in those samples has been documented.

The possibility that selection bias of convenience sampling affected sample selection must also be considered. Factors such as Facebook groups and community groups that were targeted and the use of undergraduate psychology students may have introduced some sample selection bias, over representing more educated drivers who regularly consumed social media and have access to bandwidth data. It would be useful for this research to be replicated with a more representative sample of drivers in order to get a more accurate picture of risky driving in South African drivers.

The finding pertaining to likelihood to report MVAs was inconsistent with prior research and this needs to be considered. History of an MVA was measured within the demographic questionnaire and coded from a series of questions that explored participants' history of being involved in accidents as drivers and as passengers. The validity of this measure is therefore questionable. Perhaps a more standardised and validated measure should be developed for further research, or a more unambiguous single item asking "have you been involved in any road traffic accidents or MVA whilst driving over the past five years?"

Fourthly, the data collected and reported in the current study were solely based on self-report measures. Participants may have wanted to seem socially desirable and might have biased the data. Answers could have been embellished and untruthful answers may have been

given. However, it is important to note that this weakness was attempted to be reduced by ensuring anonymity and confidentiality as well as participants volunteering to participate in the study ensured participants lying gained no benefits. Although self-report measures do not provide a genuine representation of actual behaviour, nonetheless it does provide a decent indication of behaviour (Nayum, 2008). Self-report measures unfortunately only provide a summary of behaviour and not a comprehensive overview of changes in behaviour (Nayum, 2008). However, alternative methods are expensive and time consuming. The possibility of measurement bias in how MVA involvement was measured in two brief questions was not adequate. The study should have controlled for driving experience in reference to MVA involvement and age. Moreover the study did not test for reliability of the measures used in this study based on the sample being investigated. This may have indicated errors in the research findings.

Risky driving behaviour is a multifaceted issue with a wide range of factors, which influence driving behaviours and MVA involvement. This being said, accidents are rather difficult to predict as there are low base rates which exist, and as Peck (1993, p. 147) indicated, accidents represent "the consequences or outcomes of the interaction of a driver's behaviour with external events, including the behaviour of other drivers". The general issue with using accidents as a basis for evaluating individual driver behaviours is that accident data lacks stability, statistical power due to the infrequency of accident records (Iversen & Rundmo, 2002).

Further conceptual limitations are that the attitudes of individuals are shaped by societal norms and pressures and not purely on personal choice (Iversen & Rundmo, 2002). Societal norms and pressures can influence and shape the attitudes towards risky driving practices and rule breaking within any society. This context has implications for the findings of the current study, as individuals may have under or over reported socially influenced

responses and not experienced or personal preferences of driving behaviours, anger or attitudes towards traffic safety.

Moreover, situational and environmental factors were also important to consider when investigating risky driving behaviour and attitudes towards safety. As these factors are more temporary and can trigger reactions that stem from more temperamental or emotional factors, and not necessarily intentional. Other weaknesses include that recently some variables have shown relevance in literature concerning driving behaviour, such as driving alone or with company (Rhodes, Pivik & Sutton, 2015), which were not considered in this study.

Lastly, the present study had a modest sample of 204 participants. Sample sizes generally size affects the statistical power of the study and its allowance of generalisability to the general population. It implies that real effects may not be detected in the present study. An unfortunate problem related to small sample sizes is the low response rate to emailed questionnaires, which was experienced in this study. Moreover, in terms of gender distribution, this study consisted of more females than males; this affects the gender differences that might be evident in the study, as past literature has suggested males being more susceptible to MVA. To allow for exploration of gendered patters in driving behaviour and attitudes.

