Vehicle related crime and future sales in the South African automotive industry

Research Article

written by

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DECLARATION

I,Tapiwa Elisha Bande, student number 849594, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements of the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Tapiwa Elisha Bande

Signed at…..Parktown……on the……10th…….day of ……..June..……2021

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Thank you to my wife and kids. They have stood with me through the flames and high waters of this life. They are my support system, my private oasis and slice of sunshine on a cold rainy day. I thank them for the sacrifices they made when the ravages of warfare in the trenches of this research project became almost unbearable and the endeavour looked like a lost cause.

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Thank you to Monique Diaz for the critical role she played in making sure I had a research supervisor under difficult conditions.

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Thank you to Dr Renee Horne for agreeing to take over as my supervisor and seeing this research work to its final conclusion.

And now, to the only wise God and Saviour Jesus Christ, be glory and majesty, dominion and power, both now and forever. Amen.

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Abstract

This research was a cross-sectional study aimed at discovering the impact of vehicle related crime on future sales in the South African automotive industry. The product was a framework to help managers and marketing practitioners in the automotive industry to realise that vehicle related crime was an aftermarket experience of their customers. The research suggested initiatives that can be used to mitigate against potential negative consequences of vehicle related crime on future vehicle sales. From extant literature and the theory of planned behaviour, hypotheses were developed about the relationship between vehicle related crime and future sales. Measurement scales were developed and used to design a self-administered online survey for collecting experiential data from the industry's customers. Constructs of interest were analysed using structural equation modelling. Structural equation modelling was a parametric statistical technique that was executed using statistical software such as SPSS Amos Version 26, SPSS Statistics Version 25 and R-Studio. Maximum likelihood estimation was chosen in the software packages during analysis to generate statistical parameters that were used to make inferences about the collected experiential data. There were some insights gleaned from the research results. Confirmatory evidence was found which showed that vehicle related crime induced trauma in individuals. It was estimated that 34.5% of the trauma symptoms present in economically active South Africans could be attributed to vehicle related crime. The results showed that trauma drove an inclination towards substituting the use of motor vehicles with alternative means of transportation. It was also deduced from statistical parameters and the current state of various transport modes in South Africa that users of automobiles did not yet see a viable, safe and flexible alternative. This became a constraining factor on their ability and perceived control with respect to switching or reducing their intention to purchase motor vehicles in the short to medium term. However, managers in the automotive industry were advised to commission further and more granular research to understand the impact of crime on their brands and the individual models within their portfolios. The contribution of this research was a framework for further research and a tool to help managers, marketing practitioners and planning professionals in the South African automotive industry to become aware of the potential threat of vehicle related crime to their future business.

1 Introduction

1.1 Background

According to Eagle (2015), Kaminer, du Plessis, Hardy and Benjamin (2013) and Stats SA (2018), South Africans have become more sceptical about crime in the country. Statistical records show that there was an increase in aggregate crime for the 2017/2018 reporting period. Stats SA (2018)'s Victims of Crime Survey (VOCS) provides figures for the most common and feared crimes among South Africans. The statistics provide five of the most feared crimes in the country.These are house breaking, home robbery, robbery outside the home, murder and sexual assault respectively (Stats SA, 2018). Responses by victims of crime in South Africa to two of the most feared crimes are documented in official national statistical records. Broadly, the various responses indicate an attempt to prevent further experience with crime (Villareal & Silva, 2006). As an example, South Africans have responded to crime by installing security measures to protect homes and have acquired firearms (Stats SA, 2018).

Despite these responses and measures, crime has persisted (Pieterse, 2015). Installing security systems or acquiring firearms implies an attempt by victims to keep and maintain association with their valuable assets. However, a new trend or preference is emerging among home buyers for example. The trend has seen an increase in the number of properties purchased in enclosed residential estates or secure complexes (Greaves, 2018). It is a trend driven by the occurrence of household crime. As a result of crime, home buyers are moving away from perceivably unsafe residential areas. This response behaviour mirrors the concept of avoidance as a coping mechanism found in trauma literature (Bonanno & Mancini, 2012; Silver, Holman, McIntosh, Poulin, & Gil-Rivas, 2002). Similarly, the heinuos crimes of child abuse and human trafficking have resulted in prevention strategies that aim to minimise or eliminate situations that expose people to the crimes (Conte, Wolf, & Smith, 1989). Political violence has resulted in people migrating to other countries living behind their homes (Williams & Pradhan, 2009).

It can be observed that crimes ranked higher and lower than car jackings and car theft on Stats SA (2018)'s list have solicited serious reactions from victims or society. In

most of the responses, victims have tended to avoid the targeted object of crime such as an asset or environment. It can be envisaged that a decline in sales of residential properties in areas perceived as insecure or unsafe (Stats SA, 2018) will be experienced as a response to crime.

Like a house, a motor vehicle is one of the significant purchases that individuals and families make in their lifetime. A motor vehicle is a high value item that requires a considerable investment of energy in due diligence prior to purchase. It can be reasonably expected that the after-purchase experience around motor vehicles for individuals and families has a strong bearing on how they perceive and relate to them in the future. Managers in the automotive industry generally consider the after-sale experience of their customers in terms of technical quality, aesthetics, service quality and value for money (Waligora & Waligora, 2007). Quality is considered from the perspectives of customer expectations, vehicle technical specifications or general aesthetics preferred in the markets. Managers have never considered vehicle related crime as an after-market experience.

1.2 Research problem statement

The relationship between vehicle related crime and vehicle sales has never been examined in South Africa. It is not yet known whether the impact of vehicle related crime will negatively affect future sales or not. This research intends to quantify the effect of vehicle related crime on future sales of automobiles in South Africa. The following tasks are anticipated:

1. Establishing constructs from extant literature that define relationship elements between vehicle related crime and the future vehicle purchasing behaviour of South Africans. This will lead to the development of questions used to probe the attitudes of customers of the South African automotive industry regarding crime and their future purchasing behaviour.
2. Selecting and communicating with a representative automotive industry customer population group in South Africa. Experiential information about vehicle related crime and future purchasing behaviour will be solicited.
3. Developing an architecture of statistical paths among the constructs defining correlation, causal and mediation relationships.

4. Performing statistical analysis to provide parameters that can be used to make inferences about the relationships between the constructs.

1.3 Research justification

The automotive manufacturing sector is estimated to directly employ 30300 individuals in South Africa (Vermeulen, 2018). Upstream and downstream, the automotive sector is estimated to sustain the employment of close to 900000 workers in retail sales, component manufacturing and other support services (Brand South Africa, 2012; De Lange, 2017). An adversarial impact on sales in the industry will result in the loss of jobs for many individuals. Huge costs in terms of severance compensation for the industry and tax revenue loss for the government would be experienced. The automotive industry contributes close to 8% of the national GDP exerting both downstream and upstream impact in the economy (Jordaan, Dinham, Fieldgate, & Rolland, 2018). Automotive manufacturing activities contribute close to 30% of the overall manufacturing sector's 13% GDP contribution to South Africa's economy (De Lange, 2017). The sector contributes close to 16% of the country's exported merchandise (Jordaan et al. 2018). With the GDP growth rate expected to be below 1% (Stats SA, 2019) and with an official unemployment rate pegged at 29.1% (Stats SA, 2019), it is important for automotive industry managers to maintain a comprehensive dashboard of factors that impact sales performance in the industry.

Crime is a factor that has lacked attention, yet it represents a significant potential to impede sales growth in the South African automotive industry. It is necessary to investigate the impact of crime on future sales in the automotive industry and to give managers a more comprehensive data set for use during sales and operations planning.

1.4 Research scope

This research work will be limited to the South African market for the automotive industry. The work will survey individuals living in South Africa in order to gauge their experiences, attitudes and future intentions to purchase motor vehicles in the context of vehicle related crime. The research will target a wide demographic spectrum in order to be as representative as possible of the South African population.

1.5 Research assumptions

The following assumptions will be carried in this work:

1. There are sufficient and appropriate platforms that can be used to survey a population of purely South African citizens and long-term residents.
2. The statistical distribution of response data will fit a theoretical model that can be analysed to produce results that are representative of the South African automotive market.
3. A sufficiently large number of responses and quality data can be obtained to execute acceptable statistical analysis.

2 Literature review

2.1 Theory of planned behaviour

In the work of Ajzen (1987), the theory of planned behaviour (TPB) is developed. Successive refinement work such as Ajzen (1991) provides further elaboration on the theory. It is a recognised theory used by many researchers as a framework for developing models to predict human behaviour (Hegner, Fenko, & Teravest, 2017). The TPB provides three broad factors that can be used to predict the future behaviour of individuals. These are “attitude, subjective norms and perceptions of behavioural control” Ajzen (1987).

Attitude in the context of TPB is the degree to which an individual is positively or negatively disposed to carrying out a particular behaviour. In this research, the main behaviour of interest would be purchasing or using a vehicle in the future. The TPB suggests that the more negative the attitude, the less likely a target behaviour would be carried out. Subjective norms in the TPB are the social pressures that drive an individual to perform a particular behaviour. The main influence would be the opinions and attitudes of persons or groups that are respected or valued by the individual. When these persons or groups endorse or support a particular behaviour, the TPB predicts that an individual is likely to carry out the behaviour. In this research, this would imply that if persons or groups of people whose opinions or attitudes matter to the individual endorse or discourage the purchase or use of motor vehicles, then the individual will behave accordingly. Perceived behavioural control in TPB includes factors internal and external to the individual that enhance or impede an individual’s ability to perform a behaviour. In this research, behavioural control would encompass elements that support or impair the ability of an individual to purchase or use motor vehicles in the future.

An important tenet carried in the TPB is the prediction of behaviour from intention. The theory postulates that the most potent determination of future human behaviour is the extent to which individuals intend to carry it out. Many researchers In human behaviour have tested this theory and achieved empirical results that support the theory.

The elements presented in the discourse on the TPB, together with research findings based on the TPB will be used to guide the development of research constructs and relationships.

2.2 Psychological impacts of crime and victim response

In the case of house break-ins, robberies, murder and sexual assault, victims are subjected to trauma as they face the loss of valuables and threats to their physical well being. Traumatic experiences leave psychological scars that influence future decisions, attitutes and behaviours (Langton & Truman, 2014; Arsova, Manusheva, Kopacheva-Barsova, & Bajraktarov, 2016). Trauma possibly explains the fear observed among South Africans with regard to crime. In the housing market, South Africans, given a choice, tend to avoid certain types of residential properties when making a purchase decision (Greaves, 2018). In their study of trauma due to historical loss among American Indian people, Whitbeck, Adams, Hoyt and Chen (2004) identify avoidance as one of the symptomatic responses to trauma. A category of crime in South Africa that intimately exposes individuals to life threatening and traumatic experiences is vehicle related crime. Vehicle related crime includes incidents such as hijacking, theft of a motor vehicle or theft out of a motor vehicle (Stats SA, 2018). Trauma induced by vehicle related crime can be used as a proxy of the attitude of individuals towards the purchase and use of motor vehicles. Trauma can therefore be used to represent the attitude element proposed in the theory of planned behavior.

Questions arise on how a sustained presence of these crimes, at high levels in the country, will eventually influence consumer response action. In the case of motor vehicles, it is of interest in this research work, whether or not consumers will eventually avoid certain types of vehicle brands or the use of motor vehicles altogether in South Africa. It is also important to determine whether factors such as brand and customer loyalty, will play a mediating role in keeping the South African automotive industry immune to any adverse impacts of hijackings and thefts on sales. Theories relating trauma victims' experience to their future attitudes and behaviours will be explored.

2.2.1 Impact of direct traumatic experience

In their work on the analysis of individuals' responses to potential traumatic experience (PTE), Bonanno and Mancini (2012) introduce the concept of heterogeneity in the responses of different individuals. They argue that individuals experience different magnitudes of distruption to normal life and temporal effects when exposed to the same kind of PTE. Bonanno and Mancini (2012) identify four categories of possible individual response to PTE as illustrated in Figure 2-1.

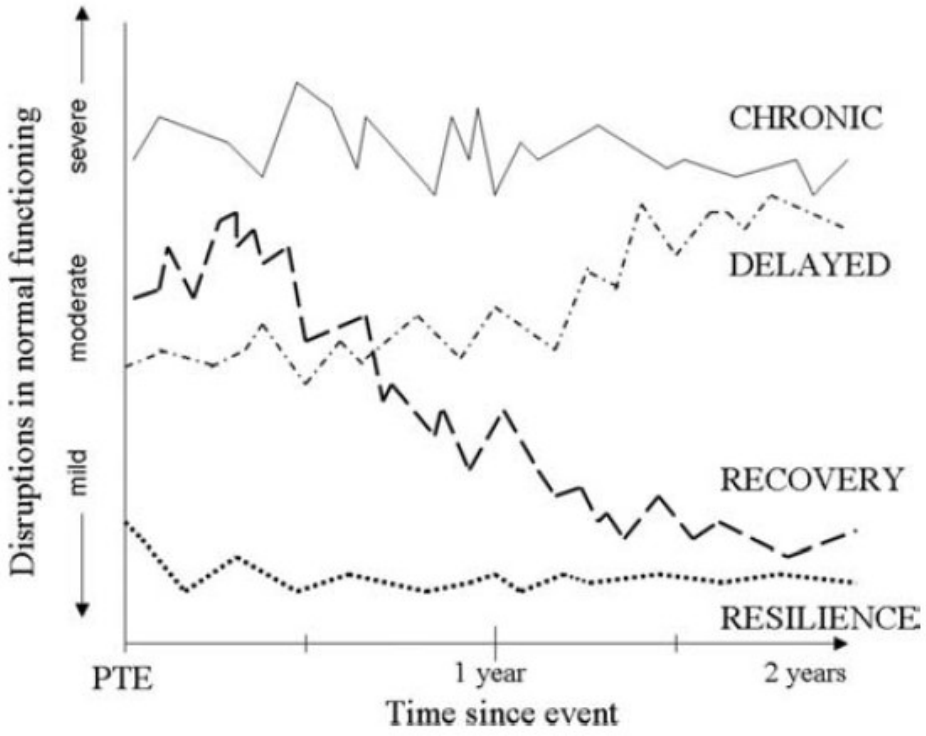


Figure 2-1 Prototypical patterns of disruption in normal functioning across time following potentially traumatic events (PTEs). Adapted from Bonanno and Mancini (2012).

A key assertion of Bonanno and Mancini (2012) is the notion that most individuals exhibit recovery or resilience after exposure to a PTE.

2.2.1.1 Risk factors affecting individual response to possible traumatic events

Silver, Holman, McIntosh, Poulin and Gil-Rivas (2002) introduce the notion that individual variability in response to potential traumatic events depends on individual inherent risk factors. These refer to particular attributes in individuals such as demographics, mental health, physical health, previous experiences of traumatic events, severity of experience and coping behaviours. The work of Silver et al. (2002)

concurs with that of Bonanno and Mancini (2012) with respect to heterogeneity of individual response. However, Silver et al. (2002) emphasize to a greater degree the concept of risk factors in individuals. In this research, due to the cross sectional nature of the study and the unavailability of resources to establish the health status of the study population prior to vehicle related crime, all past health related risk factors will be excluded. The study will focus on demographic risk factors such as gender, age and income. Coping behaviours and severity of exposure or loss (Silver et al., 2002) will also be included in the study. According to Bland et al. (2005) as cited in Bonanno and Mancini (2012) and in agreement with the findings of Silver et al. (2002) , there is significant evidence that individuals who experience more severe physical exposure and loss, exhibit more post traumatic stress disorder (PTSD) symptoms than those less exposed. As established in their study in the aftermath of the September 11 attacks in the USA, Silver et al. (2002) find that gender plays a significant role in traumatic response with women exhibiting a greater degree of PTSD than men.

2.2.2 Impact of indirect traumatic experience of others

Witnessing or hearing about violence on others, especially people known to the witness, can have traumatic effects similar to those experienced by the direct victim (Jaffe, Wolfe, Wilson, & Zak, 1986). Depending on contextual factors and individual attributes such as empathy, trauma handling skills and social support, secondary traumatic stress (STS) can be induced to varying degrees (Ludick & Figley, 2017). Secondary traumatic stress refers to the phenomenon where the trauma experienced by one person is internalised by another resulting in negative consequences for the latter (Figley, Yegidis, & Bride, 2003). When STS is left unabated, it can affect the ability of an individual to function in society. Dysfunction can be characterised by symptoms such as fear, withdrawal or avoidance, disappointment with humanity, impaired health and poor interpersonal relations (Ludick & Figley, 2017).

For STS to occur, an individual must become exposed to information relating to the trauma experienced by direct victims. Extant literature surrounding STS (Figley, Yegidis, & Bride, 2003; Ludick & Figley, 2017) is mainly focused on studying the phenomenon in caregiver professionals such as social workers, clinicians, lawyers, doctors etc, who deal directly with victims of trauma. However, information about the traumatic experiences of others is readily available to the general population through media such as television, newspaper, social platforms and the internet (Weitzer &

Kubrin, 2004). Weitzer and Kubrin (2004) find that there is variability in the impact that media has on consumers. They identify demographic factors such as gender, race, age and neighbourhood context as having significant influence on responses to information received from various media. This is in agreement with the findings of Bonanno and Mancini (2012) and Silver et al. (2002) who discuss the heterogeinity of response to PTEs and the effects of individual risk factors respectively. Information about others relating to their traumatic experiences can be linked to the subjective norms element in the TPB. The attititude of others is represented by the trauma they experience and information about it. This information is expected to inform the attitude of its recievers and their intentions to use or purchase motor vehicles in the future.

2.3 The buying decision and purchase intention

As already asserted in the TPB, Morwitz (2012) identifies purchase intention as a construct that strongly correlates to the purchase behaviour of individuals. It is a construct that is used by many marketing managers to forecast future sales (Morwitz, 2012). According to Wee, Ismail, and Ishak (2014), purchase intention is strongly influenced by the perceptions and attitudes of customers. Key to the development of attitudes, as argued in Wee, Ismail, and Ishak (2014), are customer perceptions about safety, health and general wellness. Such perceptions can be influenced by experiences around objects that can be potentially traumatic (Ludick & Figley, 2017). In the case of vehicle related crime, there is a perception that the motor vehicle, apart from potential road accidents, is a threat to safety, health and wellbeing because of crime (Arrive Alive, 2018). With reference to attitude and satisfaction theories (Fishbein & Ajzen, 1975, p. 6; Eagly & Chaiken, 1993; Oliver, 1997 as cited in Lee, Trail, Lee, & Schoenstedt, 2012), attitude is influenced by learning through information and direct experience with a product or an object. Moreover, some indirect associations with a brand or product such as unethical behaviors of supplier companies (Schmalz & Orth, 2012) and possibly frequent product targeting in crime, can impact negatively on consumer attitudes.

There are many individuals in South Africa who have had direct experience with vehicle related crime (Stats SA, 2018; News24, 2014). Information about vehicle crime in South Africa is readily accessible through various mediums (Weitzer & Kubrin, 2004; Stats SA, 2018) and can influence attitudes of customers of the automotive industry.

Due to the prevalance of vehicle related crime in South Africa (Stats SA, 2018), and the potential trauma associated with it (Bonanno & Mancini, 2012), negative attitudes towards the purchase of motor vehicles can be expected.

2.4 Factors affecting brand loyalty

2.4.1 Negative factors affecting brand loyalty

Negative information related to a brand has an adverse effect on company performance in terms of sales and profitability (Ahluwalia, Burnkrant, & Unnava, 2000). Negative personal experience with a brand also impacts negatively on the sales and profitability performanace of the brand owner. It has generally been observed in research (Friske, 1980 as cited in Ahluwalia, Burnkrant, & Unnava, 2000) that negative information and personal experience is given more weighting than positive information in the evaluation and perception formation of a brand. In their work, Schmalz and Orth (2012) discuss the buffering effects of brand attachment against negative information relating to an organisation. They conclude that the greater the negativity of the information against an organisation or its products, the more likely that even the most attached customers will habour negative emotions and attitudes towards the brand. For moderately negative information however, Schmalz & Orth (2012) find that highly attached customers remain relatively unaffected and will actively remain positive and defend the brand. This is affirmed in the research findings of Hegner, Fenko and Teravest (2017) who argue that customers who are highly attached and love their brands are more favourably disposed to forgive the mistakes and misgivings of their brands.

In the South African automotive industry, negative information about vehicle brands is available from various mediums including TV motoring shows, online reviews and word of mouth. This information is mainly concerned with technical and economic performance reviews of vehicles including reliability, power output, aesthetics and cost of onwership. Information is also available relating to vehicle brands that are frequently targeted by criminals for theft, hijacking or smash-and-grabs in South Africa (BusinessTech, 2017). Figures 2-2 and 2-3 show crime statistics related to various car brands.

