



**Addis Ababa University
School of Psychology**

Assessment on hazard perception of young drivers in Addis Ababa

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**This thesis is submitted to the school of psychology in partial
fulfillment of the requirements for the degree of Master of Arts in
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Addis Ababa University
School of Graduate Studies

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Declaration

The research is my original work, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

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Acronyms

AACA	= Addis Ababa City Authority.
AARA	= Addis Ababa Roads Authority.
AATCB	= Addis Ababa Transport and Communication Bureau
AATPTACIO	= Addis Ababa Traffic Police Traffic Accident Control and Inspection Office
ERA	= Ethiopian Roads Authority
ERTA	= Ethiopian Road Transport Authority
ETA	= Ethiopian Telecommunication Agency
GPS	= Global Positioning System
NGO's	= Non-Government Organizations.
OAU	= Organization of African Unity.
OECD	= Organization of Economic Co-operation and Development
SPSS	= Statistical Information System
SRHP	=Self reported hazard perception

ABSTRACT

Assessment on hazard perception of young drivers in Addis Ababa

Road accident in Ethiopia is one of the worst accident records in the world, as expressed per 10,000 vehicles. In Ethiopia, in 2004/5, 93 % of all accidents involved human factors, 5% account for vehicles factors and 2% were associated with road environments according to the federal police report. In Addis Ababa, taxis provide important public transport service accounting 10% of the journeys. However, taxis are at the forefront of traffic incidence accounting for between 15.6 to 26.5%. The purpose of the present study was to investigate hazard perception of young drivers and its impact on road traffic safety. Cross-sectional study was employed to study this hazard perception of young taxi drivers in 2013 in Addis Ababa. Primary data were collected from 384 young taxi drivers by using pretested questioners. The findings of the study focuses on the factors related to road use that were most commonly linked to an increased likelihood of young drivers' crashes and injury. For young novice drivers, these factors (driver skill, sensation seeking, risk taking, conscientiousness and overconfidence) were most usual factors involving road accident. On the basis of the findings, it was recommended that a longer-term training program encompass a comprehensive range of situations should be designed and implemented. Road user education and awareness raising should be given the necessary attention. Addis Ababa city administration and traffic police should control misuse of the scarce sidewalks by service giving enterprises.

I. INTRODUCTION

1.1. Background

Road traffic accident is a major but neglected public health challenge. The World report on road traffic accident prevention has indicated that worldwide, an estimated 1.2 million people die in road traffic accident each year and as many as 50 million are being injured. The severity of road traffic crashes is also likely to be much greater in Africa than anywhere else, because many vulnerable road users are involved, poor transport conditions such as lack of seat belts, overcrowding, and hazardous vehicle environments. Road accident in Ethiopia is one of the worst accident records in the world, as expressed per 10, 000 vehicles. Moreover, road accidents are concentrated in Addis Ababa which is the capital city of Ethiopia and Oromia region accounting for 58 % of all fatalities and two-third of all injuries.

Traffic-crashes data showed that inexperienced drivers are more involved in crashes than experienced drivers. According to Horswill and Mckenna (2004) like any skill, it is reasonable to assume that drivers become better in the ability to detect hazards as their experience grows. They presented research showing that novices are slower in detecting hazards and they often recognize smaller numbers of hazards than experienced drivers. They add that experience is likely to be a key influence on hazard perception independent of age (Age has different effects that will be discussed later). Young-novice drivers are the most risky group in road traffic accidents (RTA). They are consistently overrepresented in crash statistics, especially within the first few months after licensure (McCartt, Shabanova, & Leaf, 2003; Mayhew, Simpson, & Pak, 2003). In Sweden, accident involvement of young (18-19 year old) drivers was found to be five times more than older (35-50 year old) drivers (Engström, Gregersen, Hernetkoski, Keskinen & Nyberg, 2003). These drivers failure in to perceive road-traffic hazards is often due to the fact that the drivers failed to attend, because of their lack of experience and because their mental resources were focused elsewhere, a failure that could be particularly relevant in low level experience drivers. Carstensen, 2002; Gregersen, Nyberg, & Berg, 2003), duration (time) devoted to practice was much less and limited in Turkey that restricts candidates in gaining basic driving and Hazard Perception experiences in the initial phase of driving. It seems that driver training programs in Turkey target to make the candidates experienced enough to pass the exam by giving an emphasis on “skills training” and thus underemphasizing the

importance of hazard perception training and other safety training necessary for young drivers. Sümer, Özkan, and Lajunen (2006) reported that an emphasis on skills rather than safety may also lead the driver to overestimate the importance of driving skills and underestimate the significance of safety skills, which may increase the threshold for acceptable risk in traffic. Therefore, the content and target of the driver training courses may also affect how the candidates perceive driving context and how they prioritize what is important to avoid an accident (Sümer et al., 2006). Given that the motorization rate has been dramatically increasing by doubling the number of vehicles in every decade and there is a very high rate of young population who potentially will apply for a license increasing the young and novice driver population in a short term, improving the quality of novice driver training program will be more imperative for preventive traffic safety policies in Turkey. The training program consists of both theoretical training and practice sessions. In classroom based theory courses, first-aid, motor/technical lessons and traffic courses constitute 12, 16 and 35 hours respectively (T.C. Milli Eğitim Bakanlığı, 2006). Following the completion of these theoretical learner drivers are given a written exam and learners who pass the exam successfully were given supervised driving/practice courses. These on-car driving courses last for 10-hour duration and at the end of the practice session, candidates take an on-road driving exam. Compared to the graduated driving license courses in several EU countries, several states in the USA and Australia.

Hazard perception is generally described as the ability to perceive, understand and anticipate risky situations, or the ability to quickly perceive and respond to a potentially dangerous driving event. It is often refers to the identification of dangerous traffic events as they arise from a human factor of driving activities and road safety. Eventually, the study aims to assess and compare the hazard perception of young experienced drivers with novice drivers.

1.2. Statement of the problem

Hazard perception is the ability to anticipate the potential hazards on the road before they develop enough to lead an accident. Hazards can be either dynamic or static (road surface, weather conditions, environmental factors etc.). Dynamic hazards occur by the simultaneous movements of all other road users like other cars, pedestrians or cyclists. Lee (2007) describes five reasons for the high crash rate in young drivers: firstly, that imperfectly learned vehicle control skills lead to poor control and less spare attention capacity to accommodate unexpected roadway demands, secondly that young drivers have a poor ability to anticipate and identify

hazards, thirdly that young drivers have a willingness to take risks, such as shorter following distances and higher speeds, fourthly that there is a poor calibration of abilities relative to driving demands, and lastly that young drivers have a sensitivity to peer influences in adopting inappropriate norms. These five reasons incorporate aspects that relate to 'the young driver problem' and 'the problem young driver'. My view is that 'the young driver problem' magnifies the effects of 'the problem young driver' and by training the skills that are still developing in young drivers, could minimize the effects of 'the problem young driver' that exist as an inevitable part of the developmental period of adolescence. Teenage 'risky driving' due to showing off, thrill seeking etc...does not account for so many young driver crashes; it may be a risk factor in many, but as a theory, it does not explain the young driver crashes involving 'model teens' that did not involve thrill seeking or speed- the crashes that were due to poor skill. In my opinion, it is the reasons for these crashes that must be addressed. Searching about whether anticipatory hazard perception training would lead to increments or decrements in risk evaluations, McKenna, Horswill, and Alexander (2006) demonstrated that drivers who received such training preferred lower speeds when they were confronted with hazards as compared to the untrained group. They argued that anticipatory skill training was a good means of improving hazard perception in novices, by means of affecting them behaviorally to take less risk while driving. These studies therefore indicate that skill training in the form of hazard perception/anticipation training may be a beneficial addition to the training of young drivers. This type of training may improve hazard perception, without exposing them to the dangers of driving and is therefore well worth evaluating. Thus, while adolescents have developed improved general cognitive skills which underpin making logical and responsible choices, they behave erratically and recklessly, with periodic disregard for the risks and consequences of what they do. Reyna & Farley (2006) describe risk taking as something that is hardwired into the adolescent brain, and the delayed development of the frontal lobes goes a significant way to explaining the increase in risk taking, novelty seeking, sensation seeking, and emotional intensity which characterizes adolescence. Other researchers have also suggest that crash involvement is more often the result of risk taking behaviour rather than poor driving ability (Clarke, Ward & Truman, 2005). Thus, driver training programs which concentrate on car handling skills may actually lead to increased risk taking due to learners' inflated self confidence and self rated skills. McKenna and Horswill (2006) found that drivers who exhibited the most risk taking (as evidenced in laboratory based

tasks) were also those who had reported that they often allow their driving to be affected by their mood, and other studies have suggested that adolescents who are quite capable of wise decisions under 'normal' conditions, have a tendency to make poor decisions when experiencing intense emotional arousal (Dahl & Spear, 2004). Senserrick (2006) differentiates between intentional and unintentional risk taking by describing intentional risk taking as deliberate "thrill seeking", and unintentional risk taking as simply a failure in skill or failure to actually recognize the inherent risk. A similar distinction is made between errors and violations, with errors involving a skill based failure in information processing, and violations being risk taking behaviour that involves a deliberate infringement of a regulation (McKenna, Horswill & Alexander, 2006). Unfortunately, adolescence 'predisposes' young drivers to engage in intentional, knowledge-based risk taking and is a reflection of the driving style that is in some ways inevitable during this developmental, exploratory period. This leads to subsequent deliberate violations of the driving. A growing consensus among driver training and road safety researchers is that greater emphasis should be placed on higher level cognitive functions underlying driving skills (e.g., Mayhew, 2007).

An ongoing debate in the area of young driver research focuses on whether the primary causal crash factor, and therefore the primary target for intervention, is developing skills due to inexperience- 'the young driver problem', or intentional risk taking associated with adolescence- 'the problem young driver' (Senserrick, 2006). The complexity of the young novice driver crash problem is widely acknowledged. One reason for this is that the task of driving is itself extremely complex. Novice drivers learn the basic vehicle handling skills and traffic laws quickly, often after only 15 hours of driving. Hazard perception is an executive function of the pre-frontal cortex that is still developing in young drivers, as well as a critical driving skill which therefore must be trained if a demand such as driving is to be placed on adolescents. McKenna, Alexander, & Horswill (2006) report that anticipation in driving could be significantly improved by training in the laboratory using video simulation techniques, and that novice driver could be improved to the level of experienced drivers within only 4 hours of training. The fact that the driving licensure age coincides with the developmental period of adolescence is problematic for a number of reasons.

Road traffic accidents in Ethiopia also occur as a result of several factors associated with the traffic system, namely: road users, road environment and vehicles. In Ethiopia, 2004/5,

93% of all accidents involved human factors, 5% accounted for vehicle factors and 2% were associated with road environments according to federal police reports. Young drivers have a disproportionately high rate of involvement in road crashes. Particularly, accidents involving vehicles driven by young men have become countless in our country.

Hence, experience, certain personality traits, driving style and driving skills, which are shown to modify the relationship between risk assessments and hazard perception processes, may interfere with perceived risk in young novice drivers. Therefore, the aim of this research is to investigate the link between personality factors, driving skills, and experience in predicting hazard perception ability.

1.3. Research questions

Depending on the issues stated above, the study attempted to address the following basic questions in regard to hazard perception of young taxi drivers in Addis Ababa:

1. Do skilled drivers perceive hazard more than novice drivers?
2. Do risky driving behaviors of young drivers have effect on hazard perception?
3. Dose greater sensation-seeking behavior of young drivers influence hazard perception?
4. Dose overestimated driving skill of young drivers have an effect on hazard perception?
5. Do personality factors have effect on hazard perception?

1.4. Objectives of the study

The purpose of the present study is to investigate hazard perception of young drivers and its impact on road traffic safety. To explore this, questionnaires will be administered for 384 young experienced and in experience taxi drivers here in Addis Ababa. The questioner includes drivers' hazard perception ability, high risk taking behavior, overestimates driving ability, greater sensation-seeking behavior and effect of personality factors on hazard perception ability. Two key informants were interviewed i.e., traffic police officer and Road and Transport Authority official.

The specific objectives of the study are:

1. To assess hazard perception ability of experienced and novice young drivers.
2. To explore high risk taking behavior of young drivers on hazard perception.

3. To assess the effect of overestimate driving ability of young drivers on hazard perception.
4. To explore the influence of greater sensation-seeking behavior of young drivers on hazard perception.
5. To investigate the effect of personality factors on hazard perception.

1.5. Operational definitions

Hazard perception: refers to a driver's ability to detect and anticipate potential hazards in the environment, and has been consistently linked to crash involvement.

Driving Skills: refers to the cognitive and perceptual skills affecting a young driver's understanding and response to potential risks and hazards.

Sensation seeking is defined as a trait-like characteristic, which is dominated by a tendency towards new and different experiences and stimuli, despite of the risks involved.

Risk taking behavior is the situation that young drivers in general underestimate the risk of accidents in hazardous situations.

Overconfidence driving skill is the combination of the perceptions of high driving skill and low safety skill results in the highest level of accident involvement.

1.6. Significance of the Study

Road traffic accident problem in Ethiopia, especially in Addis Ababa, is now a major concern of the government, its organs and other institutions concerned with road safety as well as the public in general. In recent years over 42% of all injury road traffic accidents in Ethiopia occur in Addis Ababa of which taxis' share ranges between 15-26%. Moreover, due to the scarcity of other alternative public transport services in the city and because of its flexibility, the taxi service will continue to be significant. Therefore, the knowledge of the causes of taxi traffic accidents will be of paramount importance to all those concerned. The findings obtained from the study are expected to provide:

- 1) Helpful information about the taxi traffic accidents in the city
- 2) Information to the governmental institutions and others that are concerned with road traffic safety directly or indirectly and about the accident prone spots in the city.
- 3) Information about the existing problems related to the traffic regulation in the city for the concerned bodies such as the city administration and the traffic police.

- 4) Background information to those scholars who want to conduct future detailed studies on road traffic accidents, road safety and other related issues.