5.5. Strengths and Contributions of the Study

This study contains some strengths and as a result some important contributions have been possibly made. The study adopted a quantitative research design, which may have prevented any possible biases from the researcher to the results of the study through to the selection, data collection, scoring, analyses and interpretation. A number of studies investigating driver behaviour, MVA involvement and human factors, mostly demonstrated a relationship between variables or variables as predictors, as opposed to predictions of

odds/likelihoods being calculated (Dahlen & White, 2006; Maycock et al., 1991; Nayum, 2008; Norris et al., 2000). These studies were also conducted several years ago with little current research as opposed to the current research study which hopefully provided more current data. The current study aimed to make predictions based on significant variables associated with driver behaviour and MVA involvement amongst South African drivers' more specifically Gauteng road users. The current study also included insurance as an important variable, as opposed to past research, which may have not been included this variable in previous research.

This research aimed to bridge the gap between substantial information on driver behaviour and possible variables that influence driver behaviour and MVA involvement. The research thus aimed to conceptualise and integrate what is known about driver behaviour into risky driver behaviour, driver attitudes and driver anger, as well as insurance rewards and penalties all condensed in one study. By conducting such research with various variables in South Africa, the results could provide information, which other cities, insurance companies and road agencies could use to further understand the driving behaviour of such populations. Moreover, this information may hopefully inform clinicians working in groups to prescribe interventions, which assist in managing individual differences such as anger, temper and negative attitudes. This information may in turn, be used to inform road safety campaigns aimed at reducing risky driving behaviour with the ultimate hope of reducing road traffic accident rates and fatalities on local roads. Previous research in South Africa suggested that risky driving behaviour may be an environmental issue and excluded the possibility of it being an individual based issue, which causes financial burdens on South Africa's economy (Luke & Heyns, 2014; Williams, 2018). This research aimed to consider individual characteristics such as emotions, like anger, that play a role in driving and the psychological positioning of a driver. Furthermore, this research hopefully contributes to an improved

understanding of risky driving behaviour by using variables such as anger, attitudes and insurance rewards and penalties in predicting driving behaviour and MVA involvement.

5.6. Implications and Recommendations for Future Research

Herrero-Fernandez (2016), mentioned that of the three factors influencing driving behaviour (individual, vehicle and environment), individual factors have been identified as the most complex and significant in explaining the occurrence of MVA(s). Risky driving behaviour accounts for a large proportion of the variance under "individual" factors. The present study found and risky driving practices, such as age, driver anger and attitudes. Age was found to be one of the strongest predictors of risky driving, as indicated by a study looking at individual differences of drivers (Dahlen & White, 2006). The results of the current study showed that whilst age was a predictor of risky driving behaviour, it was not the strongest. However, it is a very important factor to consider in future research, as younger drivers were found to be more likely to report a history of motor vehicle accidents in the past 5 years. This finding suggests that interventions that aim to reduce risky driving should take into consideration age, as younger drivers may be more likely to deliberately violate certain road safety conventions. This, coupled with their experience, may render these younger drivers at risk of having accidents. Furthermore, this finding implies that safety programmes and campaigns should consider the age of individuals and enrol younger individuals as part of their programmes or target a younger audience in safety campaigns aimed at reducing MVA involvement and risky driving practices. Insurance companies should consider making safety reward and/or penalty programmes a must for younger drivers.

The current study also found Driver Anger to be one of the stronger predictors of risky driving behaviour. However, the current study further indicated that this variable, driver anger, was the second strongest predictor of risky driving behaviour amongst other human factor variables. As a result, counselling programmes that have been developed or which

need to be developed should include means to reduce anger whilst driving. Anger is a powerful emotion experienced by human beings and safety programmes need to consider this as an important factor when training learner drivers.

Of the risky driving practices, violations of road rules specifically increased risky drivers' attitudes the most. Four predictors of risky driving practices explained 82% of the total variance in risky driver attitudes. It was found that of the four predictors of risky driving practices, attitudes towards violation of road rules was the strongest predictor of risky driving (Yilmaz & Celik, 2006). Similarly, in the current study, the strongest predictor of risky driving was attitudes towards traffic safety, specifically the violations variable, was a significant predictor of risky driving practices. This finding has been corroborated by a study conducted by Rothengatter (2000) which mentioned that attitudes towards high and low-risk violations, who observed those drivers who regularly commit traffic violations, such as speeding, had a positive attitude towards committing these violations. This indicated that these drivers were more likely to drive riskily as a result of their attitude towards traffic safety. This implies that a culture of safety attitudes needs to be better implemented amongst drivers. Campaigns need to consider making road rules 'appealing and cool' to follow and abide. A culture of drivers who respect road rules and socially it is recognised to have positive attitudes towards traffic safety rather than not should be encouraged. The development of programmes for apprehended risky drivers to participate and share in appropriate driving attitudes that endorse safety should maybe be implemented.

