

Trend towards Helmet Usage

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Contributor: Malik Muneeb Abid, Shehar Bano, Ashok Kumar, Muhammad Iqbal, Muhammad Laiq Ur Rahman Shahid, Ahsan Javed, Muhammad Atiq Ur Rehman Tariq

It has been observed that cyclists wearing helmets may follow zigzag patterns while wearing helmets, which may cause accidents. Moreover, it has been observed that cyclists wearing helmets may be more responsible regarding traffic rules. These problems should be considered in creating effective traffic safety campaigns and policy making.

Keywords: risk compensation theory ; helmet safety ; helmet use behavior

1. Introduction

Keeping in mind the broad significance of mass transportation as a basic part of our everyday life, road safety plays an important role in a community's wellbeing. Traffic accidents represent a significant concern regarding public health ^[1]. For example, every year, more than about 1.4 million people expire as a result of accidents worldwide, meaning road accidents are a prime cause of fatalities on a worldwide scale ^[2]. Moreover, modes of transportation are constantly changing. These days, various alternative modes of mass transportation allow us to rethink the importance of road safety as only a vehicular or infrastructural problem. They are forcing us to enhance our understanding of the very origin of accidents and related mediations based on the study of human experiences, making it a goal to prevent the negative consequences of the poor safety of road users. According to research, motorcyclists have the highest disability rate among all other road users ^[3].

In Pakistan, motorcycles comprise 75% of registered vehicles ^[4]. Pakistan takes the same position as that of the global trend towards helmet wearing. According to studies that were carried out in medium- and low-income countries, it was found that 50% of the accidents related to motorcycle accidents are fatal ^[5]. This study also shows that wearing a helmet can reduce fatal head injuries by at least 4% ^[6]. Despite the proven benefits and necessary legislation, improper helmet usage is common in under-developed countries ^{[6][7]}. Furthermore, a brief analysis of the literature shows that the usage of helmets in Karachi lags (about 7%) behind that of other bordering countries ^[8]. Helmet use was reported to be almost 70% in most cities in India ^[9] and approximately 90% in China ^[10].

Various studies ^{[11][12][13][14][15]} have sought to understand the different types of driver behavior in which a road user engages and the frequency of engagement. Different techniques, i.e., naturalistic studies, observations, and questionnaires, have been applied to collect the data. Many studies have adopted the Driver Behavior Questionnaire (DBQ) ^{[16][17][18]}. Typically, the DBQ measures two categories of behavior related to errors (unintentional mistakes) and violations (deliberate behavior) ^[19]. Unique psychological origins are associated with the reasons for a driver's behavior, which are the prime concern of research and need to be addressed by the motivations provided by policymakers. In the same vein, a cycling behavior questionnaire was developed by Useche et al. ^[20], identifying and validating the key dimensions of violations and errors that describe risky bicycle riding behavior. Further, Useche et al. ^[21] associated an increase in crashes with risky riding behavior ^[22]. A subsequent study ^[23] explored the positive behaviors of riders while riding bicycles. Moreover, it was shown that engagement in positive and risky behavior is influenced by a rider's awareness of traffic rules, knowledge of traffic norms, and attitude toward risk perception, which was gauged by the Cyclist Risk Perception and Regulation Scale (RPRS) ^[24].

2. Trend towards Helmet Usage

Approximately millions of people die all over the world each year due to road accidents, and many of them are badly injured, which is a burden on government GDP ^[25]. The highest level of motorcyclist fatalities being in Southeast Asian countries is due to their high use of motorcycles; approximately 59%, 78%, 83%, and 95% of people in Southeast Asian countries use motorcycles in Thailand, Laos, Indonesia, and Vietnam, respectively ^[9]. A study that was conducted to check the riding behavior of school children in Yamuna Nagar, India found that young riders that are under 18 show more aggressive behavior while riding ^[26]. A survey conducted in Hanoi, Vietnam on the risky riding behavior of motorcycle

riders showed that risky behavior, such as speeding, running red lights, turning carelessly, and using mobile phones, depended upon individual habits and intentions [27]. A questionnaire study was conducted in Indonesia to assess traffic rule violations among motorcyclists; they found that most young adults use mobile phones while riding and violate traffic regulations [28].

For motorcycle riders, wearing a helmet leads to riskier behavior, which is against the safety afforded by the helmet [29]. There is much research about the risk-taking behaviors of motorcyclists, which aims to find out why motorcyclists take risks while riding [30][31]. There was research conducted in a city in Vietnam to find out about how many motorcyclists use mobile phones and take part in other risky riding behaviors, such as running red lights, overtaking on the left, riding on sidewalks, and searching information on their mobile phone while riding. An online survey was conducted in a Vietnam university to find out the percentage of students who use mobile phones while riding and take part in other risky riding behaviors. For their data analysis, they used a discrete regression analysis of the percentage of students who used mobile phones while riding and showed other risky behaviors, such as speeding, not using a helmet, violating traffic regulations, and overtaking recklessly. They found that approximately 74% of students used mobile phones while riding for calling and 49% and 51.2% used mobile phones for messaging and searching information, respectively [32].