1.7. Limitations of the Study

First of all, among the factors that affect the precision of any study, the availability and reliability of the information it employs is very important. This study mainly uses the information collected from taxi drivers and the archives of the Addis Ababa Traffic Police. Particularly taxi drivers were not interested to provide genuine information on the questioners. Information from the archives of the Addis Ababa Transport and road authority and Traffic Police were not organized properly. The absence of information related to taxis in terms of their number, distribution, traffic flow and other related factors, made this study difficult. Also since the available data is more general. Also the study was hard and tiresome to convince the respondents about the aim of the study. Therefore, shortage of time, absence of recent information and limited cooperation of the government offices were the main problems that the researcher had to face. Second, Wahlberg (2003) pointed out that to assure methodological strength the measurements should at least possess test-retest reliability. In fact the SR-HP test's success to differentiate between experienced and novice drivers partially served as a reliability indicator. Still, on-road assessments should be done to find out whether the performance on the test was tapping the actual performance on the road. Third, it has been known that both age and driving skill contribute to accident involvement of young novice drivers. In the current study the effect of age was controlled in all the analyses. However a more comprehensive design could be based on creating heterogeneous groups that were representative of different age and driving experience categories. For example assessing the hazard perception skills of younger novice vs. older novice drivers or younger novice vs. younger experienced drivers would reveal more about the effects of age and experience on hazard perception.

II. REVIEW OF LITERATURE

A review of literature was made consulting different sources, books and web-sites. The purpose of reviewing is to explain concepts about Hazard perception and to explore the current status, the developments and the gaps of young drivers. Hence, contents on theoretical and empirical perspectives of hazard perception as well as local researches were briefly reviewed and presented.

2.1. Theoretical perspectives and models of the study

2.1.1. Conceptual definition

Hazard perception (HP) in traffic is defined as “the ability to recognize a situation on the road which is either dangerous or has the potential to develop into a dangerous situation in which some driver action will be required” (Transport Research Laboratory [TRL], 1996; p. 28). Howarth, Mulvihill, and Symmons (2005) defined hazard perception as “the process whereby a road user notices the presence of a hazard (p.xiii), which is “any permanent or transitory, stationary or moving object in the road environment that has the potential to increase the risk of a crash” (p. 7). Hazard perception refers to the ability of reading the road and anticipating other road users’ actions. Therefore, it is one of the most critical processes to avoid accidents. Hazard perception develops gradually with gaining experience in driving. However, in the initial phases of learning to drive, the novice driver may need to allocate all the cognitive and perceptual capacity to the task of controlling the car, and therefore unless the driving becomes an automated task the driver has no cognitive capacity left to effectively deal with road hazards (Deery, 1999). For this reason, the incompetence in hazard perception was regarded as one of the main reasons of high accident rates in young and novice drivers (Deery, 1999; Groeger, 2001).

2.1.2. The effects of experience on hazard perception

Practice makes perfect. Hazard perception is a skill which gets better with practice and, therefore it is relatively improves but it never ends. Logan (1985) said that skill is relative rather than absolute and there is no maximum level of skill that can be attained.

There can always be someone who is more skilled than the other. Thus, when talking about experience and its contribution to the ability to detect hazards it must relate to cognitive structures and process that improves with practice.

Mayhew and Simpson (1995) reviewed the literature on the perceptual skills of novice drivers, including visual information gathering strategies. They noted that, compared to more experienced drivers, novice drivers display a smaller range of horizontal scanning of the road environment; look closer to the front of the vehicle; check the mirrors less frequently; glance at objects less frequently; utilize peripheral vision less efficiently; and fixate on fewer objects. Novice drivers also fixate more on stationary objects, whereas experienced drivers fixate more on moving objects. Research also suggests that experienced drivers (and experts in other domains, such as radiology and chess) perceive holistically, whereas novices perceive piecemeal and independent of context (Milech, Glencross, & Artley, 1989). Benda and Hoyos (1983), for example, found that novice drivers assess traffic hazards on the basis of a single characteristic, so that all situations that share a certain characteristic, such as wet roads, are perceived as equally dangerous. In contrast, experienced drivers perceive situations on the basis of multiple characteristics, which they use to differentiate their degree of potential risk. These results indicate that with experience, people are more able to integrate information quickly and consider hazardousness as a holistic attribute of the driving environment. Such holistic perception is believed to stem from the reorganization of knowledge (in memory, schema, scripts, and so on) that develops with experience (Milech et al., 1989). Quimby, Maycock, Carter, Dixon, & Wall (1984) examined the relationship between crash frequency and the time taken to detect and respond to hazard, termed hazard perception latency. They found that long hazard perception latency was associated with higher crash rates after controlling for age, driving exposure, and simple reaction time. Specifically, the crash rate doubled between the 5th and 95th percentiles of hazard perception scores. These results indicate that relatively long hazard perception latency is a risk factor for crash involvement. Researchers have illustrated those drivers who display long hazard perception latencies may not necessarily show slow reactions in other contexts. For example, Quimby and Watts (1981) found that drivers under the age of 25 displayed faster simple and choice reaction times than older drivers. Yet, the younger drivers also displayed longer hazard perception latencies. Other researchers (McKenna & Crick, 1991; Summala, 1987) have reported similar results, with young drivers more likely to miss detecting hazards altogether and taking longer to detect those hazards that they do perceive.

2.1.3. Specific driving competences of drivers, driving school tutors and traffic police personnel

Road Transport Safety Management System Guidelines of 1995 advises that the competence profile of a professional driver should include:

- Actual driving skills required for the type of vehicle being driven.
- Defensive driving.
- The knowledge and understanding of road safety legislation and rules, that is, the highway code.
- Road accident prevention measures.
- The main causes of road accidents.
- General vehicle operation and vehicle mechanics.

The same guide mentioned above advises that the competence profile of a driving school tutor should cover all the areas of expertise required for a driver, albeit at a generally higher level of understanding and application, and in addition, include presentation and coaching skills.

The competence profiling of the traffic police should cover all the areas of expertise required for a driver and a driving school tutor, although at a higher level of understanding. In addition, traffic police personnel need to be fully conversant with:

- Legal requirements,
- Emergency response and crisis management,
- Safety inspection of vehicle and driver.
- Accident investigation techniques and analysis.

2.1.4. Defensive driving and actual driving skills required for the type of vehicle being driven

Actual driving skills refer to the technical knowledge a driver requires to start, drive and bring to halt a particular vehicle. This refers to the know how of inserting the ignition key, engaging the right gears and breaking.

On the other hand, defensive driving is the demonstration of an attitude, awareness and driving skills that makes allowance for:

- Handling characteristics of the vehicle.
- The lack of skills and unpredictable actions on the part of other drivers.
- Vulnerability and unpredictable behavior of pedestrians and cyclists.
- Unpredictable behavior of animals on the road.

- Hazardous road features, for instance, curves, hills, narrow roads, bridges, absence of signs or signal and obstruction.

Road accident prevention measures.

Covered under this driving competence of road accident prevention measures are:

- Journey management, including maximum driving and duty hours and formal rest periods.
- Sleep debt effect or rest, for instance, drivers are advised to stop driving if they feel sleepy.
- The effect of alcohol and drugs on safe driving.
- Vehicle design, specification and condition.
- Vehicle safety features, including the use of safety belts.

General vehicle operation and vehicle mechanics.

Covered under this driving competence are:

- Technical aspects of vehicle operation, for instance the transformation of fuel chemical energy into movement of the wheels of the vehicle.
- Vehicle stability.
- Daily vehicle inspection, for instance, checking the levels of radiator water, the water level of the battery and use of driving mirrors.

2.1.5. Drivers Behaviors

System of laws and regulations directly affect road user behavior e.g., the behavior of the driver, pedestrian, cyclist, and passenger. Also, the characteristics of the vehicle and the environment influence pedestrian and driver behavior in ways that lead to accidents. Road user behavior equally impacts the environment and the vehicle. For instance, a fatigued driver or a distracted driver can become involved in traffic crashes because his physiological or mental states are challenged. And the probability of crash is hastened when distracted driving combines with bad conditions of roads and non-enforcement of traffic laws. In much the same way, a pedestrian who crosses the roadway outside of the crosswalk or walks in lanes meant for vehicles as a result of non-availability of pedestrian facilities or even talks on a cell phone while crossing, will most likely be involved in pedestrian-vehicle collisions. In other words, a sensation-seeking

driver who has risk-taking propensity will likely use the roadway in a manner that poses danger to other road users.

2.1.6. Risk theory

Human beings take risks on a daily basis. The concept of risk in traffic safety has been widely studied. “Risk surrounds us, it envelops us. It is our personal and societal preoccupation and our salvation. Without understanding it we risk everything, and without capitalizing upon it we gain nothing” (Breakwell, 2007, p. xi). It is a concept that defies a single straight forward definition due to its multidisciplinary applicability. For instance, studies involving risk cut across the physical and social sciences by psychologists, sociologists, geographers, economists, nuclear scientists, environmentalists, etc. Because it is applicable in many domains, the term *risk* is sometimes used interchangeably with *hazard* although there might exist a nuance between them. Technically, risk is defined as probability multiplied by consequence (i.e., probability x consequence) (Drotts-Sjøberg, 1991). Breakwell (2007) defines risk as “the probability of a particular adverse event occurring during a stated period of time”, (p.2). Breakwell sees the word “probability” as the likelihood of some specific adverse events (e.g., road traffic accidents) that might result from being exposed to a hazard. There is no doubt that human beings are interested in knowing the likelihood or probability of an adverse event happening to them and how bad or worse the effect might be. The search for understanding the nature of risk and how it is perceived by individuals has led to the development of risk theories and models such as the theory of risk homeostasis (Wilde, 1994; 1998), risk thermostat framework, the psychometric paradigm, etc. Social scientists have suggested that risk is socially constructed and have set out to investigate how people perceive and negotiate daily risks like road traffic crashes. It must be noted that these theories and models have not gone without criticisms.

2.1.7. Risk perception

The degree of risk perceived determines the degree of actions to be taken (Adams, 1995). Risk perception (Slovic, 2009) and its relationship with road traffic accidents has been the subject of numerous studies in the traffic safety literature. It is assumed that there are individual and group differences in risk perception. Personality traits are known to influence risk perception (Vavrik, 1997; Ulleberg & Rundmo, 2003; Rundmo & Iversen, 2004; Oltedal & Rundmo, 2006; Gulliver & Begg, 2007). Douglas (1986) has indicated that risk perception is the result of personal

dispositions and socio-cultural factors e.g., religious beliefs. This position has been well illustrated by the cultural theory of risk (Douglas & Wildavsky, 1982). This attribute has made risk perception a multidimensional construct. Hence, what one driver or pedestrian might consider being risky behaviour on the roadway might be perceived differently by others? The concept of vulnerability is central to risk perception and has been defined by several writers to depict the human shortcomings that make certain individuals and groups prone to threats, risks or hazards. Indeed, it is seen as a 'state' existing within a system (e.g., personal dispositions of road users) before that system comes into contact with a hazard event. It may therefore not be surprising those personality characteristics such as risk-taking propensity (Iversen & Rundmo, 2002; Oltedal, & Rundmo, 2006; Lund & Rundmo, 2009; Bingham et al., 2006); sensation-seeking (Zuckerman, 1997; Jonah, 1997), and other risky road use attitudes have been reported to play roles in road accidents. Deery (1999) has found that young drivers are more susceptible to impaired risk perception and others feel more invulnerable to traffic risks (Weinstein, 1984). Basically, risk perception is a subjective experience because risks are future events. Risk perception can therefore be described as the process by which individuals mentally represent and assimilate the probability that negative events such as injury or death connected with motor vehicle crashes might occur to them in the future. Moller (2000) has also observed that risk perception has to do with one's opinion of the likelihood of suffering a health threat associated with either performing a certain activity or choosing a certain lifestyle (e.g., speeding or hawking in traffic). Understanding how individuals perceive and negotiate risk has the potential of forming the basis for planning more effective risk communication strategies. For example, risk willingness, risk tolerance and risk acceptability are important constructs to explore. Thus, a brief introduction here of a few of the models proposed to guide this understanding will be informative and instructive.

2.1.8. Risk homeostasis theory (RHT) and risk compensation theory (RCT)

These two theories are generally referred to as theories of behavioural adaptation (Elvik, 2004; OECD, 1990; 1997). They are both related in principle and practice although Risk homeostasis theory deals more with partial compensation while risk compensation theory concerns itself with full compensation. Sometimes, both theories and terms are used interchangeably with risk compensation gaining more prominence (Elvik & Vaa, 2004). In effect, risk compensation theory is viewed as an extension of Risk homeostasis theory. Both

theories were popularized by Gerald Wilde (1976; 1982; 1994; 1992; 1998) but risk compensation theory was actually propounded by Sam Peltzman (1975). Their origins are in road traffic safety research (Taylor, 1964). Technically, Wilde describes this behavioural adaptation as having in-built target level of risk which is constant and is accepted by individuals and operates on the principle of the functioning of the thermostat. That is, in the face of perceived high danger, human cautiousness and alertness rise but as the danger appears to go away the tolerable risk level of humans' falls back to its normal position. Thus, Wilde and his colleagues (2002) argue that safety interventions will be meaningless unless they directly affect the amount of risk taking that individual road users are willing to accept (target level of risk). That is, contrary to the expectations of safety engineers and advocates, accident countermeasures put in place may rather have an offsetting effect on users. For example, driving on a first class road will make drivers feel that since the road is good there might not be any risks or even if there were risks they might only be minimal thus they may choose to speed instead. But if they were driving on a potholed gravel road, they might be more careful because of the known risks associated with driving on such roads. So the good condition of the road rather compensates for the risk to be perceived. Gerald Wilde concludes that it is this propensity for risk acceptance which determines the actual accidents associated with any behaviour engaged in by humans. As a result of this Wilde again postulates that humans and communities will get the required number of accidents they wish to get unless the target level of risk is altered. This theory has received extensive debate among researchers. Empirical evidence both confirming and refuting its usefulness has been adduced. The often cited confirmatory examples involve the use of helmets as well as the unprecedented reduction in accidents emanating from the great caution exhibited by the Swedish people when they changed from left hand drive to right hand traffic in the fall of 1967. On one hand, it has been praised for its contribution to the understanding of road user behaviour (Adams, 1983; 1988; Assum et al., 1999; Adams & Hillman, 2001; Hedlund, 2000). The explanatory constructs of the model are presented below.