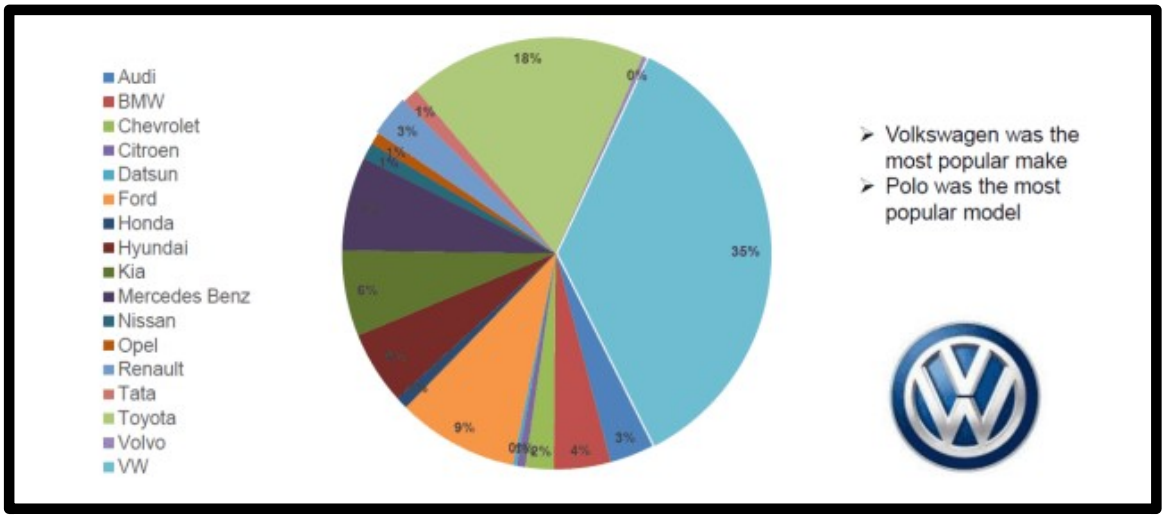


Figure 2-2 Passenger vehicles stolen or hijacked in South Africa. Source: Ctrak and Rentrak 2017 as cited on www.bluesecurity.co.za

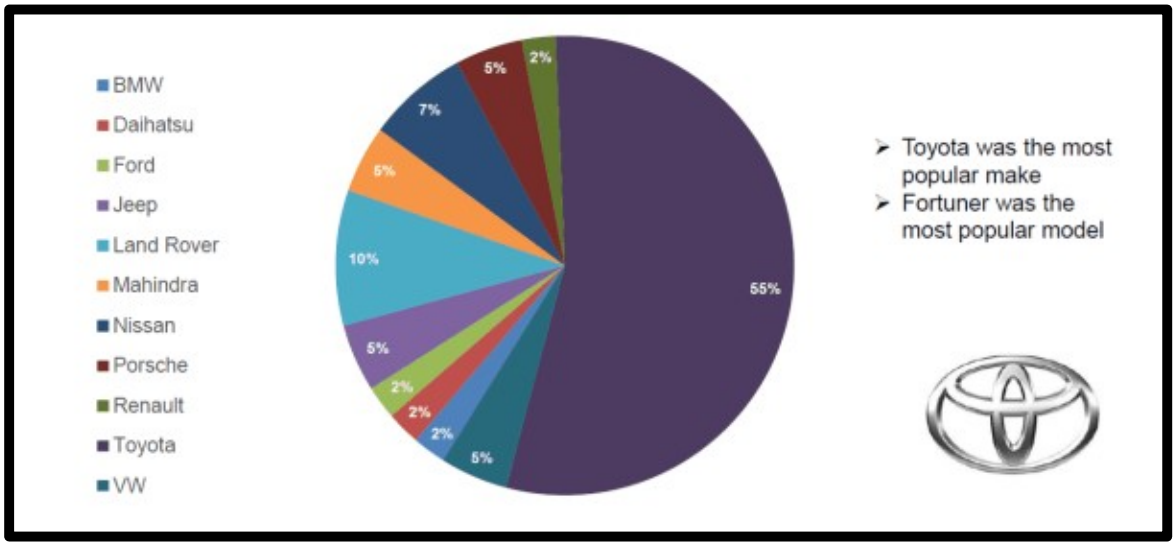


Figure 2-3 Sport utility vehicles (SUV) stolen or hijacked in South Africa. Source: Ctrack and Rentrak 2017 as cited on www.bluesecurity.co.za

Figures 2-2 and 2-3 indicate the proportions of vehicle models and brand names that are favourites among criminals for either theft or hijacking in South Africa. Blue Security Arrive Alive (2018) provides the definition of hijacking as “the unlawful, intentional and violent removal and appropriation of movable corporeal property belonging to another”. Often the violence involved in the crime of hijacking is life threatening as criminals separate the owner from their assets. Injury or loss of life occurs in some hijackings while the experience is highly traumatic for most victims (Twiggs, 2018). In the light of the high rate of hijackings in South Africa and the potential loss and trauma involved, the attitude of consumers towards vehicle brands and ownership is bound to change. Moreover, News24 (2014) cites a perceptual list of things South Africa ranks worst in the world. The list records South Africa as having the largest number of hijackings in the world.

Vehicle models and brands most targeted for theft or hijacking as indicated in Figures 2-2 and 2-3 are currently best-selling in the South African market (BusinessTech, 2017). Individual owners and their vehicles are targeted for hijacking or theft based on various criteria used by criminals (Van der Post, 2018). Criminals target vehicles that have a high demand in other African countries or for which spare parts are needed elsewhere. Vehicles that are considered status symbols and victims that are judged to offer low resistance are targeted (Stats SA, 2018). BusinessTech (2018) provides further characteristics used by South African criminals to select their victims for hijacking and robbery. These include people who withdraw large sums of money, wear expensive jewellery and generally project high income characteristics in public. BusinessTech (2017) cites Ctrack’s acknowledgement that “it is difficult for people to sell high risk vehicles”. In other words, it becomes more difficult to sell cars that are targeted by criminals because less customers are willing to buy them.

Citing the HSBC Expat Explorer Index, BusinessTech (2019) reported South Africa’s safety and security as the worst out of 31 countries surveyed for the index. Overall, the index placed South Africa on 29th out of 31 for countries where expatriates want to settle. Safety and security played a significant role in South Africa’s performance on the index. With respect to vehicle crime in South Africa, there are secondary industries that stand to benefit from the occurrence of hijackings and car thefts (CNBC Africa, 2014). These include anti-crime technology companies, insurance companies and anti-hijacking driving schools (CNBC Africa, 2014). However, the benefit to the

secondary industries is bound to be offset by the cost impact on the South African consumer and the economy at large.

2.4.2 Positive factors affecting brand loyalty

Brand attachment or commitment is described as a phenomenon where a customer forms cognitive and emotional bonds with a brand. Brand attachment is envisaged to result in brand loyalty which is an ongoing relationship with the brand (Thomson,MacInnis, & Park, 2005 as cited in Schmalz & Orth, 2012).

Belen del Rio, Vazquez and Iglesias (2001) describe the concept of brand functions as the associations that consumers make with a brand and which can generate brand equity for a company. These functions include guarantee, social identification, personal identification and status. The guarantee function of a brand speaks to the perception of reliability and quality associated with the brand. Social identification refers to the extent to which the brand allows its consumer to fit-in with their current or aspirational social group.

Personal identification is described as the extent to which a consumer perceives the brand to mirror or identify with their personal values or concept of self. The status function encampasses the perception of self distinction or prestige conveyed on the consumer by association with the brand. Belen del Rio, Vazquez and Iglesias (2001) argue that the more positive these functions are, the greater the consumer becomes loyal to the brand that provides them. Another finding by Belen del Rio, Vazquez and Iglesias (2001) is that brands positively providing these brand functions will see consumers prepared to pay higher premiums, recommending the brand to others and readily accepting brand extensions. Such brand functions should ultimately result in higher sales and business growth.

2.4.2.1 South African automotive industry structure

In the South African auto industry, there are various brands that compete and differentiate themselves on various brand functions. Extant literature points to constructs that can be used to analyse how automotive customers make a vehicle purchase decision. The constructs include brand reputation and brand loyalty (Loureiro, Sarmento, & Le Bellego, 2017).

Figure 2-4 shows the sales trends for various vehicle brands between August and December 2017.

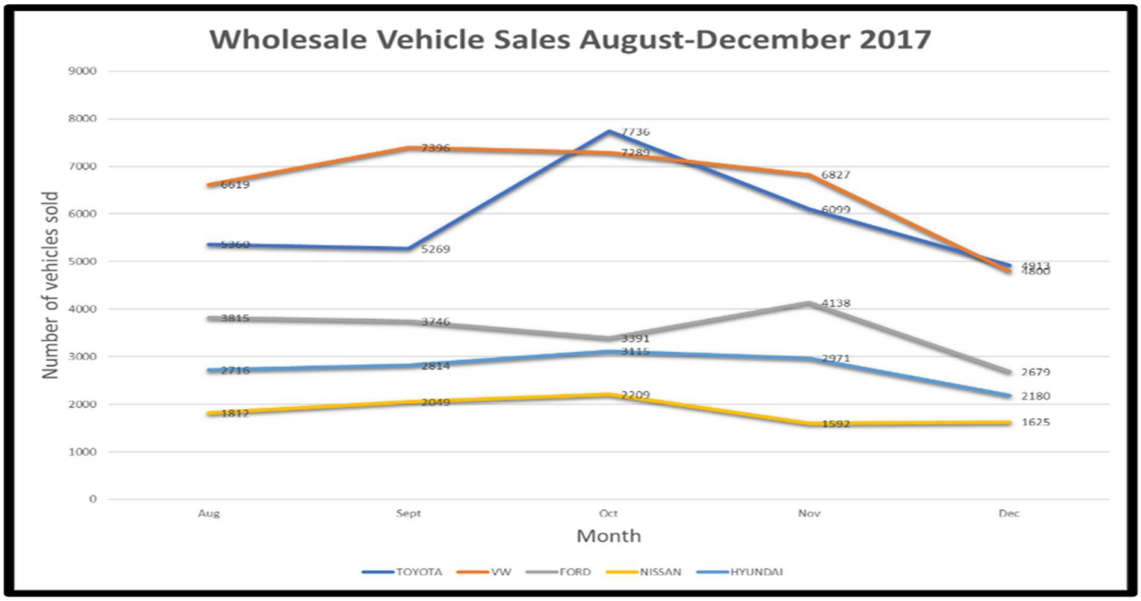


Figure 2-4 Wholesale vehicle sales August – December 2017. Data Source: Industry New Vehicle Sales, www.lightsoneauto.co.za

The sales numbers show that the best selling vehicle brands in South Africa are Toyota and VW. These are the same vehicle brands that are reported in BusinessTech (2017) as the most targeted for hijacking and theft. The high sales volumes for the top 5 vehicle brands appear to correlate with the high number of crime incidents associated with the vehicles. A shift in the perception of consumers as a result of high crime rates associated with the vehicles is envisaged in this research.The shift is anticipated to impact sales volumes negatively in the future.

The wholesale passenger vehicle segment is oligopolistic. The top 5 largest manufacturers and wholesalers account for close to 44% of the segment (Mabunda, 2018). An oligopoly is an industry structure consisting of a few large players competing for market share (Sampler, 1998; Janse van Rensburg, McConnell, & Brue, 2015). There are usually high barriers to entry for potential entrants. The passenger vehicle retail sales segment on the other hand has a monopolistic competition structure (Sampler, 1998; Janse van Rensburg, McConnell, & Brue, 2015). The dominant 5 retailers account for close to 34% of revenue in this segment (Mabunda, 2018). A monopolistic competition industry structure consists of a relatively large number of

players competing on differentiation (Sampler, 1998; Janse van Rensburg, McConnell, & Brue, 2015).

Zaichkowsky (2009) discusses the concept of consumer involvement. The concept is premised on the notion that depending on the nature of the service or product being purchased, consumers have varying degrees of the extent to which they search for information, evaluate alternatives and engage in post purchase evaluations. Consumer involvement is delineated into high and low consumer involvement. Zaichkowsky (2009), further subdivides the concept into two more dimensions. These consist of emotional and cognitive consumer involvement. Brand attachment (Park, MacInnis, Priester, Eisingerich & Lacobucci, 2010 as cited in Schmalz & Orth, 2012) involves emotional and cognitive links between an individual and a brand. A vehicle is a high involvement purchase item where individuals will consider all information surrounding their targeted purchase vehicle. High involvement and brand loyalty will potentially offer strong moderation against adverse effects of crime on purchase intention.

2.5 Drivers of substitute transportation modes

The availability of alternative modes of transport and their relevant market shares has a bearing on cross elasticity of demand between the modes (Fearnley, Nils, Currie, Graham, Flagel & Stefan, 2018). In a study to find the factors that drive users of public transport to switch between alternative modes, Fearnley et al. (2018) investigate the impact of technical and economic variables. Their study does not include the effects of social ills such as crime on demand elasticity but provides important antecedents for users of various modes of transport to switch between modes. These include the availability of viable alternatives serving the same market in a geographical area, relatively low switching costs and significant relevant market shares of the various modes of transport.

In South Africa, the passenger transportation industry is dominated by minibus taxis, public buses and a metro rail service. Figure 2-5 shows the respective market shares of the various personal transport modes in South Africa.

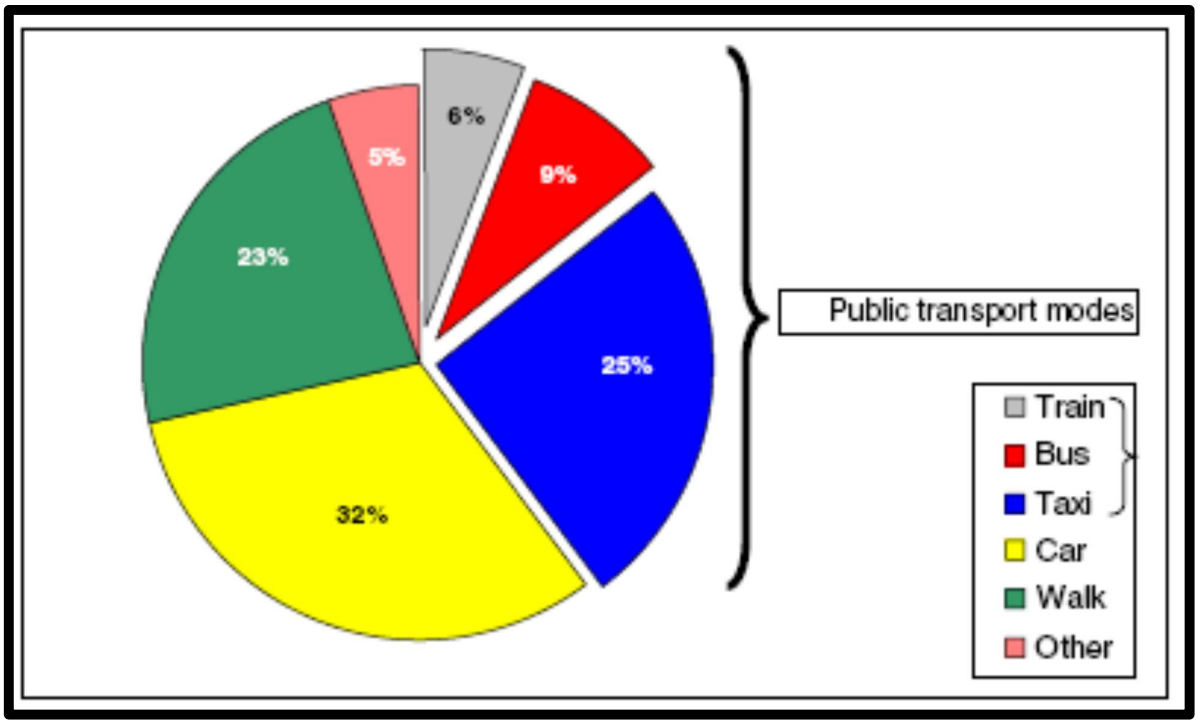


Figure 2-5 Personal transport mode market share in South Africa. Source: NHTS as cited in Walters (2008)

The public transport sector in South Africa constitutes 40% of the market share. 25% of the 40% is allocated to mini bus taxis (Walters, 2008). Private vehicles constitute 32% of the transport mode market share. Based on the antecedents for switching transport modes provided by Fearnley et al. (2018), it would seem that South Africans are likely to switch between the use of private vehicles and mini bus taxis when certain variables related to the two modes change. When switching from private vehicle use to public mini bus taxis is considered, the switching cost is very low. Mini bus taxis in South Africa provide more flexiblity and closer access to location destinations when compared to rail and bus modes (Walters, 2008). The flexibility and geographical coverage of mini bus taxis is comparable to that provided by private vehicle use. A variable of interest in this research is the social ill of vehicle related crime and its potential to induce switching from private vehicle use to public transportation.

Switching is possible between brands of motor vehicles as customers are exposed to various sources of information (Weitzer & Kubrin, 2004; Schmalz & Orth, 2012) about the brands. Vehicle customers form brand associations (Murtiasih, Sucherly, & Siringoringo, 2012) using available information. This happens during the information

search stage (Zaichkowsky, 2009) in the purchase decision process. A vehicle brand associated with and perceived as a target of crime is likely to suffer from switching in favour of less vulnerable brands. Negative brand associations created from non marketing word of mouth (WOM) will have a disproportionately negative effect (Ahluwalia, Burnkrant, & Unnava, 2000) on brand loyalty leading to switching to other competing brands. Information about vehicle brands as targets of crime in South Africa is readily available and accessible to the population. This can be seen from sources such as Stats SA (2018) and BusinessTech (2018). From the theory of planned behaviour, the availability of viable alternatives(Fearnley et al., 2018) would constitute an element of perceived external control where the individual becomes limitated in their ability to perfom the behaviour of switching brands or the use of motor vehicles.

2.6 Hypotheses and research conceptual frame work

2.6.1 Hypothesis 1 - Vehicle related crime positive impact on trauma

From the negative experiences of individuals with vehicle related crime and the anticipated resultant negative attitudes postulated from the TPB, the following hypothesis is formulated:

Hypothesis 1-(H1-null): *The experience of vehicle crime in South Africa induces lingering trauma on users of motor vehicles.*

Hypothesis 1-(H1-alternative): *Vehicle related crime does not induce trauma on users of motor vehicles.*

2.6.2 Hypothesis 2 - Individual risk factors positively impact trauma

Individual risk factors as argued by researchers such as Bonanno and Mancini (2012) and Silver et al. (2002) are anticipated to positively affect the intensity of trauma due to vehicle related crime.

Hypothesis 2-(H2-null): *Individual risk factors positively determine the intensity of trauma due to vehicle related crime.*

Hypothesis 2-(H2-alternative): *Individual risk factors do not positively impact the intensity of trauma due to vehicle related crime.*

2.6.3 Hypothesis 3 - Trauma of others positively affects secondary trauma

Based on the work of Jaffe, Wolfe, Wilson, and Zak (1986) and Figley, Yegidis and Bride (2003) in the field of secondary trauma development, the following hypothesis is fomulated:

Hypothesis 3-(H3-null): *Information about the traumatic experience of others regarding vehicle related crime induces secondary trauma in recipients of the information.*

Hypothesis 3-(H3-Alternative): *Information about the traumatic experience of others does not induce secondary trauma in recipients of the information.*

2.6.4 Hypothesis 4 – Vehicle crime negatively affects purchase intention

Premised on attitude and association theories (Lee, Trail, Lee, & Schoenstedt, 2012) and customer perception studies (Wee, Ismail, & Ishak, 2014), the trauma of vehicle related crime is anticipated to impair the intention to purchase motor vehicles. The following hypothesis is formulated:

Hypothesis 4- (H4-null): *Individual trauma due to vehicle related crime impairs the intention to purchase a vehicle in the future.*

Hypothesis 4- (H4-Alternative): *Trauma due to vehicle related crime does not impair the intention to purchase a vehicle in the future.*

2.6.5 Hypothesis 5 - Negative brand association negatively affects purchase intention

As argued in the work of Ahluwalia, Burnkrant and Unnava (2000), the concept of negative associations relating to the trauma of vehicle related crime around vehicle brands, is anticipated to impair purchase intention and loyalty to those brands. The following hypothesis is formulated:

Hypothesis 5 – (H5-null): *The trauma induced by vehicle related crime negatively impacts vehicle brand loyalty.*

Hypothesis 5 – (H5-Alternative): *The trauma induced by vehicle related crime does not affect vehicle brand loyalty.*

2.6.6 Hypothesis 6 - Brand loyalty positive effect on purchase intention

The methods and tools used by businesses to consolidate brand loyalty among their customers (Belen del Rio, Vazquez, & Iglesias, 2001) help to develop stronger intentions to purchase the brands. It is anticipated that customers who have stronger brand loyalty, are likely to purchase the brands even though there may be some negative brand associations. The following hypothesis is formulated:

Hypothesis 6 – (H6-null): *Brand loyalty has a positive effect on purchase intention mitigating against the effects of vehicle related crime.*

Hypothesis 6 – (H6-Alternative): *Brand loyalty does not have a positive effect on purchase intention against the effects of vehicle related crime.*

2.6.7 Hypothesis 7 - Vehicle crime trauma positively affects the intention to substitute

As argued by Fearnley et al. (2018), the conditions for switching from one mode of transport to another include the availability of viable alternatives that are safer and hold a significant market share. Due to the presence of various possible alternative modes of transport in the South African market, the following hypothesis is formulated:

Hypothesis 7 – (H7-null): *The trauma induced by vehicle related crime will lead to switching from using private vehicles to public transport or other modes of transport less prone to crime.*

Hypothesis 7 – (H7-Alternative): *The trauma induced by vehicle related crime will not lead to switching from private to public or other modes of transportation.*

2.6.8 Hypothesis 8 – Intention to substitute negatively affects purchase intention

As a natural consequence of the intention to substitute or switch from private vehicle used to alternative modes of transportation, the following hypothesis is formulated:

Hypothesis 8 – (H8-null): *The intention to substitute the use of motor vehicles will lead to a decline in the purchase intention for private motor vehicles.*

Hypothesis 8 – (H8-Alternative): *The intention to substitute the use of motor vehicle will not lead to a decline in the purchase intentions for motor vehicles.*

2.6.9 Research Conceptual Framework

The literature reviewed has identified factors that are independent to the trauma construct and others that are dependent on the trauma construct. Some constructs can be classified as mediators between trauma and the final construct of intention to purchase. The intention to purchase construct is the main construct in this research that will be used to predict the future purchase behaviour of research participants. The conceptual framework in Figure 2-3 will be the basis of research analysis.

