Transportation Research Part F 54 (2018) 248–263

Contents lists available at ScienceDirect

Transportation Research Part F

journal homepage: www.elsevier.com/locate/trf

Intention to use bicycle helmet as explained by the Health Belief Model, comparative optimism and risk perception in an Iranian sample

Mohsen Fallah Zavareh [a,*], Amin Mohamadi Hezaveh [b], Trond Nordfjærn [c]

[a] Department of Civil Engineering, Faculty of Engineering, Kharazmi University, Tehran, Iran
[b] Civil and Environmental Engineering, University of Tennessee, Knoxville, TN, United States
[c] Norwegian University of Science and Technology (NTNU), Department of Psychology, Trondheim, Norway

ARTICLE INFO

Article history:
Received 4 December 2016
Received in revised form 21 October 2017
Accepted 3 February 2018

Keywords:
Bicycle helmet
Intention
Health belief model
Risk perception
Comparative optimism

ABSTRACT

The present study was set out to identify variables which predict intention to use helmet among bicyclists. The theoretical framework was based on the Health Belief Model (HBM) integrated with risk perception and comparative optimism, as relevant constructs from the risk theories. The results were based on an internet survey carried out among bicyclists (n = 256). A second-order SEM revealed that while controlling for gender, age and cycling experience, risk perception ($\beta = .113$, $p < .05$) fully mediated the effect of comparative optimism ($\beta = -.201$, $p < .05$) on intention to use a helmet. Perceived exemption from harm ($\beta = -.340$, $p < .05$) and perceived barriers ($\beta = -.507$, $p < .001$) were also found to be significant predictors of intention to use a bicycle helmet. The hypothesized model explained 55.8 percent of the variance within the intention to use a bicycle helmet. Theoretical implications of these findings are discussed.

1. Introduction

Cycling is considered as a health promoting non-motorized mode of transport, consistent with the goals and policies of sustainable transport use. Bicyclists are, however, a vulnerable group in terms of crash risk. According to the World Health Organization (WHO) statistics, four percent of the total global road traffic fatalities include bicyclists (WHO, 2015). However, bicyclists' exposure to traffic is relatively lower than the motorists. In most European countries, for instance, the average cycling trip is only three kilometers long (ERSO, 2015).

Research shows that the proportion of cycling fatalities and injuries from the total road traffic victims is larger than the proportion of annual cycling from the total trips. For instance, based on an international review of the frequencies of bicyclists' casualties in different countries, while cycling accounts for a share of 31, 19, 17, 2 and 1 percent in modal split in the Netherlands, Denmark, Sweden, Canada and Australia; the share of victims in single-bicycle crashes from the total road traffic injuries are 41, 33, 23, 15 and 9 percent, respectively (Schepers et al., 2015). These figures tend to be relatively higher, if one estimates the share of victims in all bicycle crashes from the total road injuries. Therefore, the World Health Organization requires promotion of safe cycling for achieving the goals described in the Decade of Action for Road Safety (2011–2020) in reducing road traffic deaths and injuries (WHO, 2015).

* Corresponding author.
E-mail address: m.fallah@khu.ac.ir (M. Fallah Zavareh).

https://doi.org/10.1016/j.trf.2018.02.003
1369-8478/

The majority of traumatic brain injuries are due to road crashes (Wolfe, Pederson, Hotchkiss, Kozin, & Cohen, 2010). Head and brain injuries are highly frequent among bicyclists (Boström & Nilsson, 2001) and such injuries are considered as major causes of mortality and morbidity among them (Airaksinen, Lüthje, & Nurmi-Lüthje, 2010; Kaushik, Krisch, Schroeder, Flick, & Nemergut, 2015; Munivenkatappa et al., 2013; Noakes, 1995). Leijdesdorff et al. (2014) revealed that out of the 1250 road traffic casualties with severe traumatic brain injuries admitted to hospitals in the Trauma Center West-Netherlands from 2003 to 2011, the majority (51.3%) were bicyclists. This share was comparatively lower for other road users such as pedestrians (12.3%), motorists (12.5%), and moped riders (21.4%). Currently, it is well-established that bicycle helmet use could reduce not only serious head injuries among bicyclists (Amoros, Chiron, Martin, Thélot, & Laumon, 2012; Sethi et al., 2015; Thompson & Fred Rivara, 1999), but also brain injuries, facial injuries and fatal injuries (Attewell, Glase, & McFadden, 2001). Based on a systematic review and a meta-analysis of 40 studies including 64,000 injured bicyclists, Olivier and Creighton (2016) estimated the odds of reduction in head injuries, serious head injuries, fatal head injuries and face injuries due to bicycle helmet use to be 51%, 69%, 65% and 33%, respectively. Alternatively, using reconstruction methods Fahlstedt, Halldin, and Kleiven (2016) estimated that bicycle helmet use caused up to 43% reduction in tissue strain, which is associated with up to 54% reduction in risk of concussion. They also estimated that the bicycle helmet could reduce the risk of skull bone fracture by up to 98%.