2.1.9. A Model of Responding to Risks in Traffic

Hazard perception is not solely based on detecting the onset of a hazardous situation in traffic. It includes information processing on the basis of risk assessments as well. Howarth, Mulvihill, and Symmons (2005) define a hazard as any object on the road which is either stationary or moving and which poses a threat in terms of accident involvement. They proposed

that differentiating between hazard and risk is important and they asserted “Hazards exclude characteristics of the rider or the vehicle, which are classed as modifying factors” (pp.7). They argued that modifying factors may refer to personality traits, driving style, experience and all other specific attributes of the driver, that affect perceived risk associated with a hazard. Grayson and Groeger (2000) propose a model of responding to risks in traffic and they claim that the first stage is consisted of detection of a hazard. This basic level is related to the good use of scanning and searching abilities. Second drivers should assess the level of threat in that hazard, which is a subjective decision. As a result of this appraisal, at the third level drivers should think of the best way to avoid that hazard such as breaking or slowing down and then, finally driver implements the decided action at the last stage. Young and novice drivers may fail at the very first stage of this detection and responding process by not scanning the environment and not detecting the hazard earlier because of their inexperience. In addition, even if the hazard is detected, young drivers may fail to assess the actual risk that the hazard would bring due to age-specific modifying factors. Therefore, while it is important to assess the competencies of young/novice drivers in their abilities to detect a hazard early on, it is also very important to highlight the effects of modifying factors that predispose young/novice drivers to mislabel the hazardous situations as a result of perceiving less risk.

2.2. Empirical Literature

2.2.1 Global View

Individual Differences Approach in Hazard Perception Research

It has been known that accident involvement is related to situational, environmental, and driver factors and over 90% of the accidents in Turkey were reported to be resulting from driver factor rather than other factors (EGM, 2002). Driver factor refers to what has been labeled as the individual differences in differential accident involvement (Elander, West, & French, 1991) and mainly it focuses on individual factors that are correlated with crashes and unsafe driving. Elander et al. proposed that individual differences in driving could be broadly categorized under driving skills/driving ability and driving style/personality characteristics. The authors defined driving skill and driving style as the intrinsic factors to driving and they defined driving ability and personality characteristics as the extrinsic factors to driving. By driving skills, the authors referred to basic car handling skills, while with driving ability they referred to intentional and cognitive processes such as scanning strategies. Driving style was defined as the person’s

adapted way of driving with reference to having a safe or unsafe orientation and personality characteristics were claimed to be affecting the driving style extrinsically. In addition to the personality factors, the authors claimed that situational variables such as driving while intoxicated or demographic variables such as experience and age are also extrinsic factors to driving and them directly affect the intrinsic factors. Consistent with this framework, a contextual-mediated model was proposed by Sümer (2003) with defining driving skills and driving behaviors (tapping driving style) as proximal context variables and with defining demographical, situational, environmental, and personality factors as the distal context variables in predicting accident involvement. Sümer reported that there were direct effects of aberrant driving behaviors on accident risk. Psychological symptoms, sensation seeking, and aggression were found to be related to driving behaviors, which in turn were associated with crashes. Therefore, there are associations and causal relations between different individual differences factors that are intrinsic or extrinsic to driving and interactions between specific individual differences factors may lead to a variable type of drivers. Adapting this framework, hazard perception, which was defined as the ability to read the road can be regarded as a proximal factor that directly influences the accident involvement, and thus HP ability is expected to be influenced by distal context including environmental conditions and personality factors.

Sensation-Seeking behavior

Sensation seeking is defined as a trait-like characteristic, which is dominated by a tendency towards new and different experiences and stimuli, despite of the risks involved (Zuckerman, 1990). Sensation seeking as proposed by Zuckerman, fits into an “approach – avoid” kind of evolutionary heritage. He argued that sensation seekers are the ones who have a strong need to explore the environment and take risks on the way to reproductive success. This tendency predisposes high sensation seekers to be more tolerant during dangerous situations; the situations in which sensation avoiders would feel anxious. In addition to this psycho physiological perspective, Arnett (1994) proposed that social environment and individual differences other than genetics were also important in affecting the behaviors of sensation seekers and sensation avoiders. Sensation seeking was linked with various kinds of risky activities and behaviors such as gambling, smoking and dangerous sports. Considering the traffic environment is one of the most risky contexts, sensation seeking as a driver characteristic was also investigated by researchers under the concept of individual differences approach.

Risk taking behavior

To examine the relationship between age, perceived driving ability and perceived risk, Matthews and Moran (1986) asked their young participants to assess themselves in ‘vehicle-handling skills’, ‘driving reflexes’ and ‘driving judgment’. The results provided support to the argument that there is an indirect relationship between perceived driving skill and perceived risk. Moreover it was revealed that young drivers have a tendency to perceive themselves as more skillful than their peers in vehicle-handling and driving judgment categories, and to perceive themselves more skillful than older drivers in driving reflexes category. Young drivers were also found to indicate their risk of involving a crash as lower than the risks of their peers. Matthews and Moran (1986) argued that young drivers’ tendency to perceive themselves as skillful as older drivers, points out a misjudgment rather than a fact. As a support for this argument, Harrison (2004) in a follow-up on learner drivers found that although learner drivers’ experience of driving in different and complex circumstances (such as at nights or in intercity roads) was very low, the positive perceptions about their driving skills increased rapidly within a short time. Judgments about driving skills or perceived risk are susceptible to experiential driving knowledge (Rothengatter, 2002; Groeger & Grande, 1996; Groeger & Brown, 1989). Groeger and Grande (1996) provided statistical evidence concerning this point and they reported that drivers who had an accident-free driving record had the tendency to perceive their driving abilities in a more positive light. This indicates that drivers tend to think of themselves as very good drivers if they had not been involved in accidents. This generalization seems to be used by young and novice drivers as well, although they do not have a history in driving that is long-enough to make inferences. However, having overconfidence in driving skills which would create an elevated threshold for tolerable risk, can be said to create a potential basis for is labeling the hazards when it was combined with inexperience and low levels of safety skills.

Overestimation of Driving Skills

It has been known that individuals have the tendency to engage in self enhancement biases while making self-evaluations, in order to verify their beliefs about certain aspects of themselves. Taylor and Brown (1994) asserted that majority of the people have illusionary beliefs about themselves with regards to three domains “a) ...view themselves in unrealistically positive terms b) they believe they have greater control over environmental events than is actually the case, and c) they hold views of future that are more rosy than base-rate data can

justify” (pp. 21). The authors claimed that optimism bias and illusion of control were good for psychological well-being and they act as a buffer to cope with threats to self esteem. They also asserted that optimism bias, which was described as holding positive views about future, was mostly pronounced among non-clinical samples with high self-esteem, while depressed individuals in clinical samples were found to make a more realistic assessment. (see Taylor & Brown, 1988, for a review). Given that the driving context is one of the most risky environments, optimism bias or illusion of control may not be a good ground to make driving related self-assessments. It is more important for a driver to make realistic self evaluations on the basis of driving skills and abilities, in order to be aware of his limits in handling the hazardous situations. An elevated positive belief about the self in the driving domain may predispose the driver to perceive that he/she could handle every challenging situation in traffic. Therefore the overconfidence in one’s driving may lead to the adaptation of a risky driving style and may act as a modifying variable in attributing lower amounts of risks to road hazards. A common method to investigate drivers’ self-enhancement bias in traffic is to measure self-reported driving skill. In several studies, it was reported that there exists the tendency among all kinds of drivers to overestimate their driving skills when they were comparing themselves with the average driver (McCormick, Walkey, & Green, 1986; McKenna, Stanier, & Lewis, 1991) or a tendency to underestimate the other drivers’ driving skills as compared to their skills (Delhomme, 1991; Walton & Bathurst, 1998). McKenna et al. (1991) and Waylen, Horswill, Alexander, and McKenna (2004) reported that there was a positive correlation between experience and one’s view of driving safety and driving skill. Lajunen and Summala (1995) found that experienced drivers (with an annual mileage of 5000km/year and above) were found to be skill-oriented rather than safety-oriented. They argued that gaining mastery over the car and being experienced create controllability and this may decrease the perceived risk while driving. This is critical considering the findings showing that the combination of the perceptions of high driving skill and low safety skill results in the highest level of accident involvement (Sümer & Özkan, 2002; Sümer, Özkan, & Lajunen, 2006). In their study with experienced drivers, Sümer and Özkan (2002) found that drivers, who scored high on self-reported driving skill, but low on safety skills, were more accident-involved than other combinations of driving and safety skills groups. This group of drivers was also found to be speeding and overtaking other drivers more and has more traffic convictions (Sümer et al, 2006). The authors elaborated on the issue that when driving

skills were not accompanied by safety skills the driver may develop overconfidence about their driving skills, and this could be especially a problematic pattern for young drivers. A comparison of young male and female drivers in terms of perceived driving ability and perceived accident risk revealed that, male drivers tend to assess their driving skills in a more positive light than females did (DeJoy, 1992). Similarly young-male drivers were found to underestimate their accident likelihood, while this tendency was not observed for older drivers (Finn and Bragg, 1986).

Personality factors

Empirical evidence with regards to the predictive power of personality traits in accident involvement is relatively narrow, but suggesting that conscientiousness is the most consistent variable in predicting safe behaviors. Given that hazard perception is the leading cause of accidents among young novice drivers, it should be investigated which personality domains moderate/mediate the relationship between perceived risk and hazard perception. In terms of the given links between personality traits and accident involvement, it can be expected to find a positive relationship between high conscientiousness and hazard perception ability. High conscientiousness, which is defined by rule governed behaviors, may lead the driver to be more perceptive about other drivers' rule-incongruent behaviors in traffic and this may enhance hazard detection time. In addition, given that extraversion and openness to experience can be related to sensation seeking, these traits may also contribute to taking more risks while driving, which will impair perceived risks associated with hazards. In terms of its relation to driving stress and anxiety, high neuroticism can be expected to interfere with hazard detection time. Finally low levels of agreeableness may create a basis for hostile attitudes in driving context and drivers with low agreeableness may themselves contribute to the development of hazardous situations by driving aggressively and putting themselves into risky situations.

2.2.2. African countries' perspective

Causes of road traffic crashes: the case of Uganda

Turyagurnanawe (2000) lists down the ten known causes of road traffic crashes in Uganda as follows:

- Reckless driving
- Hit and run.
- Overturning.

- Mechanical defects of motor vehicles.
- Careless pedestrians.
- Driving under the influence of alcohol and/or drugs.
- Tyre bursts.
- Overloading.
- Dazzling of lights of other vehicles.
- Other causes.

We note that, apart from mechanical defects and tyre bursts, the other causes of road crashes in Uganda are behavioral and can be addressed using the principles of psychological contract, social capital and driving competence. These are the principles behind this study.

Reckless Driving /Over-speeding

In 1999, out of 5,811 victims, 627 died because of reckless driving. In the year 2000, the figures rose to 7,161 victims and 714 died.

The known reasons for over-speeding and reckless driving in Uganda have been itemized as:

- Intoxication after drinking liquor and taking drugs.
- Greed for money by taxi drivers and boda-boda operators.
- Excitement and showing off by the youth in Uganda.
- Unplanned journeys.

Driving under the influence of alcohol and/or drugs

Turyagumanawe (2000) reports that among the most deadly evils we have in the Ugandan society, driving under the influence of alcohol and drugs is one of them. Driving under the influence of medicines like choroquine injection, marijuana Indian hemp, mairungi, cocaine and other intoxicating drugs is on the increase in Uganda much as it is dangerous to good driving. Detection of the alcohol/drug crime is not easy in Uganda. This is mainly because of the lack of appropriate detection equipment like the breathalyzer. It is also presumed that drink-driving counts for most of accidents that occur at night, weekends and most of the hit-and-run accidents in Uganda. Among the known reasons for driving under the influence of alcohol and/or drugs in Uganda are listed as:

- Frustration
- Excitement

- Wrong companion and refusal to take advice against alcohol and/or drugs.

Once again, we note that the above reasons are behavioral; and addressing the habits and attitudes of drivers will go a long way in improving road traffic safety performance of professional driving in Uganda. Having itemized the main causes of road crashes in Uganda, the traffic and road safety report lists down a number of recommendations to address the issues raised above. The recommendations are listed as follows:

- The issues of driver training in the driving schools, driver testing before issuance of driving permits and the issuance of driving permits themselves, should be attended to by the legislators. These important processes must be streamlined and be conducted with the utmost efficiency that they deserve.
- Pre-registration and pre-licensing inspection must be re-instated or institute periodic inspections of vehicles for purposes of checking their roadworthiness.
- Traffic personnel should do beat patrols, motorized patrols on highways and in urban centres to check driving standards, motor vehicle standards and enforce traffic laws, rules and regulations for road safety improvement.
- The traffic road safety act (TRSA) of 1998 should be fully operationalized to curb the indiscipline of road users especially the drivers and riders.

Threats - the driver

Accident reports indicate that human behavior of the driver is a primary cause of over 90% of road accidents. A number of driver related threats exist. The driver could be:

- Untrained for the type of vehicle he is required to drive.
- Without defensive driving skills.
- Not medically fit, for instance, through poor vision, heart disease, epilepsy, obesity, muscular-skeletal problems, to mention but a few.
- Under the influence of alcohol, drugs or medication.
- Suffering from psychological stress.
- Lacking judgment and/or experience, generally associated with young drivers.