As mentioned prior, human factors are responsible for 85 to 95% of road accidents globally (Iversen & Rundmo, 2002; Sabey & Taylor, 1980). In a study conducted by Brorsson, Rydgren, Ifver (1993) indicated that drivers between the ages of 18 and 19 years old were 6 times were more likely to be involved in a MVA than the average person. Whilst individuals aged 24 to 54 were less likely to be involved in an MVA, but rather more likely to

run their cars off the road. In the present study, it was found that younger aged individuals were more likely to be involved in MVA(s) as a driver. As explained by Norris et al. (2000), this may be due to risky driving practices of young adults. This may have implications for driving schools who are training younger drivers to consider the risks involved. Furthermore the age at which drivers are considered for licencing may need to be reviewed, as studies have shown that young drivers are more likely to cause and be involved in MVA(s).

Authors such as Waller et al. (2001) and Maycock et al. (1991) have indicated that men have been found to be involved in MVA(s) more than women. It has been reported that for every 1000 MVA(s) men were involved, double the rate than women were (Chipman, MacGregor, Smiley & Lee-Gosselin, 1992). However, in this study, gender was not found to be significantly different, in that both men and women were likely to be involved in MVA(s) as a driver. According to a study conducted by Gonzalez-Iglasias, Gomez-Fraguela and Luengo-Martin (2012), males reported a greater number of traffic violations and car accidents. In a study conducted by Storie (1977) which corroborated this finding, as it was discovered that no gender differences existed in MVA(s), but rather in risky driving practices such as violations of road rules. Moreover, research conducted by Lawton et al. (1997) also found no one gender to be more predictive than the other, as violation scores were excluded from the analysis. It is therefore suggested that gender only plays a role in MVA(s) if violations are considered and the tendency or frequency of committing such violations of road rules (risky driving practices) is explored. It has been found that males are more likely to commit driving violations than that of females, hence the possibility of more MVA(s) as drivers (Lawton et al., 1997; Waller et al., 2001). Therefore, should the analysis of this study have included actual risky driving behaviours, specifically violation scores by observation rather than self-reported scores, it is possible that a significant difference might have been found.

As previously indicated, a driver who had higher levels of anger often committed more traffic violations, were more likely to be involved in MVA(s) (Bogdan et al., 2016; Herrero-Fernandez, 2016). Contrary to these findings, the current study did not find a significant likelihood of being involved in a MVA(s) as a result of high levels of driver anger. This has implications for future research, to consider if age mediates the relationship between driver anger and MVA involvement. If so, there are implications for who should be recommended for and for whom the programme will be developed to target (older or younger) angry driving.

Driver anger and aggression are usually mediated and influenced by poor driver attitudes (Feather & Deverson, 2000). Nayum (2008) found that attitudes towards traffic safety, along with gender, as good predictors of risky driving behaviours and subsequently MVA involvement. The study concluded that attitudes were an important variable in determining driving behaviour and car crashes. In the current study, it was however found to not be the case, where attitudes towards traffic safety was not a significant predictor of the likelihood of accident involvement. Elander et al. (1993) noted that studies failed to find associations between MVA involvement and driving attitudes. This has implications for future research, who should consider establishing why attitudes towards traffic safety is not significant in causing MVA(s).

Deffenbacher et al. (2003) indicated that drivers with not only high anger levels, but risky driving behaviour accounted for more traffic accidents having occurred. However, in this study risky driving behaviour was not found to be a significant predictor of MVA(s) involvement as a driver. This implies that risky driving behaviour may not explain the occurrence of MVA(s) alone.