Research was conducted in three cities in Vietnam to find out why motorcyclists showed risky behavior while riding. They found that unhealthy habits were a cause of risky riding behavior among motorcyclists. Unhealthy habits included smoking, drinking, and other risky behaviors among motorcyclists. For data collection, they used online surveys and field survey methods. They selected three cities in Vietnam for data collection, including Hanoi, Ho Chi Minh City, and Da Nang during the summer of 2018. First, they designed a Google form for online data collection and conducted paper-based surveys at different locations in these cities. They used SPSS statistics2 for their data analysis. They used a logistic regression analysis for their data analysis to find out that an unhealthy lifestyle was a cause of risky riding behavior among motorcyclists. The results showed that unhealthy habits, such as smoking, led to several risky riding behaviors. They found that the riders who were smokers and alcohol users showed more risky riding behaviors while riding a motorcycle than did the riders who were non-smokers and non-alcohol users [33]. In summary, helmet usage behavior has been studied in several studies, but it needs to be explored further in terms of the behavior changes observed while wearing a helmet [34].

Helmet use is considered to be beneficial for minimizing the intensity of accidents [35] and avoiding most of the fatalities of motorcyclists while riding, which is the reason behind the formation of legislation that exists in all countries across the globe. But practically, the scenario related to helmet wearing is complex, mainly in developing countries across the globe [36][37]. Therefore, Researchers target one of the developing cities in Pakistan to study and investigate the helmet-wearing behavior of motorcycle riders in the city of Sargodha, Pakistan. Researchers attempt to determine the significant factors that essentially change helmet behavior and propose some important effective campaign measures to implement to promote trends in helmet use.

The intended effects of road safety measures might be detracted from by behavior adoptions by riders. This phenomenon has been demonstrated by several road safety measures at an individual and aggregated accident risk level. This research tries to cluster the literature concerned with offsetting behavior in road safety.

Risk compensation theory in traffic encompasses the road system changes that are perceived as capable of improving safety by adapting behavior [38]. Thus, in this way, measures designed to improve traffic safety may have some negative consequences in terms of risky riding, and measures designed to improve traffic safety may have some negative consequences in terms of risky riding when feeling safer [39]. The term closely related to risk compensation is behavior adoption, which may be positive or negative changes induced by road safety measures [40].

The road safety literature is full of claims for the efficacy of a wide range of traffic safety measures. Risk compensation is a widely raised issue when promoting helmet use for motorbikes. Briefly, risk compensation theory suggests that an individual provided with protective measures, such as a helmet, will act in a riskier way because they have a sense of increased protection, thereby nullifying the protection afforded by the helmet. Risk compensation theory is not only applicable to case studies; rather, its potential applicability includes the widespread use of helmets.

Helmet usage is a critical issue all around the world. Without a rule, habitual helmet use is scarce. In 2015, in Germany, only 15% of cyclists were reported to use a helmet [41]; previously, it was less than this [42][43][44] although it is a known fact pointed out unambiguously by available research that cycling helmets can reduce crash severity [45][46][47]. In particular, they can reduce the risk of head injury [48]. Data from the United States revealed that the number of severe head injuries and fatalities decreased after a mandatory helmet usage law was introduced in Seattle [49]. Nevertheless, legislation

regarding the mandatory use of helmets is highly controversial because of the associated side effects. It has been argued that legislation might impact cycling frequency ^[50]. In a frequently cited (although heavily criticized ^[51]) study, Walker ^[52] found that drivers might modify their passing distance dependent on a cyclist's usage of a helmet, passing closer to those who wore helmets.

It has also been argued that cyclists wearing helmets might adopt behavior based on perceiving risk differently in a given situation; thus, as per risk compensation theory, a risk would be perceived as being reduced because of the cyclist wearing a helmet ^{[53][54]}. Consequently, cyclists wearing helmets, for instance, cycle faster, objectively increasing their risk of being involved in a crash ^[55]. However, evidence for this argument is harder to find. An experiment with 1500 cyclists conducted in Norway revealed that an intention/expectation of riding fast is the reason for helmet use, and not the other way around ^[56]. In addition, it was observed that participants were aware of the increased risk attached to fast cycling, and self-reporting provided no evidence about the relationship between crash involvement and helmet use. Similarly, experimental studies have so far failed to provide evidence for cyclist risk compensation ^[57]. The results showed that routine helmet users cycled slower when not wearing a helmet compared to the condition in which they wore a helmet (i.e., they slowed down when their usual protection was removed). However, there was no comparable effect for non-helmet users (i.e., they did not increase their speed once they wore a helmet).

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