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UNDERSTANDING THROUGH LITERATURE REVIEW THE BEHAVIOURS ASSOCIATED WITH SAFE DRIVING ON THE ROADS

RICHARD VINCENT D'SOUZA
RESEARCH SCHOLAR

CANARA BANK SCHOOL OF MANAGEMENT STUDIES
BANGALORE UNIVERSITY
BANGALORE

K JANARDHANAM
PROFESSOR

CANARA BANK SCHOOL OF MANAGEMENT STUDIES
BANGALORE UNIVERSITY
BANGALORE

ABSTRACT

Since ancient times there has been agreement among thinkers that human capacities are organized into three distinct groups corresponding to the three fold human nature: the will (attitude), the understanding (knowledge and skill), and the actions of an individual (behaviour). Human behaviour of the road users particularly the behaviour of drivers play an important role in safe driving practices by preventing road accidents. A driver for the purpose of this study is defined as a person who drives a motorised vehicle like moped, scooter, motor cycle, auto rickshaw, car, van, bus or truck on the public road. Apart from driver behaviour the behaviour of other road users like pedestrians and cart pullers, can also play a role in the safety of road travel. Road accident is most unwanted thing to happen to a road user, though they happen quite often. The most unfortunate thing is that we don't learn from our mistakes on road. Most of the road users are quite well aware of the general rules and safety measures while using roads but it is only the laxity on their part which cause accidents and crashes. Road crashes are manmade and preventable if road users are inculcated with right kind of knowledge, skills and attitude to promote safety.

KEYWORDS

Aggressive action, Driver behaviour, Safe driving, Road user.

INTRODUCTION

Travel by road in India is very popular for various reasons, but the safety climate is needed to be improved. The rate of road-accidents and fatality in the country is very high. Pressure on roads has been on increase and the number of vehicles is increasing by leaps and bounds. Lack of road-sense has further complicated the matters. Road transportation is the backbone of our nation and transport services are considered as growth engine of the economy. It is said that more the lengths of roads, more the prosperity of the nation. The prosperity brigades of a nation normally comprise of intelligentsia, hard labour, infrastructure availability and lastly smooth functioning of its roads. However, transportation network if not used properly may cause pollution and accidents. As per data registered by the World Health organization, (WHO 2004) nearly 12 lakhs people are known to die globally each year in road accidents. Out of which more than 83,000 people are killed and about 400000 people are seriously injured in India. It means, we kill about 230 people and injure about 1100 every day on Indian roads. Out of this, about 25-30% is pedestrians and 15-20% children under 15 years of age. In India, the total cost of losses due to road accidents are in the range of Rs. 400- 500 crores a day (Desai, 2011). The estimated cost includes compensation, asset loss, time and energy spent on police, hospital and court cases etc. But it is difficult to measure these sufferings in terms of money. The loss to the nation due to road accidents is untold, eating into the economics of the nation.

Road accident is most unwanted thing to happen to a road user, though they happen quite often. The most unfortunate thing is that we don't learn from our mistakes on road. Most of the road users are quite well aware of the general rules and safety measures while using roads but it is only the laxity on their part which causes accidents and crashes. Main cause of accidents and crashes are due to human errors. Some of the common errors of people which results in accident are: (1) over speeding; (2) drunken driving; (3) distractions to driver; (4) red light jumping; (5) not using safety gears like seat belts and helmets (6) non-adherence to lane driving and (7) overtaking in a wrong manner.

Road safety in India has become a major concern for the regulatory authorities. Indian road safety situation is many times worse when compared to the developed countries of the world, which leaves much to be done in the field of Road Safety Management. "Accidents are not natural but they are caused," is a common saying in the area of traffic safety. Road safety is defined as the absence of crashes, injuries and fatalities. The term "safety" implies that there are no occurrences of accidents. Although undesirable, crashes and fatalities are inevitable incidents of the transportation system. The road transportation is cursed with road accidents. A substantial accident risk is always present in the development of transport facilities. Road crashes are a growing problem worldwide. The road systems all over the world are getting more and more congested and unsafe day by day. Road Traffic Accident (RTA) is normally defined as "accident which takes place on the road between two or more objects, one of which must be any kind of a moving vehicle." Road traffic accidents can be called as perennial disaster, as they have claimed far more lives than any of the natural disasters.

THE ROLE OF ROAD USER BEHAVIOURS

Human behaviour of the road users particularly the behaviour of drivers play an important role in safe driving by preventing road accidents. A driver for the purpose of this study is defined as a person who drives a motorised vehicle like moped, scooter, motor cycle, auto rickshaw, car, van, bus or truck on the public road. Apart from driver behaviour the behaviour of other road users like pedestrians and cart pullers, can also play a role in the safety of road travel. It is commonly acknowledged that human factors may contribute to accident involvement in traffic (Grayson and Maycock, 1988). Based on a study of 2041 traffic accidents, Sabey and Taylor (1980) concluded that human factors were contributing elements in 95% of the accidents. In particular, driving behaviour was identified as the most central of these factors. Consequently, a variety of studies have been carried out in order to identify variables which may influence accident involvement and risk-taking behaviour in traffic, meaning behaviour that indicate the possibility of a negative outcome for the individual as well as for others.