In the current study, it was found that penalising bad driving and rewarding good driving did not predict the likelihood of being involved in a car accident. Insurance was found to not be a significant predictor of MVA(s) involvement as a driver. A study in Cape Town investigated drivers who transported children, found that by rewarding these drivers improved their driving dramatically. Drivers were found to speed less and were less likely to be involved in MVA(s) (Discovery, 2018). Since implementation of rewards and penalty programmes, there has been a reduction in MVAs, where drivers who drove safely were 63% less likely to be involved in a MVA and 77% less likely to be involved in a severe MVA(s) than other drivers who drove riskily. Although this study did not find a significant likelihood, it is important for insurance programmes to consider refining their risky driving behaviours even further and be careful not to only consider aspects such as speeding. And, to increase their means of detecting poor driving behaviours.

5.6.1. Recommendations for Future Research

Firstly, it is recommended that a larger sample size with a more representative sample group be involved in the study. The larger sample size with better distribution of age, gender, MVA involvement as well as insurance-related aspects be included. This will be useful in better understanding the complex relationships between the variables in this study. Increasing the sample size also means increasing the statistical power of the results, which would enable this research to detect subtle differences in relationships and predictions between variables.

Furthermore, more research of this kind, traffic psychology, is needed, as there are alarmingly high rates of MVA(s) reported across all provinces of South Africa. Gaining a better understanding of the human factor involved in MVA(s) could assist in reducing the occurrence of accidents across the country.

Adding a separate scale to measure the causality of accidents needs to be developed and would be useful as there were only a few to one question asking about the involvement in MVA(s) and not the cause of the MVA(s). The causality of the MVA plays an important role in determining the level of anger and attitudes the participants may have contributed to the occurrence of a MVA(s). Future research should consider severity of accident and attributions of causality as risky driving behaviour may be more associated with *causing* accidents and not just accident involvement overall.

If possible, future research should not only rely on self-report data and include the use of simulation tasks or observing the driver's behaviours whilst driving. Although this may be an expensive and risky task, and may not be able to be executed by all studies, a means to mitigate this would be to included dashboard recordings and/or for future research to control for certain variables involved in risky driving behaviour, such as age and driving experience. Furthermore, future research needs to be conducted in the area of insurance-related programmes and driving behaviours and/or MVA involvement in SA. As not many research in this area exists.

Due to the fact that the measures used in this study have not been used often in South African research, it is imperative for future research to elucidate the factor structure of driver anger, risky driving behaviour and attitudes towards traffic safety, specifically, within the South African context. The reliability of the scales for a South African study population should be noted, as this study did not do so.

6. CHAPTER SIX: Conclusion

The present study contributes to literature by exploring risky driving behaviour amongst a predominantly student sample and considering the influence of insurance rewards and penalties on driving behaviour. Statistical analyses compared the data between individuals who had been in a MVA (as a driver), their demographics and the following instruments; DBQ, ATTS and DAS. Preliminary investigations were ran, such as Frequencies, Means and Standard Deviations tests as well as Correlation Matrices on all key variables in the study.

To answer the research question: How much of the variance in Risky Driving Behaviour is uniquely attributed to each of the following; Age, gender, driver anger and attitudes towards traffic safety both Correlations and Stepwise Regression analyses were performed. Some of the correlations had significant relationships amongst given variables, namely; Age, driver anger and all four domains of the attitudes towards traffic safety (See Table 3). A Stepwise Regression was performed on key variables of the study indicated by the analyses as having a strong influence on risky driving and MVA involvement, namely; age, driver anger and attitude domains. As predicted by the TRA, the study found that a strong predictor of risky driving behaviour is predicted by attitudes of the driver. It was determined to have statistically significant effect on risky driving behaviours, all excluding speeding which had no statistically significant effect on risky driving behaviours.