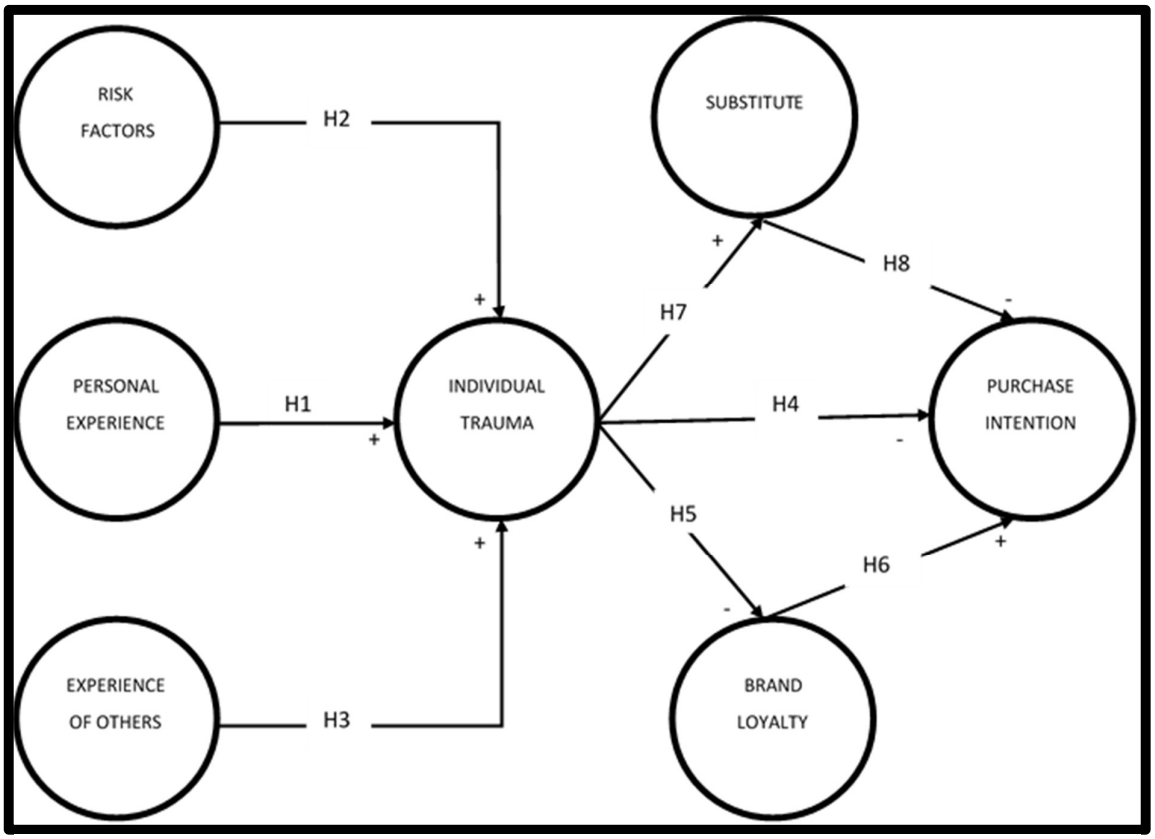


Figure 2-3 Research conceptual framework diagram

3 Methodology

3.1 Research design model

3.1.1 Methodological technique

The constructs envisaged in this research were depicted in the conceptual model in Figure 2-3. The constructs and their hypothesized relationships were derived from the review of extant literature. This research sought to discover behavioural changes of customers of the automotive industry in South Africa caused by vehicle related crime. More specifically the impact on motor vehicle purchase intention was investigated. The constructs were categorised as latent or unmeasured variables (Wright, 1921 as cited in Hox & Bechger, 2000). Latent variables were measured through observed or indicator variables (Hox & Bechger, 2000) using established scales where possible.

Analysis of the constructs and the research design model in Figure 2-3 lent itself to the use of structural equation modelling (SEM), a statistical technique extensively applied in behavioural sciences (Wright, 1921 as cited in Hox & Bechger, 2000).

Firstly, a measurement model was developed and tested for convergent and discriminant validity using the guidelines provided from the work of Ab Hamid, Sami and Sidek (2017). Statistical software applications including IBM SPSS Amos and R-Studio (lavaan) were used to generate the estimates for model fit, factor loadings, correlations and scale reliabilities (Hooper, Coughlan, & Mullen, 2008).

The structural model was also assessed using the same guidelines and statistical software packages. Model fit was assessed and parameter estimates were generated.

3.1.1.1 Coding of constructs

From psychology and sociology literature focusing on the influence of traumatic events on the functionality of individuals, various constructs were postulated. The researcher assigned codes to identify each construct. The final constructs identified and used in the analyses were risk factors (RSK), personal experience (AEP and PLP), experience of others (AEO and PLO), trauma (TRA), brand loyalty (BL), intention to substitute (IS) and intention to purchase (IP). The abbreviated codes for the constructs were explained as follows:

RSK – Personal Risk Factors
APE – Actual Personal Experience
PLP – Perceived Likelihood of Personal experience
AEO – Actual Experience of Others
PLO – Perceived Likelihood of Others experience
TRA – Trauma
BL – Brand Loyalty
IS – Intention to Substitute
IP – Intention to Purchase

3.1.2 Data collection and measurement

This research used a survey instrument generated from the scales of the measurement model. The instrument was self-administered online. Various online channels such as Email, WhatsApp, LinkedIn and Telegram were used to reach a random representative sample of the South African automotive customer population. Some of the latent variables were measured using established scales while others were measured using scales anticipated from literature and confirmed through an exploratory factor analysis. The established scales had proven validity and reliability which was further confirmed in the exploratory factor analysis. The proposed scales to measure the indicator variables were as follows:

3.1.2.1 Personal risk factors scale (RSK)

Extant literature (Bonanno & Mancini, 2012; Silver et al., 2002) pointed to variables that could be used to measure personal risk as relates to vulnerability to develop elevated trauma symptoms. Items including demographic variables (sex, age, race), mental health, personal income, coping strategies, previous trauma experiences and social support were identified as personal risk factors. These were expected to be one dimension of explanation for variance in trauma symptoms experienced after traumatic events by individuals. However, scales with acceptable validity were not readily available to be used directly or adopted. Previous research that used the risk factors identified had not provided clear and acceptable results with good reliability in the indicator variables for the risk factor latent variable. The risk factor construct was largely omitted from the research analysis.

3.1.2.2 Personal experience scale (APE & PLP)

In order to measure the latent construct of personal experience, items derived from the Negative Life Events Scale for Students (NLESS) (Buri, Post, Cromett, Landis, & Alliegro, 2015) and adapted to the general population of motor vehicle users was used. Students are a microcosm of society and can be considered a good representation of vehicle users. Many students drive vehicles and encounter most of the experiences common to the general population of vehicle users in the country. Compared to other event experience scales, The NLESS focuses on measuring long term life events as opposed to short term events (Buri et al., 2015). The experience of vehicle related crime is a long-term event that can have effects projected long into the future. The NLESS presents various events that may be experienced by an individual and then asks them to rate the levels of stress anticipated or experienced. The scale has been found to demonstrate good potential for predictive efficacy. Events that were used in this study were the experiences of hijacking, theft of a motor vehicle and theft out of a motor vehicle as described in Stats SA (2018).

3.1.2.3 Experience of others scale (AEO & PLO)

The NLESS (Buri et al., 2015) was also used as a basis for the experience of others scale. Measurements were based on questions that were asked with regards to the experience of others. Questions were modelled around the same events of hijacking, theft of motor vehicles and theft out of motor vehicles.

3.1.2.4 Personal trauma scale (TRA)

Trauma measurement scales exist with many items that can be adapted to the current study interest. The Davidson Trauma Scale (DTS) is a short and convenient self-report measure of trauma (McDonald, Beckham, Morey, & Calhoun, 2009). The DTS demonstrates good internal consistency (alpha 0.97) showing better results than other trauma questionnaires (Norris & Hamblen, 2004 as cited in McDonald, Beckham, Morey, & Calhoun, 2009, p8). The DTS was adapted to this current research by selecting appropriate measurement items to represent trauma from self experience and the experience of others. Items for this research from the DTS included painful images, memories or thoughts of the event, feelings of event reccurrence, upsetting reminders of the event, avoidance of event thoughts, and avoidance of situations that

remind of the event. These items were used to generate questions for self reporting trauma.

3.1.2.5 Intention to substitute scale (IS)

Extant literature provides measures of the intention to substitute construct based on negative affect indicator variables (Revilla-Camacho, Vega-Vázquez, & Cossío-Silva, 2017). Negative affect indicator variables have shown composite reliability above 0.7. In this research, negative affect generated from the trauma was anticipated to fuel the intention to substitute the private vehicle mode with other modes of transport or certain brands with others. Items used as bases for survey questions included, feelings of safety, feelings of loss, switching costs, availability of viable alternative and the wellbeing of others.

3.1.2.6 Brand loyalty scale (BL)

Brand loyalty for motor vehicles was measured based on the refined four item scale of (Odin, Odin, & Valette-Florence, 2001). The items measured were; I am loyal to one car brand, I will purchase same car brand on next purchase, I will always buy same car brand and I usually buy the same car brand. This scale is found to have a high alpha of 0.96 and an intercorrelation among the items of 0.88 (Odin, Odin, & Valette-Florence, 2001). A Likert scale ranging from 1 (totally disagree) to 5(totally agree) was used.

3.1.2.7 Purchase intention scale (IP)

Spears and Singh (2004) provide a five item scale with an alpha coefficient of 0.96 and a composite alpha of 0.97. The items that were measured using the adapted scale used a 5 point Likert scale ; never (1) / definetly (5), Definitely do not intend(1)/ Definitely Intend (5), Very low purchase interest(1)/Very high purchase interest(5), Definitely not buy it(1)/ Definitely buy it(5) and Probably not buy(1)/ Probably will buy it(5). The questions on the survey instrument for this latent construct were based on these items from the Spears and Singh (2004) scale.

3.1.3 Designing the survey instrument

The collection of data for the research was done by means of a survey instrument and administered entirely online. The discussion of the latent constructs and their indicator variables in the foregoing section informed all the questions in the survey instrument.

Qualtrics was the design platform of the survey instument. A copy of the survey instrument was included in Appendix A.

3.1.4 Data Analysis

Data collected through the qualtrics platform was exported to SPSS software programs and Excel. It was used in analysis and generation of statistical estimates required to draw insights. Estmates on model fit, reliability and validity of the contructs and the values of factors and coefficients for the models were generated. The statistical analysis method employed was structural equation modelling (SEM). SPSS ver 25, SPSS Amos ver.26 and R-Studio (lavaan) were used. Analytical graphical models were generated using the software packages.

3.1.4.1 Univariate and multivariate normality

Structural equation modelling is a parametric statistical technique premised on the assumption that the data being analysed follows a multivariate normal distribution (Suhr, 2006). There is significant variability in the views of various researchers and statisticians with regards to the acceptable criteria for normality tests (Trevethan, 2020). Univariate normality is considered a necessary but not sufficient condition for multivariate normality (Johnston, Mokhtarian, & Gao, 2008). Sample size is another factor that influences the criteria for normality tests (Kim, 2013). Using skewness and kurtosis as measures of univariate normality, Kim (2013) provided a guide for checking univariate normality. For a sample size of 50 -300, Kim (2013) suggested using the z parameter. z is the ratio of the skewness or kurtosis to its standard error. Kim (2013) provided the criteria for univariate normality as $z < |3.29|$. In this research, the z-statistic was used to assess univariate and multivariate normality since the sample size was within the 50 -300 size range. Visual inspections of histograms and Q-Q plots were used in addition to judge the normality of the research variables data. Multivariate normality was measured using the Mardia coefficients of multivariate skewness and kurtosis in conjunction with Chi-squared Q-Q plots (Johnston, Mokhtarian, & Gao, 2008). According to Johnston, Mokhtarian and Gao (2008), the Mardia coefficient of kurtosis can be used on its own to test multivariate normality. They argue that a critical ratio value of 1.96 or less at the 0.05 level of significance indicates multivariate normality.

3.1.4.2 Maximum likelihood estimation

Structural equation modelling assumes univariate and multivariate normality of data. The presence of various degrees of non-normality within collected data lends the determination of statistical parameters to estimation. The maximum likelihood estimation method calculates the most probable parameter estimates for the data according to an assumed distribution (Taboga, 2017). Assuming normal distribution in the data collected, the maximum likelihood estimation approach for estimating parameters was chosen in the statistical software packages used in all analysis.

3.1.4.3 Convergent (composite reliability) and discriminant validity

According to Engellant, Holland and Piper (2016), convergent validity is the extent to which each indicator variable measures the latent variable on the latent variable's scale. Discriminant validity is the extent to which latent variables diverge from each other and do not have correlation (Ab Hamid, Sami, & Sidek, 2017). The convergent validy of a variable scale is also an assessment of reliability as measured by a composite reliability estimate (Ursachi, Horodnic, & Zait, 2015).

The composite reliability was calculated for each scale using the average variance extracted formula (Engellant, Holland , & Piper, 2016). The generally accepted minimum standard for composite reliabilty on any scale is 0.7.

Discriminant validity was assessed based on a comparison of composite reliability of each latent variable and the correlations between them (Ab Hamid, Sami, & Sidek, 2017). The value of correlation between any pair of latent constructs should be less than the composite reliability of each construct. All correlations between any pair of latent variables were compared with each of their composite reliabilities.

3.1.4.4 Model fit statistics

Parameters that must be reported for assessment of statistical model fit include the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR). The generally accepted criteria for good model fit indices are CFI ≥ 0.90, TLI ≥ 0.90, RMSEA < 0.08 and SRMR < 0.08 respectively (Kline, 2010; Hooper, Coughlan, & Mullen, 2008). In this research, the identified criteria for model fit indices were used to determine model fit for both the measurement model and the structure model.

3.1.5 Ethical considerations in research

In the works of Moreno, Goniu, Moreno, & Diekema (2013) and Emery (2014), privacy, informed consent, confidentiality and vulnerable groups are identified as the main ethics issues related to online research. Since this research involved the use of a partially automated self-administered online survey generated from a Qualtrics system, these ethics issues were addressed.

3.1.5.1 Privacy

Privacy is a right that entitles an individual to protect information about them from being made publicly available. Social media platforms observe this right by allowing users to control, through the platform settings, the extent to which any identifying information they post becomes available to the general public (Moreno et al., 2013). This research sent out an anonymous link to participants that did not collect any personal identifiers. The participants were informed that the research was anonymous and for academic purposes only. Therefore, the privacy requirement was met by maintaining anonymity and excluding any individual identifiers in any report that may be published. The report that was generated did not have any information pertaining to any individual participant.

3.1.5.2 Informed Consent

Informed consent is based on an individual's ability to competently and legally agree to participate in research or to provide personal information (Ketefian, 2014). From a competence perspective, the ability of the participant to ask questions and clarify issues with the researcher is paramount (Emery, 2014). According to Emery (2014), it is good ethics to provide a mechanism for a participant to interact with the researcher at any point during an online survey so as to clarify any concerns and then to only proceed after receiving full information. This research provided a survey instrument with a consent form as the first page. The informed consent page provided clear details about the purpose of the research and the anticipated use of the information collected. A mechanism for interaction between the researcher and participant was provided by means of contact email and a social media platform through which the participants could be contacted. All contact with participants was made through common social media platforms so that participants could communicate or give feedback to the researcher at any point during the survey.

3.1.5.3 Confidentiality

Both Moreno et al. (2013) and Emery (2014) identify risk to confidentiality from the perspective of private and personally identifying information potentially being exposed in the public domain through incompetent third parties performing outsourced functions after data collection. Hacking of data storage systems is also identified as a potential risk. This research used a Qualtrics generated survey instrument that anonymously stored all participant responses on a secured password protected database controlled by the university. Confidentiality was further protected by the exclusion of any personal identifying features on individual response data sets. There was no outsourcing of any function to third parties that included access to and saving of the individual responses on another system that did not belong to the researcher or the university.

3.1.5.4 Vulnerable groups

Children and minors below 18 years of age and the mentally impaired were considered vulnerable groups (Ketefian, 2014) in this research. The consent form included a clause for the participant to acknowledge that they are above the age of 18. The platforms used to contact the participants were those that only those without mental impairment could competently use. Therefore, this research activity was designed to avoid the involvement of identified potentially vulnerable groups.

4 Results and data analysis

4.1 Target population and sample

A self-administered Qualtrics generated anonymous link survey was sent to individuals over the internet through various platforms. The platforms included LinkedIn, WhatsApp, ResearchGate, Telegram and Email. A total of 254 responses were received of which 238 contained complete data sets suitable for statistical analysis. Based on the sample size calculator of Soper (2021) as supported by the works of Cohen (1988) and Westland (2010), a usable sample size of 238 was found to be acceptable. The final structural equation model for this research consisted of 8 latent variables and 26 indicator variables. For an effect size of 0.3, statistical power of 0.8 (Cohen, 1988) and a significance level of 0.05, the research model required a minimum sample size to detect effect of 177. A sample size of 166 was required for the model structure. Therefore, a usable sample size of 238 was found to be acceptable. The target population was mainly individuals in the middle and upper class who constitute economically active groups. The target groups coincided with the main market for the automotive industry as they are more likely to be empowered to purchase motor vehicles. From the literature, 32% of transport users in South Africa use private motor vehicles (Figure 2-5).

4.2 Descriptive statistical results

This section presents descriptive statistics for the variables identified in the research model design.

4.2.1 Personal risk factors

There was no single factor to represent personal risk factors as originally anticipated in the research design. The personal risk factor construct was largely excluded from inferential statistics as a result. However, a simple regression analysis between the identified risk factor items in the rotated component matrix (Table 4-10) and the trauma construct was carried out to identify any that had statistically significant parameter estimates.

Four components in the rotated component matrix were selected for analysis based on their loadings or number of items in a component. They were assigned names as in Table 4-1 according to the risk items they were loading onto.

Table 4-1 Component names for risk factor items identified from EFA

Component Assigned Name	Risk Item	Risk Item Description
Age	RSK2	Age
Health	RSK6 RSK7	Physical health Mental health
Support	RSK9c RSK11c RSK12c	Social support Emotional support Positivity
Avoidance	RSK10c	Avoiding reminders

Tables 4-2 and 4-3 show the results of the simple linear regressions.