Accidents on the roads are also called as road crashes. Hence both these terms in this study conveys the same meaning. Road crash is an event on the public road, caused by the behaviour of road users, which results in damage to the vehicle and injury or death to the road users. Road crashes can be divided as single party crashes and multi party crashes. Single party crash is a road accident in which the driver does not hit the vehicle to another vehicle or to another person. Rather he may hit the median, drain, kerb, tree or any other physical object thereby causing death or injury to himself or to his passengers or both apart from damage to the vehicle. In multi party crashes the driver hits his vehicle to a person or to another vehicle. In multi party crashes the party responsible for the

accident is the culprit whether he himself is also injured or died and the other people who suffer damage to vehicle, injury or death are victims. It is not always the driver only at risk in a road crash rather the lives of passengers in the crash vehicle is also at stake.

THE PERSONALITY DETERMINANTS

Within psychology, the different perspectives of cognitive, personality and social psychology have all attempted to explain individual differences in risk-taking and traffic accident involvement (Arthur, Barrett, and Alexander, 1991; Parker and Manstead, 1996). Cognitive research has traditionally studied variables such as management of attention and information processing capabilities, whereas personality research has focused upon the predictive value of personality traits. At the same time, socio-psychological research has attempted to explain differences in risk-taking behaviour and accident involvement within the framework of social cognition models. Despite the extensive research within these areas of psychology, few studies attempt to integrate variables from these different research traditions. For instance, personality traits are rarely studied together with social cognitive variables.

Different perspectives of cognitive, personality, and social psychology have attempted to explain risky driving and traffic accidents. Personality research focuses on the reductive value of personality traits. It attempts to explain differences in risk taking behaviour and accident involvement within the framework of social cognition models, where variables such as attitudes, perceived risk, social norms, and perceived behavioural control are central determinants of behaviours (Ulleberg & Rundmo, 2003). In the social psychology domain, there have been a lot of interests in studying risky driving in the individual life context.

In one of the studies high- and low-accident drivers in a taxi firm were examined. Through an interviewing process it was found that driving habits and high accident record were simply the manifestation of a way of living that had been demonstrated in drivers' personal lives (Wang, 2011). That is to say "a man drives as he lives". Hence lifestyle also becomes a determinant of risky driving and traffic accidents. Driving behavior is not an isolated behavior. It is connected to other aspects of life and is affected by the individual's value, attitudes, and motivation. Hence within the psychological research field, various perspectives such as cognitive and personality have attempted to explain individual differences in risk-taking and traffic accident involvement.

Social cognitive research focuses on studying variables such as the management of attention and information processing capabilities, and consequently, the most popular strategies of promoting road safety are to change drivers' attitudes and risk perception with regard to unsafe driving. The associations between risky driving and life situations have been investigated in quite a few studies. Most of them used two approaches. One was the problem behaviour approach, which showed that unsafe driving was highly related to problem behaviours such as smoking, drinking, antisocial behaviours and involvement in non-organized activities with friends. The other was the lifestyle approach, which identified correlations between driving behaviour and lifestyle aspects, including infrequent participation in sport activities, frequent intoxication, and low commitment to study and other organized activities.

Personality research emphasizes the predictive power of personality traits that are not evaluative, do not refer to specific objects, and are more stable as compared to attitudes that are defined as evaluative conditions with reference to specific objects. Personality traits such as sensation-seeking, aggression and social deviance are found to be frequently related to involvement in traffic accidents. The integration of both social cognitive and personality psychology approaches provides an understanding of the mechanisms underlying drivers' risk-taking behaviours on the road and is therefore important.

KNOWLEDGE, SKILL AND ATTITUDE

Since ancient times there has been agreement among philosophers that human capacities are organized into three distinct groups corresponding to the three fold human nature: the will (attitude), the understanding (knowledge and skill), and the actions of an individual (behaviour). Psychology always defines driving behaviour in terms of these three inter-related domains of human behaviour. Driver education and training need to explicitly address each of the three domains of driving behaviour. Different instructional activities are needed for acquiring driving competence in each of the three domains. Similarly, when testing the competence of drivers, all three domains must be assessed by suitable and valid questions.

Modern psychologists also function within this threefold system of behaviour. What pertains to the behaviour of the will is called affective behaviour and includes affections, feelings, motives, needs and everything that pertains to the goal-directedness of people's actions. For example, signalling before changing lanes is a sensory motor behaviour embedded in an affective context. Here the driver maintains the motive of avoiding driving errors. In the absence of this motive, errors are committed and the driver fails to signal. Learning to maintain the motive of avoiding driving errors is an important affective driving skill. Frequently, affective driving errors occur when conflict between motives is experienced, as when a driver is in hurry and speeds. The feeling of wanting to be cautious and law abiding is weakened by the feeling of urge to hurry and not be too late. The theory of driving behaviour includes the capacity to explain the content and organization of affective driving skills and errors. What pertains to the behaviour of the understanding is called cognitive behaviour and includes cognitions, thoughts, and reasoning that pertains to the decision-making and analyzing aspects of people's action. For example, signaling before changing lanes is not only embedded in an affective (motivational) context, but in a cognitive context as well. Here the driver processes information by common sense and logic. Learning to make correct judgments in routine driving incidents is an important cognitive driving skill. Frequently, cognitive driving errors occur when an illogical sequence of interpretation leads to an incorrect decision, as for instance: "I know there is nobody behind me, therefore I won't bother signalling this time." This erroneous decision overlooks several reasons that should be taken into account such as: There may be somebody in my blind spot, or there may be somebody from the front that might turn in, or there may be a policeman watching; etc. A comprehensive study of driving behaviour has the capacity to identify correct and incorrect decision-making, and specify how cognitions interact with affections to produce overt acts.