Risk perception and fatalism

The issue of risk perception and fatalism and their relationship with road traffic accidents was raised by respondents during the interviews and discussions. Generally, risk perception has to do with how drivers of motor vehicles deal with the ever-changing driving situations on the roadway by adapting their actions both to the physical environment and the behaviours of other road users. Though drivers appear to understand that the driving occupation has inherent risk factors with dire consequences for all road users, they seem to describe them as mere occupational hazards. The extant literature supports this finding. Deery (1999) carried out a study on hazard and risk perception among young novice drivers and has observed that young drivers in general underestimate the risk of accidents in hazardous situations. Young male drivers also tend to rate dangerous traffic situations as less risky than older male drivers (Trankle et al., 1990). Trankle et al. suggested that educational measures designed for young drivers should focus on different aspects of their risk perception and risk tolerance. Some participants explained that their culture makes it a taboo to talk about accidents and death. For others their religious practices do not encourage them to have negative thoughts about future events because as they explained; whatever you say with your mouth shall come to pass. And yet for another group, they are almost always pre-occupied with their challenging socio-economic status to the extent that these socio-economic situations compensate for their perceived driving risk. Drivers appeared evasive in their response to open-ended questions such as: “How probable do you think it is for yourself to be involved and injured in a traffic crash?”, “How concerned are you about traffic crash risks and think you could be a victim?” The resultant consequences of inaccurate risk perception are dangerous driving and motor vehicle crashes. This finding is supported by risk compensation theory (RCT) and risk homeostasis theory (RHT) proposed by (Wilde 1994, Adams 1995, Adams 1999). These theories hold the assumption that humans adapt their behaviours to the intensity (high or low) of risk as a function of their subjective perceptions. For example, if drivers see themselves to be in greater risk situations, they will try to behave with a lot more caution than when they perceive themselves to be in lesser risk situations (Wilde, 1998; Hedlund, 2000). Lund (2006a) conducted a comparative study on the associations between risk perception, attitudes, driver behaviour and accident involvement in a high-income country (Norway) and a low-income country (Ghana) and has found that Ghanaian drivers were more ‘sensitive’ to traffic risks as well as to risks in general as compared to their Norwegian

counterparts. This finding is consistent with the findings of the present study because for Ghanaian drivers traffic risk perception is not just an ordinary thing but rather a complex issue mediated by culture, religion and one's socio-economic status. Again, Bediako (2004) has observed that commercial drivers in Accra-Ghana possess a high level of traffic risk perception but they show negative attitudes towards traffic rules. She has noted that factors such as educational level, religion and marital status have significant influence on commercial drivers' risk perception, attitudes and behaviour. Lund & Rundmo (2009) have conducted another study using the same data used by Lund (2006) entitled "Cross-cultural comparisons of traffic safety, risk perception, attitudes and behaviour" among Ghanaians and Norwegians and they have reported that there were differences in respondents' rating of attitudes, risk perception, and behaviour and that perceived risk and attitudes were great predictors of risk behaviour and accident involvement. Another finding closely related to risk perception which is associated with careless driving is fatalism and or superstitious beliefs. Some drivers perceived road traffic accidents to be caused by forces beyond the control of mortal human beings. For instance, they mentioned the issue of destiny and fate and explained that anyone fated to die through road traffic crashes will die irrespective of what men do. This may not be surprising after all because both experts and lay people make subjective judgments about risks and hazards (Slovic et al., 1981). Dake (1991) corroborates this by noting that mental models of risk are the results of personal cognition and deeply held socio-cultural beliefs and values. Besides, some respondents also seemed to be convinced that accidents are just punishments for wrongdoing. With such mentality, it is clear that many a driver will resign to fate in circumstances where a little action on their part could help save accident situations. This may bring about learned helplessness (Seligman, 1975; Peterson et al., 1993). Available literature lends support to this finding. In Ivory Coast, Kouabenan (1998) has concluded that fatalistic beliefs influence how individuals perceive risks and explain the causes of accidents. Superstition has been found to correlate positively with accident involvement among South African taxi drivers (Peltzer & Renner, 2003). In addition, both Leplat (1983) and Shaffer (1984) have made interesting conclusions about fatalistic beliefs. Leplat writes "our modern mentality is still impregnated with a fatalistic conception of accidents. How often do we hear accidents associated with bad luck, misfortune, or chance? People sometimes say that "his time had come" when talking about an accident that someone has had" (p. 14; cited in Kouabenan, 1998).

Driver training and road use behavior

Inadequate driver training has also been mentioned as being responsible for aberrant driving. The mode of training is 99% informal and driving knowledge is acquired through *mate apprenticeship*. This is the practice where anyone who wishes to learn driving does so by going to work with a driver (the master) for a maximum period of three years. Subsequently, he learns to drive on the job by observing the master. The training is purely by word of mouth and observation. Although the mode of training is the same for both young and older drivers, older drivers appeared to be uncomfortable with current training regimes undergone by the young ones. Older drivers say that the young ones are now using days or only weeks to learn driving. Some young ones are said to have learnt driving at the car washing bay just by washing people's cars. The fear is that a lot of these young ones are now driving passenger-carrying commercial vehicles now on the roadway. The threat they pose to driving safety cannot therefore be overemphasized. It is well known that driving skill and competence is acquired through serious instruction and practice (Groeger, 2006). Therefore, the number of years one spent acquiring driving skills helps to shape road use attitudes and behaviour in significant ways (Groeger, 2000; 2004). The result of inadequate driver training is novice and inexperienced drivers (Martinez, 2005). Due to the fact that driver training in the district is just by observation and word of mouth under the supervision of a master, aberrant driving is passed on from one reckless driver to another. There is poor interpretation and comprehension of road signs. Thus, they are motivated to engage in aggressive driving, speeding, and general road rage behaviours. In Europe, aggressive driving is reported to be the cause of some motor accidents (Parker, Lajunen, & Stradling, 1998; Mizell et al., 1987; Lajunen et al., 2004; Åberg & Rimmo, 1998; Blockley & Hartley, 1995), and speeding (Parker, 2002; Carcary et al., 2001). In Ghana, Afukaar (2003) investigated the effect of speed on road traffic accidents and found that the dominant driver mistakes which traffic police have identified were loss of control of vehicles which emanates from extreme speeding. He has noted that speeding alone represented 50% of all road traffic accidents in Ghana between the period of 1998 and 2000. Damsere-Derry, Afukaar, Donkor and Mock (2008) have corroborated this finding when they studied two dimensions of speed-mean and dispersion in Ghana. They used unobtrusively measures like speed guns to collect data on travelling speeds of 28,489 vehicles at 15 different urban locations on highways categorized into three. They found that 98%, 90% and 97% of vehicles which plied those routes exceeded the

required speed limit of 50km/h posted on national, inter-regional, regional roads respectively. Thus, they have concluded that excessive speeding and wide speed dispersions were highly prevalent on highways in Ghana. The inadequate driving is given further boost by the operations of illegal driver licensing contractors. The inexperience of these young drivers equally makes them have feelings of invulnerability or optimism bias (Cohn et al., 1995; Dejoy, 1989; Weinstein, 1980, 1982, 1984; Svenson, 1981). This reflects in their willingness to take risks and the decisions they take on the roadway are error-laden. Martinez further argues that giving a 16-year-old teenager a license to drive is similar to giving an adult a 3000-pound weapon to kill.

2.2.3. Empirical Literature in Ethiopia Causes and variation of Road Accidents

Different studies (Davis, 1968; Crighton, 1970; Hutchinson, 1974; Hobbs, 1979; TRL, 2000; Girma, 2000) across a number of countries show that the occurrence of an accident is not usually attributable to a single cause, but to the combined effects of a number of deficiencies or failures associated with the drivers, pedestrians, the vehicles and the roads. The studies also indicate environmental conditions such as the road surface, weather condition and time of the day are additional factor. TRL (2000) spot studies of different countries on accident data show that human factors are the sole reason in 65 percent of the cases and contributory cause in 95% More than a quarter of the accidents studied displayed a deficiency in the road environment linked to a driver error. Vehicle defects also contributed to 8 percent of the accidents. Moreover, Saad (1989) described the major accident factors in urban areas of under developing countries. Hobbs (1979) also indicated that sight distance factors, skidding, signs and marking deficiencies are causal factors most frequently found in urban accidents. Likewise, in Ethiopia about 90 percent of the total traffic accidents and 87 percent of the injury accidents were caused by human error. The contribution of vehicles and road defect are only 4 and 1 percent, respectively. But Girma (2000) points out road factors are not well identified by the police as the causes of traffic accidents due to the lack of awareness about road and traffic engineering factors and insufficient training in road accident reporting. Road traffic accidents occur as a result of several factors associated with the traffic system, namely: road users, road environment, and vehicles. In Ethiopia, in 2004/5, 93% of all accidents involved human factors, 5% accounted for vehicle factors, and 2% were associated with road environments according to the Federal police report.

Young drivers have a disproportionately high rate of involvement in road crashes. Particularly, young novice drivers continue to be killed at rates that far exceed those of more experienced drivers.

2.2.4. Addis Ababa City Situation

Trends of Taxi Traffic Accidents

As mentioned above the contribution of taxis to the total road traffic accidents is quite significant relative to their numerical share out of the total vehicle-fleet in the city. What about its trend? Is that becoming more severe or not? These two questions are the core questions treated here under. Since 1989/90 there has been an increase in such accidents. This increase continued until 1993/94 with some fluctuations. As of 1997/98 it had decreased by 24% from the peak year (1997/98) and stayed almost constant until 2000/01. The steady increase from 1989/90 up to 1997/98 was not only exhibited in traffic accidents but also in the overall traffic accidents which forced the city government to issue the new road traffic regulation in 1997/98. Even though it is not significant, the relative decrease in taxi traffic accidents is apparently a result of the new traffic regulation, which raised the fine for every traffic offence. Or it could be due to the under reporting of accidents. Mostly if the two parties solve their problem, the involvement of the traffic police is rare especially depending on the severity level of the accident. Serious care is given for fatal accidents than others and the least care is given for damage to property.

Major factors contributing to road traffic accidents in Addis Ababa

This section focuses on the identification and analysis of the major factors contributing to the problem among which the most important ones considered are the driver, vehicle, pedestrian, and the environmental factors. The driver factors considered are gender, age, driving experience, level of driving license, and employment. Vehicle factors include types of vehicles, ownership of vehicles, vehicle service years and vehicle defect. And pedestrian factors are treated in terms of occupation and movement. Environmental factors such as road arrangement, road surface, weather as well as time are also considered. According to AATPTACIO various unpublished monthly reports the most commonly committed errors of drivers include failure to give way for pedestrians and vehicles, not respecting traffic control, inaccurate overtaking and driving too close. These errors account for 75% of the total taxi traffic accidents. Whereas failure to give way for pedestrians and driving on the wrong side are causes for 88% and 78% of the fatal and PIA injuries respectively. Also 90% of injury and 85% of fatal pedestrian accidents

were associated with drivers failing to give way for pedestrians. Most of the time it may be due to their negligence and due to the fierce competition they face, they are in hurry, which creates favorable circumstances for the incidence of traffic accidents. Among the collision types, those that cause the highest property damage are side, nose-side, and nose-tail accounting for 87%. These errors of taxi drivers have mainly resulted from the fierce competition for market. Therefore, as it can be seen from the above discussions driver errors are the causes of most taxi traffic accidents in the city. The assumption here is that these errors are attributed to the age, education level, driving experience, vehicle ownership, terms of employment as well as background of taxi drivers and other related factors.

Driving experience of taxi drivers

As indicated in the literature review inexperienced drivers commit a large proportion of traffic accidents. In this respect the formulated hypothesis is that taxi drivers with less driving experience have a tendency to cause more traffic accidents than the more experienced ones. According to AATPTACIO various unpublished monthly reports the less experienced (<5 years) had caused about 64, 36, 42, and 40 percent of the fatal, PIA, damage and total traffic accidents respectively. Had it not been for the considerable size of hit and run cases (unknown) the contribution of the less experienced taxi drivers would have increased even beyond the given proportion. The coefficient of correlation between driving experience and taxi traffic accidents was also -0.210 which shows again a very weak relationship. Therefore, the hypothesis that states as the driving experience increases taxi traffic accident decreases rejected. But the result of the field survey given in table 31 shows that about 50% of taxi and 37% of non-taxi traffic accidents are the results of traffic incidents caused by the less experienced drivers.

2.3. Summary and Implication

In summary, research suggests that compared to more experienced drivers, novice drivers perceive less holistically and detect hazards less quickly and efficiently. This seems to stem, at least in part, from novice drivers adopting less efficient information gathering strategies. With experience, drivers move from using visual search strategies that are largely fixated to adopting more efficient search patterns, their ability to detect hazards increases. They also learn to associate specific hazards with certain parts of the traffic system. For example, they acquire knowledge about the dynamic characteristics of other road users, which allows them to predict the nature of hazards presented by moving objects (Brown & Groeger, 1988). Recent literature

on hazard perception mainly focuses on the effects of experience with regards to the acquisition of reading the road ability in young novice drivers. Reading the road is related to scanning and searching strategies on the way to develop certain expectations about the consequences of other drivers' actions (Stradling & Meadows, 2001). In addition, perceived risk was given as one of the best predictors of hazard perception since it would interfere with deciding about whether the situation is really hazardous or not (Howarth et al., 2005). In that sense, it can be expected that young and novice drivers would fail to detect hazards as fast as experienced drivers since they do not have a well structured schema for traffic which would guide them in where to attend. Moreover, certain personality traits, driving style and driving skills, which are shown to modify the relationship between risk assessments and hazard perception processes, may interfere with perceived risk in young novice drivers. However, it is also reasonable to claim that these modifying factors may also predispose the more experienced drivers to perceive less risk in certain hazards. Perceived risk in hazards was measured by self-report ratings given for hazardous traffic scenes (Coulborn, 1978; Farrand & Mckenna, 2001) and no study tested the effects of personality factors and certain driving skills in predicting hazard perception ability. Therefore, the aim of this thesis is to investigate the link between personality factors, driving skills, and experience in predicting hazard perception.

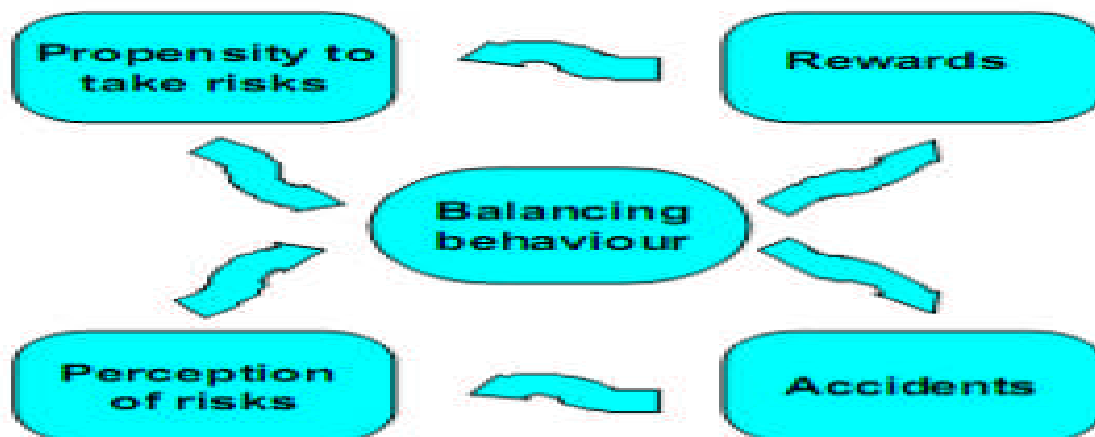


Figure 1: Risk thermostat model

Source: Adams (2003); Adams & Thompson (2002)

The model above shows that each individual has in-built risk-taking propensity but there are individual differences with regard to risk-taking. The arrowheads point to the directional influence. From the diagram, rewards of risk-taking (e.g., sensation seeking, speeding to get to a destination early or for the thrill which comes with it, etc) have a direct influence on the insatiable desire to take risks (propensity to take risks). Also, risk perception is determined by accidents. That is, if you have personally been involved in an accident before or some relatives of yours have been injured or killed in an accident, these negative events directly shape your risk perception. In general, risk-taking could bring both rewards and punishments (accidents). Thus, in perceiving the risk to be taken, a balancing act or in other words, a cost-benefit analysis has to be performed. This balancing act is represented by the box in the middle of the diagram. Though the model may not be comprehensive enough to answer all questions relating to risk estimation, it does shed light on some important aspects of the motivations for risk-taking behavior.