Table 4-2 Regression model summary for selected risk factor components and trauma (TRA)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	Change Statistics: F Change	Change Statistics: df1	Change Statistics: df2	Change Statistics: Sig. F Change
1	.168[a]	.028	.012	.99704	.028	1.695	4	233	.152

a. Predictors: (Constant), Avoidance, Support, Age, Health

Table 4-3 Regression coefficients for selected risk factors and trauma (TRA)

Coefficients[a]

Model		Unstandardized Coefficients: B	Unstandardized Coefficients: Std. Error	Standardized Coefficients: Beta	t	Sig.
1	(Constant)	.879	1.714		.513	.609
	Age	.062	.106	.038	.586	.558
	Health	-.037	.087	-.028	-.421	.674
	Support	-.067	.088	-.050	-.757	.450
	Avoidance	.129	.056	.151	2.307	.022

a. Dependent Variable TRA_c

Only Avoidance had a significant p-value of 0.151 at the 0.05 level of significance. Avoidance was chosen as a proxy to indicate trauma in individuals and cross tabulated with selected personal risk factors. The cross tabulation was used as an approximate indication of the influence of the selected risk factors on the development of trauma symptoms in individuals. Personal risk factors related to individual economic activity potential were chosen for cross tabulations with avoidance. They were selected based on the assumption that they are good representative attributes of customers of the South African automotive industry. The attributes included age, ethnicity, gender, income and education.

4.2.2 Gender composition

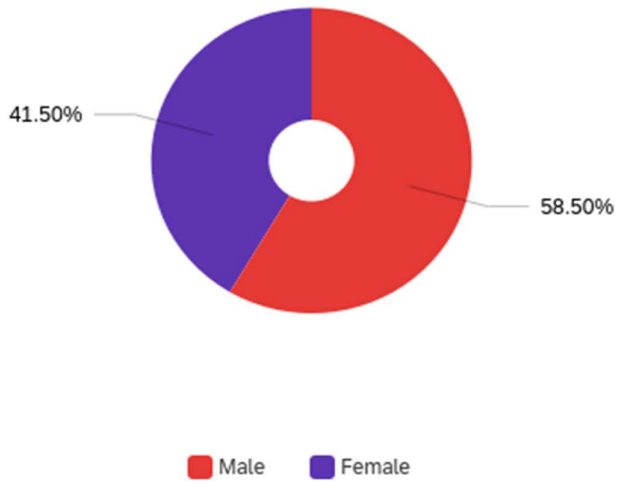


Figure 4-1 Gender composition of sample

The gender ratios of 41.50% female and 58.50% male mirrored closely the South African gender labour ratios found in the World Bank's data reflecting 45.47% female and 54.53% male as reported in Trading Economics (2020). Some researchers (Silver et al., 2002) assert that females tend to exhibit lingering trauma more than males. Using the Avoidance factor as a proxy for proclivity towards developing trauma, this assertion seemed to be supported from the cross tabulation results in Table 4-4. 35.1% of females compared to 24.1% of males indicated that avoiding reminders of traumatic experiences described them moderately well. 19.6% of females compared to 11.3% of males indicated that avoiding reminders of traumatic events described

them very well. 4.1% of females compared to 2.8% of males indicated that avoiding reminders of traumatic events described them extremely well. Overall, 58.8% of females compared to 38.2% of males indicated that avoidance described them at least moderately well. Therefore, the assertions of Silver et al. (2002) seemed to be supported.

Table 4-4 Crosstabulation of gender and avoidance

RSK1 (Gender)			Avoidance					Total
			18.00	19.00	20.00	21.00	22.00	
rsk1	Male	Count	50	37	34	16	4	141
		% within rsk1	35.5%	26.2%	24.1%	11.3%	2.8%	100.0%
	Female	Count	26	14	34	19	4	97
		% within rsk1	26.8%	14.4%	35.1%	19.6%	4.1%	100.0%
Total		Count	76	51	68	35	8	238
		% within rsk1	31.9%	21.4%	28.6%	14.7%	3.4%	100.0%

4.2.3 Age distribution of sample

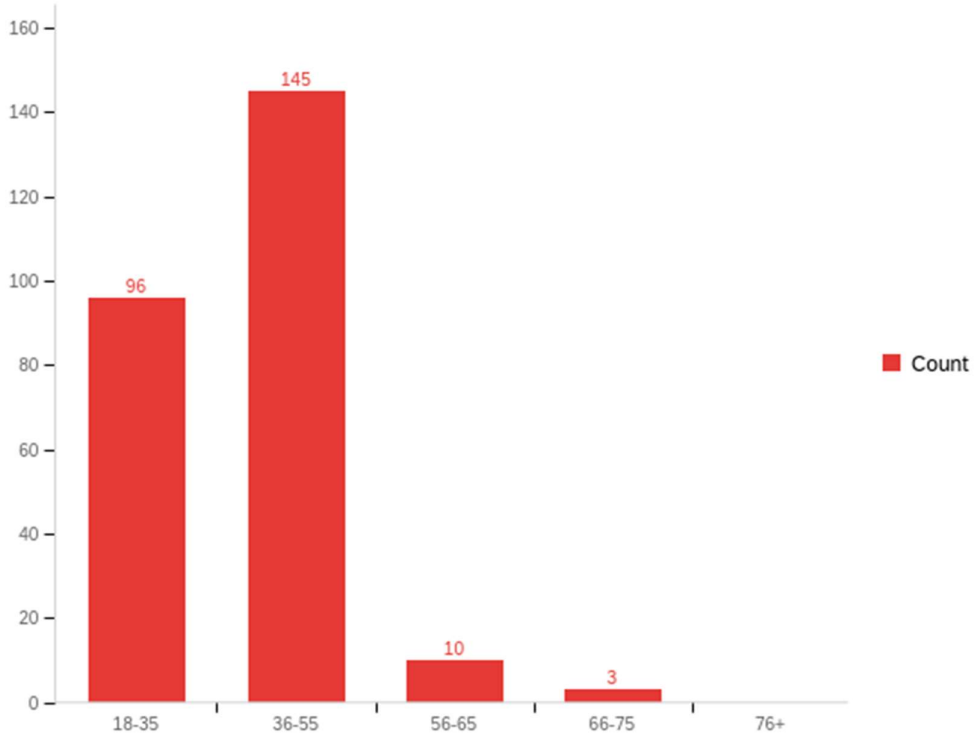


Figure 4-2 Sample age distribution

The two age groups 18-35 and 36-55 corresponded with the economically active age groups in South Africa. The survey used a Likert scale rated from 1 to 5 with 1 corresponding to the 18-35 age group while 5 corresponded with the 76+ age group.

No respondent was found in the 76+ age category as might be expected for the economically active population. Table 4-5 is a cross tabulation of age and avoidance.

Table 4-5 Crosstabulation of Age and Avoidance

RSK2 (Age)			Avoidance					Total
			18.00	19.00	20.00	21.00	22.00	
(Age)	18-35	Count	29	18	29	12	4	92
		% within rsk2	31.5%	19.6%	31.5%	13.0%	4.3%	100.0%
	36-55	Count	41	31	36	21	4	133
		% within rsk2	30.8%	23.3%	27.1%	15.8%	3.0%	100.0%
	56-65	Count	3	2	3	2	0	10
		% within rsk2	30.0%	20.0%	30.0%	20.0%	0.0%	100.0%
	66-75	Count	3	0	0	0	0	3
		% within rsk2	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Total		Count	76	51	68	35	8	238
		% within rsk2	31.9%	21.4%	28.6%	14.7%	3.4%	100.0%

Of the participants who indicated that avoidance described them either moderately well or very well, there were 44.5% of the 18-35 years olds, 42.9% of the 36-55 and 50% of the 56-65 year olds. It appeared, therefore, that there was a general increase in use of avoidance as age increased.

4.2.4 Ethnic count of sample

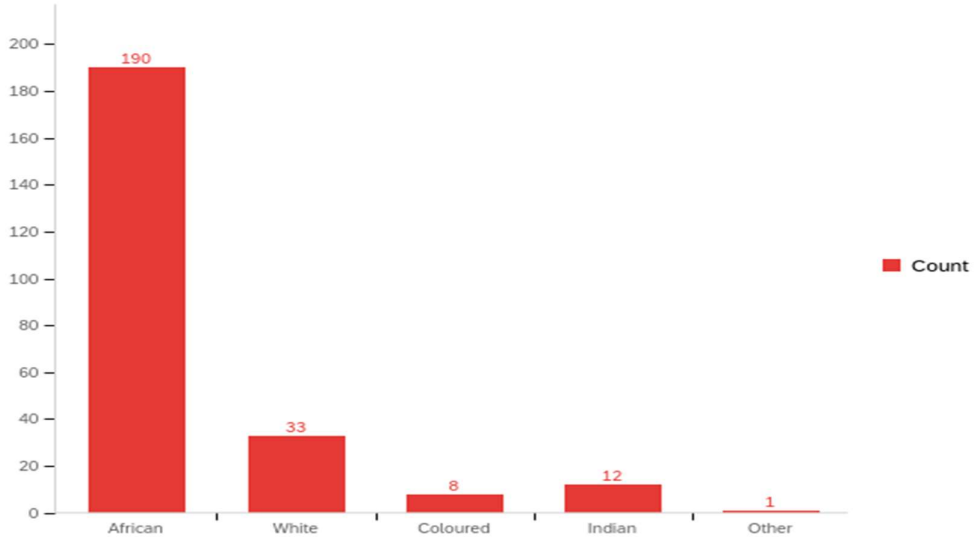


Figure 4-3 Ethnicity of the study sample

The percentages of the ethnic groups represented in Figure 4-3 compared reasonably well with those from Index Mundi (2020) which showed black African 80.9%, colored 8.8%, white 7.8%, Indian/Asian 2.5%.

Table 4-6 Crosstabulation between Ethnicity and Avoidance

RSK3 (Ethnicity)			Avoidance					Total
			18.00	19.00	20.00	21.00	22.00	
rsk3	African	Count	56	38	53	30	7	184
		% within rsk3	30.4%	20.7%	28.8%	16.3%	3.8%	100.0%
	White	Count	11	6	11	3	0	31
		% within rsk3	35.5%	19.4%	35.5%	9.7%	0.0%	100.0%
	Coloured	Count	2	3	2	2	1	10
		% within rsk3	20.0%	30.0%	20.0%	20.0%	10.0%	100.0%
	Indian	Count	7	3	2	0	0	12
		% within rsk3	58.3%	25.0%	16.7%	0.0%	0.0%	100.0%
	Other	Count	0	1	0	0	0	1
		% within rsk3	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Total		Count	76	51	68	35	8	238
		% within rsk3	31.9%	21.4%	28.6%	14.7%	3.4%	100.0%

50% of coloured, 48.9% of African, 45.2% of white and 2% of Indian individuals among the participants indicated that avoidance described them at least moderately well. The count for the white, colored and Indian groups was, however, relatively small compared to the African group. This made it difficult to deduce a trend from an acceptable sample size.

4.2.5 Income distribution of study sample

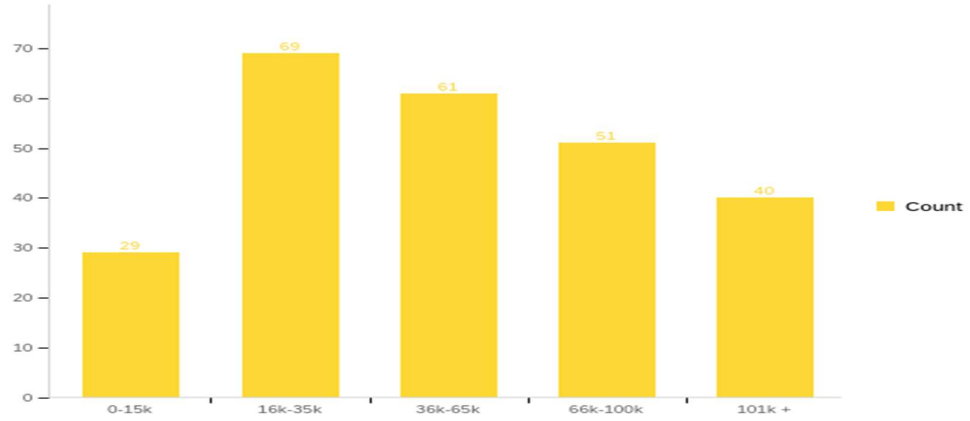


Figure 4-4 Income distribution of sample

The income groups were rated on a Likert scale from 1 to 5. 1 represented the 0-15k income group while 5 represented the R101k+ income group. Income was denoted in South African rands. Further descriptive statistics are displayed in Table 4-7.

Table 4-7 Crosstabulation of Income and Avoidance

RSK4 (Income)			Avoidance					Total
			18.00	19.00	20.00	21.00	22.00	
rsk4	0-15k	Count	8	6	10	2	2	28
		% within rsk4	28.6%	21.4%	35.7%	7.1%	7.1%	100.0%
	16k-35k	Count	18	11	24	9	2	64
		% within rsk4	28.1%	17.2%	37.5%	14.1%	3.1%	100.0%
	36k-65k	Count	22	13	14	9	1	59
		% within rsk4	37.3%	22.0%	23.7%	15.3%	1.7%	100.0%
	66k-100k	Count	16	11	14	7	2	50
		% within rsk4	32.0%	22.0%	28.0%	14.0%	4.0%	100.0%
	101k +	Count	12	10	6	8	1	37
		% within rsk4	32.4%	27.0%	16.2%	21.6%	2.7%	100.0%
Total		Count	76	51	68	35	8	238
		% within rsk4	31.9%	21.4%	28.6%	14.7%	3.4%	100.0%

The counts for the various income groups were within the same order of magnitude. 49.9% of those in the 0-15k, 54.7% in the 16-35k, 40.7% in the 36-65k, 46% in the 66-100k and 40.5% in the 101k+ income groups indicated that avoidance described them at least moderately well.

4.2.6 Education level descriptive statistics of study sample

Education was rated in increasing order from 1 to 8. The senior certificate was rated 1 while PhD level education was rated 7. Other education was rated 8.

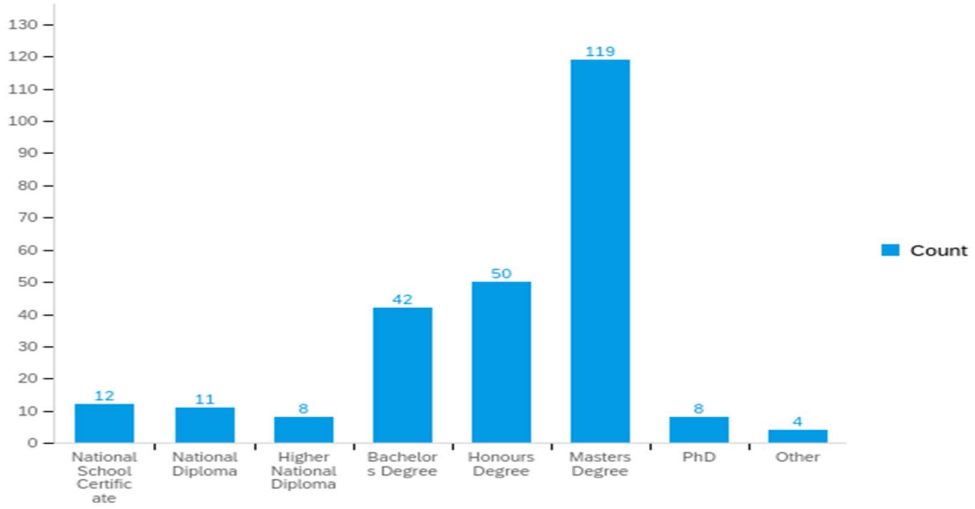


Figure 4-5 Education level count of the study sample

Further descriptive statistics for education level distributions are provided in Table 4-8.

Table 4-8 Crosstabulation of Education and Avoidance

RSK5 (Education)			Avoidance					Total
			18.00	19.00	20.00	21.00	22.00	
rsk5	National School Certificate	Count	3	3	2	2	1	11
		% within rsk5	27.3%	27.3%	18.2%	18.2%	9.1%	100.0%
	National Diploma	Count	2	1	5	0	0	8
		% within rsk5	25.0%	12.5%	62.5%	0.0%	0.0%	100.0%
	Higher National Diploma	Count	1	3	3	1	0	8
		% within rsk5	12.5%	37.5%	37.5%	12.5%	0.0%	100.0%
	Bachelors Degree	Count	16	9	6	6	2	39
		% within rsk5	41.0%	23.1%	15.4%	15.4%	5.1%	100.0%
	Honours Degree	Count	15	12	11	8	0	46
		% within rsk5	32.6%	26.1%	23.9%	17.4%	0.0%	100.0%
	Masters Degree	Count	35	22	36	16	5	114
		% within rsk5	30.7%	19.3%	31.6%	14.0%	4.4%	100.0%
	PhD	Count	4	0	2	2	0	8
		% within rsk5	50.0%	0.0%	25.0%	25.0%	0.0%	100.0%
	Other	Count	0	1	3	0	0	4
		% within rsk5	0.0%	25.0%	75.0%	0.0%	0.0%	100.0%
Total		Count	76	51	68	35	8	238
		% within rsk5	31.9%	21.4%	28.6%	14.7%	3.4%	100.0%

45.5% with National School Certificate, 62.5% with National Diploma, 50% with Higher Diploma, 43.9% with Bachelors, 41.3% with Honours, 50% with Master's and 50% with PhD qualifications indicated that avoidance described them at least moderately. The counts in some of the categories were too small to draw any statistically meaningful trends due to the small sample sizes.

4.2.7 Descriptive statistics for personal experience of vehicle related crime

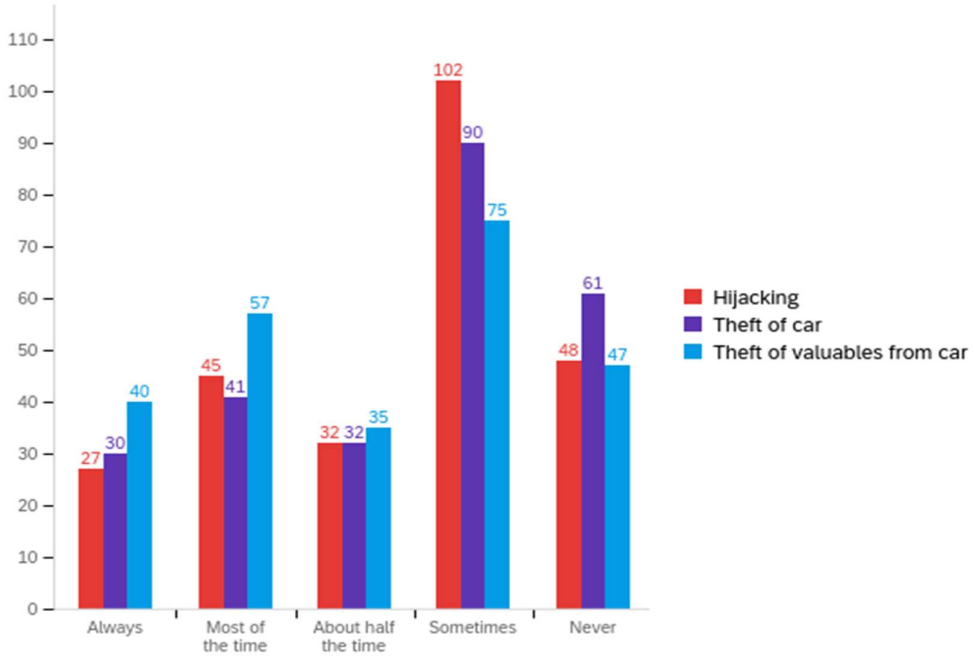
Vehicle related crime was divided into three categories as described in the South African government and police statistical records (Stats SA, 2018). The three categories were hijacking, theft of motor vehicle and theft of valuables from motor vehicles. Questions were asked to the participants to indicate their actual personal experience (APE) and perceived likelihood of personally experiencing vehicle related crime (PLP).