Further analyses were ran, as significant relationships between variables were found, a series of Logistic Regression analyses was run to further answer the research question: The likelihood of being involved in a MVA as a driver depending on specific variables; such one's age, gender, driver anger, risky driving behaviour, attitudes (violations, speeding, other drivers' risk taking and drunk driving) and insurance rewards and insurance penalties. These logistic regression analyses were found to have no statistically significant effect on the odds

of being involved in a MVA as a driver, outside of age. Significant age differences were found to influence the involvement in MVA.

However it should be noted that the limitations in analysing risky driving behaviours and MVA involvement, which should be better operationalised and questioned more clearly in future research. The study suggests, by its lack of incorporation, that, studies and society need to explore and develop initiatives to address risky driving behaviour whilst considering a variety of human factors, especially psychological factors such as driver attitudes and anger as significant factors. According to the results of this study, it is suggested that gender plays a significant role in MVA involvement and risky driving behaviour and should be considered amongst other variables. These findings have implications for road safety programmes and insurance driving reward and penalty policies, which should endorse more focus on addressing driver anger and driver attitudes towards safety, rather than only focusing on the use of cell phones whilst driving or putting up driving safety billboards.

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APPENDIX A: Demographic Schedule Questions

Please select from the drop down options the applicable response option to all of the following questions.

1. Please indicate your age range:
    a. 18 to 24 years old
    b. 25 to 34 years old
    c. 35 to 44 years old
    d. 45 to 54 years old
    e. 55 to 64 years old
    f. 65 to 74 years old
    g. 75 years or older
2. Please indicate to which gender you most identify?
    a. Male
    b. Female
    c. Transgender male
    d. Transgender female
    e. Non-conforming
    f. Not listed: Please specify
    g. Prefer not to answer
3. Please indicate your highest level of education:
    a. Not complete high school
    b. High school/GED
    c. Some college diploma
    d. Bachelor's Degree
    e. Master's Degree
    f. Post graduates degree
4. How long have you been driving as a licensed driver?
    a. 0 to 1 years
    b. 2 to 3 years
    c. 4 to 5 years

d. 6 years or more

5. Which roads do you most frequently drive:
    a. City
        i. Yes
        ii. No
    b. Rural
        i. Yes
        ii. No
6. Please specify, on average, how long you spend driving on the road each week, in hours?

e.g. 12 hours

7. Have you been involved in a Motor Vehicle Accident or Accidents before?
    a. Yes
    b. No
8. Have you been involved in Motor Vehicle Accident or Accidents as a:
    a. Driver
        i. Yes
        ii. No
    b. Passenger
        i. Yes
        ii. No
9. How many times have you been involved in a Motor Vehicle Accident or Accidents over the past 5 years?
10. How long ago were you involved in a Motor Vehicle Accident? Please cite your most recent encounter
    a. 0 to 1 years
    b. 2 to 3 years
    c. 4 to 5 years
    d. 5 years or more
11. What was your positioning during this recent Motor Vehicle Accident?
    a. The driver
    b. The passenger

c. The onlooker

12. Were there any fatalities involved?
    a. Yes
    b. No
13. Do you have an insurance policy which serves as a motivating factor to your driving, whom:
    a. No
    b. Yes

    10.1. If yes, does your insurer:

    a. Reward good driving behaviour
        i. Yes
        ii. No
    b. Penalise bad or poorer driving behaviour
        a. Yes
        b. No

APPENDIX B: Driver Behaviour Questionnaire (DBQ)

Below are some behaviours that can occur whilst driving. Please indicate using the 5-point scale below, how often you have done some of these behaviours whilst driving.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5

Never A little Sometimes Often Always

1	Miss seeing a “Give Way" sign and just avoid colliding with traffic	1	2	3	4	5
2	Go into an intersection so far that a driver with right of way has to stop and let you out.	1	2	3	4	5
3	When turning left, nearly hit a bicycle rider who has come up on your left.	1	2	3	4	5
4	Attempt to overtake someone that you had not noticed was signaling a right turn.	1	2	3	4	5
5	Fail to notice that pedestrians are crossing when turning into a side street from a main road.	1	2	3	4	5
6	Fail to check your rear-view mirror before pulling out, changing lanes, etc.	1	2	3	4	5
7	Brake too quickly on a slippery road.	1	2	3	4	5
8	Misread the signs and exit from a roundabout on the wrong road.	1	2	3	4	5