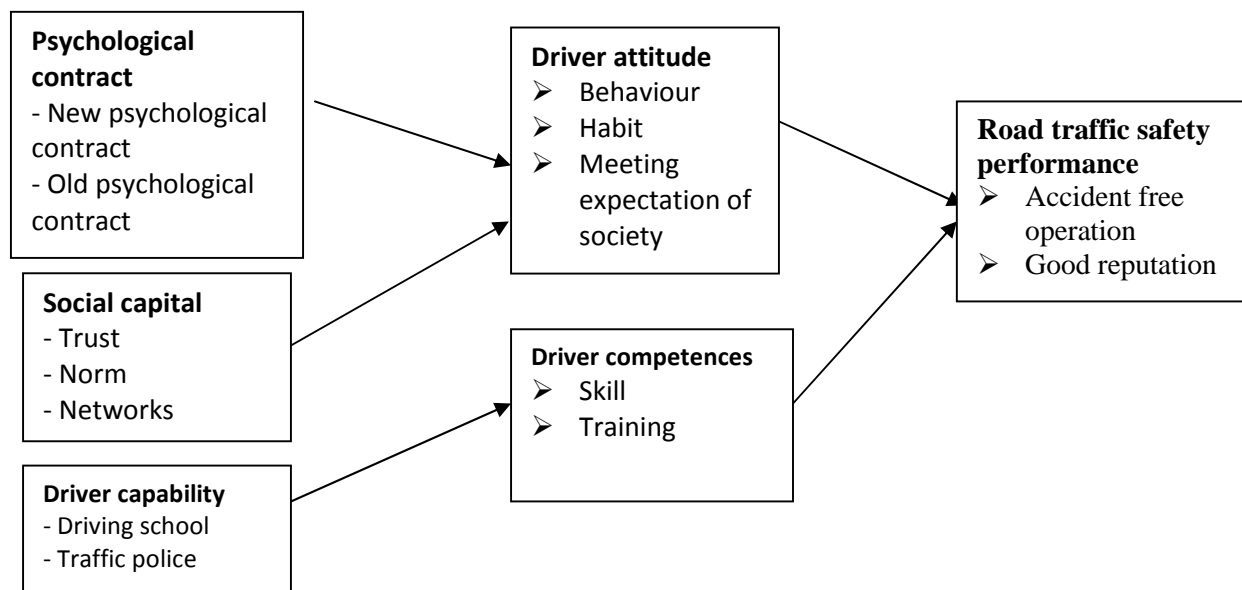


Figure 2. Conceptual framework

Source: Ndyabawe George William (April 2013). Makerere University, Uganda

The above conceptual framework shows that the driving skill possessed by driving schools and traffic police will determine what driving skill a new driver can acquire from these two service providers. For instance, good driving skills can be achieved via training with a

competent driving school. The traffic police, in turn, need driving skill so as to set standards against which:

- Potential drivers are pre-tested before issuance of driving permits; and
- Defaulting drivers shall be guided and counseled

Driving school instructors would need the same driving skills required of professional drivers, although at a higher level of understanding. Presentation and coaching skills are also required of instructors. Similarly, the police traffic personnel would require the driving skill required of professional drivers but at a higher level of understanding and application. Traffic personnel need to be conversant with the national legal requirements and safety inspection of vehicles. They also need to be equipped with accident investigation techniques and analysis skills. Good driver's attitude evidenced by positive behaviors like fastening seat belts and good habits like courtesy to other road users, displayed while driving supplemented by professional driving skill lead to improved road traffic safety performance characterized by minimum human error. Road traffic accidents and deaths are reduced, while the organization enhances own popularity; and the national road traffic safety performance regains reputation worldwide. Under driving skill we are referring to the fitness, capability, skill and/readiness a driver must have in order to drive safely on the road. As drivers become more skilled in handling the vehicle, subtasks such as changing gear become more automatic, thereby releasing cognitive capacity which can then be allocated to other tasks such as general surveillance. Increased skill is therefore associated with an increase in the capacity available to acquire information about the events around us, so that when we next encounter similar situations we have an increased awareness of what to expect and are thus able to anticipate the appropriate course of action and hazard perception. Based on risk thermostat model on figure 1 risk-taking could bring both rewards and punishments (accidents) in general. Thus, in perceiving the risk to be taken, a balancing act or in other words, a cost-benefit analysis has to be performed. Similarly, finding of this study suggests that, in comparison with more experienced drivers, young novice drivers are less able to quickly and efficiently detect all of the hazards they encounter. Novice drivers were not as skilled at detecting hazards in their own lane. These findings highlight the importance of driving experience, and indicate that a driver's mental model of the road environment changes with driving experience⁴¹. This situation is further compounded by greater difficulties among inexperienced drivers, compared with experienced drivers, in attention control and prioritizing competing tasks and distractions (for example,

passenger behaviour, radios and mobile phones etc). Young drivers are also less likely to moderate their driving according to their capabilities. An ability to respond effectively to hazards involves both an accurate perception of the hazard as well as an understanding of one's own driving skills for the current situation. Young drivers typically over-estimate their driving skills relative to others.

III. METHODS

3.5. Design

A cross-sectional study on hazard perception of young drivers was conducted on December 2013 in Addis Ababa. It is called cross-sectional because the information gathered represents what is going on at only one point in time. The data was collected through pretested questioner from randomly selected drivers, who were willing to participate. In this study the dependant variable is hazard perception whereas the independent variables are driving skill, risk taking, overconfidence, sensation-seeking and personality.

3.6. Population

The total number of registered taxi in Addis Ababa in 2013 was 9000. Among those taxi drivers young drivers aged from 17-30 years were chosen for sampling frame. The study excluded young drivers driving the targeted vehicles outside Addis Ababa and those drivers who were unavailable during the study period in Addis Ababa town.

3.7. Participants

The study was done with a sample of 384 young taxi drivers. To determine the sample size Estimating a Single Proportion formula was employed. To calculate a 95% confidence interval for p that is expected to be about 50% (0.50) with a margin of error (d) no more than 0.05,

$$n = \frac{pq (1.96)^2}{d^2}$$

Where $q = 1 - p$.

$$n = (1.96^2) (.50) (1-0.50) / (.05^2) = 384$$

Since young taxi drivers are evenly distributed in Addis Ababa, they have equal chance to be included in the samples. Hence, simple random sampling technique was approached to select the participants.

3.8. Instruments

To gather data from the participants a paper and pencils questioners were employed. The questioners include participants' demographic information, Self-Reported Hazard Perception Scale, skill of driving, risk taking behaviors of young drivers, sensation seeking behaviors of

young drivers, driving confidence on different situations and personality of young drivers. Responses of participants for every item in each questioners were measured by a 5 point likert type scale. A likert type scale technique was preferred because it involves the use of statements about the attitude and skill that are either clearly favorable or unfavorable. Advantages of this technique are ease of scoring and ease of summarizing the information obtained. Pilot study was done to obtain appropriate data and to uncover minor and potentially troublesome administrative problems such as misspellings, poor wording, or confusing directions. Two students of psychology translated the questioners from English to Amharic and then back to English to check whether it is correctly translated or not. Simultaneously they analyzed each item separately and all items collectively to confirm item representativeness in the questioners. More over two teachers from Psychology department reviewed the items, and their reactions to the items were used to modify appropriateness of the items. The items that were found to be vague or unclear were rejected and some of them were re-phrased so as to make good meaning out of them. Thereafter, the questionnaires were administered to 15 young drivers selected from all sub cities of Addis Ababa. Internal consistency of item was determined by SPSS version 16. Items with Reliability coefficients of above 0.75 were considered to be accepted. Initially the total numbers of items developed were 140 and at the end of the pilot study, items were revised, refined and the problems were eliminated and finally 69 items were ready to be used with the intended target drivers.

3.4.1. Self-Reported Hazard Perception Scale (SRHP)

A shortened form of the SRHP consisted of five items were adopted from a *Self Evaluation* questionnaire of their driving ability (Horswill, Waylen & Tofield, 2004). The scale was adopted to assess the self-reported hazard perception of young taxi drivers in Addis Ababa. The first statement relating to accident concern (item 1) was “Do you never feel worried that you will be involved in an accident?” and the second statement (item 2) which related to participants’ tendency for thrill seeking and was “Do you never drive to get a thrill from driving?” The third item, which addressed driving ability, was “Do you think that you will be less involved in accidents in the future compared with the average driver?” The same response scale was also applied to the second driving ability evaluation (item 4) which was “Do you think that you are more skilful than the average driver?” and (Item 5) about traffic sign “Do you think that you know all the basic traffic signs on the roads implemented in Addis Ababa?” Participants were

asked to indicate to what extent they agree or disagree with the situations that were given in the items by using 5-point Likert type scales (1= Strongly disagree, 5= Strongly agree). Higher means represented better self-reported hazard perception ability. Cronbach's alpha for the scale was satisfactory ($\alpha = .79$). An indication of good hazard perception ability is to respond to the hazard as early as possible. Scores obtained from all the items were summed, and thus, the total score for Self-Reported Hazard Perception was calculated. Respondents who scored three and below were labeled as not perceive hazard and scored above 4 labeled as perceive hazard.

3.4.2. Taxi driving skills questionnaire (DS)

Driving Experience/skills questionnaire was developed by Lajunen and Summala (1995) to measure drivers' perceived skills and competency in driving. The scale was adapted to Addis Ababa taxi drivers context to measure drivers' skills and competency in driving as well as safety related motivations. Participants were asked 10 questions to assess their competency by indicating the degree of their strengths and weaknesses along 5 point scale (Very weak =1, Weak =2, Moderate =3, Strong =4, Very strong =5). Higher mean values indicate a high degree of driving skills. Acceptable levels of alpha reliabilities were reported for the inventory which is ($\alpha = .90$).

3.4.3. Taxi drivers risk taking questionnaire (RT)

The driver risk taking questionnaire developed from the Driver Risk Taking questionnaire (internal reliability $\alpha > 0.77$, Parker, Stradling & Manstead, 1996) and 10 questionnaire which was typical to Addis Ababa Taxi drivers selected. The internal reliability of the driver risk taking questionnaire was good (Cronbach's $\alpha = 0.76$). Participants were required to indicate to what extent they agreed or disagreed (Strongly Disagree=1 Disagree=2 Neither agree or disagree =3 Agree =4 Strongly agree=5) with a 10 statements relating to the laws that address unsafe or risky driving behaviour. Higher mean values indicated a high degree of risk taking.

3.4.4. Taxi drivers sensation-seeking questionnaire (SS)

The questionnaire was developed by Ayvaşık, Sümer, Er, and Hünler (2004) for the purpose of generating a sensation-seeking scale that was specific to traffic situation and items adopted representing characteristic typical to Addis Ababa taxi drivers. Following item validation and reliability test a pool of 17 items was reduced to 10 items. Participants responded to the items by using a 5-point Likert type scale (Not at all described=1, Moderately

described=2, Neither / Nor described=3, Moderately described=4, Completely described=5). Higher mean values indicated a high degree of sensation seeking. The scale was reported to have alpha reliability of $\alpha = 0.80$.

3.4.5. Taxi drivers confidence level questionnaire (DC)

The scale developed by (Bergdahl, 2005) indicates that driving in various situations such as at night and in an unfamiliar area could fail. The scale adopted to Addis Ababa Taxi drivers characteristics and asked the participants to fill in short-scale questions about their driving confidence under various conditions. They were asked to indicate on a 5-point Likert type scale (Not at all confident=1, Moderately confident=2, Neither / Nor confident=3, Moderately confident=4, Completely confident=5) and the conditions which were given were as follows: at night, in bad weather, in rush hour or heavy traffic, on the highway, changing lanes on a busy road, reacting quickly and usually in all conditions. A high mean represented overconfidence of driving in a particular situation. Reliability analysis revealed that Cronbach's alpha for the scale was satisfactory ($\alpha = .80$).

3.4.6. Taxi drivers personality questionnaire (DP)

Of all the Big Five personality factors, conscientiousness has been found to positively correlate most with job performance ratings. It was assessed using items from the International Personality Item Pool (Goldberg et al., 2006). This factor is highly related to self-discipline, attention to detail, and organization. Generally, conscientiousness is the most consistent predictor of hazard perception. Low level of conscientiousness scores would be indicative of low hazard perception among drivers. Participants were asked to indicate to what degree the given definitions were reflecting their characteristics by using a 5-point Likert type scales (Very Inaccurate=1, Moderately Inaccurate=2, Neither Inaccurate=3, Moderately Accurate=4, Very Accurate=5). Acceptable levels of alpha reliabilities were reported for the inventory which is $\alpha = 0.80$.

3.4.7. Interview

Interview was undertaken with experts of Addis Ababa Transport and road authority and Traffic police to gather information on hazard perception level of young taxi drivers and factors of road accident in Addis Ababa. The interview was conducted with a face to face discussion with the assigned experts at their office. Recent information on road transport and drivers behaviors were gathered from the interview conducted with the two sector experts. Six open ended questions prepared for experts of Addis Ababa Transport and road authority and the

other six questions for Addis Ababa Traffic police. Two experts purposely selected from Addis Ababa Transport and road authority and Traffic police bureaus then interviewed according to the interview items constructed. The information provided by the experts was enough to represent their bureau. Sufficient information about the journey from data to conclusions was provided. During analysis all items were included and reported. Triangulation of methods, samples, theoretical approaches, sources and other research carried out to confirm the findings or strengthens theory building by accounting for contradictions. To demonstrate the link between the data and conclusions, how the data themselves shaped the conclusions was strengthened by cross-reference between conclusions and data within the study.

