Influential Factors of Bicycle Helmet Use

A Case Study of the University of Florida in Alachua County

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Abstract - Although no federal law requiring the use of bicycle helmets exists, many state and district laws specify age limits for mandatory helmet use. College students are not subject to the helmet law in Florida, since helmets are required for bicyclists under the age of 16. The objective of this paper is to identify influential factors regarding helmet use at the University of Florida and to correlate them to behavioral aspects in psychology. Out of 100 individuals who completed an on-campus survey, 41 never wear a helmet, 37 always wear a helmet, and 22 sometimes do. Results indicate that the most significant factors affecting helmet use were commute distances and number of traffic signals passed, law familiarity, and negative perceptions of wearing a helmet. In order to promote helmet use, the author believes that educational campaigns must target college students while helmet manufacturers should economically improve aesthetics and create storage capabilities.

Keywords: bicycle, helmet.

INTRODUCTION

Bicycle helmet laws reflect an effort to reduce the number of bicycle-related injuries and deaths. Although age requirements vary for each state and many districts *(14)*, bicyclists of all ages are often encouraged to always wear a helmet. Since Florida has the highest number of bicycle fatalities *(5, 19)*, it is important for the state to clearly inform all bicyclists, including college students, of pertaining laws and statistics. Founded in 1853, the University of Florida is located in the city of Gainesville in Alachua County. Out of 11 public state universities, the University of Florida is the largest in the state and the fourth largest in the nation. Bicycle safety enforcement at the state, city, and campus levels are acknowledged. Also considered are two psychological behavior models that clarify behavioral intentions and actions. Specifically, Rosenstock's Health Belief Model (HBM) and Theory of Planned Behavior (TPB) by Fishbein and Ajzen are analyzed to understand helmet use *(18, 10)*.

Bicycle Laws and Helmets

Many states and districts have specified age requirements for helmet use despite the absence of federal laws. In 1997, the state of Florida adopted a law requiring all bicyclists under the age of 16 to wear a helmet *(14)*. Although the law does not apply to survey participants because of their ages, they may be unaware of their vulnerability to bicycling accidents. Records of the Florida Department of Highway Safety and Motor Vehicles (DHSMV) show that bicyclists at the age of 16 and older were involved in 95% of fatalities and 86% of injuries in 2009 *(20)*, as seen in Table 1.

TABLE 1 Gender Distribution and Age Groups

	Deaths		Injuries	
	Male	Female	Male	Female
Under 16	3	2	490	103
16 and older	83	11	3033	746
Total	86	13	3523	849

According to the Florida Bicycle Association (FBA), helmets must fit properly, fasten securely, and meet Consumer Product Safety Commission (CPSC) standards *(11).* Bicyclists often consider cost, ventilation, and appearance while choosing a helmet. Fortunately, tests have proven that cheap helmets perform almost identically to expensive ones *(6).* Discount stores supply many affordable, yet effective helmets for bicyclists with budget concerns. For those desiring enhanced ventilation and aesthetic appeal, bicycle shops offer numerous options at a greater price. In this study, participants' acquaintance with bicycle regulations and perceptions of wearing a helmet significantly affected helmet use.

Statistics

Florida currently leads the nation in bicycle deaths and injuries *(5, 19).* According to the University of Florida Police Department, approximately 75% of bicycle fatalities are caused by head injuries *(4).* Wearing a bicycle helmet effectively reduces the risk of serious head injury by 85%, while also preventing brain and upper facial injuries *(2, 11, 12).* Studies on the effects of bicycle helmet legislation have illustrated a general increase in helmet use and decrease in fatalities in the long-run *(2, 13, 17).* The DHSMV displays an overall decrease in statewide bicycle deaths and injuries since the passage of the helmet law in 1997, as shown in Table 2. Although there is an overall decrease in bicycle injuries in Alachua County, there is actually an increase in deaths. In 2009, 3.9% of all traffic fatalities in Florida were bicycle-related. Of the bicyclists killed, 88% were not wearing helmets while 12% were wearing them *(20).* In the same year, male bicyclists were involved in 87% of total deaths and 81% of total injuries, as seen in Table 1. In this study, 71% of participants were male and 29% were female, implying that males are at greater risk for bicycling accidents. Awareness of relevant statistics may shape an individual's perceived risk of bicycling.