The aspects of, the individual's overt actions is called sensory motor (or psychomotor) behaviour and includes all the experience that is mediated through sensory and motor channels. For example, signalling before changing lanes is a complex psychomotor action involving eye-hand coordination, motor readiness to apply the brakes if needed, twisting of neck to look behind, changes in breathing pattern, and less visible endocrine and neurologic changes. A realistic driving theory includes the specification of the sequence of sensory motor actions of drivers and how these are influenced by the on-going affective and cognitive context.

EVOLUTIONARY LEARNING IN SAFE ROAD USE

Acquiring the range of fundamental psychological skills and knowledge required in order to interact with traffic, together with the ability to deploy these strategically in different traffic situations, is a lengthy developmental process that begins early in life (Thomson *et al.*, 2006). Attitudes to safe driving emerge well before any formal driver training takes place and that these lay the foundations for adult attitudes and behaviours (Waylen & McKenna, 2002). It needs also to be borne in mind that the relationship between attitudes and behaviour is complex, and this is at least as true in the course of development as it is in adulthood.

Over the period from the pre-school years to their teens, children have extensive direct and indirect opportunities to acquire information about drivers and driving. Some of this information, and the associated attitudes and emotions, may in turn be incorporated into young people's own expectations and practices as novice drivers. During adolescence, young people are undergoing dramatic changes in their cognitive capacities, their hormonal and emotional regulation, their relationships with parents and peers, their orientation to society and their sense of personal identity (Durkin, 1995; Keating, 2007). For example, adolescents have different sleep patterns and needs from adults, not least a tendency to wake up later in the morning, but the practical arrangements of their lives (school attendance or work requirements) may lead to early morning start times. Young people are coping with hormonal fluctuations and high energy levels, a desire to become less dependent on parents, strong motivations to engage with peer communities, the temptations of legal and illicit substances, and the need to define who they are (Durkin, 1995; Keating, 2007; Shope, 2006). All of these factors have extensive implications for the development of pre-drivers and early drivers.

Strecher *et al.* (2007a) has identified key psychosocial targets for safe driving behaviour in adolescents and reviewed prospects for interventions. The psychosocial factors proposed by him are: affective beliefs, perceived threat, perceived benefits of unsafe driving, subjective norms, personality, identity, task difficulty, and habit. However, two complementary themes are also very salient when a developmental approach is taken. One of these, namely contextual influences (especially, parents, peers and the mass media) bears on each of the above. The other, education, flows naturally from any consideration of how pre-

drivers develop, what influences the course of development, and typically of great practical interest; what can be done to promote the development of a healthy orientation towards road safety and driving. Contextual influences and education are not psychosocial factors akin to those identified by Strecher *et al.* However, they both have potential influences, and are therefore also addressed.

It is well established that young novice drivers, especially if they are male, are at greater risk of accidents than any other group. Extensive research has addressed a range of factors that might help explain this association, in order to inform attempts to mitigate risk (Keating, 2007). However, relatively little of this research has been concerned with the pre-driver period, and the influences that might extend from this into becoming a driver. This is despite the fact that: (a) age and gender differences in the risk pattern rule out any simple account in terms of inexperience; and (b) the elevated risk among members of this group emerges too rapidly to be due solely to behaviours acquired at that point. The research on the pre-driver period has tended, moreover, to focus predominantly on attitudinal processes to the exclusion of other types of influence. It has also lacks a developmental orientation aimed specifically at considering continuity and change over the transition to becoming a driver. The existing literature, therefore, presents a restricted basis for understanding the influences that might be operating over this whole period, and thus planning for interventions at the pre-driver stage.

In adult pre-drivers, the relationship between attitudes and behaviours is complex and subject to other influences. Of course, during this period attitudes cannot bear directly on driving behaviour, but they may bear on other aspects of road behaviour, and they may contribute part of the context in which young people progress towards driving. Importantly, at present, the evidence on the stability of attitudes and affective beliefs across the pre-driver and novice driver periods is scant and inconclusive. Some degree of continuity seems likely, but it is also probable that the extent of this continuity is dependent on the effects of personality, identity and contextual influences (peers or parents). Some changes come about as part of broader developmental changes in social reasoning (e.g. the tendency to question authority in late childhood and adolescence). The likelihood that there are changes during this period highlights a major opportunity for intervention.

Risk management in driving entails an array of perceptual, cognitive and emotional skills. Acquiring these skills begins in early childhood, but develops over a long period. Children's judgments of risks as pedestrians are often inadequate into early adolescence, and children show indications of subscribing to risk compensation bias and optimistic bias. They share these erroneous perceptions with their parents. Skills required for risk management are likely to be still developing through the teens. Adolescents approaching the age where they could seek a driving license may also be both more prone to emotional over-reaction in risky environments and less able to suppress appealing actions. Risk-taking is a natural part of adolescent development, but some teenagers are more prone to it than others, and some develop lifestyles of multiple risk-taking. These patterns, established in early to mid-adolescence, are significant precursors of risky driving and crashes in early adulthood.

FATIGUE AND STRESS

Driving is a complex task, requiring full concentration and a calm attitude. Stressed and strong emotions, whether they result from the driving task itself or unrelated matters, can affect a driver's ability for safe driving. For example, angry drivers are more likely to take risks such as speeding, rapidly switching lanes, tailgating and jumping red lights. All drivers are exposed to stressful driving situations from time to time, even if they do not generally suffer from stress in everyday life. Traffic jams, tailgating and generally dealing with other drivers' risk-taking can all lead to heightened stress levels. If a person drives while stressed he runs a much greater risk of being involved in a crash that kills or injures them or other road users.