4.2.7.1 Actual experience of motor vehicle crime (APE)

The following question was presented to participants and their responses were rated as follows:

Question: **How often do you feel at risk of actually experiencing or nearly experiencing the following crimes related to motor vehicles?**

Ratings**: 21- Always to 25 - Never**



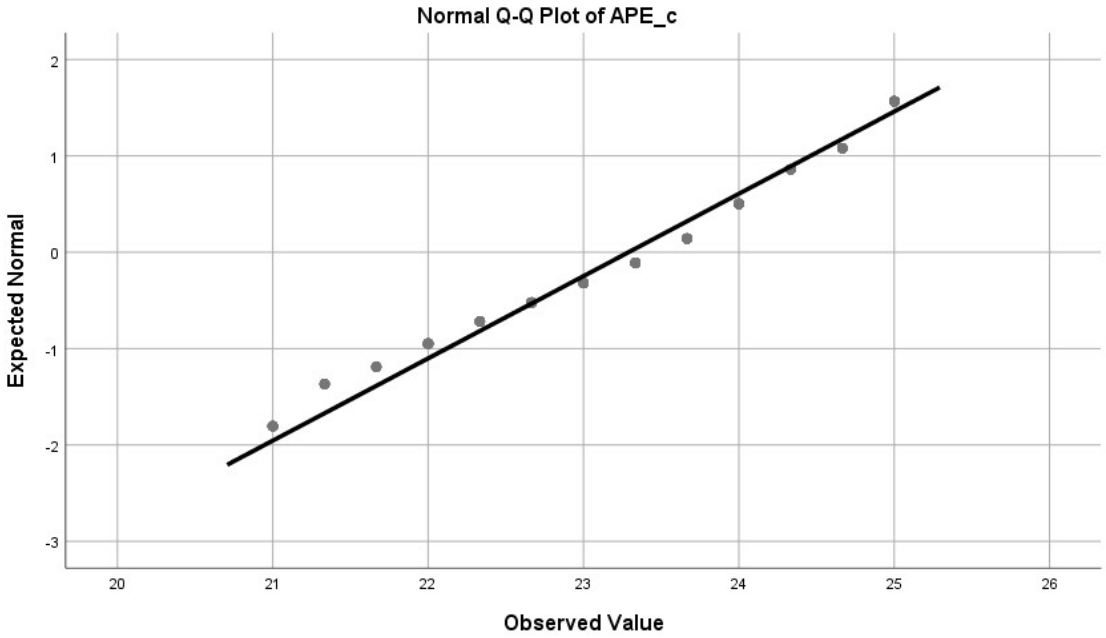


Figure 4-6 Q-Q plot for actual personal experience (APE)

The z parameter for skewness was 2.35 and 2.55 for kurtosis. According to criteria suggested by Kim (2013), the data for the APE variable met the requirement for univariate normality since z < |3.29| for both skewness and kurtosis. An examination of the Q-Q plot in Figure 4-6 also indicates that deviations from normality were not too severe.

4.2.7.2 Perceived likelihood of personal experience of vehicle related crime (PLP)

The following question was asked to the participants and their responses were rated as follows:

Question: **In your view, how likely are you to experience or nearly experience the following events in your neighbourhood or in the areas that you frequently visit?**

Rating: **17- Extremely unlikely to 23- Extremely Likely**

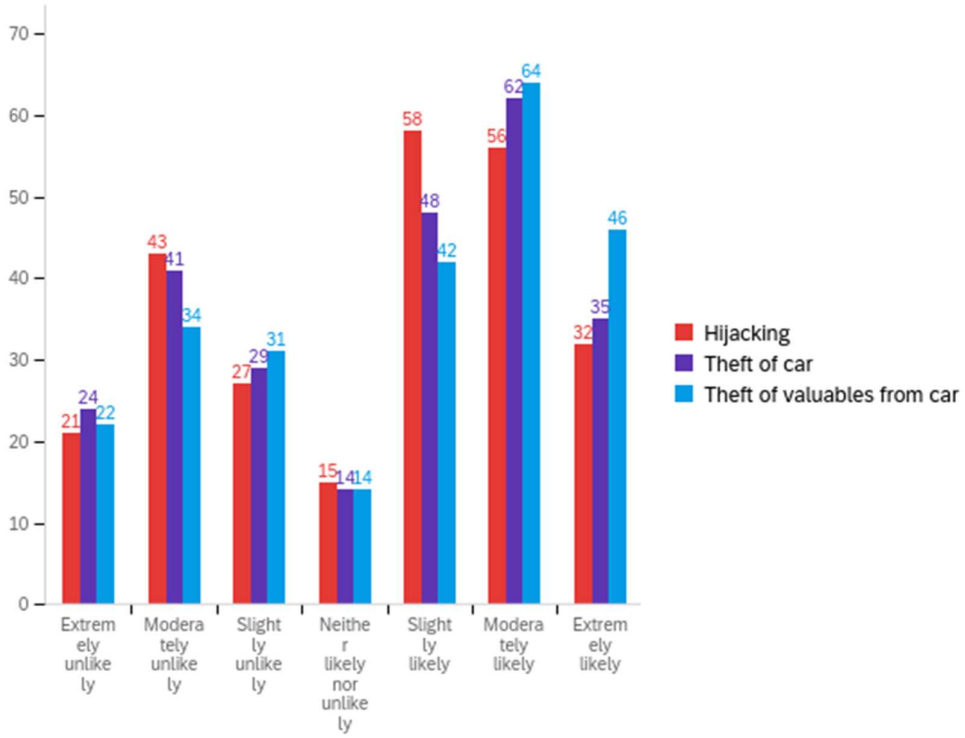


Figure 4-7 Response count for perceived likelihood of personal experience (PLP)

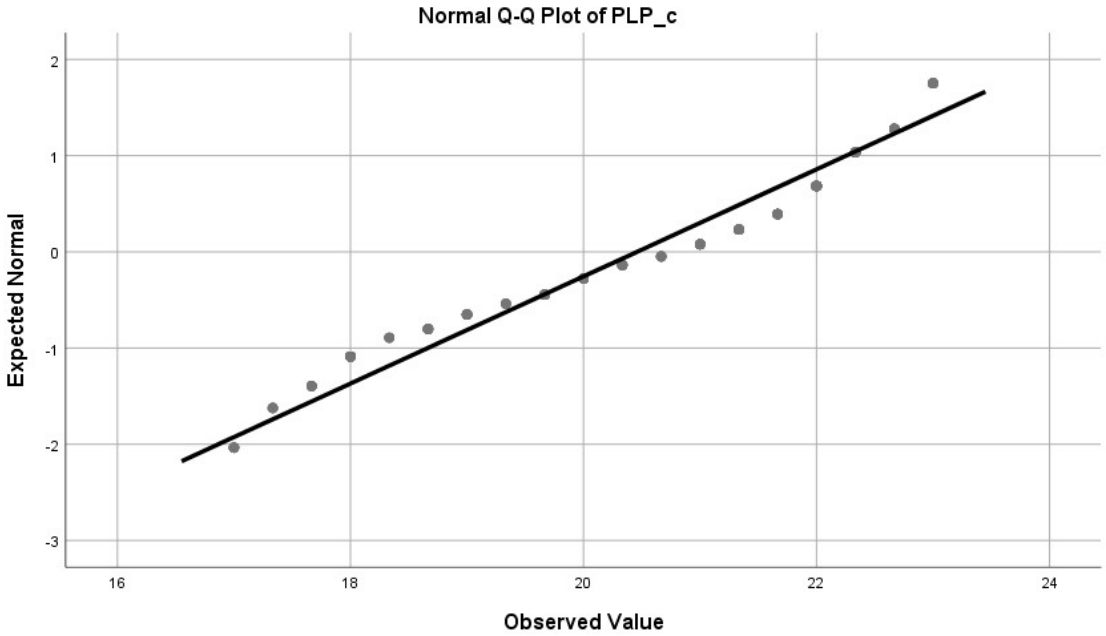


Figure 4-8 Q-Q plot for perceived likelihood of personal experience of vehicle related crime (PLP)

The z parameter for skewness was 2.30 and 3.48 for kurtosis. There was moderate univariate non-normality of the data as evident from the Q-Q plot in Figure 4-8.

4.2.8 Descriptive statistics for the experience of others with vehicle related crime

4.2.8.1 Measuring awareness of actual experience of others (AEO)

Participants were asked the following question relating to their awareness of the experience of others with vehicle related crime. Their responses were also rated.

Question: **How often do you receive or seek out information about the experience of others concerning the following crimes?**

Rating: 1- Extremely rarely to 6- Extremely often

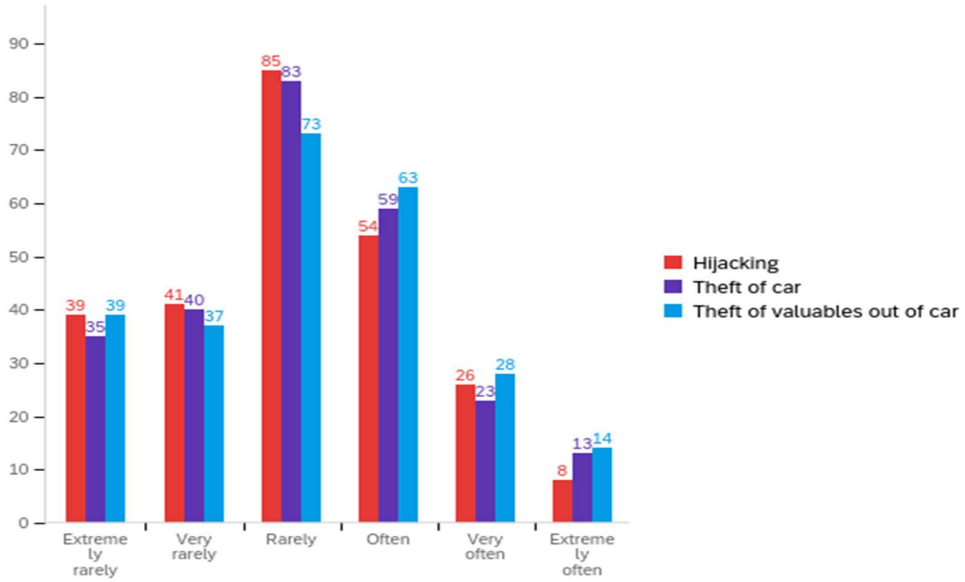


Figure 4-9 Response count plot for reception of information about the actual experience of others (AEO)

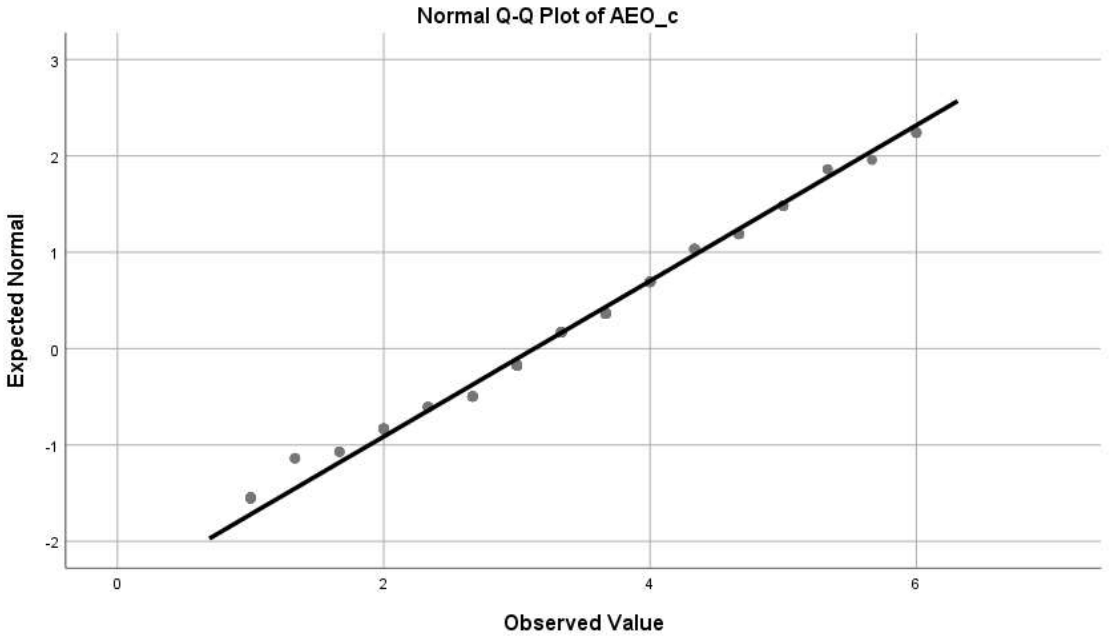


Figure 4-10 Q-Q plot for reception of information about the actual experience of others (AEO)

The z parameter for skewness was 0.25 and 1.57 for kurtosis. The AEO variable met the requirement of univariate normality as suggested by Kim (2013). Visual inspection of the Q-Q plot in Figure 4-10 also confirmed the univariate normality of the AEO variable.

4.2.8.2 Measuring perception for the likelihood of others experiencing vehicle related crime (PLO)

Participants were asked to provide their view on the likelihood of others they know experiencing vehicle related crime. Their responses were rated from their answers to the question below.

Question: **In your opinion, how likely is it that others you know will experience the following crimes in their neighbourhoods or areas they frequently visit?**

Rating: **1- Extremely unlikely to 7- Extremely likely**

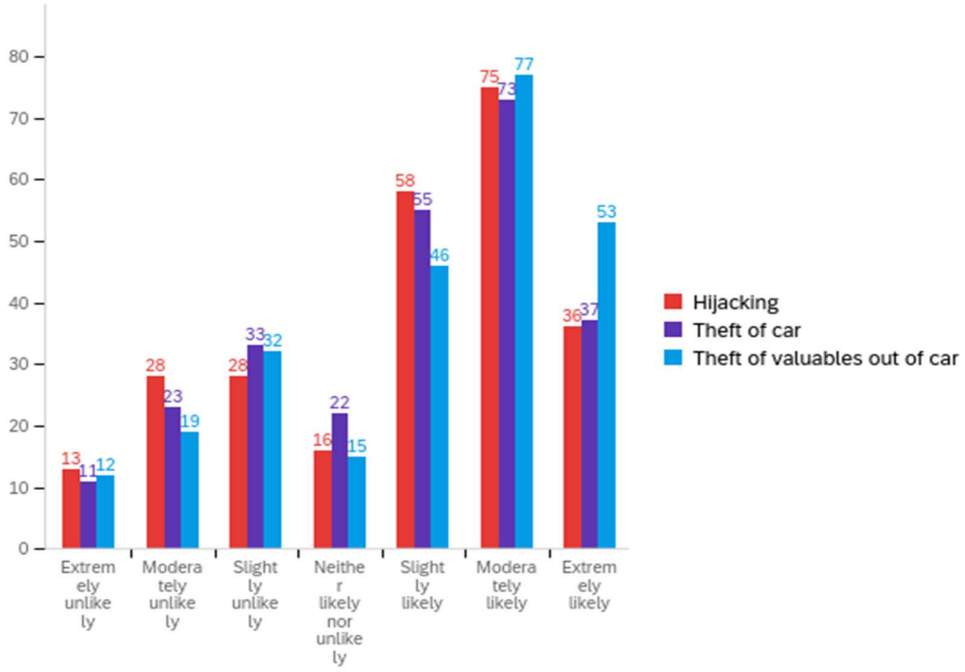


Figure 4-11 Response count plot for the perceived likelihood of others experiencing vehicle related crime (PLO)

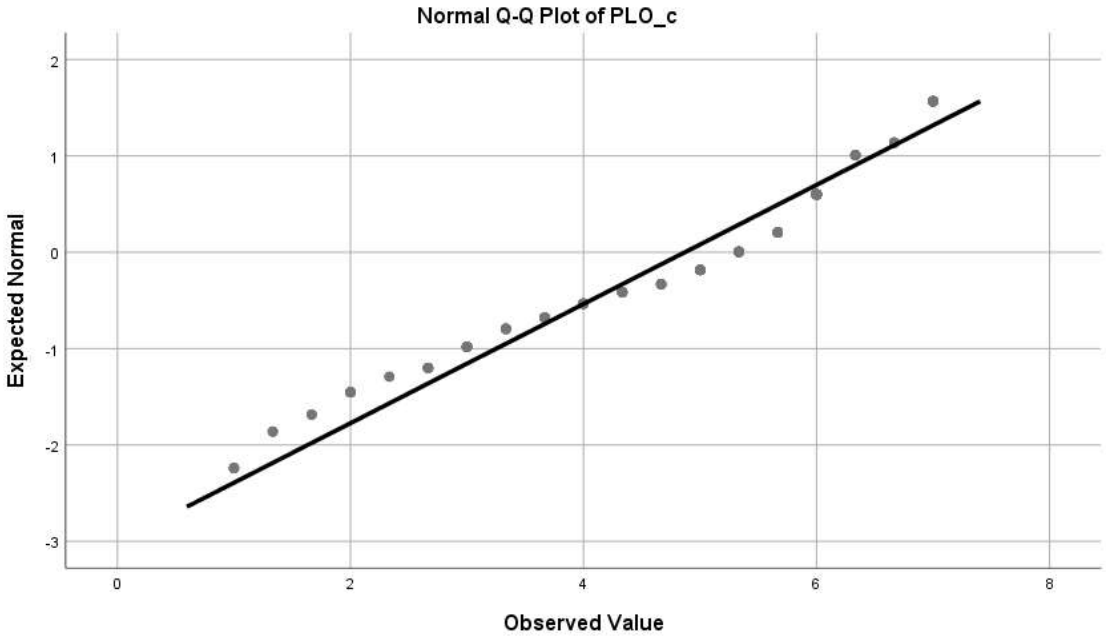


Figure 4-12 Q-Q plot for the perceived likelihood of others experiencing vehicle related crime (PLO)

The z parameter for skewness was 4.20 and 1.66 for kurtosis. The z parameter for skewness indicated a significant degree of univariate non-normality in the PLO variable data. The Q-Q plot in Figure 4-12 shows some deviation of the data for PLO from univariate normality.

4.2.9 Descriptive statistics for the prevalence of trauma due to vehicle related crime (TRA)

To assess the extent to which vehicle related crime induces trauma in the South African population, research participants were asked the following question and their responses were rated as indicated.

Question: **Relating to the crimes of hijacking, theft of motor vehicles and theft of valuables out of cars, how frequently do you respond in the following ways?**

Rating: **1-Never to 5- Always**

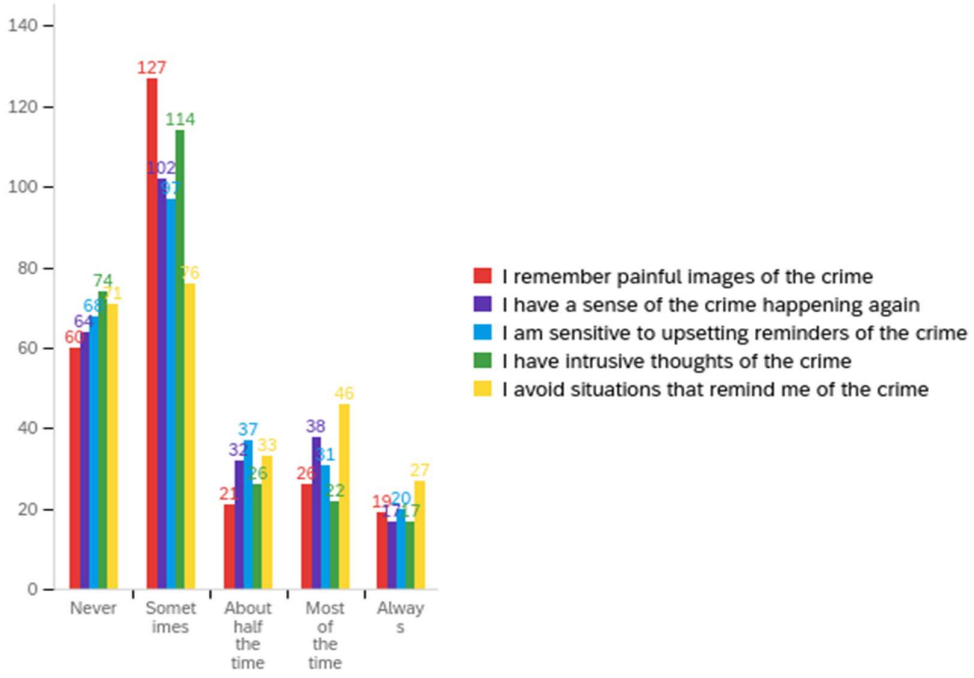


Figure 4-13 Response count for trauma (TRA)

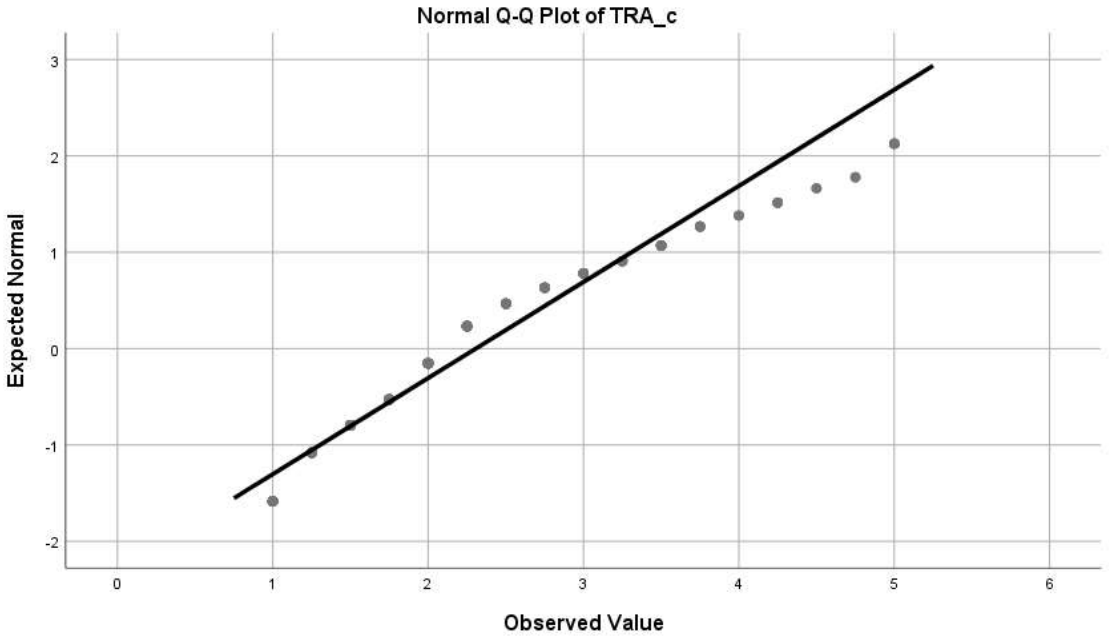


Figure 4-14 Q-Q plot for trauma induced by vehicle related crime (TRA)

The z parameter for skewness was 5.87 and 1.18 for kurtosis. There was a significant deviation from univariate normality in the TRA data. The Q-Q plot in Figure 4-14 also confirmed the non-normality.

