Important Aspects of Human Behavior in Road Traffic Accidents

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Abstract

Worldwide road traffic accidents have been increasing. Human behaviors and environmental factors are often responsible for such events. This being a serious public health concern, public health interventions are needed to minimize the rate of road traffic accidents. We aimed to identify broader human behaviors, sociodemographic factors, and environmental factors associated with the risk of road traffic accidents. We searched for the relevant studies in electronic database including PubMed, Cochrane, Web of Science, Google Scholar, and World Health Organization global health library. In addition, a manual search was also performed. Findings from scientific literature were presented in a summative form. Young age, male gender, speed, influence of substance, use of mobile phone, driving experience, temperament, attitude, aggression, stress, anxiety, emotionality, fatigue, lack of sleep, and road conditions were found closely associated with a risk of road traffic accidents. Despite having substantial driving training and ability to handling motor vehicles, professional drivers such as bus and taxi drivers are very vulnerable to road traffic accidents. This study reports that the increasing prevalence of road traffic accidents can be addressed significantly by applying behavior change theories. The health belief model was found useful in promoting safer driving.

Keywords
- road traffic accidents
- human behavior
- public health

Introduction

Effective solutions to road traffic accidents require input from the fields of both engineering sciences and behavioral sciences. However, behavioral scientists encounter several methodological barriers in researching this crucial area of public health. Factors including lack of control for driver exposure and driver experience, difficulties in observing actual driving behavior, and the problems associated with recording and analyzing accident and violation rates possess limitations in researching behavioral dimensions of road safety and accidents.[1] Insights into road safety behavior are critical in preventing and mitigating the morbidity and mortality associated with road traffic accidents.[2] In this backdrop, the purpose of this article is to describe the role of behavior change in injury prevention and illustrate how the application of selected behavior change theories to injury problems, within the context of a health promotion framework, can contribute to the enhancement of injury prevention programs.[3]

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Behavior Change and Road Safety

Behavior change is often associated with complex social, political, and economic dimensions. This is evident from smoking, diet, alcohol consumption, physical inactivity, and other health-related behaviors. However, unlike behavior change entailed in health-related behaviors, road safety behavior often does not entail such complex social, political, and economic dimensions that may prevent people to change their behavior to more healthy ways of living.[2] For example, changes in smoking, dietary changes, alcohol consumption, and physical activity are processes and practices embedded in social life, not one-off events triggered by information or prevented by remedying information deficits. Neither are these processes a consequence of people applying a rational calculus to their own actions.[2] Changing road safety behaviors is therefore an attractive policy approach. Research into the psychological aspects of driving behavior is essential to an overall approach to road safety issues. However, the problems of conducting such research are not easily addressed. Controlling for the effects of experience and exposure within studies of the general population is rather difficult,[4] and the analysis of actual driving behavior and accidents is also fraught with problems. One way of attempting to compensate for these problems is to limit the scope of research to groups of road users that allow for a more careful study of psychological factors. Examples of this approach that have been successful include the study of long-distance truck drivers[5] and taxi drivers. Research into taxi drivers is not just valuable because of its possible usefulness to general road safety research but it is also valuable in its own right. Taxi drivers play a crucial role in the social and economic functions of modern society. Their contribution to the day-to-day operation of the business world and tourism is of considerable significance, as is their general social function as a mean of transport for those who are unable to use other modes of public or private transport. In terms of general road safety, the use of taxis is a key alternative to drink-driving, and hence taxis provide a service of potentially great indirect benefit to overall road safety.[1] Many studies have shown that human behavioral factors collectively represent the main cause of road traffic crashes, and their remedial measures can go a long way to help prevent road traffic injuries (RTIs).[6-11] A growing body of work is emerging that demonstrates the positive impact of using behavioral science approaches to both understand and reduce injury risk behaviors.[12-16]

Epidemiology of Road Traffic Accidents

Numerous epidemiological studies have demonstrated that human behavior accounts for more than 85% of road accidents.[17-19] The World Health Organization report attributes 71% of road accidents to human factors.[20] Application of behavior change theories can significantly reduce the rate of road accidents and resultant injuries.[21]

Common Risks of Road Accidents

Speed

Speed is the most common factor that leads to accidents. The literature indicates that both human and environmental factors can affect the speed of the motor vehicle. Among human factors, age, gender, alcohol consumption and its level, and number of passengers in a vehicle are often found responsible. While motor vehicle condition, its power, its speed, road layout, surface quality, traffic density, allowed speed, time of the day, and weather conditions significantly affect speed.[22] Influence of substance: approximately 20% road accidents in high-income countries and 33 to 69% in low-income countries take place under the influence of alcohol.[23] However, studies from Norwegian demonstrate that the professional drivers who also drive under the influence of alcohol have a lower rate of accidents than the nonprofessional drivers.[24]

Fatigue

Fatigue is an important risk factor that has been found to be associated with road accidents. Young drivers in the age range of 16 to 29 years, males, shift workers, people with sleep apnea, drivers who had less than 5 hours of sleep, and drivers who drive between 2:00 a.m. to 5:00 a.m. were found to be more affected with fatigue.[22] Professional drivers who work on a tight schedule were found at a higher risk of having fatigue.[22] Research suggests that drivers experience same influence on their driving with fatigue impairment, as they would do with alcohol consumption.[25]

Handheld Mobile Telephone

Numerous studies have shown that the use of mobile phone leads to a bigger distraction in driving. Across the world, a high number of accidents had been attributed to this risky behavior.[22]