The average number of driver interactions on the wheel has steadily climbed due to traffic congestion. Thousands of interactions with hundreds of vehicles create new challenges for drivers. Any one of these exchanges can go wrong when the context is hostile. They represent a tremendous diversity of competence, style, and purpose. The hundreds of drivers one encounters in a thirty minutes drive put us into contact with this diversity. It is unrealistic to expect homogeneity of driving styles. Drivers differ in gender, age, experience, familiarity with the road, physical health, mood, and the reason for them to be on the road. Not all drivers are in a hurry, not all drivers are alert, not all drivers are competent and not all drivers know how to coordinate with the rest of traffic. There is no doubt that stress, emotions, or lack of attention, is a problem for many drivers. Some people feel that they are stressed in certain situations, others may not realize it. Either way, they could be putting themselves at risk each time they drive. It is therefore important that all drivers know what to look out for in their own behaviour.

The following signs may indicate a stressed driver- feeling aggressive, feeling distracted, having near-misses or collisions and improper driving skills. The attitude of a driver towards safe driving can be assessed by answering the following questions.

- 1) Aggression - to what extent does an individual react to difficult driving conditions by driving in an aggressive manner
- 2) Thrill-seeking - how likely is a driver to take risks on the road in an attempt to raise their adrenaline levels?
- 3) Hazard monitoring - to what extent does a driver use observation and awareness of hazards to mediate the stress of driving, especially in risky situations?
- 4) Proneness to fatigue - how much does the stress of driving produce fatigue in the individual?
- 5) Dislike of driving - is the driver's stress level exacerbated by a dislike of driving or a lack of confidence in his driving abilities?
- 6) Confronted coping - does the individual cope with the stress of driving by being confrontational to other road users and taking risks?
- 7) Reappraisal coping - does the individual deal with the stress of driving by evaluating their own driving and learning from their mistakes?
- 8) Avoidance coping - does the individual ignore a difficult situation and cope with resulting stress by pretending nothing has happened?
- 9) Emotional coping - does the individual deal with their driver stress by criticizing themselves and blaming themselves for anything that goes wrong when they are driving?
- 10) Task focus coping - does the individual cope with the stress of driving by concentrating hard on the driving task and trying to adapt their driving to meet the requirements of the situation?

ATTITUDES AND AFFECTIVE BELIEFS

Attitudes are the evaluative judgments we make about any person, place, event or things. Attitudes are a mixture of belief systems and values that determine how we experience the world and how we respond to things in our lives, like driving. It is our attitude that determines how we will acquire and use our skills and knowledge when confronted with a driving challenge. Pre-conceived notions about other drivers based on age, gender or ethnicity, and expectations about their behaviour can create attitudes of intolerance and frustration where cooperation and patience may yield more positive results. Failure to accept our powerlessness in situations where traffic is slow or tied up can encourage aggressive driving behaviour in an attempt to reach faster.

Attitudes are the prime determinant of how much risk we take on the road. Risk tolerance is the amount of risk that we normally accept when performing a task like driving. What is crucial to understand is that our tolerance for risk can change in a moment based on our internal state of mind and the events around us. Our emotional state is one of the personal factors that can cause changes in our willingness to take risks. Stress, anger, overconfidence and fatigue are a few of these factors. Our expectations play a huge role in the process. If we live in a world of "should" we drive with the expectation that others *should* drive properly or safely, respect our space and follow the rules; then we are setting ourselves up for a stressful trip.

When another driver doesn't meet our expectations and doesn't do what they *should* do, we may respond in anger and find that our willingness to take an unsafe risk escalates. Anger at other driver's behaviour and frustration with traffic can cause us to take chances; so can minor problems, like running late. If we honestly ask ourselves if we have ever done something downright dangerous while driving under the influence of stress or frustration, the answer will likely be yes. Most people are good drivers, except during moments when they become angry, frustrated or otherwise influenced by factors that elevate risk tolerance. Changing expectations is just one stress reduction technique that can make a major difference in driver attitudes and behaviour. But most driving courses fail to consider it and instead bore drivers with reviews of rules that most already know and, for the most part, follow.

When we live in a world of "is" instead of "should," we drive with the expectation that there will be discourteous or rude drivers, and that there will be traffic tie-ups and delays. We are armed now, however with the knowledge and tools to safely and responsibly manage ourselves in these stressful situations. This goes a long way towards reducing risk-taking behaviour behind the wheel of vehicles. To make changes in fleet safety, simple driver training is only part of the

solution. Defensive driving course or refresher training that focuses only on driving rules and techniques misses the critical issue of personal factors and attitudes that change risk tolerance.

To be effective, driver safety training and education must focus on driver attitudes about risk and stress, and provide more meaningful and workable tools that people can use to self-manage these states.

An attitude can be defined as a positive or negative evaluation of people, objects, activities, ideas, or just about anything in your environment. It is a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor. As will swiftly become clear, it is an oversimplification to assume that individuals have singular, unitary attitudes towards particular phenomena or issues. We tend to have an array of beliefs in any given area, each of which can be associated with positive or negative evaluations. For example, a driver might hold the beliefs that (a) it is a good thing that traffic police are essential to ensure safe and efficient uses of the roads, (b) it is a bad thing that traffic police are rarely there when needed (e.g. to control reckless and incompetent drivers), and (c) it is deplorable that traffic police who stop me for speeding are unfair revenue-raisers. Each of these beliefs are accompanied by an affective reaction. These are referred to as affective beliefs (e.g., Lawton *et al.*, 2007). Importantly, an individual can hold multiple and even contradictory affective beliefs about the same topic.