4.2.10 Descriptive statistics for intention to substitute motor vehicles (IS)

Research participants were asked a question designed to probe their intention to substitute the use of motor vehicles with alternative means of transportation. Their responses were recorded and rated as shown below.

Question: **When using a motor vehicle in South Africa, to what extent do you agree or disagree with the following statements:**

Rating: **1- Strongly disagree to 7- Strongly agree**

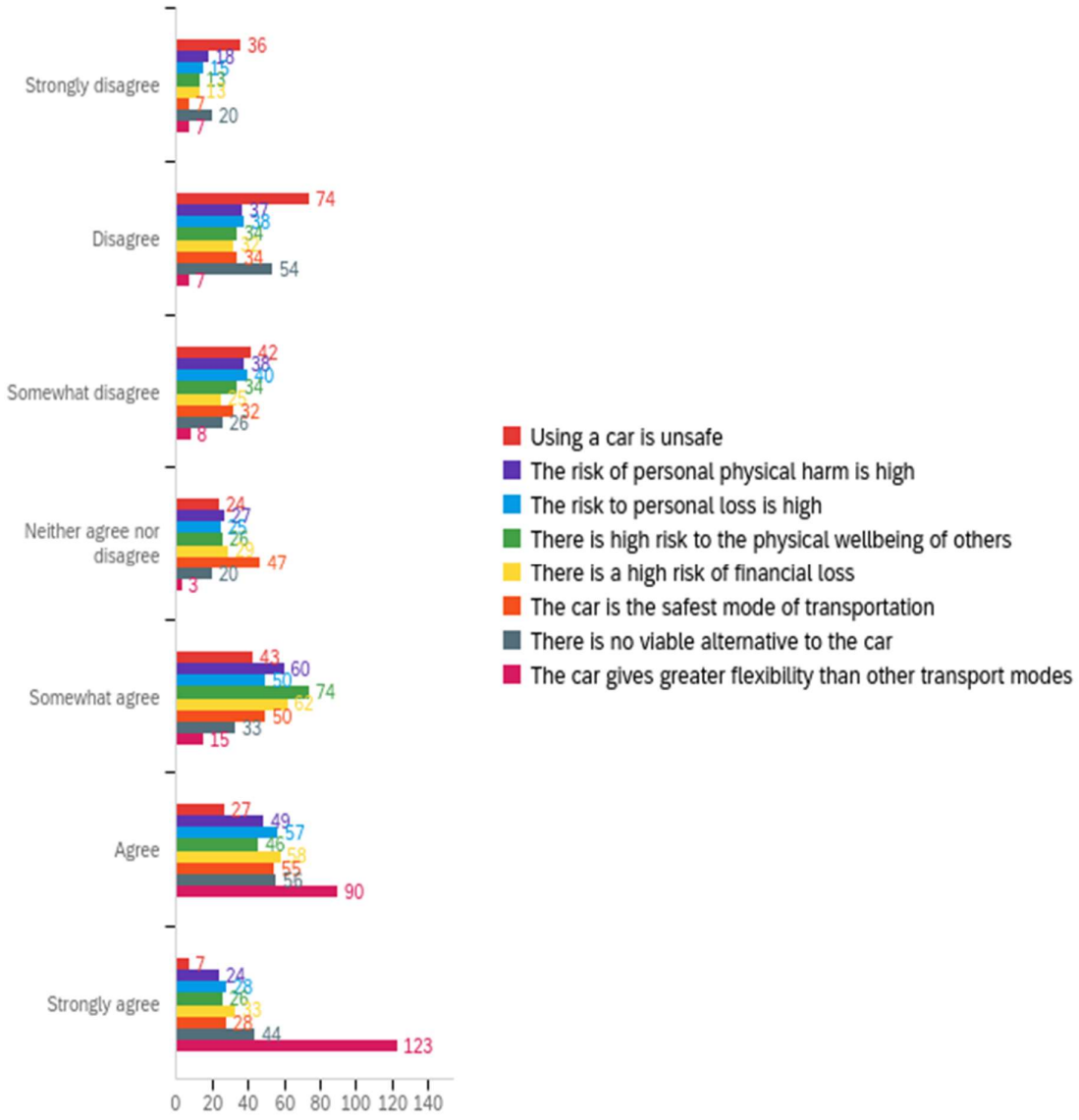


Figure 4-15 Count plot for intention to substitute the use of motor vehicles (IS)

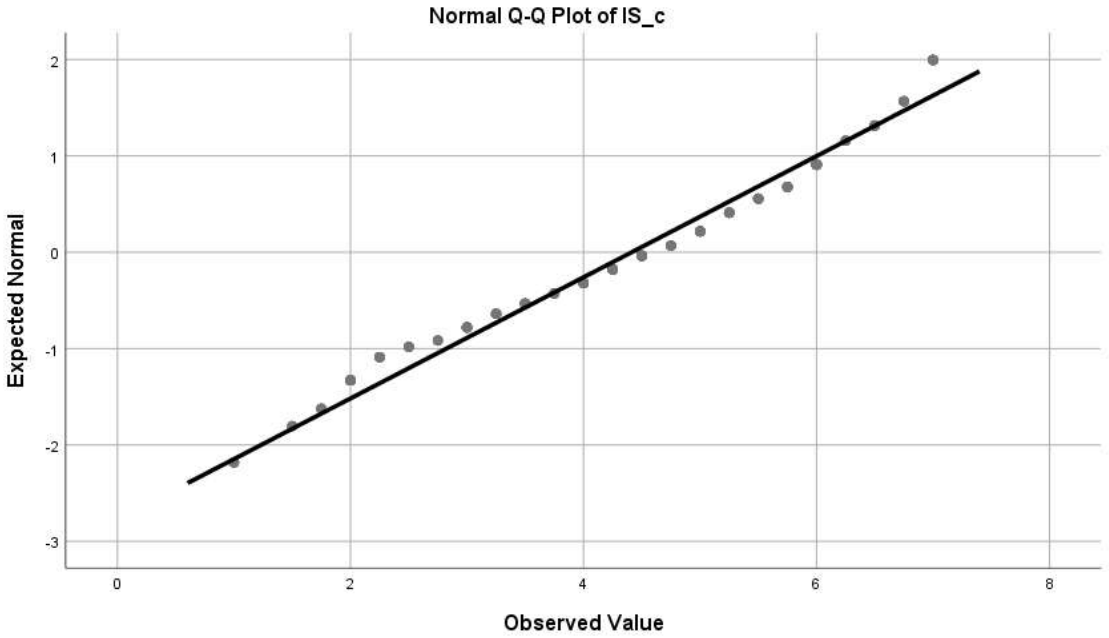


Figure 4-16 Q-Q plot for intention to substitute the use of motor vehicles (IS)

The z parameter for skewness was 1.91 and 2.72 for kurtosis. The IS variable data exhibited univariate normality based on the criteria of Kim (2013). Figure 4-16 confirms the closeness of the IS data to univariate normality.

4.2.11 Descriptive statistics for car brand loyalty (BL)

For the measurement of car brand loyalty among research participants, the following question was asked and responses ranked on a Likert scale:

Question: **To what extent do you agree or disagree with the following?**

Rating: 1- **Strongly agree to 7- Strongly disagree**

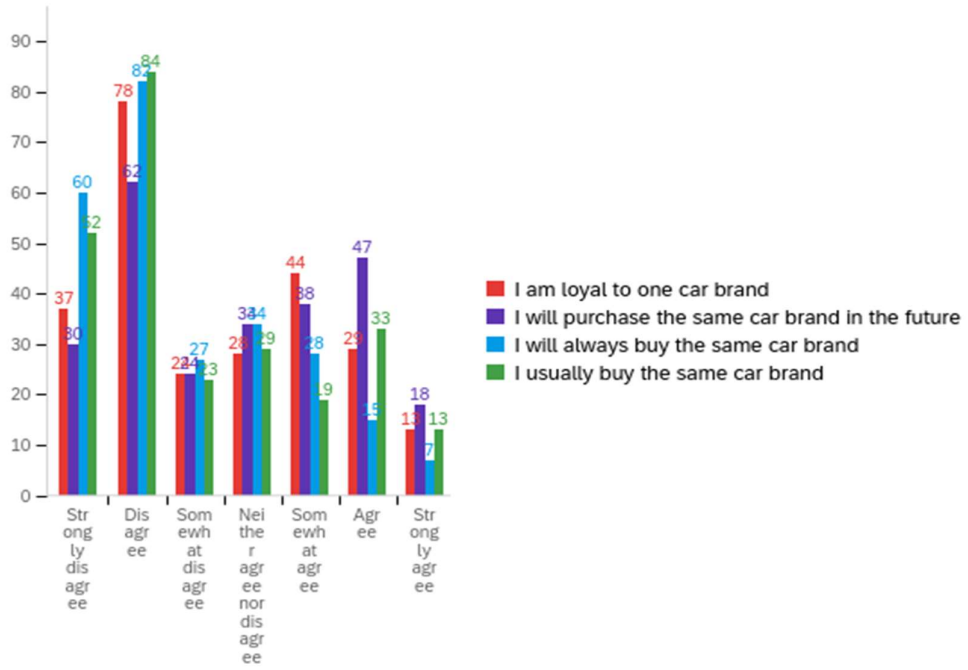


Figure 4-17 Count plot for assessment of brand loyalty (BL)

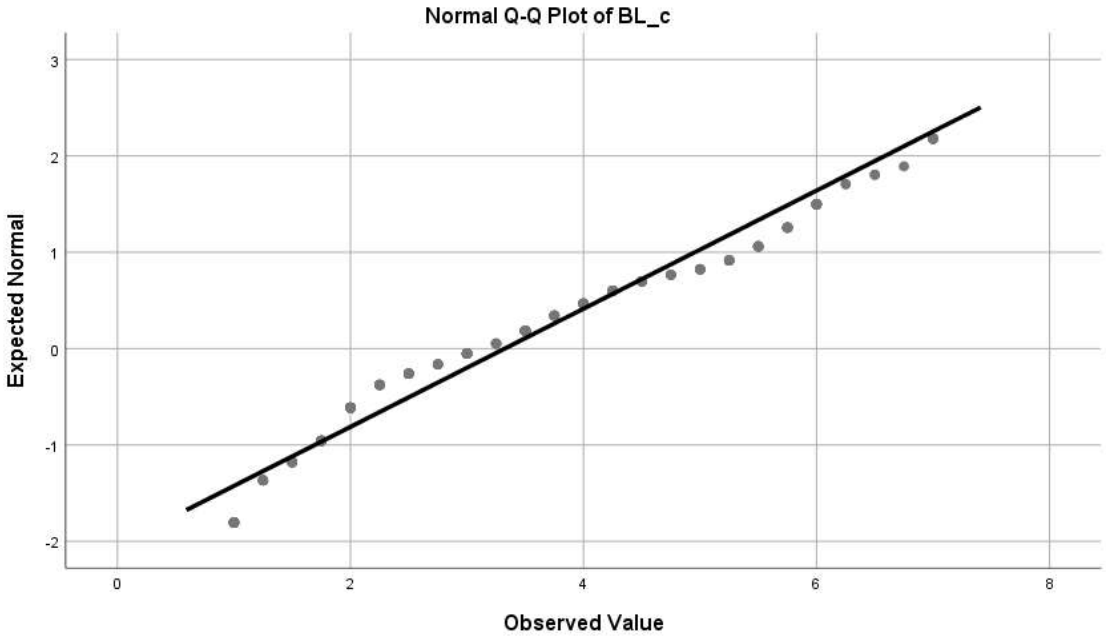


Figure 4-18 Q- Q plot for brand loyalty assessment data (BL)

The z parameter for skewness was 3.01 and 2.54 for kurtosis. The data for the BL variable was univariate normal based on the criteria of Kim (2013).

4.2.12 Descriptive statistics for research participants' future intention to purchase a motor vehicle (IS)

A question aimed at probing research participants' attitudes towards buying any motor vehicle in the future was presented. Responses of the participants were rated on a Likert scale.

Question: **Looking to the next 5 years, please indicate how strongly you feel about the following statements?**

Rating: **1- Very weak to 7- Very strong**

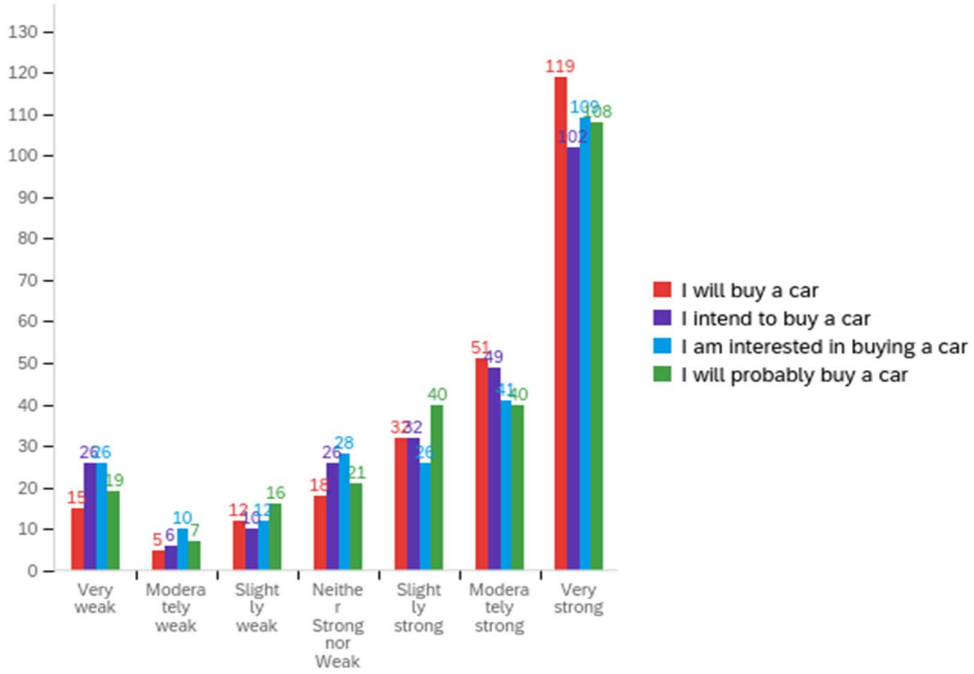


Figure 4-19 Count plot for intention to purchase motor vehicle response data (IP)

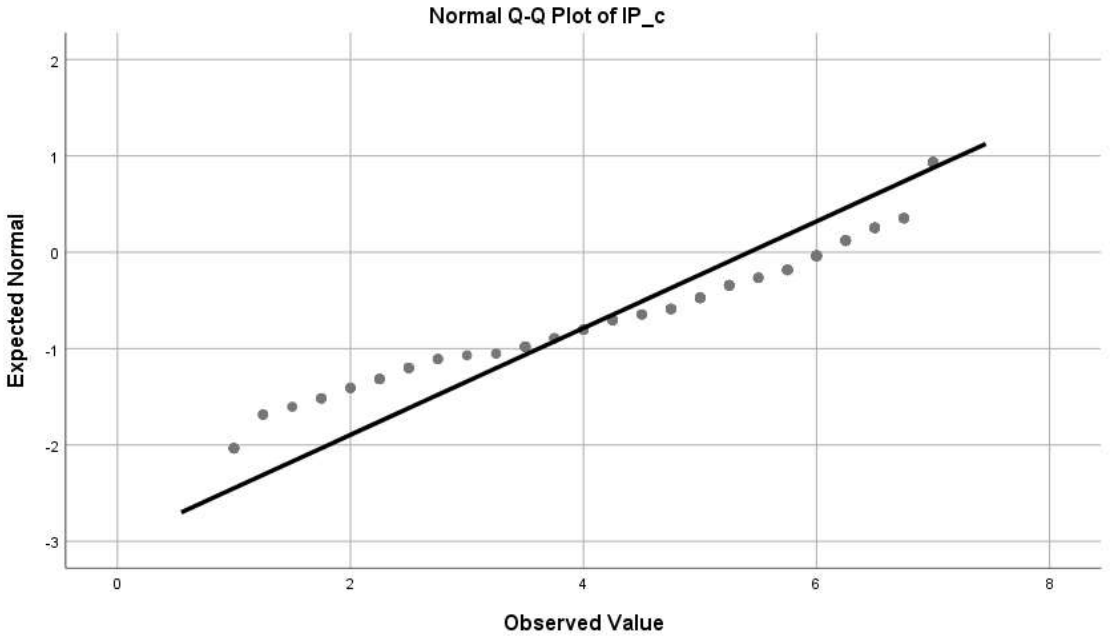


Figure 4-20 Q-Q plot for intention to purchase vehicle data (IP)

The z parameter for skewness was 6.73 and 0.06 for kurtosis. The z value for skewness showed excessive univariate non-normality for the IP variable. The responses from participants were heavily biased towards the right as shown in Figure 4-19. This was an indication that on average, most participants were not changing their preference of buying and using motor vehicles in the short to medium term. The Q-Q plot of Figure 4-20 also confirmed the high degree of univariate non-normality in the IP variable.

4.2.13 Multivariate normality test results of composite latent variables

Table 4-8 gives the results of the multivariate test for normality executed using R-Studio statistical software. The Mardia skewness test produced a result indicating non-normality while the Mardia kurtosis test produced a result showing normality.

Table 4-9 Mardia's test results for multivariate normality of composite variables

Test	Statistic	p-Value	Result
Mardia Skewness	276.34	0.000	NO
Mardia Kurtosis	1.17	0.242	YES
MVN	<NA>	<NA>	NO

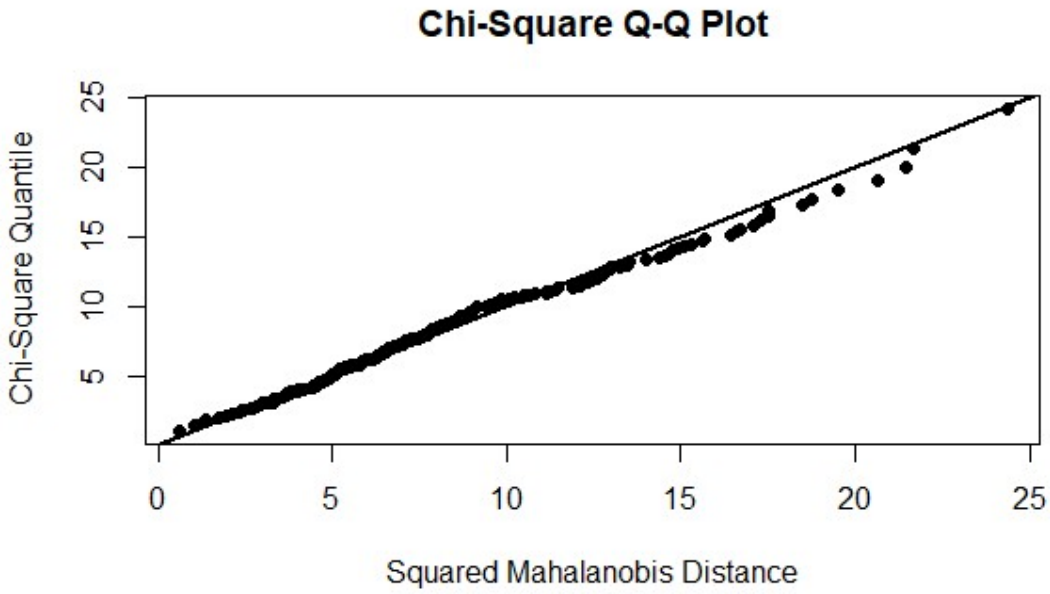


Figure 4-21 Chi-Square q-q plot for multivariate normality with squared Mahalanobis distances

A visual inspection of the chi-square q-q plot of the squared Mahalanobis distances (Johnston, Mokhtarian, & Gao, 2008) in Figure 4-21 showed a few outliers but not an excessive deviation from multivariate normality in the data.