3.5. Procedure of data collection

Based on the information given from transport office of the town and facilitation support of taxi associations the questionnaires were administered for 384 randomly selected young taxi drivers at the taxi stations. Ten students had been selected to assist me on data collection. After properly informed the purpose of the study and way of data collection, they collected the data by using pretested questionnaires. Following trained data collectors brief explanation on research purpose and the instructions, the participants filled the questioners that include their demographic information, Self-Reported Hazard Perception Scale, driving skill, risk taking behaviors, sensation seeking behaviors, driving confidence and their personality. All of the participants were assured about anonymity of their identity and confidentiality of their personal information. One of the main challenges of this study was unwillingness of drivers to fill the questioners because of time constraint. Due to this fact, the research assistants were engaged to closely follow-up with the respondents, thus making the exercise of data collection difficult and costly. Despite the problems encountered, this research received a response rate of about 100%, which was attained successfully.

3.6. Procedure of statistical analysis

The data initially consisted of 384 young taxi drivers across different age spans (range 17 – 30) and with varying degrees of driving experience. Thirty five participants excluded from further analysis since they had not properly filled the questioners as instructed. Finally analyses were conducted with the remaining 349 participants. After cleaning and editing the data were analyzed using SPSS (statistical package for social sciences) version 16. To assure accuracy of the data entry into the computer, a double-entry audit was implemented. The data entered in two

times by different people. The results were then checked for discrepancies. These discrepancies were then checked for accuracy by looking once again at the raw data. For the few errors that were found, corrections were made from the original data before the data analyses were conducted. The SPSS was used to examine descriptive statistics and the correlation between the selected variables. In the data analysis, bivariate correlations for testing the degree of associations among the variables. A regression analysis was also conducted to investigate the degree of association between the dependent and independent variables of the study. Hierarchical regression analyses were used in predicting Hazard Perception of young drivers.

APA (American Psychological Association) conventions was used in reporting significant results, i.e., $p < 0.05$ as statistically significant (*) and $p < 0.01$ as statistically highly significant (**).

IV. FINDINGS

4.1. Descriptive Analysis of Demographic and Main Variables in the Study

The demographic section of the instrument mostly consisted of driving-related information. First, drivers were asked to indicate their age, level of driving license, as well as their driving status (learner driver, amateur driver and professional driver). In addition, they indicated the number of years with driving, number of accidents and number of traffic offences for the last 12 months.

Table 1. Descriptive Statistics for Demographic Variables

Variables	Mean	SD	Observed Range
Age	24.20	3.75	17-30
Driving experience in years	3.78	0.704	2-5
License grade	3.18	0.49	3-5
Accidents and near miss	3.19	0.52	2-5
Traffic offences	3.46	0.79	2-5

Descriptive statistics for 349 participants were examined before the main analyses. According to the above table, participants had a mean age of 24.20 years ($SD = 3.75$) and had a mean driving experience of 3.78 years ($SD = 0.70$). The majority of the sample indicated that they were driving a car for more than 3 years and 37.3% of the participants indicated that they were driving three and less years. While the majority of the sample (86.8%) licensed with 3rd grade and less driving license and the remaining (13.2%) were above 3rd grade driving license. Mean number of accidents and near miss reported were 3.18 ($SD = .49$). Of the participants, 94.6% reported above two accidents and the remaining reported below two accidents in the last 12 Months. Participants' mean traffic offences was 3.46 ($SD = .79$). While 9.5 % of the participants reported 2 traffic offences in the last 12 months, the remaining 90.5% reported to be convicted from three or more traffic offences. According to Addis Ababa traffic police report, drivers in the age group between 18-30 are responsible for 39, 36, 27 and 32 percent of the fatal, serious, and slight and damage to property respectively during the specified period. Whereas those in the age group 31-50 had contributed 38,38, 27 and 42 percent of the fatal, serious, slight and damage to property respectively. But the contributors of about 21% of the total traffic

accidents are the hit and run cases. Drivers having driving experience between 2-5, 5-10 and above 10 years are responsible for 22, 20 and 18 percent of the casualties respectively. There for experience and age of drivers can have significant effect on hazard perception ability of drivers.

Table 2. Descriptive Statistics of the Main Variables

Main variables	Descriptive states			
	Mean	Std. Deviation	Minimum	Maximum
Drivers Skill	3.4903	.64426	2.50	4.90
Sensation Seeking	2.8994	.38782	2.00	4.00
Risk Taking	1.5851	.38328	.90	2.30
Driver Confidence	2.3501	.53700	1.50	3.30
Drivers Personality	3.8762	.41865	3.30	4.70

Means, standard deviations, and ranges for the main variables were given in Table 2. As can be seen, participants reported high levels of drivers skill ($M = 3.49$), and considerably moderate levels of sensation seeking revealed that mean ($M = 2.899$), while the lowest mean was observed for risk taking in traffic subscale ($M = 1.58$). Young drivers who have more sensation-seeking tendencies by nature are also more likely to speed and drive under the influence of alcohol or drugs, as well as display other risky driving behaviours. A police report showed that sensation-seeking was associated with more reports of drug driving or drive recklessly of young drivers. Those with a stronger sensation-seeking personality type were more involved in risk-taking. In most case, thrill or sensation-seeking was related to overall risky driving behaviours such as speeding, rule violations and driving too closely to the vehicle ahead. The study also found that the relationship between personality factors (including sensation-seeking) and risky driving was affected by the young person's attitudes to risky driving behaviour. Sensation-seeking personality traits were associated with a higher likelihood of road rule violations, but not the likelihood of other driving behaviours such as mistakes and inattention. It appears that sensation-seeking tendencies, which are more common among young people, have some association with road-related risky behaviours and increased crash risk.

4.2. Correlation Analysis of Demographic and Main Variables in the Study

Table 3. Correlation matrix for the demographic and main variables

	Hazard perception	Age	Year of driving experience	License grade	Accident and nearmiss	Traffic offence	Skill of driving	Sensation seeking	Risk taking	Drivers overconfidence	Drivers personality
Hazard perception	1										
Age	.966**	1									
Year of driving experience	.783**	.778**	1								
License grade	.105	.085	.082	1							
Accident and nearmiss	.065	.086	.030	-.213**	1						
Traffic offence	-.097	-.089	-.127*	.142**	.030	1					
Skill of driving	.807**	.846**	.688**	.053	.099	-.045	1				
Sensation seeking	-.306**	-.314**	-.294**	.065	-.043	-.030	-.442**	1			
Risk taking	-.257**	-.282**	-.150**	-.043	-.018	-.043	-.266**	.138*	1		
Drivers overconfidence	-.106*	-.120*	-.101	-.055	-.053	.035	-.158**	.102	.081	1	
Drivers personality	.153**	.152**	.116*	-.047	-.012	-.105*	.246**	-.292**	-.021	.182**	1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Based on the table above the relationships among demographic variables were tested using Pearson correlations. Results revealed that age was positively correlated with the year of experience ($r = .778, p < .01$). Adolescence is a key developmental period, during which young people (aged 13-18 years) prepare themselves for adulthood, often engaging in risk-taking behaviour to test boundaries. This is also the time when the consequences of risk-taking behaviour can be fatal. Some young people are more likely to seek new experiences, be more impulsive, more tolerant of risky situations and engage in risks for the thrill of the experience. These personality factors are associated with an increased crash risk. This tendency towards risk-taking behaviour is generally displayed in many areas of the young person's life (for example, they may struggle to control their temper and be quick to start arguments). Inexperienced drivers

show less awareness than aged drivers of the realities of the road system in operation, where other road users cannot always be relied upon to follow the road rules. In addition, young drivers also struggle with moderating their driving based on their awareness of risks and their driving capabilities. Hazard perception highly correlated with age ($r = .966, p < .001$) and with Year of driving experience ($r = .783, p < .001$). This implies that experienced drivers with active driving experience above 3 years perceive hazard more than Novice drivers with 3 and less years driving experience. Hazard perception highly correlated with age ($r = .966, p < .001$) and with Year of driving experience ($r = .783, p < .001$). This implies that experienced drivers with above 3 years active driving experience perceive hazard more than Novice drivers with 3 and less years driving experience. As expected, number of traffic offences was negatively correlated with years of experience ($r = -0.127, p < .05$). According to the information given from traffic police drivers errors were the causes of most taxi traffic accidents. The young, less experienced and with taxi driver assistant “Weyala” background; taxi drivers are responsible for most of the accidents. Therefore, drivers' training and testing should be standardized; a longer minimum time of driving experience should be imposed before a license is issued to a driver. The young novice driver may also have an increased opportunity for, and interest in, risk-taking behaviour, which happens together with increased vulnerability as the consequences of risk-taking behaviour potentially be cause to commit a number of traffic offences. License grade negatively correlated with accident and near miss ($r = -0.213, p < .01$) where as positively correlated with traffic offence ($r = 0.142, p < .01$). Drivers having high grade driving license attitude evidenced by positive behaviors like fastening seat belts and good habits like courtesy to other road users, displayed while driving supplemented by professional driving competencies lead to improved road traffic safety performance characterized by minimum human error. Road traffic accidents and deaths are reduced, while the organization enhances own popularity; and the national road traffic safety performance regains reputation worldwide. Under driving competence we are referring to the fitness, capability, skill and/readiness a driver must have in order to drive safely on the road. Unlikely, particularly here in Addis Ababa as license grade increased drivers involved in increased number of traffic offence, because being experienced creates controllability and this may decrease the perceived risk while driving. This is critical considering the findings showing that the combination of the perceptions of high driving skill and low safety skill results in the highest level of accident involvement. Experienced drivers having high grade of driving license

scored low safety skills, were more accident-involved than other combinations of driving and safety skills groups. This group of drivers was also found to be speeding and overtaking other drivers more and has more traffic convictions. If driving skills of young drivers were not accompanied by safety skills the driver may develop overconfidence about their driving skills, and this could be especially a problematic pattern for young drivers. Overall, it was revealed that the majority of participants in this study had been involved in a crash, and almost all had experienced a 'near miss'. Most of the traffic offence, crashes and near misses were involved because of lack of experience, less accepting of road rules and a less safe attitude to risk taking. This study showed that those participants who had been involved in the most crashes or near misses were also less accepting of road rules and had a less safe attitude to risk taking. Accordingly many young taxi drivers in Addis Ababa who are at a considerable risk of having a crash often resulting in death or serious injury. The relationships among the main variables were tested through Pearson Correlation (See Table 3). Results of the analysis revealed that Self Reported hazard perception score was positively correlated with age ($r = 0.966, p < .01$) and with driving skill ($r = 0.807, p < .01$) where as negatively correlated with sensation seeking ($r = -0.306, p < .01$), with risk taking ($r = -0.257, p < .01$) and with overconfidence ($r = -0.106, p < .01$). Which means that, as the drivers more skilled and matured then his hazard perception ability will be increased. While hazard perception ability of risk taking, sensation seeking and overconfidence of drivers are low. The Self reported hazard perception was positively correlated with driving skill and drivers' age. As an intervention for increasing the amount of experience and improving hazard perception abilities of novice drivers. Lengthening the time for accompanied driving during the pre-licensing period was a beneficial means of reducing accident involvement in novices. Given the content of the current driver-training curriculum in Ethiopia in which the learner drivers are given only 10 hours of on-road driving lessons, it seems that pre-licensing period is not comprehensive enough to learn about higher-order skills. As the present findings implied, novice drivers' hazard perception abilities are not developed as much as experienced drivers' and on-road driver training should be enhanced in length to compensate for poor hazard perception abilities of novice drivers. In fact, the pronounced effects of experience would be even larger if the drivers were to be investigated on-road. Data from Addis Ababa traffic office also show that young drivers' low experience could cause a considerable risk of injury and death during the first months of driving. In this study experience appeared as a

significant determinant of hazard perception. Drivers who indicated a higher rate of active driving exhibited better abilities of hazard perception. This means that there is a critical time in which drivers would be under more risk in terms of accident involvement and this is the novice-period in general. The issues of driver training in the driving schools, driver testing before issuance of driving permits and the issuance of driving permits themselves, should be attended to by the legislators. These important processes must be streamlined and be conducted with the utmost efficiency that they deserve. Traffic personnel should do beat patrols, motorized patrols on highways and in urban centers to check driving standards, motor vehicle standards and enforce traffic laws, rules and regulations for road safety improvement. Generally young taxi drivers need greater sensation-seeking than the older one. Young drivers who have more sensation-seeking tendencies by nature are also more likely to speed and drive under the influence of alcohol or drugs, as well as display other risky driving behaviours. A police report showed that sensation-seeking was associated with more reports of drug driving or drive recklessly of young drivers. Those with a stronger sensation-seeking personality type were more involved in risk-taking. In most case, thrill or sensation-seeking was related to overall risky driving behaviours such as speeding, rule violations and driving too closely to the vehicle ahead. The study also found that the relationship between personality factors (including sensation-seeking) and risky driving was affected by the young person's attitudes to risky driving behaviour. Sensation-seeking personality traits were associated with a higher likelihood of road rule violations, but not the likelihood of other driving behaviours such as mistakes and inattention. It appears that sensation-seeking tendencies, which are more common among young people, have some association with road-related risky behaviours and increased crash risk. Age positively correlated with driver skill ($r = 0.846$, $p < .01$) where as negatively correlated with sensation seeking ($r = -0.314$, $p < .01$). Unskilled drivers show less awareness than aged drivers of the realities of the road system in operation, where other road users cannot always be relied upon to follow the road rules. In addition, young drivers also struggle with moderating their driving based on their awareness of risks and their driving capabilities. Adolescence is a key developmental period, during which young people (aged 13-18 years) prepare themselves for adulthood, often engaging in risk-taking behaviour to test boundaries. This is also the time when the consequences of risk-taking behaviour can be fatal. Some young people are more likely to seek new experiences, be more impulsive, more tolerant of risky situations and engage in risks

for the thrill of the experience. These personality factors are associated with an increased crash risk. This tendency towards risk-taking behaviour is generally displayed in many areas of the young person's life (for example, they may struggle to control their temper and be quick to start arguments). Investigation of driver skill correlation with other factors revealed that it was positively correlated with personality of drivers ($r = 0.245, p < .01$) but negatively correlated with sensation seeking ($r = -0.442, p < .01$), risk taking ($r = -0.266, p < .01$) and overconfidence ($r = -0.158, p < .01$). With regards to the predictive power of personality traits in accident involvement is relatively narrow, but suggesting that conscientiousness is the most consistent variable in predicting safe behaviors. In terms of the given links between personality traits and accident involvement, it can be expected to find a positive relationship between high conscientiousness and hazard perception ability. High conscientiousness, which is defined by rule governed behaviors, may lead the driver to be more perceptive about other drivers' rule-incongruent behaviors in traffic and this may enhance hazard detection time. Consistently, in the current study conscientiousness and hazard perception positively correlated. Indicating that high conscientiousness, which is defined by rule governed behaviors, may lead the driver to be more perceptive about other drivers' rule-incongruent behaviors in traffic and this may enhance hazard detection. On the other hand as the drivers are more skilled the vulnerability to risk situation will be decreased (They will take calculated risk, will not be over confident and do not drive to seek thrill). On the contrary, personality of drives negatively correlated with overconfidence ($r = -0.184, p < .01$). Sensation seeking positively correlated with risk taking ($r = 0.139, p < .01$). Consistently, the literature revealed that risk taking and sensation seeking behaviours negatively correlated with hazard perception, experience and drivers personality. The number of crashes/near misses also related significantly to less safe attitudes to risk taking. The Addis Ababa police report revealed that the responses reflected the safest attitudes to drugs abused/driving behaviour and close following and the least safe attitudes to the risk factors speeding and overtaking. There was a significantly less safe attitude to speeding and overtaking with risky behavior of the participants. The drugs abused/driving findings need to be interpreted with caution as drugs effects the decision making process. Speeding violation is the most frequent cause of crashes for young drivers, a statistic which is consistent with the high number of speeding violations the participants anticipated in this study. They indicated that they often get a thrill from driving and disagreed often with the statement that they sometime feel worried that

they will be involved in an accident. Consistent with this profile, those more confident participants were also more likely than those who were less confident to get a thrill from driving and were more likely to feel their driving skills were better than others.