The influence of attitudes is therefore determined to some extent by whichever specific beliefs seem most salient under given conditions (this will not remain uniform), and the combined strength of the evaluations associated with those beliefs. Attitudes are problematic. To the layperson, it seems obvious that there is a strong connection between attitudes and behavior and it is natural to assume that, if an individual holds favourable attitudes towards road safety, then he/she will be an exemplary driver but there is little research evidence to support it. At best, they have been found to be only weakly associated.

In an effort to explain why the influence is weak, contemporary research typically portrays attitudes as an indirect influence on behaviour, which operates by helping to shape people's intentions to act in one way or another (Ajzen and Madden, 1986). The impact of attitudes on actual behaviour is limited for three reasons. First, intentions are rarely translated into action completely. This is because external factors intervene to bring about other reactions. A driver might 'intend' to keep within the speed limit, but, finding that traffic delays have made him late for work, he accelerates when on a clearer stretch of road. Compromises between intention and reality are most likely in the moment-to-moment adjustments demanded by driving. Second, attitudes are only one of a set of influences on intentions (Ajzen & Madden, 1986, Terry *et al.*, 1999a).

In the present context, these points give rise to three questions concerning attitudes during the pre-driver period namely (1) what evidence is there that attitudes/affective beliefs, as opposed to some other related influence, are actually important determinants of driver behaviour, especially as regards riskier actions? (2) what sources of influence can be identified with regard to the acquisition of affective beliefs in the pre-driver period? (3) How stable are attitudes over time in particular, is there evidence that attitudes/affective beliefs acquired in the pre-driver period will carry over into novice driving?

Strecher *et al.* (2007a) argue that attitudes and beliefs are a relatively stable influence on driver behaviour, and that they help to determine the level of risk that individuals are prepared to accept. As already stressed, the relationship between attitudes and behaviour is not invariably straightforward. Research by Corbett and Simon (1999) identified four different driver profiles in respect of reactions to the installation of speed cameras. Conformers' (normally complied with speed limits on the survey road and so cameras would make no difference), 'deterred' (reduced their speed on the survey road to avoid detection), 'manipulators' (slowed down on approach to cameras and accelerated once away from them), and 'defiers' (continued as before, driving well above the speed limit). Notwithstanding very different behavioural choices, all types – including the manipulators and defiers – professed attitudes in favour of cameras.

Even if attitudes towards risk are relatively stable, the circumstances in which drivers actually operate can render attitudes more or less accessible. Drivers are unlikely to carry a stable view about risk around with them, which is always present in their mind, to the same extent. Consideration of risk may come to the foreground of consciousness under some circumstances (e.g. driving on a wet motorway at night under crowded conditions), while on many occasions (e.g. a quiet Sunday morning on a country road) it may not be in drivers' minds at all (Midlands Partnership Group, 2006).

At the very least, then, the influence of attitudes would appear to be an uncertain one. The implication is that the circumstances are in many ways more critical than individual drivers' attitudes, and that, in particular, it is collective affective beliefs and consequent intentions and actions that are the proper target of attention. In line with this, Terry *et al.* (1999a) found that, for those who attached great importance to their social group, group norms were as strong an influence on intention as individual attitudes. Viewed from this perspective, the distinct pattern of attitudes towards driver violations exhibited by, for example, drink-drivers relative to the general population (Baum, 2000) take on a potentially new significance, particularly if they tend to socialize with each other.

The key point here is that, if there is some underlying characteristic that ties affective beliefs about disparate behaviours together, it is a misnomer to call this an attitude, in the sense that this term is technically defined. It may be more appropriate to refer to a general orientation. That is, a driver will have a general orientation towards, for example, road safety that will be reflected in various ways. Any attitudinal statements that she or he endorses are part of this, and each in turn will be associated with affect, but also important are the driver's practical ways of behaving when behind a wheel, the extent to which she or he is responsive to perceived norms, her or his personality and sense of identity. This means that attempts to understand driver behaviour in terms of attitudes alone, or to improve behaviour simply by targeting attitudes, are inadequate.

Hence the answer to the question whether attitudes are important determinants of driver behaviour is that attitudes and affective beliefs certainly need to be taken into account as partial determinants, but it is important to recognise that the attitudes-behaviour relationship is complex. For this reason, attitudes need to be examined in relation to a host of other psychosocial and contextual factors, including skills, knowledge, experience, habits, norms, personality and identity. This is true of adult drivers and may be even more so of pre-drivers, whose developing orientations towards road safety are influenced by many variables.

OTHER INFLUENCES

Other influences include; perceptions of personal ability (for example, an individual's attitude that speeding is reprehensible may have less influence over his driving behaviour than his perception that he can handle a car well at 80 mph); the perceived attitudes of others (subjective or injunctive norms) – a person's attitude may be that drivers should leave a safe distance from the car in front, but his driving behaviour may reflect the fact that he perceives drivers behind as expecting him to move closer to the vehicle ahead; and the behaviours that others exhibit (descriptive norms) – one should stop at amber, but everyday observation leads to the recognition that most other drivers do not. Attitudes alone cannot explain safe and unsafe driving behaviour. In children, as in adults, the relationship between attitudes and behaviour is inconsistent. For example, Berg and Westerling (2001) found that a clear majority of secondary school pupils in a Swedish sample held attitudes in favour of wearing cycling helmets and believed that they were important for their safety; however, most of the children had abandoned wearing helmets.

Nevertheless, there is evidence of some formative influence of attitudes on intention and thence behaviour during the pre-driver period. Examining the relative influence of different variables among 12–15-year-olds on 11 cautious and risky pedestrian behaviours (e.g. waiting for the green man, running through gaps in the traffic), Tolmie *et al.* (2006) found that those who held more positive attitudes towards risk, and more negative attitudes towards caution, were indeed more likely to take risks. However, the strength of the association was never more than moderate. Moreover, further analysis showed that attitudes were typically related to self-identity, and that the latter had the stronger influence on intention. They found also that self-identity was strongly related to peer behaviour, and that it showed a progressive shift towards risk-taking with age, in line with a shift in the perception of peers as being more likely to take risks.

Other studies also point to ambivalent and multifaceted attitudes among pre-drivers. For instance, the Midlands Partnership Group (2006) report much excitement among adolescents about the prospect of car ownership and driving, linked in part to anticipation about its impact on personal popularity, especially, for males, in terms of potential girlfriends (Waylen and McKenna, 2002). When it comes to formulating a personal orientation towards driving, the basic premise for many adolescents is that it is a very attractive pursuit. At the same time, many perceive the behaviour of other drivers as dangerous and unacceptable. In this respect, adolescents appear to be acquiring self-enhancing attitudinal biases that are comparable to those of some adult drivers, namely the belief that 'I am safe and others are dangerous', or 'I am an above-average driver' (Deery and Fildes, 1999; McKenna *et al.*, 1991; Svenson, 1981; Walton, 1999). While it is hard to ascertain from these data how far these different perceptions reside within the same individuals, taken together the evidence is strongly suggestive of

ambivalence borne of the contrast between identities and related attitudes that have collective origins (i.e. which reflect socially desirable identity), and those that derive more directly from actual experience and insight, particularly where this has been more negative in character.

There are also subtype differences among young drivers. Clarke *et al.* (2005) report that young drivers of high performance cars are significantly more likely to take speeding risks. Deery and Fildes (1999) identified two relatively high-risk groups of young drivers, one characterized by high levels of driving-related aggression, competitive speed, sensation seeking and hostility, and another with low levels of emotional adjustment and high levels of depression, resentment and irritability. These subtypes had lower levels of driving skill than other young drivers.

Understanding that driving is associated with risk is much more than a matter of recognizing that 'accidents can happen'. Deery (1999) points out that it entails skills in hazard perception, attention control, managing time allocation across different components of vehicle management, and calibrating the relationship between one's ongoing performance and changing task demands. In each respect, novice drivers tend to be inferior to experienced drivers (Deery, 1999; Harré, 2000). Furthermore, novice drivers may compound risk by selecting an option which is itself risky for any driver (e.g. speeding), but which they are able to handle less skillfully than a more experienced driver; in turn, they may be more prone to overestimate their own skills in coping with the unnecessarily high demands that their risk taking incurs (De Joy, 1992; Harré, 2000). Young drivers tend to underestimate the risk entailed in various driving conditions (Bragg & Finn, 1982; Matthews & Moran, 1986).

Research on the perception of risk has demonstrated that many adults sustain perceptual biases, most notably an optimistic bias whereby they assume that their risk of mishap or injury is lower than it actually is, and a self-enhancement bias, whereby they assume that their skills are superior to average (Deery, 1999; Strecher *et al.*, 2007a). For example, White *et al.* (2004) found that drivers who used their phone while driving felt that they were less likely to have an accident than other drivers committing the same offence. Young drivers appear to be particularly vulnerable to these biases. There is evidence that optimistic bias is stronger in young people, especially young males (Clarke *et al.*, 2005; Harré, 2000). Similarly, self-enhancement bias is found in most age groups, but young drivers are particularly prone (Deery, 1999; McKenna & Horswill, 2006). They tend to overestimate their ability to handle in-vehicle devices such as audio systems, climate control, mobile phones and satellite navigation equipment, and are more likely to be involved in distraction-related accidents (Sarkar & Andreas, 2004; Neyens & Boyle, 2008).

It indicates a lack of integration of affective beliefs about driving among adolescents. Adults experience ambivalence, too, but have had more opportunity to work at integration (Higgins, 1987). In concrete terms, adults have had to reconcile their awareness of the positive and risky features of driving, whereas pre-drivers and novice drivers may have heightened perceptions of both, leading to states of psychological dissonance. At present, these are speculations based on qualitative data and they point to the need for additional quantitative research. However, if confirmed, then this would suggest that personal experiences during this more fluid period of development, and the affective beliefs that derive from them, may serve as a potential lever for influencing future perceptions and behaviour. These contrasting findings point to early adolescence as an important period for the impact of personal experiences and exposure to norms. Young people are still acquiring information and formulating values, and are sensitive to the attitudes of significant others, including peers and parents. Little systematic work has been done on the stability or otherwise of affective beliefs over the pre-driver and novice driving period, and on the factors that precipitate change.

At the same time, it is important to be aware of continuities. There are some indications of enduring patterns, for example, in respect of gender differences in attitudes to risky behaviours (including risky driving) from childhood to early driving. Waylen and McKenna (2002), using primary school, pre-driver and novice driver samples, report consistent tendencies across this age range for males to have more positive attitudes to different kinds of risk, and to exhibit behaviours consistent with these attitudes.

Learning to follow the rules of road safety (including formal safety information, such as the Green Cross Code, the Highway Code) and to respect the roles of key figures (like traffic wardens, police officers) are part of the process of learning how to use the roads that begins in childhood. Relatively little research appears to have been directed to the relationship between learning about these concepts and children's general developmental adjustment to authority. There are some key considerations here. First, children's understanding of rules and morality is a complex process that begins in the pre-school years and develops gradually through childhood into adolescence (Durkin, 1995; Kohlberg, 1969; Turiel, 1983).