4.3 Factor Analysis

4.3.1 Exploratory Factor Analysis

The constructs and hypotheses in this research were derived from a literature review exercise. However, due to the novelty of the concept of investigating the impact of vehicle related crime on future sales of vehicles, an exploratory factor analysis (EFA) was initially conducted to confirm the latent variables deduced from extant literature. The results of the EFA are shown in Tables 4-10 and 4-11.

Table 4-10 Rotated component matrix with risk factor items only

Rotated Component Matrix[a]														
	Component													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
rsk1														
rsk2														.805
rsk3														
rsk4														
rsk5												.769		
rsk6									-.740					
rsk7									-.789					
rsk8														
rsk9										.653				
rsk10c													.751	
rsk11c										.642				
rsk12c										.615				
rsk13c														
rsk14c														

a. Rotation converged in 15 iterations.

Table 4-11 Rotated component matrix with main research construct indicator variables

Rotated Component Matrix[a]

	Component													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
peH							.825							
peV							.813							
peT							.785							
peH1								.750						
peV1								.747						
peT1								.802						
eoH						.898								
eoV						.885								
eoT						.842								
eoH1					.788									
eoV1					.784									
eoT1					.770									
tra1		.763												
tra2		.708												
tra3		.844												
tra4		.817												
tra5		.682												
sub1	.680													
sub2	.902													
sub3	.894													
sub4	.898													
sub5	.807													
sub6											.695			
sub7											.715			
sub8											.627			
br1				.867										
br2				.873										
br3				.897										
br4				.909										
int1			.904											
int2			.957											
int3			.939											
int4			.944											

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 15 iterations.

4.3.2 Confirmatory factor analysis

4.3.2.1 Measurement model generation

Using SPSS Amos Ver. 26 and RStudio (lavvan, sem, semPlot), the measurement model shown in Figure 4-22 was generated. The latent factor IS2 identified through the EFA. It was initially part of the IS scale but was identified as a separate component and excluded in subsequent analyses as it loaded poorly on the indicator variables sub6, sub7, and sub8.

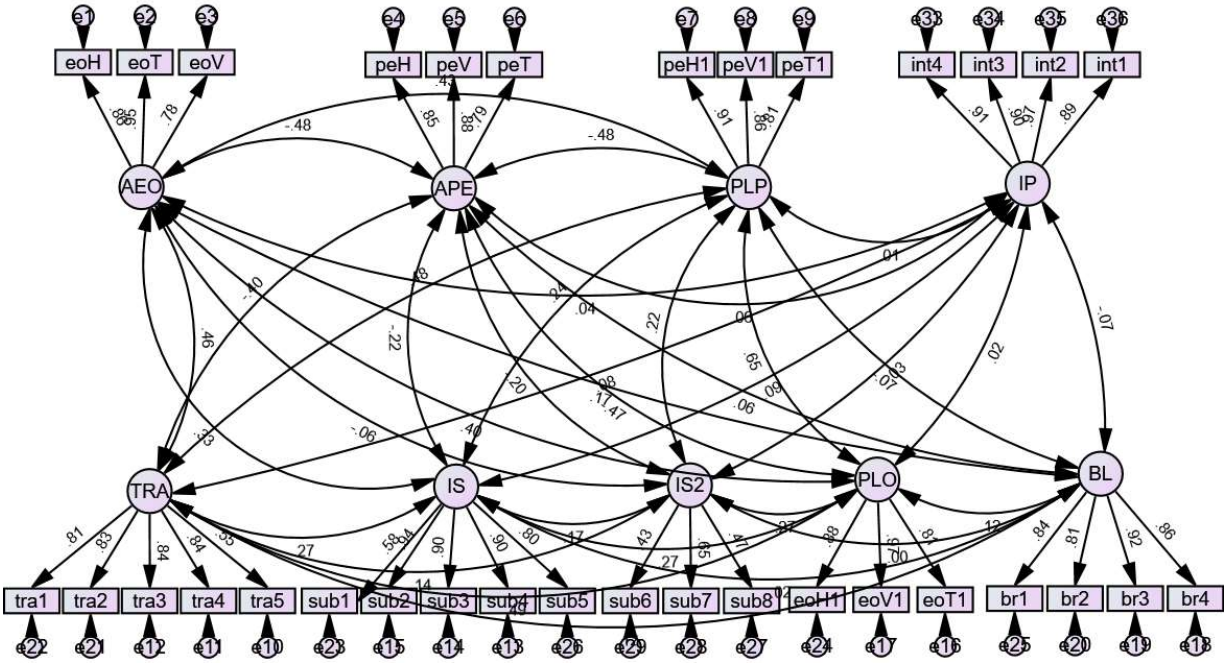


Figure 4-22 Research measurement model

4.3.2.2 Measurement model fit summary

The following fit statistics were generated in R-Studio (lavaan) for the measurement model.

Table 4-12 Measurement model fit indices

```
summary(fit_cfa_all, fit.measures = TRUE)
lavaan 0.6-7 ended normally after 74 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of free parameters                         86

  Number of observations                           238


Model Test User Model:

  Test statistic                               566.773
  Degrees of freedom                               349
  P-value (Chi-square)                           0.000

Model Test Baseline Model:

  Test statistic                              6079.388
  Degrees of freedom                               406
  P-value                                        0.000

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                    0.962
  Tucker-Lewis Index (TLI)                       0.955

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)             -10295.906
  Loglikelihood unrestricted model (H1)             NA

  Akaike (AIC)                               20763.812
  Bayesian (BIC)                             21062.427
  Sample-size adjusted Bayesian (BIC)        20789.834

Root Mean Square Error of Approximation:

  RMSEA                                          0.051
  90 Percent confidence interval - lower         0.043
  90 Percent confidence interval - upper         0.059
  P-value RMSEA <= 0.05                          0.390

Standardized Root Mean Square Residual:

  SRMR                                           0.040
```

Table 4-13 Measurement model factor loadings

Latent Variables:	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
APE =~						
PEH	1.000				1.032	0.817
PEV	1.136	0.076	14.880	0.000	1.173	0.889
PET	1.039	0.077	13.484	0.000	1.072	0.798
PLP =~						
PEH1	1.000				1.729	0.915
PEV1	1.027	0.048	21.352	0.000	1.776	0.912
PET1	0.948	0.053	17.744	0.000	1.640	0.829
AEO =~						
EOH	1.000				1.161	0.903
EOV	1.084	0.046	23.390	0.000	1.259	0.957
EOT	0.987	0.054	18.280	0.000	1.146	0.837
PLO =~						
EOH1	1.000				1.565	0.893
EOV1	1.052	0.045	23.420	0.000	1.645	0.964
EOT1	0.925	0.053	17.559	0.000	1.447	0.825
TRA =~						
TRA1	1.000				0.870	0.761
TRA2	1.025	0.089	11.519	0.000	0.892	0.747
TRA3	1.165	0.089	13.027	0.000	1.014	0.838
TRA4	1.121	0.085	13.260	0.000	0.975	0.854
IS =~						
SUB1	1.000				1.083	0.635
SUB2	1.477	0.130	11.364	0.000	1.599	0.902
SUB3	1.520	0.132	11.477	0.000	1.646	0.916
SUB4	1.395	0.125	11.205	0.000	1.510	0.884
SUB5	1.247	0.123	10.133	0.000	1.350	0.771
BL =~						
BR1	1.000				1.494	0.809
BR2	1.038	0.072	14.395	0.000	1.552	0.819
BR3	1.001	0.061	16.303	0.000	1.496	0.897
BR4	1.126	0.070	16.168	0.000	1.682	0.891
IP =~						
INT1	1.000				1.548	0.878
INT2	1.207	0.052	23.397	0.000	1.870	0.950
INT3	1.221	0.055	22.341	0.000	1.891	0.932
INT4	1.132	0.051	22.311	0.000	1.752	0.932

4.3.2.3 Convergent validity/Internal reliability (Cronbach Alpha)

Table 4-14 Calculation of composite reliability of factor scales

Indicator Variables		Latent Variables	Standardised Loadings	Square of Standardised Loadings	Sum of the Squares of Standardised Loadings	Number of Indicators	AVE	Squrare Root of AVE /DV
EOH	<---	AEO	0.9020	0.813604				
EOV	<---	AEO	0.9580	0.917764				
EOT	<---	AEO	0.8360	0.698896	2.430264	3	0.810088	0.900
PEH	<---	APE	0.8180	0.669124				
PEV	<---	APE	0.8900	0.7921				
PET	<---	APE	0.7970	0.635209	2.096433	3	0.698811	0.836
PEH1	<---	PLP	0.9150	0.837225				
PEV1	<---	PLP	0.9130	0.833569				
PET1	<---	PLP	0.8280	0.685584	2.356378	3	0.785459	0.886
TRA1	<---	TRA	0.7580	0.574564				
TRA2	<---	TRA	0.7450	0.555025				
TRA3	<---	TRA	0.8400	0.7056				
TRA4	<---	TRA	0.8540	0.729316	2.564505	4	0.641126	0.801
SUB2	<---	IS	0.9040	0.817216				
SUB3	<---	IS	0.9160	0.839056				
SUB4	<---	IS	0.8830	0.779689				
SUB5	<---	IS	0.7700	0.5929	3.028861	4	0.757215	0.870
BR1	<---	BL	0.8090	0.654481				
BR2	<---	BL	0.8100	0.6561				
BR3	<---	BL	0.8960	0.802816				
BR4	<---	BL	0.8930	0.797449	2.910846	4	0.727712	0.853
INT1	<---	IP	0.8770	0.769129				
INT2	<---	IP	0.9500	0.9025				
INT3	<---	IP	0.9320	0.868624				
INT4	<---	IP	0.9320	0.868624	3.408877	4	0.852219	0.923
EOH1	<---	PLO	0.8930	0.797449				
EOV1	<---	PLO	0.9640	0.929296				
EOT1	<---	PLO	0.8250	0.680625	2.40737	3	0.802457	0.896

The calculation of composite reliability was based on finding the square root of the average variance extracted (Engellant, Holland , & Piper, 2016).

4.3.2.4 Latent construct discriminant validity

Table 4-15 Construct discriminant validity matrix with comparisons between correlations and composite reliabilities

	AEO	APE	PLP	PLO	TRA	IS	IP	BL
AEO	**0.900**							
APE	-0.447	**0.836**						
PLP	0.419	-0.508	**0.886**					
PLO	0.383	-0.486	0.654	**0.801**				
TRA	0.397	-0.442	0.506	0.467	**0.870**			
IS	0.230	-0.328	0.299	0.277	0.195	**0.853**		
IP	0.070	0.049	0.053	-0.023	0.037	0.055	**0.923**	
BL	0.050	-0.005	0.044	0.123	0.098	0.075	0.037	**0.896**

4.3.3 Structural modeling and analysis

Using IBM SPSS Amos Ver. 26 in conjunction with R-Studio (sem, semPlot and lavaan packages), a path model was generated based on the latent variables identified from extant literature and exploratory factor analysis. Figure 4-23 is a depiction of the final research model.

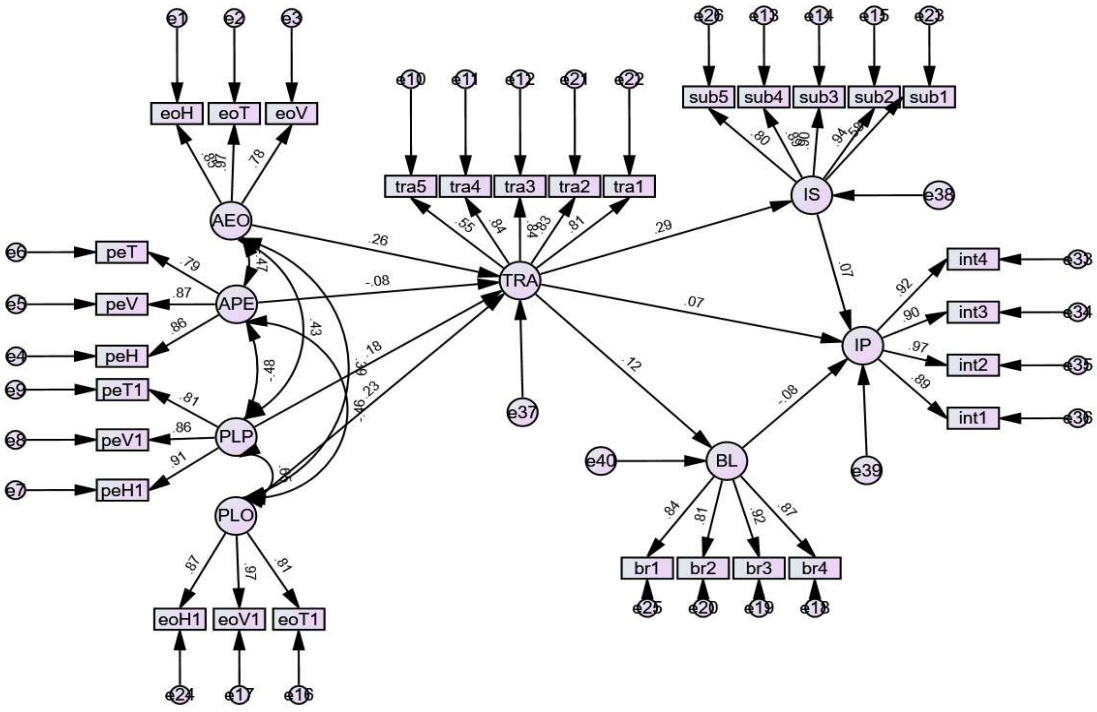


Figure 4-23 Final research structure model

4.3.3.1 Structural model fit statistics summary

The structure model fit statistics in Table 4-16 were generated using R-Studio.

Table 4-16 Structure model fit indices

```
> summary(fit, fit.measures = TRUE, standardized = TRUE, rsquare = TRUE)
lavaan 0.6-7 ended normally after 65 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of free parameters                         73

  Number of observations                           238

Model Test User Model:

  Test statistic                               595.007
  Degrees of freedom                               362
  P-value (Chi-square)                           0.000

Model Test Baseline Model:

  Test statistic                              6079.388
  Degrees of freedom                               406
  P-value                                        0.000

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                    0.959
  Tucker-Lewis Index (TLI)                       0.954

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)             -10310.022
  Loglikelihood unrestricted model (H1)             NA

  Akaike (AIC)                               20766.045
  Bayesian (BIC)                             21019.521
  Sample-size adjusted Bayesian (BIC)        20788.134

Root Mean Square Error of Approximation:

  RMSEA                                          0.052
  90 Percent confidence interval - lower         0.044
  90 Percent confidence interval - upper         0.059
  P-value RMSEA <= 0.05                          0.323

Standardized Root Mean Square Residual:

  SRMR                                           0.070
```

4.3.3.2 Structural equation model regression statistics *(Hypotheses 1-8 results data)*

The following tables are a presentation of regression results with path coefficients (β), significance levels (α) and R^2 values for the research model as generated in R-Studio.

Table 4-17 Covariance matrix of exogeneous variables

Covariances:						
	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
APE ~~						
PLP	-0.907	0.149	-6.108	0.000	-0.508	-0.508
AEO	-0.535	0.096	-5.559	0.000	-0.447	-0.447
PLO	-0.785	0.133	-5.919	0.000	-0.486	-0.486
PLP ~~						
AEO	0.841	0.153	5.497	0.000	0.419	0.419
PLO	1.771	0.231	7.655	0.000	0.654	0.654
AEO ~~						
PLO	0.694	0.136	5.120	0.000	0.382	0.382

Table 4-18 Regression coefficients of research structure model

Regressions:						
	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
TRA ~						
APE	-0.143	0.067	-2.119	0.034	-0.170	-0.170
PLP	0.125	0.045	2.782	0.005	0.250	0.250
AEO	0.117	0.053	2.219	0.026	0.157	0.157
PLO	0.092	0.047	1.951	0.051	0.166	0.166
IS ~						
TRA	0.276	0.090	3.055	0.002	0.222	0.222
BL ~						
TRA	0.172	0.124	1.391	0.164	0.100	0.100
IP ~						
TRA	0.041	0.129	0.315	0.752	0.023	0.023
IS	0.068	0.101	0.676	0.499	0.047	0.047
BL	0.032	0.071	0.450	0.653	0.031	0.031

Table 4-19 R - squared values for latent and indicator variables

R-Square:

	Estimate
TRA	0.346
BL	0.010
IP	0.004
PEH	0.669
PEV	0.791
PET	0.635
PEH1	0.837
PEV1	0.833
PET1	0.685
EOH	0.814
EOV	0.917
EOT	0.699
EOH1	0.798
EOV1	0.929
EOT1	0.681
TRA1	0.574
TRA2	0.555
TRA3	0.705
TRA4	0.729
SUB1	0.399
SUB2	0.817
SUB3	0.839
SUB4	0.781
SUB5	0.593
BR1	0.655
BR2	0.670
BR3	0.802
BR4	0.797
INT1	0.769
INT2	0.903
INT3	0.868
INT4	0.868
IS	0.049

5 Discussion of results

5.1.1 Research objectives

The main aim of this research was to investigate the influence of vehicle related crime on future sales of automobiles in the South African market. A literature review was conducted leading to the development of eight hypotheses representing relationships between an initial set of seven latent variables. The research was designed to use a parametric statistical method to make inferences about the relationship between crime and future sales of vehicles in South Africa. The chosen parametric approach was structural equation modelling (SEM). A list of the research hypotheses and their descriptions is provided in Table 5-1.

Table 5-1 List of research hypotheses and descriptions

Hypothesis	Description
H1	*The experience of vehicle crime in South Africa induces lingering trauma on users of motor vehicles.*
H2	*Individual risk factors determine the intensity of trauma due to vehicle related crime.*
H3	*Information about the traumatic experience of others regarding vehicle related crime induces secondary trauma in recipients of the information.*
H4	*Individual trauma due to vehicle related crime impairs the intention to purchase a vehicle in the future.*
H5	*The trauma induced by vehicle related crime negatively impacts vehicle brand loyalty.*
H6	*Brand loyalty has a positive effect on purchase intention mitigating against the effects of vehicle related crime.*
H7	*The trauma induced by vehicle related crime will lead to switching from the use of private motor vehicles to public transport or other transport modes less prone to crime.*
H8	*The intention to substitute the use of motor vehicles will lead to a decline of the purchase intention for private motor vehicles.*

5.1.2 Sampling and response profile

The research target population was a random search for those individuals who are ordinarily the target market of the automotive industry in South Africa. Such individuals were typically those with the economic resources to purchase motor vehicles. The group naturally consisted of individuals gainfully employed, educated and of an economically active age. A total of 254 responses were received. 238 responses had complete data and were used in the statistical analysis. The number of responses was initially anticipated to be higher since SEM is generally a large sample technique (Hox & Bechger, 2000; Kline, 2010). The lower response number was ultimately attributed to the difficult Covid-19 pandemic environment which rearranged the priorities of most individuals. The usable sample of 238 was however more than adequate according to well established online statistical calculators of sample size (Soper, 2021).

5.1.3 Attributes of the research constructs

5.1.3.1 Univariate and multivariate normality

Table 5-2 shows the calculated values of the z-statistic for univariate normality for the research constructs.

Table 5-2 z -parameter test results with skewness and kurtosis for multivariate normality analysis

Variable	z-skewness	z-kurtosis	z-max
APE	2.35	2.55	3.29
PLP	2.30	3.48	3.29
AEO	0.25	1.57	3.29
PLO	4.20	1.66	3.29
TRA	5.87	1.18	3.29
BL	3.01	2.54	3.29
IS	1.91	2.72	3.29
IP	6.73	0.06	3.29

Some of the variables showed univariate non-normality based on the z statistic parameter criteria for the research sample. These were highlighted in Table 5-2. However, each of the variables had at least one value for z that was within the criteria. Q-Q plots for the variables indicated the presence of non-normality. However, the plots did not show excessive deviations from normality. Transformation of data and the elimination of outliers was not done in this research following to the caveats by

Johnston, Mokhtarian and Gao (2008). This was an attempt to preserve the power of the statistical tests and the assumption of linearity in statistical analysis. In order to mitigate against non-linearity observed in the data, the maximum likelihood estimation method (Johnston, Mokhtarian, & Gao, 2008) was applied.

Multivariate non-normality was confirmed for skewness with a Mardia coefficient of 276.34 and p-value of 0.000 at alpha 0.05 significance level. Mardia coefficient of kurtosis confirmed multivariate normality with a value of 1.17 and p-value of 0.242 at apha of 0.05 significance level. This was based on the criteria provided by Johnston, Mokhtarian and Gao (2008) who argued that a critical ratio value of 1.96 or less for kurtosis at the 0.05 level of significance indicated multivariate normality.