9	Queuing to turn left onto a main road, you pay such close attention to the traffic on the main road that you almost hit the car in front.	1	2	3	4	5
10	Switch on one thing, such as the headlights, when you meant to switch on something else, such as the wipers.	1	2	3	4	5
11	Hit something when reversing that you had not previously seen.	1	2	3	4	5
12	Attempt to drive away from traffic lights in the wrong gear.	1	2	3	4	5
13	Disregard the speed limit on a freeway or rural highway.	1	2	3	4	5
14	Disregard the speed limit on a residential road.	1	2	3	4	5
15	Race away from traffic lights with the intention of beating the driver next to you.	1	2	3	4	5
16	Enter an intersection knowing that the traffic lights have already changed against you.	1	2	3	4	5
17	Overtake a slow driver on the left.	1	2	3	4	5
18	Drive so close to the car in front that it would be difficult to stop in an emergency.	1	2	3	4	5
19	Forget where you left your car in a car park.	1	2	3	4	5
20	Having set out to drive to one place, you suddenly realize you are on the road to somewhere else.	1	2	3	4	5

21	Realise that you have no clear memory of the road you have been travelling on.	1	2	3	4	5
22	Get into the wrong lane approaching a roundabout or intersection.	1	2	3	4	5
23	Underestimate the speed of an oncoming vehicle when overtaking.	1	2	3	4	5
24	Use your horn to indicate your annoyance to another road user.	1	2	3	4	5
25	Become angry at another driver and chase them with the intention of showing them how angry you are.	1	2	3	4	5
26	Get angry at a certain type of driver and express your anger any way you can.	1	2	3	4	5
27	Stay in a lane that you know will be closed ahead until the last minute before forcing your way into the other lane.	1	2	3	4	5

APPENDIX C: Attitudes towards Traffic Safety Measure – Short Form (ATTS)

Please indicate using the 5-point scale below, to how much you agree or disagree to the statements below in reference to you.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5

Fully agree Agree Somewhat agree Disagree Fully disagree

1	It is acceptable to take chances when no other people are involved.	1	2	3	4	5
2	There is no point to stop at a red light if no other car is around.	1	2	3	4	5
3	Traffic rules are often too complicated to be practiced in real-life.	1	2	3	4	5
4	Many traffic rules must be ignored to ensure traffic flow.	1	2	3	4	5
5	Taking chances and breaking a few rules does not necessarily make bad drivers.	1	2	3	4	5
6	Punishment for speeding should be more restrictive and punitive.	1	2	3	4	5
7	It makes sense to exceed speed limits to get ahead of “Sunday drivers” or lax-slow drivers.	1	2	3	4	5
8	When road conditions are good and nobody is around driving at 100 km/hr on most roads is ok (despite speed limits).	1	2	3	4	5
9	If you are a good driver it is acceptable to drive a little faster.	1	2	3	4	5
10	I will ride with someone who speeds if others do.	1	2	33	4	5
11	I will ride with someone who speeds if that is the only way to get home at night.	1	2	3	4	5

12	It is my responsibility to speak up against careless driving.	1	2	3	4	5
13	I would never drive after drinking alcohol.	1	2	3	4	5
14	I would never ride with someone I knew has been drinking alcohol.	1	2	3	4	5

APPENDIX D: Driver Anger Scale (DAS)

Imagine that each situation described below was actually happening to you and rate the amount of anger that would be provoked.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5