Despite the evidence of the effectiveness of using a bicycle helmet, a relatively large proportion of bicyclists are still reluctant to use this safety gear (Joseph et al., 2016). Even though non-use of bicycle helmet is common both in high income as well as low and middle income countries, non-use is more common in the latter countries due to the lack of legislations and enforcement (Secginli, Cosansu, & Nahcivan, 2014).

Literature reviews indicate the effectiveness of compulsory bicycle helmet legislation on helmet use (Karkhaneh, Kalenga, Hagel, & Rowe, 2006) and head injury hospitalization (Karkhaneh, Rowe, Duncan Saunders, Voaklander, & Hagel, 2013). Based on a systematic review, Karkhaneh et al. (2006) concluded that the effect of bicycle helmet legislation on change in bicycle helmet use could vary widely from modest (37% increase) to massive (91% increase). They showed that the change is stronger where the initial helmet wearing rate in the pre-legislation period was lower. The authors, however, argued that the effects could also be due to change in other factors such as socio-economics, social motivations and enforcement level.

It is, however, discussable whether mandatory legislation and enforcement alone could be sufficient to change the road user behaviour. First, the influence of mandatory legislation on road users' behaviour is shown to be directly related to the intensity of enforcement. For instance, the effects of road safety legislations tend to disappear if the enforcement system is not effectively in place (Rousseau & Blondiau, 2013; SafetyNet, 2009). For example, if camera surveillance was stopped, effects of speed enforcement was demonstrated to disappear immediately in a short time (SWOV, 2011).

Moreover, it is arguable that behavioural changes due to enforcement might fade away and devaluate, if the change does not correspond to the social motivations (Rocakova-Filemon & Allan Quimby, 2008). This suggests that legislation and enforcement activities are not sufficient to promote bicycle helmet use and to deliver sustainable safety results, if complimentary promoting activities are not combined with mandatory legislation and enforcement. Therefore, it is prudent to investigate the underlying social psychological precursors that lead to bicyclists' helmet use behaviour.

The role of personal motivation has been underlined as an important predictor of health-related behaviour in the literature. Intention has been recognized as an important construct that reflects personal motivation in theories of social cognition and health behavioural models (Ajzen, 2006). Reviewing the precursors of different health-related behaviour, Godin and Kok (1996) reported that the average correlation coefficient between intention and behaviour ranged from 0.35 to 0.56; suggesting that a moderate amount of variability in health-related behaviour could be explained by behavioural intention. A similar proportion of explained variance in behaviour was reported by Armitage and Conner (2001). A meta-analysis also revealed that one third of the variance in behaviour could be explained by behavioural intention (Sheeran, 2002).

Previous research indicates the efficacy of behavioural intention to explain bicycle helmet wearing behaviour (Ali et al., 2011a,2011b; O'Callaghan & Nausbaum, 2006; Quine, Rutter, & Arnold, 1998). By an intervention study based on the Theory of Planned Behaviour, Quine, Rutter, and Arnold (2001) argued that change in behavioural and normative beliefs as well as perceived behavioural control could change intention to wear a bicycle helmet. However, meta-analysis of intervention studies that assess behavioural change due to change in intention showed that a large manipulation of intention due to interventions may lead to only a low to moderate behavioural effect (Webb & Sheeran, 2006).

Several theoretical models attempt to explain the adoption of health-protective behaviour. The cognitive perspective assumes that attitudes, beliefs and expectations of future outcomes contribute to health-related behaviour (Munro, Lewin, Swart, & Volmink, 2007). Some theories developed within this approach (e.g. the Health Belief Model (HBM), the protection motivation theory (PMT), and the social cognitive theory (SCT)) share the common idea that protection motivation is a result of perceived risk and desire to avoid the potential negative outcome, as well as the perceived costs and benefits of taking precautionary action (Floyd, Prentice-Dunn, & Rogers, 2000). In contrast, theory of reasoned action (TRA), theory of planned behaviour (TPB) and the subjective expected utility (SEU) assume that individual assessment of response efficacy (belief that the protective action is effective) cannot be determined directly (Floyd et al., 2000).

The Health Belief Model (HBM) is one of the most widely used theoretical cognitive frameworks in explaining a wide range of health-protective behaviours or behavioural intentions. Using HBM is less cumbersome than the PMT and SCT, as the HBM simply organizes a catalog of variables contributing to protection motivation (Floyd et al., 2000). On the other hand the SCT is usually argued to be complicated to operationalize because of an extensive focus and hence, only segments of the theory are usually deployed (Munro et al., 2007). Since HBM is a simple model, and since it reflects the perceived