There are some important shifts in reasoning on authority during adolescence (Kohlberg, 1969; Turiel, 1983). By this stage, understanding is more elaborate, but still not on a par with adults in many respects. However, the ability to question authority is high. Many adolescents especially boys – tend to resent authority and are hostile to figures such as the police (Ceci *et al.*, 2005). Hence, the relevance of attitudes to road safety is strong. Adolescents may be developmentally prone to rejecting the kinds of rules that are imposed in road environments and to skepticism/dislike of the people who enforce them (police, traffic wardens). This is not to say that all adolescents are irremediably and profoundly hostile to traffic authorities, but to suggest that the developmental processes of this phase place them in a different position to younger children in this respect. Attitudes to the rules governing driving may well be linked to children's broader attitudes towards schools and testing. For example, Christmas (2008) found that some pre-drivers regarded the driving test as part of the 'system' and something to be dealt with as quickly as possible.

In adults, the relationship between attitudes and behaviours is complex and subject to other influences. In pre-drivers, the relationship is complex, subject to other influences, and changeable over time. Of course, during this period attitudes cannot bear directly on driving behaviour, but they may bear on other aspects of road behaviour, and they may contribute part of the context in which young people progress towards driving. Importantly, at present, the evidence on the stability of attitudes and affective beliefs across the pre-driver and novice driver periods is scant and inconclusive. Some degree of continuity seems likely, but it is also probable that the extent of this continuity is dependent on the effects of personality, identity and contextual influences (peers, parents). Some changes come about as part of broader developmental changes in social reasoning (e.g. the tendency to question authority in late childhood and adolescence). We need more research into how the patterns shift over the course of adolescence. The likelihood that there are changes during this period highlights a major opportunity for intervention.

The available research with adult drivers establishes, not surprisingly, that there are individual differences in orientations to risk (Vassallo *et al.*, 2007). Overall, male drivers are more likely to take risks than female drivers, though there are variations within gender, too (Baxter *et al.*, 1990). Older drivers tend to be lower risk takers than younger drivers (Musselwhite, 2006), though, again, there are variations within age group. It is well established that, overall, young drivers take more risks and are disproportionately likely to be involved in accidents (Fergusson *et al.*, 2003; Jonah, 1990). Fergusson *et al.*, with a sample of 907 21-year-old New Zealand drivers, found that over 90% reported having committed some risky driving behaviours during the past three years, the most common being speeding and driving within four hours of having consumed alcohol. Smaller percentages reported very high-risk behaviours such as street racing (11%) and deliberately running through red lights (8.3%).

RISKY DRIVING AND PERCEIVED BENEFITS

Several studies have provided evidence that some individuals do perceive benefits in risky driving (Strecher *et al.*, 2007a). Obvious benefits include arriving at one's destination faster by speeding, the satisfaction of taking revenge on another driver perceived to have transgressed in one's space, or the arousal of handling a vehicle under pressure. Many young drivers, especially young males, are particularly attracted to the thrill of speed (Clarke *et al.*, 2005; Fuller *et al.*, 2008). Perceived benefits may outweigh perceived risks (McKenna & Horswill, 2006). McKenna and Horswill (2006), in adult samples, found that concern about accident involvement was the worst predictor of risky driving. The best predictors out of the factors examined were legal constraints and journey time. Mood and thrill seeking were also good predictors of risk taking behavior.

Moller and Gregerson (2008) surveyed over 4,000 young drivers (18–25 years) about the frequency of their risk taking while driving, their beliefs about the psychosocial functions of driving, and their leisure-time activities. Nine psychosocial functions of driving were assessed: practicality in everyday life; independence; seeing friends easily; status; freedom; becoming an adult; adventure with friends; blowing off steam; and get any place. Each of these was significantly related to a level of self-reported risk-taking behaviour. Among the leisure-time activities, being interested in cars, acting as a chauffeur for friends and driving with friends for fun were associated with higher scores on risk taking.

Risk taking is normative in adolescence (Arnett *et al.*, 2002; Durkin, 1995; Galvan *et al.*, 2007). Most teenagers take some risks in some areas of their lives, and a minority takes many risks (Jessor, 1987). Risks are taken in experimentation with alcohol and other substance use, sexual behaviour, school performance, petty crime and antisocial behaviour, and in aspects of road use, though it is perhaps less clear how genuinely threatening such experimentation actually is.

Few studies are available of specific patterns of road-related risk taking in adolescents, though research in the context of pedestrian, cycling and car passenger injuries would all seem to support the existence of a growing willingness on the part of adolescents to accept or even seek risk. For instance, epidemiological data indicate broad increases in injury rates with age, though there is some country-to-country variation in the precise patterns. In general, peak pedestrian injury rates in developed nations tend to occur between 11 and 16 years (Roberts *et al.*, 1998). This holds for the UK, although with some variation according to gender. Sentinella and Keigan (2004), in an analysis of police fatal accident files, found a peak in pedestrian fatalities at age 12 for boys and at age 14 for girls. However, rates remain elevated throughout early to mid-adolescence.

The picture is similar for cyclist injuries albeit with a sharper gender divide in incidence, with boys accounting for 83% of all child cyclist casualties (Durkin *et al.*, 1999). Car passenger casualties also show a marked increase in the 11–15 age group, relative to younger children, but only where the driver of the vehicle was in the 16–19 age group; for other age groups of driver, the incidence is either stable across passenger age groups, or actually declines with age. The fact that girls account for just over half of car occupant casualties where they are a much smaller fraction of pedestrian and cycling casualties suggests a particular pattern of involvement on the part of girls being driven by slightly older teenage boyfriends, and being implicitly prepared to accept the risk that this presents.