None at all A little Sometimes Much Very much

1	Someone is weaving in and out of traffic.	1	2	3	4	5
2	A slow vehicle on a mountain road will not pull over and let people by.	1	2	3	4	5
3	Someone backs right out in front of you without looking.	1	2	3	4	5
4	Someone runs a red light or stop sign.	1	2	3	4	5
5	You pass a radar speed trap.	1	2	3	4	5
6	Someone speeds up when your try to pass him/her.	1	2	3	4	5
7	Someone is slow in parking and is holding up traffic.	1	2	3	4	5
8	You are stuck in a traffic jam.	1	2	3	4	5
9	Someone makes an obscene gesture toward you about your driving.	1	2	3	4	5
10	Someone honks at you about your driving.	1	2	3	4	5

11	A bicyclist is riding in the middle of the lane and is slowing traffic.	1	2	3	4	5
12	A police officer pulls you over.	1	2	3	4	5
13	A truck kicks up sand or gravel on the car you are driving.	1	2	3	4	5
14	You are driving behind a large truck and you cannot see around it.	1	2	3	4	5

APPENDIX E: Participant Information Sheet

Title of Study: Risky Driving Behaviour As Predicted by Driver Anger and Attitudes

26 March 2018

Dear Prospective Participant,

Hello, my name is Kayleigh Green. I am conducting research which forms part of my MA (Clinical Psychology) degree. This research study aims to explore and gain an understanding of some of the ways in which drivers think about their own driving choices as well as the choices that other drivers make on the road. It is hoped that this research will give us some important insights into some of the challenges people encounter on the road, and most importantly how they make sense of them. These are important factors in understanding driving behaviours. And I would like to invite you to participate in this research.

Your participation is completely voluntary and there will be no benefits to participation in this research. Participants' identity will remain completely anonymous as no identifying information will be collected in this research. Should you wish not to participate you may decline or withdraw from the online survey at any time without being negatively affected in any way whatsoever. Since no identifying information will be available to link you as a participant to your responses or data in particular, we will not be able to give you feedback in this regard. The data collected in this research will only be accessible by my research supervisor and myself. In the unlikely event that participation in this research leaves you feeling distressed, you may contact the South African Depression and Anxiety Group (SADAG) on (011) 234- 4837 for free telephonic psychological services. These details will be displayed again at the end of participation, should you decided to proceed. Your consent will be implied by completing the online survey.

Should you choose to participate, select the option to consent to participation in the study, you will then be requested to answer the questions that follow as honestly as possible. This survey should take you approximately 20 to 30 minutes to complete. The data gathered in this study will be kept in a secure file (on a password-protected computer) and will not be made available to any third parties, apart from my research supervisor. By completing the online survey, which will indicate that you have provided permission for your data to be used for the analysis of this report. As well as reporting, and possible publication or conference presentations.

Should you have any further questions concerning this research study, please feel free to contact me or my supervisor (see below for contact information). Furthermore, should you be interested in the findings of this research study, a summary can be made available to you by contacting me after July 2019. My contact details appear below.

Thank you for taking the time to read this invitation and for considering participating in this study.

Kind regards,

Ms Kayleigh Green

Researcher

E-mail: kayleighc.green@gmail.com

Dr Esther Price

Research Supervisor & Course Coordinator

E-mail: esther.price@wits.ac.za

APPENDIX F: Ethical Clearance

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (SCHOOL OF HUMAN & COMMUNITY DEVELOPMENT

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: MCLIN/18/003 IH**
PROJECT TITLE:	Risky behaviour as predicted by driver anger and attitudes
INVESTIGATORS	Green Kayleigh
DEPARTMENT	Psychology
DATE CONSIDERED	29 May 2018
DECISION OF COMMITTEE*	Approved

This ethical clearance is valid for 2 years and may be renewed upon application

DATE: 29 May 2018

CHAIRPERSON
(Dr Esther Price)

cc Supervisor: Dr Esther Price
Psychology

DECLARATION OF INVESTIGATOR (S)

To be completed in duplicate and **one copy** returned to the Secretary, Room 100015, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure, as approved, I/we undertake to submit a revised protocol to the Committee.

This ethical clearance will expire on 31 December 2020

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES