



Discrepancy in bicycle helmet use among college students between two bicycle use purposes: Commuting and recreation

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ABSTRACT

Objectives: The purpose of the study was to examine associations between bicycle helmet use and attitudes among U.S. college students. Bicycle helmet use was assessed for two different bicycle use purposes: commuting to school and recreation.

Materials and methods: Student bicycle riders were recruited on the campus of a large public university in Colorado. Questionnaire development was guided by the Theory of Reasoned Action and Health Belief Model. Bicycle use and helmet use for the two purposes, attitudes toward helmet use and bicycle helmet regulations on campus, perceived risk of bicycle-related injury, subjective norms were asked. Bicycle helmet use was defined by current behaviors and intentions for the future, based on the Stages of Change model.

Results: A total of 192 questionnaires collected from students who rode bicycles for both commuting and recreation was used for the analysis. Bicycle helmet use differed depending on purposes of bicycle riding: 9.4% of bicycle riders wore bicycle helmets every time for commuting, while 36.5% did so for recreation. Different variables were associated with bicycle helmet use for commuting and recreation in logistic regression models, suggesting that psychosocial structures behind bicycle helmet use behaviors might differ between two bicycle use purposes, commuting and recreation.

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1. Background

Traditional college student age groups in the U.S. are frequent bicycle riders (Rodgers, 1995, 2000) and susceptible to bicycle-related traumatic brain injuries (TBIs) (Sacks et al., 1991). Between 1984 and 1988, 1204 youth aged 15–24 years were killed in bicycle-related injuries and 65.3% of the deaths were due to head injuries (Sacks et al., 1991). Annual bicycle-related mortality among bicycle riders aged 16 years and older has remained stable around 500 since the mid-1980s, while deaths among younger bicycle riders declined from over 400 during the 1980s to 300 in the 1990s (Pucher et al., 1999). Nevertheless, young adult age groups were less likely to wear bicycle helmets (Rodgers, 1995, 2000). In a 1998 national survey, 21.8% of youth aged 16–24 years reported they wore

bicycle helmets more than half the time they rode, while 68.8% of younger children and about half of older adult groups did so (Rodgers, 2000). Reported bicycle helmet use rates among U.S. college students ranged from a low of 5.0% to a high of 26.7% (Patrick et al., 1997; Weiss, 1996; Fullerton and Becker, 1991; Joly et al., 2000; Page et al., 1996; Coron and McLaughlin, 1996; Everett et al., 1996; Ludwig et al., 2005). Based on the significance of bicycle-related TBI among young adult bicycle riders and the importance of increasing bicycle helmet use by the group, more research and interventions targeting college students are needed.

The purpose of the study was to examine bicycle helmet use among college students at a university located in Fort Collins (population: 131,000 in 2007), Colorado. Bicycle riding is popular as a commuting mode and also as a leisure activity in the city. The city was identified as a bicycle-friendly community based on efforts to increase bicycle use (League of American Bicyclists, 2003). However, the city does not have a bicycle helmet law/ordinance. The study addressed the use of bicycle helmets when commuting to university campus and when riding for recreation, because bicycle helmet use may vary depending on bicycle use purposes (Cody et al., 2004). The study also assessed associations between bicycle helmet use and psychosocial variables including attitudes, past

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Table 1
Bicycle helmet use classification by the Stages of Change model.

	Stage				
	Precontemplation	Contemplation	Preparation	Action	Maintenance
Bicycle helmet use frequency during the past 30 days	Never Almost never Sometimes Almost every time	Never Almost never Sometimes	Almost every time	Every time	Every time
(For 'every time' users) Length of time since starting wearing a bicycle helmet every time	NA	NA	NA	Less than 6 months	6 months or longer
Intention to start wearing a bicycle helmet every time within the next 6 months	No	Yes	Yes	NA	NA

NA = not applicable to the stage.

bicycle helmet use, risk perception, perceived norms, and history of injuries.

2. Study instrument design

Psychosocial conceptual constructs and models are useful tools in the areas of health research (Glanz et al., 2002) and unintentional injury research (Gielen and Sleet, 2003; Trifiletti et al., 2005) to facilitate model building and questionnaire development.