Sociodemographic Factors Affecting Behavior

Age and Gender

Age and male gender have been found significantly associated with risky behaviors. Studies conducted in low- as well as high-income countries have found that younger people compared with older age group, and males engage in high-risk driving behaviors.[26] In those studies, it was observed that male drivers compete with other drivers, ignore signal lights, do not fasten the seat belt, and overtake at a higher rate than their female counterparts and take longer time to return in the proper lane.[27,28] Males also violate rules more than females and encounter higher numbers of fatal accidents due to poor compliance with traffic rules.[27,28] Association between gender, age, time of driving in the day, and road conditions were also observed in several international studies, and it was found that female are much safer drivers in all road conditions (wet/dry, straight/curbed, rural/urban) and time of day (day/night). Females become much

safer drivers at a much higher rate than their male counterparts as they get older.[29,30] Females were also found keeping a safer distance between other vehicles on the road, whereas male drivers are much prone to drive in close proximity to other vehicles.[31] Males between 31 and 40 years of age were found to be more traffic rules violators than any other age and gender group.[32]

Behavior of Professional Drivers

This section talks about the behavior of professional drivers, mainly bus and taxi drivers. The experience of driving makes these professionals more comfortable in driving in all situations. Once professional drivers start seeing themselves as expert drivers, the risk-taking behavior also increases among them. They are more likely to use mobile phone for communication and engage in other tasks such as setting the radio station and so on, which leads to a huge distraction in their driving.[33] Mainly high workload, fatigue, sleep deprivation, stress, and dual tasking while operating the vehicle causes road accidents in professional drivers.[34,35] Professional drivers have shown poor intention of wearing a seat belt and have been found driving in fatigue and under the influence of alcohol in middle- and low-income countries.[36,37] It is well understood in the existing literature that when drivers perceive a higher level of self-control, their behavioral intentions, motivation, and priorities for safety rules get influenced negatively.[38] Professional drivers are more exposed to traffic hazards as they spent more time in driving than nonprofessionals and get desensitized with the hazards and undermine risks.[36,39] Professional drivers who undergo a training receive a different level of driving license, social image of an expert driver, low level of driving anxiety, and more driving experience. All these factors put in their minds that they are more skilled drivers. This negative confidence brings vulnerability in their behaviors, which indirectly promotes risk-taking behaviors.[40-42]

Bus Drivers

In addition to experiencing the same environmental traffic conditions, bus drivers carry additional constraints that are imposed by the vehicle characteristics, concern for passengers and their comfort/safety, and reaching on the scheduled time. Bus driving has been classified as a highly stressful occupation. Often, the associated physical and psychological factors result in poor driving performance.[43] People perceive that a higher level of control and their behavioral intentions, motivation, and priorities regarding safety could be influenced in a safety-reducing direction.[38] Personality trait, especially attitude of the driver, has been found highly responsible for risky driving, failure to follow traffic rules, and number of road accidents in studies conducted in several countries.[43-45]

Taxi Drivers

Compared with bus driving, taxi driving has been seen to be a strenuous occupation. However, research findings have shown that taxi drivers face a significantly higher risk of crime that impacts their driving negatively. Taxi driving is based on an intermittent reward system, that is, their earning is not fixed like bus drivers, and therefore they have even greater pressure of working long hours and in unfavorably difficult situations. Compared with bus drivers, taxi drivers develop communicable, noncommunicable, and chronic diseases at a much faster rate and in a higher magnitude due to frequent contact with passengers from all walks.[46] Unhealthy lifestyle is much common among taxi drivers, which makes them prone to obesity, heart disease, type 2 diabetes, and even HIV/AIDs infection.[46,47]

Other Factors

Reckless and Fun Ride

Some drivers look for gratification, adventure, joy, and pride in their driving. Mainly, these drivers are not professional; they lack adequate training and engage in high risk-taking behavior. Alcohol consumption is also very prevalent among this group, which, on the one side, impairs their judgment and concentration, and on the other side, elevates their mood, making them more vulnerable to fatal accidents.[48,49]

Experience

Experienced drivers gain better driving skills, attitude, and behavior, whereas drivers who lack driving experience are more susceptible to making mistakes.[24]

Personality Traits

Personality traits including risk propensity, sensation-seeking, conscientiousness, openness to experience, emotional stability, extraversion, and agreeableness exert influence on drivers' driving attitude and behavior while driving.[50]

Emotions: Anger and Anxiety

Emotions, mainly anger and anxiety, have also found to be significantly associated with a higher chance of traffic accidents. Often, drivers charged with emotions find difficulty in concentrating on their driving and they become victims of making mistake.[51,52]

Need for Behavior Change

Evidences strongly suggest that road traffic accidents can be greatly minimized by bringing about changes in human behaviors and the associated psychological and structural factors. Multiple behavior change theories have been successfully implied in various driving-related risky health behaviors across the world. The health belief model has been found to be more appropriate in addressing human behaviors and educating drivers for the risk as well as prevention.[53,54] In addition, environmental changes are also needed to address the high rate of road accidents.

Conclusion

Road traffic accidents are rapidly increasing in low- and middle-income countries; however, public health interventions

and related research are very minimal in these countries. Behavior health theories have been applied in more advanced nations, but application of such behavior interventions is minimal in low- and middle-income nations. This study provides a brief idea of factors that contribute to road traffic accidents, including differences between professional and nonprofessional drivers, association with sociodemographic factors, and vulnerable population. This information can be used to guide appropriate behavior change theory and plan to promote safer driving and prevent road traffic accidents.

Conflict of Interest
None declared.

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