4.3. Predicting Hazard Perception Scores from Driving skill, Personality factor, Risk taking, Sensation seeking and Overconfidence of driving ability.

Hierarchical regression analyses were conducted on the scores of the Self reported HP to test whether Skill, Personality Factor, Risk taking, Sensation seeking and Overconfidence driving ability predict hazard perception or not. These were chosen on the basis of previous findings in the literature.

Table 4. Examination of influencing factors with hierarchical multiple regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.106 ^a	.011	.008	.52709	.011	3.968	1	347	.047
2	.205 ^b	.042	.037	.51955	.031	11.139	1	346	.001
3	.318 ^c	.101	.093	.50409	.059	22.558	1	345	.000
4	.390 ^d	.152	.142	.49034	.051	20.612	1	344	.000
5	.812 ^e	.659	.654	.31126	.507	510.727	1	343	.000

a. Predictors: (Constant), Drivers overconfidence

b. Predictors: (Constant), Drivers overconfidence, Drivers personality

c. Predictors: (Constant), Drivers overconfidence, Drivers personality, Risk taking

d. Predictors: (Constant), Drivers overconfidence, Drivers personality, Risk taking, Sensation seeking

e. Predictors: (Constant), Drivers overconfidence, Drivers personality, Risk taking, Sensation seeking, Skill of driving

Based on the above table for the hierarchical multiple regression ($F(1,347) = 3.968$, $p < 0.05$), ($F(1,346) = 11.139$, $p < 0.05$), ($F(1,345) = 22.558$, $p < 0.001$), ($F(1,344) = 20.61$, $p < 0.001$) and ($F(1,343) = 510.73$, $p < 0.001$); there were an overall relationship between the dependant variable “Self reported hazard perception” and the independent variables Drivers overconfidence, Drivers personality, Risk taking, Sensation seeking and Skill of driving respectively. Since the probability of the F statistics ($p < 0.001$) was less than or equal to the level of significance (0.05), the null hypothesis was rejected. The research hypothesis that there was a relationship between the independent variables and the dependant variable was supported. The F test for the regression was statistically significant. The analysis also revealed that Driving skill was the best predictor of Hazard perception accounting 50.7% of the variance. The rest predictors such as Sensation seeking, Risk taking, Drivers personality and Drivers overconfidence contribute 5.1%, 5.9%, 3.1% and 1.1% of the variance respectively.

4.4. Analysis and results of qualitative data collected through interview

4.4.1. Purpose and ways of the qualitative study

The study was aimed to explore understanding of experts from concerned government sectors around Hazard perception of young drivers. Interview was undertaken with experts of Addis Ababa Transport and Road Authority and Traffic police to gather information on hazard perception level of young taxi drivers and factors of road accident in Addis Ababa. The interview was conducted with a face to face discussion with the assigned experts at their office. Recent information on road transport and drivers behaviors were gathered from the interview conducted with experts of the two sectors. Six open ended questions prepared for experts of Addis Ababa Transport and Road Authority and another six questions for Addis Ababa Traffic police. Two experts purposely selected from Addis Ababa Transport and road authority and Traffic police bureaus then interviewed according to the interview items constructed.

➤ ***Questions to be responded by traffic polices of Addis Ababa***

1. How do the road accident severities described in Addis Ababa?
2. What are the major factors of road crash in Addis Ababa?
3. What age group of drivers more involved in road crash?
4. How do you describe skill and behaviors of drivers involved in road accident?
5. Do drivers in the above question perceive hazard?
6. What measure should be taken to improve hazard perception of young drives?

According to the response provided by expert of traffic police in Addis Ababa:

- According to the response given by Addis Ababa traffic police road accident severities described as, traffic accidents from 2003 to 2004 E.C increased by about 106% with annual average growth rate of 8.8%. The highest growth in traffic accident is exhibited by damage to property, slight injury and fatal with a percentage change of 145, 69 and 38. They have an average annual growth of 12, 9 and 3 percent respectively.
- The negligence of drivers is the main feature of traffic accident in Addis Ababa. As calculated using the traffic accident data from the traffic police, (2003 to 2004) driver faults account for 96% of the causes. Refusing priority to pedestrians (92%) and to other vehicles (17%), driving too close (15%) and inaccurate by pass (14%) respectively which account for about 73% of all cases are the prominent problems. Among these faults of the

driver, refusing priority to pedestrians and driving too fast cause 80, 88 and 81% of the fatal, serious and slight injuries respectively.

- Drivers in the age group between 18-30 are responsible for 39, 36, 27 and 32 percent of the fatal, serious, and slight and damage to property respectively during the specified period. Whereas those in the age group 31-50 had contributed 38, 34, 27 and 29 percent of the fatal, serious, slight and damage to property respectively. But the contributors of about 21% of the total traffic accidents are the hit and run cases.
 - More than 75% of the traffic accidents in the city are attributed to those drivers having less than 3 years of driving experience. Drivers with the 2nd and 3rd level of driving licenses account for around 38 and 25 percent of the traffic accidents respectively.
 - The given information suggests that, in comparison with more experienced drivers, young drivers are less able to quickly and efficiently detect all of the hazards they encounter. The tendency for young novice drivers to be over-confident and over-estimate their skills (relative to the driving environment) further contributes to their risk of crashing.
 - These problems could be addressed by motivating young drivers to drive safely and provide them with the hazard perception, risk management skills and insights to counteract overconfidence. Driver education needs to use the best teaching practices, psychological learning principals, computer based instructions and simulations so that the novice drivers can learn important higher level skills such as eye scanning, without exposing them to hazardous driving situations.
- ***Questions to be responded by experts of transport and road authority in Addis Ababa.***
1. How many taxis are there in Addis Ababa now?
 2. How many of young drivers in Addis Ababa legally licensed?
 3. What is the minimum age limit to get license?
 4. What knowledge and skill a driver should acquired to obtain license?
 5. Do the present training provided for drivers enough to perceive hazard?
 6. How do you evaluate weather the drives properly acquire the skill and knowledge?

According to the response provided by experts of transport and road authority in Addis Ababa:

- The total number of registered taxi in Addis Ababa in 2013 was 9000.
- Among legally licensed drivers in Addis Ababa young drivers were accounted about 70%.
- According to the law of Road and Transport Authority the minimum age limit to be licensed is 18 years old.
- To obtain license the trainee should properly attend all theoretical and practical sessions and pass the exam.
- No, particularly driver education needs to use the best teaching practices, psychological learning principals, computer based instructions and simulations so that the novice drivers can learn important higher level skills such as eye scanning, without exposing them to hazardous driving situations.
- Skill and knowledge of drivers were evaluated by practical and theoretical exams.

Sufficient information about the road accident from data to conclusions was provided. During analysis all items were included and reported. Triangulation of methods, samples, theoretical approaches, sources and other research carried out to confirm the findings or strengthens theory building by accounting for contradictions. To demonstrate the link between the data and conclusions, how the data themselves shaped the conclusions was strengthened by cross-reference between conclusions and data within the study.

4.4.2. Summary and discussion of qualitative data

Hazard perception skills are fundamental to driving. The analysis here suggests that, in comparison with experienced drivers, young novice drivers are less able to quickly and efficiently detect all of the hazards they encounter. A common conclusion from the analysis is that underestimation of risk factors is a contributor to crashes involving young drivers. The information obtained from hazard perception is critical for young drivers to be able to determine whether a situation or environment is risky. The tendency for young novice drivers to be over-confident and over-estimate their skills (relative to the driving environment) further contributes to their risk of crashing. Driver errors were the causes of most taxi traffic accidents. The young, less experienced taxi drivers are responsible for most of the accidents. Therefore, drivers' training and testing should be standardized; a longer minimum time of driving experience should be attained before a license is issued to a driver. In addition, there should be additional

prerequisite criteria for taxi drivers with regard to their background and good behavior, age, driving experience, free from any addiction like chewing chat, alcoholic drinks, free from criminal acts as well as offending violation of traffic regulations. There should be a restriction for taxi drivers regarding the length of driving hours (working hours) because most taxi drivers are on the road for about 13 to 16 hours a day continuously, which leads to the use of chat as stimulant and that in turn makes them more aggressive drivers. To make more effective traffic control, the traffic police should be provided with the necessary facilities, together with reasonable salaries in relation to the prevailing market conditions, and they should be paid for the extra time they are on duty. On the other hand, the existing traffic regulations that create problems in controlling and punishing the offenders should be revised without delay. And the higher amount of fine imposed on each offence should be considered in relation to the prevailing side effects it had created. Therefore, prompt corrective measures should be taken. Finally, emphasis must be placed on the alleviation or avoidance of the prevailing corrupt practices like bribery by taking the necessary measures.

An effective road safety education program should include the following content:

1/ A focus on cognitive or perceptual skill development, including:

- Hazard perception – young people have a less developed ability to scan their environment and predict the behaviour of other road users
- Attention control – young drivers find it difficult to priorities competing tasks (for example, operating radios, distracting passengers)
- Impact of over-confidence—young drivers believe their driving skills are better than they really are.

2/ A focus on attitudinal change, not on the acquisition of driving skills. Attitudes to be targeted include:

- Acceptance of dangerous risk-taking behaviour (for example, impairment due to drugs/ alcohol, fatigue, speed, or distraction)
- Impulsive and aggressive driving
- Reducing the influence of risk-taking friends on driver behavior awareness of self limitations
- Parental engagement in modelling safe driving behaviours
- Changing the perception of risky behaviour (such as speeding or drinking) as ‘safe’ and having benefits (such as impressing people or getting there faster).

V. DISCUSSION

The findings of the current study discussed in this chapter with reference to the previous findings in the literature. The main issues that were examined in the current study were the correlates and predictors of hazard perception of young drivers. The Self reported hazard perception was positively correlated with driving skill and drivers' personality. Given the content of the current driver-training curriculum in Ethiopia in which the learner drivers are given only 10 hours of on-road driving lessons, it seems that pre-licensing period is not comprehensive enough to learn about higher-order skills. As the present findings implied, novice drivers' hazard perception abilities are not developed as much as experienced drivers' and on-road driver training should be enhanced in length to compensate for poor hazard perception abilities of novice drivers. In fact, the pronounced effects of experience would be even larger if the drivers were to be investigated on-road. Data from Addis Ababa traffic office also show that young drivers skill a considerable risk of injury and death during the first months of driving. In this study skill appeared as a significant determinant of hazard perception. Drivers who indicated a higher rate of active driving exhibited better abilities of hazard perception. This means that there is a critical time in which drivers would be under more risk in terms of accident involvement and this is the novice-period in general. Age positively predicted the SR-HP which means that older drivers rated their hazard perception ability as higher. On the contrary, risk taking and sensation seeking behaviours negatively correlated with hazard perception, experience and drivers personality. The number of crashes/near misses also related significantly to less safe attitudes to risk taking. It may therefore not be surprising those personality characteristics such as risk-taking propensity (Iversen & Rundmo, 2002; Oltedal, & Rundmo, 2006; Lund & Rundmo, 2009; Bingham et al., 2006); sensation-seeking (Zuckerman, 1997; Jonah, 1997), and other risky road use attitudes have been reported to play roles in road accidents. The results for the driver risk taking questioner revealed that the responses reflected the safest attitudes to drugs abused/driving behaviour and close following and the least safe attitudes to the risk factors speeding and overtaking. There was a significantly less safe attitude to speeding and overtaking with risky behavior of the participants. The drugs abused/driving findings need to be interpreted with caution as drugs effects the decision making process. Speeding violation is the most frequent cause of crashes for young drivers, a statistic which is consistent with the high number of speeding violations the participants anticipated in this study. They indicated that they often get a

thrill from driving and disagreed often with the statement that they sometime feel worried that they will be involved in an accident. Consistent with this profile, those more confident participants were also more likely than those who were less confident to get a thrill from driving and were more likely to feel their driving skills were better than others. Overconfidence has been offered as one explanation as to why young drivers over estimate their driving ability (McKenna, Stanier, & Lewis, 1991), and it is possible that training they have received in vehicle handling skills may fuel these levels of confidence. This is another support for Farrand and McKenna (2001) who reported that drivers' positive perceptions about their driving skills lead them to attribute low risks to the hazards since they were trusting in their abilities. Many of the participants rated their driving skills as better than the average driver, and thought they were less likely than others to be involved in an accident. They also reported high levels of confidence in their driving skills which related strongly to unsafe attitudes in relation to many risk taking behaviours. Those whose confidence was high were less likely to agree with road rules addressing risky driving behaviour, and were less concerned about being in an accident. A high level of confidence in driving skills related to unsafe attitudes for many risk taking behaviours, but particularly regarding speeding behaviour. As expected, those with high levels of confidence also reported attitudes and behaviours that were the least conducive to safe driving. Empirical evidence with regards to the predictive power of personality traits in accident involvement is relatively narrow, but suggesting that conscientiousness is the most consistent variable in predicting safe behaviors. In terms of the given links between personality traits and accident involvement, it can be expected to find a positive relationship between high conscientiousness and hazard perception ability. High conscientiousness, which is defined by rule governed behaviors, may lead the driver to be more perceptive about other drivers' rule-incongruent behaviors in traffic and this may enhance hazard detection time. Consistently, in the current study conscientiousness and hazard perception positively correlated. Indicating that high conscientiousness, which is defined by rule governed behaviors, may lead the driver to be more perceptive about other drivers' rule-incongruent behaviors in traffic and this may enhance hazard detection.