This apparent pattern of accelerating preparedness to accept and take risks during adolescence is borne out by more detailed psychological research, raising a worrying prospect of declining risk aversion just at the point of first learning to drive. Tolmie *et al.* (2006), for instance, found significant shifts between 12 and 15 years towards more positive attitudes to risky pedestrian behaviours and more negative attitudes to cautious pedestrian behaviours. This appeared to reflect a normalization of risk taking, since these shifts were associated with perceived increases in peer risk-taking over the same age range. The trend was also stronger among boys, and corresponded to self-report of a greater incidence of pedestrian injuries.

However, both the casualty data and the psychological evidence need to be interpreted with care. With regard to the former, for example, the increase in pedestrian injuries is accompanied by an increase in exposure, both in terms of time and number of roads crossed. When this is taken into account, the accident risk per unit of exposure actually declines with age in boys – though it does increase for girls (Bly *et al.*, 1999). If boys in particular are taking more risks as they go through adolescence, then the implication might be that they are also getting better at judging when it might be safer, relatively speaking, to do so.

The extent to which they really are taking more risks is also questionable, though; the change in attitude patterns reported by Tolmie *et al.* (2006) was modest, and was far outstripped by a perceived increase in risk taking on the part of peers. Since any respondent was likely to have been part of the set of peers referred to by other respondents, it would seem that the shifts in risk taking are more perceived than actual, though this, in itself, may create some pressure in favour of risk. Elliott (2004) points to a similar conclusion.

The pattern of gender differences might also be less significant than it appears to be. Tolmie *et al.* (2006) found that, while adolescent males displayed riskier attitudes, intentions and behaviour than females, the influences leading to elevated risk were identical for boys and girls. Thus, the apparent differences may reflect nothing more than lags in exposure to these influences – and to roads themselves, hence girls' increased accident risk per unit of exposure as they grow older. More research is needed here, but there are grounds for thinking that adolescent girls and boys are simply at different points in the same developmental sequence. The net conclusion from the pedestrian research – there is a dearth of comparable research relating to influences on risk taking as a cyclist or car passenger – is therefore that the increase in risk propensity during adolescence may be relatively small overall, and that individual variations may be a more significant concern. Even here, it is unclear how far risk-taking behaviour is actually stable and consistent across contexts, though there are some data to suggest that patterns among novice drivers are in line with the trends noted above for pedestrians.

Bina *et al.* (2006) found among a sample of 645 Italian adolescents aged 14 to 17 that have some similarities to Fergusson *et al.*'s (2003) data for 21-year-old New Zealand drivers, above. Fergusson *et al.* found that over 90% of young adults reported having committed some risky driving behaviours during the past three years. Bina *et al.* (2006), found that some 84% of their teenage sample reported at least one violation of the penal and highway code within the preceding two months. These teenagers were too young to obtain driving licences, but most rode mopeds or motorcycles, and a fifth of these had driven cars without a licence. By at least adolescence, young people are aware that there are risks associated with driving and they appreciate that traffic injuries are a leading cause of death among the young (Harré *et al.*, 2000; Ramos *et al.*, 2008). Nevertheless, despite some cognitive awareness of risk and its consequences, adolescents remain vulnerable to compensatory errors.

Because these phenomena involve cognitive competencies, and cognitive ability is still developing through childhood and adolescence, it is of interest to consider how optimistic and self-enhancement biases develop in pre-drivers and whether they might be appropriate targets for intervention in pre-driver education. In fact, however, the evidence is somewhat mixed (Harré, 2000). Some researchers have found no evidence of differences between adolescents and adults in estimations of personal vulnerability in risky situations (Furby & Beyth Marom, 1992). In one study, adolescents (mean age 15.2 years, range 13 to 18 years) showed unrealistic optimism in respect of being hurt in a car accident, but their parents showed significantly greater unrealistic optimism on this item (Cohn *et al.*, 1995). Christmas (2008) makes the interesting point that pre-drivers are often exposed to commentaries (e.g. their parents') in which the driver implies his or her own superiority over other road users (commenting on their poor skills and bad behaviour), and this everyday process may feed into pre-drivers' inferences about how a safe driver behaves; even if the role model is in fact somewhat less than an ideal driver.

Impaired driving carries serious consequences for the driver and innocent victims. If a driver is impaired and causes a crash, whether it results in a death or not, the effects can change or ruin lives forever. It could also mean life in prison for the impaired driver. Impaired driving involves being behind the wheel of a vehicle after consuming alcohol, illegal drugs, and even over-the-counter cold medication to the point where it can impair your driving abilities. This is considered a criminal offence. Consequences for this act can include loss of driver's license, being fined or time in prison.

CONCLUSION

Knowing the rules of the road and understanding the rights and responsibilities of other road users is an important part of road safety awareness. Crashes can and do occur. We can significantly reduce the risk by following the basic road safety principles. For example defensive driving can be a way for drivers to avoid accidents. Everyone can benefit from knowing and using defensive driving practices. Defensive driving means you are thinking in advance about any possible problems that could happen while you are driving and are prepared to respond quickly. There are also increased safety risks due to driver distractions. Activities such as talking on a cell-phone or using other electronic devices are associated with the greatest distraction-related crash risks. Knowing traffic laws and rules helps to keep the road safe for drivers and pedestrians. Ignoring these laws and rules can result in expensive traffic fines or, for serious offences, removal of your licence. Dangerous or negligent driving that result in someone being injured or killed can lead to a criminal conviction and prison. The current methods of driver training which mostly focuses on inculcating the skills should be further improved by incorporating the knowledge needed to promote safety and the attitude needed to use the roads responsibly.

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