TABLE 2 State and County Statistics

	Florida		Alachua	
	Deaths	Injuries	Deaths	Injuries
1994	123	6957	2	203
1995	137	6757	2	181
1996	105	6412	0	159
1997	114	5696	2	146
1998	95	5110	1	155
1999	115	4731	5	120
2000	83	4585	0	108
2001	107	4476	4	102
2002	108	4970	2	121
2003	95	4991	2	107
2004	119	4820	3	80
2005	119	4515	0	66
2006	124	4227	2	86
2007	121	4303	5	97
2008	118	4380	4	102
2009	99	4376	3	105

Enforcement

Future trends of bicyclists often depend on available information and education. The University of Florida Police Department enforces all bicycle traffic regulations on campus *(7).* In the city of Gainesville, the Bicycle & Pedestrian Program promotes bicycling safety and awareness *(3).* Also, the Florida Department of Transportation (FDOT) funds several organizations that offer numerous bicycling resources. Various materials such as booklets and videos that encourage safe bicycling tips are accessible to the community. Workshops are provided for children to instill proper bicycling techniques and habits at an early age. These enforcement agencies inform the general public and young children, but none specifically target college students to emphasize the benefits of wearing a helmet.

Psychological Behavior Models

Psychologists have developed the HBM *(18)* and the TPB *(10)* to understand the reasoning behind actions. Many case studies have significantly associated aspects of each model to predictions of intention and behavior. The HBM states that behavior depends on a combination of psychological variables: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers *(1).* Perceived susceptibility and severity reflects the view of the vulnerability to and intensity of a particular health condition, in this case, a head injury. Additionally, an individual considers whether or not the perceived benefits overcome the perceived barriers before taking a specific action, such as wearing a helmet *(18).* The HBM categorizes experiences and media as 'instigating events' *(18)* that often trigger a preventative action *(14).* A case study by Arnold and Quine shows that the HBM can help predict helmet use *(1).* The researchers encourage educational campaigns to use this information to effectively emphasize the advantages of wearing a helmet.

The TPB asserts that behavioral intention is influenced by three factors: attitude toward behavior, subjective norms, and perceived behavioral control *(8).* Attitude toward an action describes an individual's personal beliefs and

evaluations regarding the outcome of a behavior *(10).* Subjective norms refer to perceived social pressure *(8),* including views and expectations of family and peers *(9).* Perceived behavioral control involves internal or external factors, such as laws, that either help or inhibit the attempt to take a specific action *(10).* The most influential factors identified in this study fall under categories presented by these two behavioral models.

METHODOLOGY

For two weeks in May, a survey was conducted on the University of Florida campus to gather data and identity factors that influence helmet-wearing trends. The 19-question survey encompassed various aspects of bicycling. Demographics specified the bicyclist's age, gender, and years of transportation use while bicycle details indicated cost and recreational patterns. The survey required estimations on commute distances and number of traffic signals passed during trips. Respondent accident awareness was based on personal experience, knowing someone else with an experience, or witnessing a bicycle accident. Participants indicated their knowledge of bicycle legislation and specifically stated up to which age they believed the Florida helmet law affects. The final question allowed individuals to explain in their own words the reasoning behind their decision.

Surveys were personally administered to bicyclists on campus during the hours of 10:00am to 2:00pm and also emailed to various campus organizations. Collected data were analyzed through a series of charts, shown in Figures 1-3, that reveal the top three factors influencing helmet use. These factors were then linked to psychological behavior models and compared to previous findings.