The data in this research showed evidence of non-normality. The mixed results of the univariate normality tests also produced mixed results in the multivariate normality tests. However, a visual inspection of the Q-Q plots for both univariate and multivariate normality showed that the deviation from normality was not so excessive as to render the tests meaningless. The maximum likelihood estimation method used helped to mitigate some of the effects of non-normality.

5.1.3.2 Discussion of risk factor items

Only avoidance had a significant β- value of 0.151 at alpha 0.05 significance level with a p-value of 0.022. This suggested that the more an individual actively avoids reminders of potentially traumatic events, the more they will display dysfunctional symptoms of the trauma associated with the event. In this research, 81.9% (Appendix B, pg. 9) of respondents indicated that avoidance of reminders did not describe them well. The 18.1% remainder indicated that avoidance described them well. This outcome concurred with the key assertion of Bonanno and Mancini (2012) that most individuals exhibit resilience and quickly recover from traumatic events. The results also support hypothesis 2 (H2) in the case of avoidance as a risk factor. It may be inferred that individuals who avoid reminders of incidents of vehicle related crime experience more trauma related to the crimes.

The gender crosstabulation (Table 4-4) showed 58.8% of females using avoidance compared to 38.2% of males. The crosstabulation for age (Table 4-5) seemed to show a higher proportion in the older age group using avoidance more than the younger groups. This may be due to the risk averse nature of older people in general. The

ethnicity crosstabulation (Table 4-6) showed a higher proportion in the coloured group who used avoidance. This was followed by the African group, the white group and the Indians. This may be attributed to cultural or historical experiences in South Africa of the various ethnic groups.

The income crosstabulation (Table 4-7) showed roughly the same proportions using avoidance. The proportions ranged between 40% and 55% in the groups. The 16-35k income group showed the highest proportion of avoidance use. This may be attributed to the percerption of likelihood of experiencing vehicle related crime in this group. The most common and affordable vehicles are possibly used by this income group. As a result the 16-35k income group may be the most vulnerable.

The education crosstabulation (Table 4-8) showed those with national diploma and higher diplomas with the highest proportions of avoidance use. It may be postulated that this group coincides with the 16-35k income group. This would make it the same group that is most exposed and vulnerable to motor vehicle related crime.

Though the risk factor as a construct was not used in the main inferential analysis of this research, the preceeding discussion suggested that there is a relationship between the identified risk items with trauma as they moderate the proxy factor identified as avoidance.

5.1.4 Confirmatory factor analysis results

5.1.4.1 CFA model fit

The research CFA model was identified and acceptable with reported fit indices (Table 4-12) of Comparative Fit Index (CFI) of 0.962, Tucker-Lewis Index (TLI) of 0.955, Root Mean Square Error of Approximation (RMSEA) of 0.051 and Standardised Root Mean Square Residual (SRMR) of 0.040. The model fit was acceptable based on the criteria provided by Kline (2010) and Hooper, Coughlan, and Mullen (2008).

5.1.4.2 Convergent (Composite relaibility) and discriminant validity of factors

Composite reliability values for the research CFA model scales were calculated and showed values of APE apha 0.836, PLP alpha 0.886, AEO alpha 0.900, PLO alpha 0.896, TRA alpha 0.801, BL alpha 0.853, IS alpha 0.870 and IP alpha 0.923. All scale composite reliabilities were above 0.7 and therefore the CFA model had acceptable reliability (Table 4-14).

For discriminant validity, all correlations between any pair of latent variables was less than their composite reliabilities (Table 4-15).

The measurement model for this research was found acceptable based on the results of convergent and discriminant validity tests.

5.1.5 Structure model fit

The structure model fit indices (Table 4-16) were CFI of 0.959, TLI of 0.954, RMSEA of 0.052 and SRMR of 0.070. Both CFI and TLI were above the 0.90 minimum while RMSEA and SRMR were both below the maximum of 0.08. The structure model fit was therefore acceptable based on the criteria provided by Kline (2010) and Hooper, Coughlan, and Mullen (2008).

5.1.5.1 Structure model regression and R-squared values

The final research model assumed a causal relationship from APE, PLP, AEO and PLO to the trauma construct TRA. At the 0.05 significance level, all the exogenous variables APE, PLP, AEO and PLO had significant β-values of -0.170, 0.250, 0.157 and 0.166 respectively (Table 4-18). The corresponding p-values were 0.03, 0.01, 0.03 and 0.05 respectively. The results implied that the more an individual has a personal experience of vehicle related crime, the less traumatic the crimes become. This was counterintuitive as the opposite relationship would have been expected. The perceived likelihood of personally experiencing vehicle related crime, however, has a positive causal relationship with the trauma (TRA) related to the crime. As an individual develops an increasing perception that they will experience vehicle related crime, the more they develop symptoms related to trauma. It appeared therefore that anticipating vehicle related crime is more traumatic than the actual experience of the crime.

R^2 for TRA was 0.346 (Table 4-19). This implied that 34.6% of trauma symptoms experienced in sample group was due to vehicle related crime. This proportion was not very high as might be expected from the fact that there are many other issues in South African society that are potentially trauma inducing. Among aspects of vehicle related crime in South Africa, the perceived probability by an individual (PLP) of occurrence of the crime had the strongest trauma inducing effect.

The research model anticipated a causal relationship of trauma (TRA) on the intention to substitute motor (IS) vehicles with alternative means of transportation. At the 0.05 significance level, the β- value was found to be 0.222 with a p-value of 0.002. This showed that the greater the trauma experienced by an individual as a result of vehicle related crime, the more they inclined towards finding alternative modes of transportation. In South Africa, there is currently very limited choice for those who currently use motor vehicles as a sole means of transportation. This can be confirmed by the fact that 52.6% agreed that there is no viable alternative to the motor vehicle (Appendix B, pg. 22). 51% also believed the car is the safest mode of transport in South Africa despite all the crime and accidents involving motor vehicles.

The R^2 value for the intention to substitute construct (IS) was 0.049 (Table 4-19). This implied that only 5% of the variance in the sample group's intention to substitute the use of motor vehicles was attributable to trauma (TRA) due to vehicle related crime.

The research model anticipated a causal relationship from trauma (TRA) to brand loyalty (BL). The β-value was found to be 0.100 with a p-value of 0.164. The causal relationship between TRA and BL was found to be statistically insignificant at the 0.05 level of significance.

The anticipated causal relationships from TRA, IS, and BL to IP were also found to be statistically insignificant at the 0.05 level of significance.

5.1.6 Hypotheses testing

Table 5-3 Research hypotheses decision summary with parameter estimates

Hypothesis	Parameter estimates	Decision
H1	(APE : β = -0.170, p = 0.03), PLP(β = 0.250, p = 0.01), α= 0.05	Rejected wrt. APE and accepted wrt. PLP
H2	RSK10c : β= 0.151, p= 0022, α= 0.05	Accepted wrt to RSK10c only
H3	(AEO : β = 0.157, p = 0.03), (PLO : β = 0.166, p = 0.05), α = 0.05	Accepted
H4	β = 0.023, p = 0.752, α = 0.05	Rejected
H5	β = 0.100, p= 0.164, α = 0.05	Rejected
H6	β = 0.031, p = 0.653, α = 0.05	Rejected
H7	β = 0.222, p = 0.002, α = 0.05	Accepted
H8	β = 0.047, p = 0.499, α = 0.05	Rejected

Hypothesis H1 was accepted with respect to PLP since a positive relationship between personal experience of vehicle related crime and trauma is implied. This is despite the fact that PLP represents only the perceived likelihood of actual personal experience by an individual. There was a negative relationship between actual personal experience (APE) and trauma (TRA) and so H1 was rejected on the basis of the negative relationship implied.Hypothesis H2 was accepted only with respect to the risk factor RSK10c (Avoidance). The other risk factor items were not considered on the basis that they were insignificant at the 0.05 significance level. The implication is that the more an individual attempts to avoid the reminders of potentially traumatic vehicle related crime events, the more they will exhibit trauma symptoms. This is in concurrence with the assertions of Bonanno and Mancini (2012).

Hypothesis H3 was accepted on the basis that both AEO and PLO were significant at the 0.05 level of significance. This confirms and concurs with the notion that when an individual receives information about the experiences of others and develops a perception about the likelihood of others experiencing vehicle related crime, they experience secondary trauma as anticipated by Figley, Yegidis and Bride (2003).

Hypotheses H4, H5, H6 and H8 were rejected since their β-values were insignificant at the 0.05 level of significance. H4, H6 and H8 were the causal paths anticipated to indicate the final influence of vehicle related crime the extent to on the willingness of South Africans to buy motor vehicles in the future. Despite the insignificant statistical parameters, an examination of the intention to purchase responses showed that most individuals were still willing and intending to purchase motor vehicles in the future. 80% responded that they felt strongly about buying a car in the future (Appendix B, pg. 24). Therefore, there appears to be no significant influence of vehicle related crime on future sales of vehicles in the short to medium term.

Hypothesis H7 was accepted as there was a positive relationship between trauma induced by vehicle related crime and the intention of individuals to substitute the vehicles with other transport modes. The small β- value could be attributed to the fact that there is no viable alternative mode of transport as perceived by the users of motor vehicles in South Africa. However, as argued by Fearnley et al. (2018), the negative events around the use of motor vehicles will induce an inclination to substitute the use of motor vehicles with better alternatives.

6 Conclusions and recommendations

The overarching objective of this research was to examine the relationship between vehicle related crime and future sales of vehicles in the South African automotive market. The relationship was mediated by the constructs of trauma, brand loyalty and the intention to substitute. From the statistical results obtained, conclusions about the relationships were derived.

6.1.1 Impact of crime on future purchasing behaviour

This research showed that none of the paths connecting elements of vehicle related crime to the future purchase intentions of South Africans had any significant impact. The most direct path between crime and the intention to purchase (H4) was mediated by trauma. This path was statistically insignificant. There was no finding to suggest that the trauma caused by vehicle related crime negatively affected the future intention to purchase motor vehicles. It had been anticipated from consumer perception literature (Wee, Ismail, & Ishak, 2014) and the theory of planned behaviour (Ajzen, 1987) that the trauma of vehicle related crime would generate negative perceptions and attitudes around the use of motor vehicles and impair the intention to purchase.

The path mediated by trauma and brand loyalty was found to be statistically insignificant. There was no evidence supporting the notion that the trauma of vehicle related crime would negatively affect brand loyalty (H5). A negative relationship had been hypothesised from brand association research findings (Ahluwalia, Burnkrant, & Unnava, 2000) and the TPB which postulated that negative information around brands would diminish loyalty of customers to the brands. A negative relationship between crime and brand loyalty was expected since there were vehicle brands that were more targeted by crime than others. Brand loyalty, on the other hand, was expected to positively influence the intention to purchase (H6) as found by Belen del Rio, Vazquez and Iglesias (2001). Although the relationship was slightly positive, it was statistically insignificant and therefore unsupported as relates to vehicle related crime.

The path mediated by trauma and the intention to substitute was also statistically insignificant. The path from trauma to the intention to substitute (H7) was however positive and statistically significant. This showed that there was an intention among South Africans to substitute the use of the motor vehicle with other forms of transport.

The constraint imposed by the unavailability of viable alternative means of transport appeared to be the main reason there is no evidence of a reduction in the purchase intention of motor vehicles in the short to medium term future. This supports the theory of planned behaviour (Ajzen, 1987) with respect to the perceived control element where individuals ability to switch from motor vehicles to an alternative is externally curtailed. This observed effect of this constraint also concurred with the findings of Fearnely et al. (2018) and Weitzer and Kubrin (2004) who argued that switching from private to public transport occurs when a viable alternative with significant market share and geographical coverage exists. The effect anticipated from the findings of Murtiasih, Sucherly and Siringoringo (2012) and Zaichkowsky (2009) seemed to have been neutralised by the unavailability of viable transportation alternatives. The anticipated effect was that negative word of mouth, negative vehicle brand associations with crime and the ready availability of negative information relating to vehicle crime would have combined to negate both brand loyalty and the intention to purchase motor vehicles. The path from intention to substitute to purchase intention (H8) was statistically insignificant.

6.1.2 The trauma of vehicle related crime

This research has shown that there is a significant amount of trauma that is caused by vehicle related crime in South Africa. About 35% of the trauma expressed in South Africa was due to vehicle related crime. It was found that a heightened perception of the probability of experiencing vehicle related crime had the most significant and detrimental influence on trauma in individuals. The more an individual expects to experience vehicle related crime (H1), the more dysfunctional they may become. Dysfunction, as a case of interest in this research, may manifest as avoidance (Whitbeck et al., 2004) of motor vehicles and a reduced intention to purchase them. A counterintuitive phenomenon was discovered which seemed to suggest that individuals who have an actual experience with motor vehicle crime tend to manifest less trauma and dysfunction compared to those who have only a perception that they will experience the crime.

Information about the experience of others with vehicle related crime was shown to be a significant contributing factor to individual trauma (H3). This was in agreement with the subjective norms paradigm expressed in the theory of planned behaviour. The trauma of others represented their attitudes towards motor vehicles and were clearly

transferred to recipients of the information about them. This result concurred with the findings of Jaffe et al. (1986) and Figley, Yegidis and Bride (2003) who described the concept of secondary trauma induction. There is ready information from various sources regarding the experiences of others with vehicle related crime. It can be concluded that this information is enough to cause an increase in the perception of the likelihood of personally experiencing vehicle related crime.

6.1.3 Personal risk factors

The risk factor construct was largely excluded from the main inferential analysis of the research. It became apparent that more work was required to find a single construct that can accurately capture all the risk factors identified from literature. However, a few conclusions could be drawn from the descriptive statistics and crosstabulations.

6.1.3.1 Gender and trauma

It was shown that there is a higher likelihood of the female gender experiencing more adverse traumatic effects as a result of vehicle related crime. This was in agreement with the outcomes found by Silver et al. (2002) and Bonanno and Mancini (2012). There is need to provide targeted support for the female gender against the impact of vehicle related crime.

6.1.3.2 Age and trauma

It was shown that age has a bearing on the occurrence of trauma caused by vehicle related crime. The crosstabulations of age and the avoidance factor showed that the older an individual gets, the more they tend to avoid the use of motor vehicles as a coping mechanism against vehicle related crime. This was also in agreement with the findings of Silver et al. (2002) and Bonanno and Mancini (2012).

6.1.3.3 Education, income and trauma

From the crosstabulations of education, income and trauma, it was found that the lower the income and education of individuals, the more vulnerable they were to the experience of vehicle related crime and the development of trauma. It was found that the lower education and income groups corresponded with the market for the most affordable and popular vehicle brands in South Africa. The same brands were the most targeted by crime in the country. Lower education and income groups are therefore the most vulnerable to vehicle related crime in South Africa.

6.1.3.4 Recovering from the trauma of vehicle related crime

This cross-sectional study showed that very few people are disposed to avoid reminders of past traumatic events. As a result, most individuals do not experience lingering trauma symptoms and debilitating dysfunction. This finding agreed with authors such as Bonanno and Mancini (2012) and Silver et al. (2002) who argued that most people are resilient in the face of traumatic life experiences and can rapidly regain normal or baseline life function. When this finding is juxtaposed with vehicle related crime, it may be concluded that in South Africa, most people who experience vehicle related crime quickly recover and do not avoid reminders of the crime. They are likely to continue buying motor vehicles and use the same brands in the short to medium term.

6.1.4 Recommendations

6.1.4.1 Commercial market research

Marketers and planners in the automotive industry should seriously consider the impact of motor vehicle crime on their future business. They could begin by sponsoring market research initiatives into this area of study. The current research study was broad and considered the impact of vehicle related crime on all brands of motor vehicles. Vehicle manufacturers should commission research that focuses on their own brands. They should become more granular and study the impact of crime on each model in their brand portfolios. As was clear from the literature, all brands and models are not created equal in the sight of perpetrators of vehicle related crime. Some car brands are prone to hijackings and thefts more than others. Within brands, some models are targeted by criminals more than others. Studies at a more granular level may provide insights leading to targeted strategies that may mitigate against potential negative effects of crime on future sales.

6.1.4.2 Corporate social responsibility initiatives

As was found in the results of this study, about 35% of the variance in the trauma symptoms found in individuals could be attributed to the experience of vehicle related crime. Automotive industry players can include as part of their corporate social responsibility strategy, initiatives that target breaking the trauma inducing paths that were identified in this research. In areas that are recognised as hijacking and high crime zones, investments can be made to improve the safety and security of motor

vehicle users. This can involve setting up closed circuit television cameras, clearing up obstructive vegetation and sponsoring police patrols among other responses. This may be a worthwhile social investment as it will likely reduce the perception in individuals that they are highly at risk of experiencing vehicle related crime in those areas. Another corporate social investment that may be made by players in the automotive is to sponsor or set up centres that provide trauma counselling. They could make agreements with first responders such as the police, emergency service providers and religious organisations to direct victims of vehicle related crime to the trauma centres where they may receive counselling and support.

6.1.4.3 Improvements in vehicle security technologies

The automotive industry should develop technologies and vehicle systems that preclude crime. Some vehicles are targeted for hijacking or theft because they have components that can be easily fitted onto other models of vehicles. Designs that preclude such interchangeability across models can be applied. The costs benefit lost by reducing interchangeability of components may be offset by future sales that may be protected. Security systems such as anti-hijacking and alarm systems should be improved by making a deliberate effort to prevent overriding and bypassing by criminals. In light of the potential effect of crime on future business, the automotive industry can make the necessary investments and make such secure systems standard in their vehicles.

6.1.4.4 Pre-emptive competitive diversification

From the capital resources accumulated by players in the automotive industry, efforts can be made to diversify their business into other mobility technologies. In the developed world, railway technology is a major player in passenger mobility. There remains a lot of room for investment and development in the South African railway transport sector. In a pre-emptive move that may avert competition from state-sponsored railway initiatives, the automotive sector can invest in rail to proactively make available a viable alternative, safe and flexible transportation service.

6.1.5 Limitation of research

6.1.5.1 Research during a pandemic

This research was carried out during a very difficult time with the Covid-19 virus disturbing and disrupting the lives of many individuals. Many individuals had to prioritise more on various aspects of their lives. It is understandable that the sample size was not as large as the researcher would have preferred for use with the SEM statistical technique. SEM is considered as large sample method. Sample sizes of around 500 would have been more comfortable for the researcher. The size of the sample may have affected the power of the statistical method used. Sample size may have played a role in the univariate and multivariate non-normality observed in the data. Normality was a key assumption of the parametric statistical method used in the research.

6.1.5.2 Breadth of research subject of interest

The study investigated the effect of vehicle related crime on the entire automotive industry in South Africa. There is evidence that different automotive brands and models of motor vehicles are affected differently by the phenomenon of crime in the country. Those that are marginally affected may have diluted the effects that may have been found had the study been more focused on the brands and car models that are generally more severely affected. A more granular study may reveal a clearer picture.

6.1.5.3 Generalisability

Due to the pioneering nature of this research and the limitations that were identified in the work, the results may be used only as a guideline for future work in the same area of study. The work is analogous to a quick and dirty engineering solution or prototype. It does not have the refinement necessary for commercialisation but shows its intentions clearly. The error values for all variables showed that there is more work needed particularly to refine the research. The errors for the endogenous variables were high. The errors for the indicator variables were moderate. At this stage, the results of this research may not be generalised for application in the South African automotive industry and market as the standard error values show.

6.1.6 Suggestions for further future research

6.1.6.1 Development of a reliable personal risk factor scale

The risk factor construct was largely excluded from the research structural equation modelling after the realisation that the items prescribed by other researchers as the indicator variables for the construct failed to load onto a single component. This was discovered in exploratory factor analysis. Research can be carried out with the aim of establishing a reliable and valid scale that can be used. The scale would be to define a risk factor construct that can be used to predict susceptibility of individuals to trauma symptoms and dysfunction in the face of potentially traumatic events.

6.1.6.2 Contemporary research techniques and the assumption of normality

The non-normality identified in the current research casts doubt on the accuracy of the statistical estimates delivered. Other contemporary research methods that do not rely on the assumption of normality can be used. These include machine learning methods such as random forest regression. Some traditional non-parametric methods are generally susceptible to low power and less accurate results than parametric methods. Contemporary methods combine high power and a non-dependence on the assumption of normality. This research exercise may be repeated with a combination of larger sample sizes and contemporary analytical methods.

6.1.6.3 Granular commercial research by the automotive industry

It may be of benefit to players in the automotive industry to commission and sponsor further research at a more granular level. This is research that could be targeted at specific vehicle brands and models within the brands. This is due to the apparent differences in the extents to which each is affected by vehicle related crime in South Africa.

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