VI. CONCLUSIONS AND RECOMMENDATION

6.1. Conclusions

Following the current infrastructures development and expansion program of Addis Ababa city and lack of parallel alternative roads, lack of appropriate short cuts or absence of linkages between radiating or parallel roads; poor surfacing and narrow carriage ways; inadequate sidewalks and traffic control facilities; together with the existing narrow streets and junctions create traffic congestion and jams in the city. In Addis Ababa, taxis provide important public transport service. Taxis account for 10% of the vehicle fleet and 10% of the journeys or trips made in the city. However, taxis are at the forefront of traffic incidence accounting for between 15.6 to 26.5%. Among the major causes of taxi traffic accident the study focus on error of the drivers which claims the highest proportion on road accident. The study was investigated hazard perception by means of a brief self-report scale. The study was aimed to measure how the young drivers perceive their hazard perception. According to findings of the study, skilled drivers scored significantly higher hazard perception ability than novices' drivers. Hence, the study provides richer support for the notion that novices misperceive particular hazards. And it provides direction for developments in education and training programs for novices before licensure. The study mainly considered the effects of Driving skill with regards to the acquisition of reading the road ability in young novice taxi drivers in Addis Ababa. Reading the road is related to scanning and searching strategies on the way to develop certain expectations about the consequences of other drivers' actions. In addition, Risk taking was seen as one of the best predictors of hazard perception since it would interfere with deciding about whether the situation is really hazardous or not. The sample was considered as representative of many young drivers in Addis Ababa who are at a considerable risk of having a crash often resulting in death or serious injury. Due to Risk taking behavior of young drivers, it was revealed that the majority of participants in this study had been involved in a crash, and almost all had experienced a 'near miss'. Particularly young taxi drivers with less safe attitudes were more likely to commit driver violations or be involved in accidents, this study showed that those participants who had been involved in the most crashes or near misses were also less accepting of road rules and had a less safe attitude to risk taking. Among the influencing factors, sensation seeking was found to be the best predictor of risk-taking, which was reflected by driving faster and violating traffic rules, overtaking tendency of the driver among all other variables like locus of control and

formlessness. The finding also prevailed that conscientiousness is the most consistent variable in predicting safe behaviors. It had been also seen that positive relationship between high conscientiousness and hazard perception ability. High conscientiousness, which is defined by rule governed behaviors, may lead the driver to be more perceptive about other drivers' rule-incongruent behaviors in traffic and this may enhance hazard detection time. Overconfidence driving skill was another influencing factor of hazard perception. Young drivers are also less likely to moderate their driving according to their capabilities. An ability to respond effectively to hazards involves both an accurate perception of the hazard as well as an understanding of one's own driving skills for the current situation. Young drivers typically over-estimate their driving skills relative to others. A common conclusion from this research referred to be that underestimation of risk factors is a contributor to crashes involving young drivers. The tendency for young novice drivers to be over-confident and over-estimate their skills (relative to the driving environment) further contributes to their risk of crashing. Moreover, certain personality traits, driving style and driving skills, which are shown to modify the relationship between risk assessments and hazard perception processes, may interfere with perceived risk in young novice drivers. However, it is also reasonable to claim that these modifying factors may also predispose the more experienced drivers to perceive less risk in certain hazards.

6.2. Recommendation

- ✓ Driver errors are the most causes of taxi traffic accidents in Addis Ababa. Particularly, less experienced young taxi driver were more responsible for most of the road accidents. Overall, young drivers' perceptual and cognitive skills are insufficiently developed to ensure safe driving behavior and they have been shown to have a greater acceptance of risk. So that, the focus was on issues such as over-confidence, over-estimation of one's own skills and under-estimation of risk. Therefore, it was generally recognized that a single, one-off road safety education program is unlikely to be able to adequately cover many facets of safe driving or safe road use behaviour. Training that is potentially too ambitious, in attempting to cover a number of topics in a short space of time, might run the risk of being less effective. A longer-term training program has the potential to encompass a comprehensive range of situations and result in longer retention of key messages by the trainees. In addition, there should be additional prerequisite criteria for

taxi drivers with regard to their background and good behavior, driving experience, age, free from any addiction like chewing chat, alcoholic drinks, free from criminal acts as well as offending violation of traffic regulations. Also, road safety education should be provided in the schools as a short-term solution. But in the long run, this should be included in the school curricula. This is because most of the traffic accident victims are children.

- ✓ Road user education and awareness raising should be given the necessary attention. Pedestrian traffic education should be offered and encouraged through the radio, television, newspapers, magazines, books, films, leaflets and posters as well as giving traffic education around worship places and public gatherings, and the like.
- ✓ Addis Ababa city administration and traffic police should control misuse of the scarce sidewalks by service giving enterprises such as Garages, Wood and Metal works, Groceries, Restaurants, street peddlers or hawkers, should be controlled. Also parking cars on both or either sides of the road along narrow one-way or two-way streets especially in front of Hotels, Restaurants and supermarkets can be controlled by introducing paid parking (Parking meters).
- ✓ Further results from this cross-sectional study, including a similar hazard perception task using digital videos and repetition of the tasks during differing stages of driving experience, will help further clarify the findings in this paper. Moreover, background research is required on hazard perception, particularly on qualitative features of hazards. It is hoped that the project will provide further insights into the role that practice at the driving task has on the development of hazard perception.
- ✓ The relationship between accidents and hazard perception skill should also be tested in a longitudinal design in future studies to better understand the importance of hazard perception in novice drivers' safety. For that reason follow-up studies can be conducted to track month-by-month changes in accident involvement of young novice drivers and future studies may focus on demonstrating the characteristics of road accidents that were occurring as a result of low hazard perception skills.

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APPENDICES

APPENDEX -1-

Questionnaire Prepared for Sample Population

Introduction

Dear respondents, available data from the Addis Ababa Traffic police suggest that road traffic crashes are the commonest causes of fatalities and injury related disabilities in Addis Ababa in particular and in Ethiopia in general. The driver factor is the topmost priorities among the major causes of road traffic crashes in Addis Ababa. Therefore, this research is about hazard perception of young drivers in Addis Ababa. The research is designed for academic purpose to the fulfillment of MA Degree on Measurement and Evaluation in Addis Ababa University. It aims to assess factors that affect hazard perception of young drivers in Addis Ababa. Through the present research, relevant data that will provide useful information to complement those of the institutions involved in traffic safety campaign in the country.

Your response is very important for the success of the study. I hereby request you that to answer all questions honestly and carefully. If by any chance a question should make you feel uncomfortable, do not answer it. Hence you are kindly requested to give your response by selecting your answer among the alternatives or by describing your opinion.

Confidentiality

I hereby assure you that all information obtained through this questionnaire shall be used for only and only academic purposes, and will be handled and stored with the highest order of confidentiality. Please do not write your name anywhere on the questionnaire.

I would like to thank you for your cooperation.

Sintayehu Alemayehu

APPENDIX -2-

Demographic Information

Instructions one

Put tick mark “√” on your appropriate answers

1/ Age of respondent

17 to 20 years 21 to 25 years 26 to 35 years

2/ Level of driving license

Level 2 Level 3 Level 4 Levels 5 and other

3/ When did you obtain your car driving license?

This year Last year 2 years ago

4/ Your driving experience.

Less than 2 years 3 to 9 years 10 years and above

Instructions two

Almost every driver becomes involved in an adverse traffic event (accident or near-hits) of some sort during their driving years. We would like to know how often people experience such events. Please tell us how many ACCIDENTS or NEAR HITS that you have been involved in during the last twelve months.

In the last twelve months, how many accidents have you been involved in?

An accident is any collision that occurred while you were the driver of the vehicle and irrespective of who was at fault. -----accidents.

In the last twelve months, how many near misses have you experienced?

A near hit is when you narrowly avoided being in an accident on public roads, while you were the driver of the vehicle and irrespective of who was at fault.

-----near misses.

Instructions three

Nearly all drivers commit traffic offences and we would like you to estimate how often these have happened. Please let us know whether you have committed any traffic offences in the last twelve months. For each of the offences below indicate approximately how many times these happened.

Please write the number of times in the space provided. If you have no traffic convictions or warnings please put zero.

A conviction is when your offence has legal consequences resulting in a fine and / or demerit points.

A warning is when you are stopped by the police regarding your driving but no further action is taken.

No	Offence type	Convictions	Warnings
1.	Speeding - e.g., over the legal limit		
2.	Drinking or drug related e.g. driving under the influence		
3.	Roundabout offences - e.g., using the wrong lane or use of inappropriate signals		
4.	Traffic signal offence - e.g., running a red light		
5.	Parking offence - e.g., parking in disabled parking, on footpath		
6.	Failing to stop - e.g., for police, after an accident		
7.	Vehicle defects - e.g., broken headlamp, noisy vehicle		
8.	Uncertified vehicle modification - e.g., lowered suspension		
9.	Seatbelt offence - e.g., driving without a seatbelt		
10	Driving without legal certification - e.g., driving without a warrant of fitness or without registration		

APPENDEX -3-

Self-Reported Hazard Perception Scale (SRHP)

Instructions

Below there are some hazard perceptions measuring statements. For each statement put tick mark “√” for the number indicating to what extent you agree or disagree.

Strongly Disagree Disagree Neither agree or disagree Agree Strongly agree
1 2 3 4 5

No	Items	1	2	3	4	5
1.	Do you never feel worried that you will be involved in an accident?					
2.	Do you never drive to get a thrill from driving?					
3.	Do you think you will be less involved in accidents in the future compared with the average driver?					
4.	Do you think that you are more skilful than the average driver?					
5.	Do you think that you know all the basic traffic signs implemented on Addis Ababa roads?					

APPENDEX -4-

Taxi drivers Skills Inventory (SD)

Instructions

Naturally, we all have strengths and weaknesses. What are your strengths and weaknesses while driving? Please indicate by ticking the appropriate option below.

Very weak **Weak** **Moderate** **Strong** **Very strong**
1 **2** **3** **4** **5**

No	Items	1	2	3	4	5
1	See traffic hazard					
2	Being patient behind a slow vehicle riding					
3	Predict future traffic conditions					
4	Leave enough space					
5	Speed adjustment depending on the circumstances					
6	Careful Overtaking					
7	Obey the speed limit					
8	Avoiding unnecessary risks					
9	To be able to make up for the mistakes of other drivers					
10	Closely follow the traffic light					

APPENDEX -6-

Taxi drivers Sensation Seeking Questionnaire (SS)

Instructions

Below there are some statements. How much this statement describes / define you.

Please specify the appropriate option for each statement.

Not at all **Not** **Neither / Nor** **Moderately** **Completely**
described **described** **described** **described** **described**
1 **2** **3** **4** **5**

No	Items	1	2	3	4	5
1	I like to use a high horsepower vehicle					
2	I like to take risks while driving					
3	I enjoyed breaking the rules					
4	I'm just wondering exhilarating substances such as chat					
5	Return from the boundary of the danger gives me the shivers					
6	I enjoy racing in traffic					
7	I enjoy the excitement of dangerous driving					
8	I like fast driving					
9	I like to increase the power and speed of the car assemblies					
10	I enjoy the occasional drink distribute					

APPENDIX -7-

Taxi Drivers confidence level Questionnaire (DC)

Instructions

Drivers vary in how confident they feel in different situations. Please rate Putting tick mark “√” how confident you feel driving in each of the situations described below. Tick on 5 if you feel completely confident and on 0 if you are not at all confident.

Not at all **Not** **Neither / Nor** **Moderately** **Completely**
confident **confident** **confident** **confident** **confident**
1 **2** **3** **4** **5**

No	Items	1	2	3	4	5
1	At night					
2	In bad weather					
3	In rush hour or heavy traffic					
4	On the highway					
5	Changing lanes on a busy road					
6	Reacting quickly					

APPENDIX -8-

Taxi drivers Personality Item Pool (DP)

Instructions

Please use the rating scale to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly the same age. Please read each statement carefully, and then put tick mark “√” the number that corresponds to your reply.

Very Inaccurate Moderately Inaccurate Neither Inaccurate nor Accurate Moderately Accurate Very Accurate

1 2 3 4 5

No	Items	1	2	3	4	5
1	Start conversations					
2	Being interested in other people's problems					
3	Get chores done right away					
4	Do not easily disturbed					
5	Have excellent ideas					
6	Have a lot to say					
7	Have a soft heart					
8	Often forget to put things back in their proper place					
9	Do not upset easily					
10	have a good imagination					

APPENDEIX -9-

Interview for concerned government bureaus

Part 1: Questionnaire to be responded by traffic polices of Addis Ababa

7. How do the road accident severities described in Addis Ababa?
8. What are the major factors of road crash in Addis Ababa?
9. What age group of drivers more involved in road crash?
10. How do you describe skill and behaviors of drivers involved in road accident?
11. Do drivers in the above question perceive hazard?
12. What measure should be taken to improve hazard perception of young drives?

Part 2: Questionnaire to be responded by experts of transport and road authority in Addis Ababa.

7. How many taxis are there in Addis Ababa now?
8. How many of young drivers in Addis Ababa legally licensed?
9. What is the minimum age limit to get license?
10. What knowledge and skill a driver should acquired to obtain license?
11. Do the present training provided for drivers enough to perceive hazard?
12. How do you evaluate weather the drives properly acquire the skill and knowledge?