2.1. Bicycle helmet use and intention

First, bicycle helmet use needs to be classified. Most college student bicycle helmet use studies asked only whether respondents wore bicycle helmets (Coron and McLaughlin, 1996; Everett et al., 1996), or how often they wore them (Patrick et al., 1997; Fullerton and Becker, 1991; Page et al., 1996; Joly et al., 2000). The Stages of Change model has been used in several studies (Kakefuda et al., 2008; Weiss et al., 2004). The Stages of Change model (Grimley et al., 1994; Prochaska and DiClemente, 1983) is a tool to classify individual behaviors based on current behaviors and intentions to commit a behavior in the near future (Table 1). Behavioral intention has been considered an important mediator between attitude and actual behavior (Kim and Hunter, 1993). The model may be useful for bicycle helmet research to assess differences across groups with different bicycle helmet use behaviors, and also groups who present the same behavior (e.g., bicycle helmet non-use) but express different behavioral intentions (e.g., no intention to wear a bicycle helmet vs. an intention to start wearing a bicycle helmet in the near future) (Kakefuda et al., 2008; Weiss et al., 2004).

2.2. Attitude

Attitudes are associated with bicycle helmet use, as posited in psychosocial models including the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980) and the Health Belief Model (HBM) (Rosenstock, 1974). Non-use of bicycle helmets among college students was related to factors including cost of a bicycle helmet, concerns about messing up hair, and the inconvenience of carrying a helmet around campus (Coron and McLaughlin, 1996; Fullerton and Becker, 1991; Page et al., 1996). Perception about the effectiveness of bicycle helmets in preventing TBI was also related to bicycle helmet use among adults (Page et al., 1996; Wasserman et al., 1988; Coron and McLaughlin, 1996; Fullerton and Becker, 1991; Kakefuda et al., 2008). College students may also have opinions about bicycle helmet policy and regulation on campus (Joly et al., 2000; Ludwig et al., 2005).

Attitudes toward bicycle helmet use may be multi-dimensional. For instance, a question such as "what do you think about bicycle helmet use?" may elicit emotional reactions (e.g., 'foolish,' 'smart') among some students, while it may trigger cognitive evaluations of the effectiveness of bicycle helmets among other students. The semantic differential (Osgood, 1952; Snider and Osgood, 1969) is useful in examining the dimensionality of attitudes. The technique uses multiple sets of adjectives to assess attitude structures (Osgood, 1952).

2.3. Past behavior

The influence of past behavior on current behavior (i.e., habit) has been discussed in TRA (Ajzen and Fishbein, 1980) and the Theory of Planned Behavior (Ajzen, 1991) to expand the utility of the models (Ajzen and Fishbein, 2000). For example, O'Callaghan and Nausbaum (2006) found in two surveys conducted over two-week intervals that bicycle helmet use among high school students in the second survey was correlated with use reported in the first survey.

Bicycle safety education in elementary school and legislation requiring child bicycle riders to wear bicycle helmets have been shown to increase bicycle helmet use among the populations (Rivara et al., 1998; Rodgers, 2002; Royal et al., 2005). However, helmet use among adolescents and young adults was consistently lower than other age groups (Rodgers, 1995, 2000), suggesting a decline in use as children become adolescents.

2.4. Perceived norm

Perceived norm as a construct was introduced in TRA (Ajzen and Fishbein, 1980). The theory postulates that two components, normative belief and motivation to comply, form perceived norm. A person's behavioral intention will be higher when his or her family's and/or friends' expectations for the person to commit the behavior are high compared to when others do not expect the behavior (normative belief), and the person thinks that he or she will comply with others' expectations (motivation to comply). Peer bicycle helmet use was associated with bicycle helmet use among college students (Coron and McLaughlin, 1996; Everett et al., 1996; Page et al., 1996). Frequent bicycle helmet users reported that their families expected them to wear bicycle helmets in one study (Page et al., 1996), but not another (Everett et al., 1996).

2.5. Perceptions toward risk and control

Individuals may underestimate personal risk of being involved in negative events (Weinstein, 1980). Children and adults who were

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