RESULTS

Of 100 individuals who completed the survey, 37 always wear a helmet, 41 never wear a helmet, and 22 sometimes do. It was found that most bicyclists who spend over $200 on their bicycles and 47% of bicyclists that ride for recreation always wear a helmet. Accident awareness had a slight impact on helmet use: Of the 37 individuals who always wear a helmet, 62% had a personal experience, 81% knew someone else who had been involved, and 65% had witnessed a bicycling accident. The three most significant factors regarding helmet use involved commute distances and number of traffic signals passed, law familiarity, and negative perceptions of wearing a helmet.

Participants were asked to estimate commute distances and the number of traffic signals passed during each trip. Figure 1 indicates that bicyclists are more likely to never wear a helmet if their commute distance is less than two miles. However, bicyclists are more likely to always wear a helmet if they pass four or more traffic signals, as shown in Figure 2. Travel distances and passage through intersections tend to affect an individual's perception of danger.

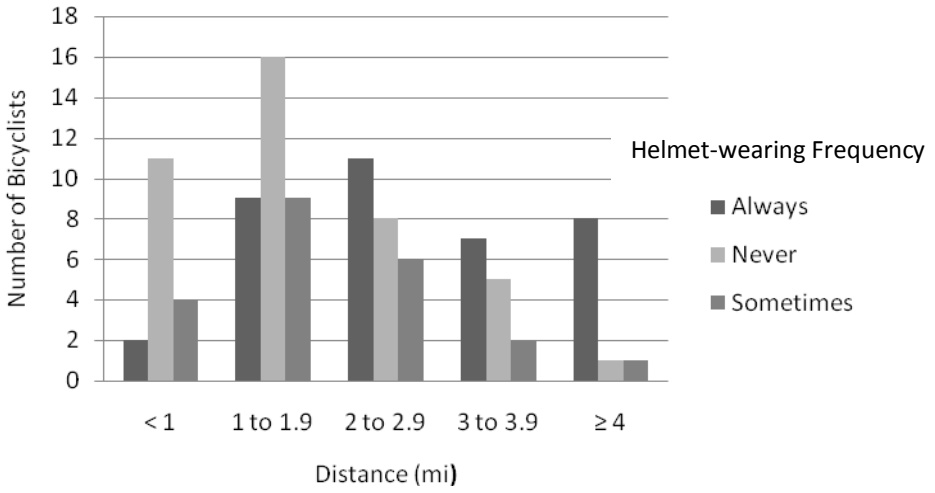

FIGURE 1 Estimated commute distances

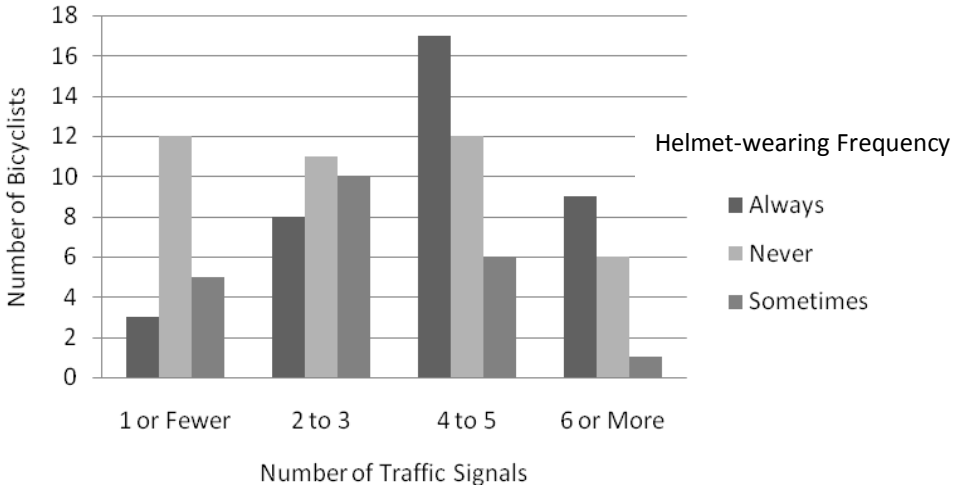

FIGURE 2 Estimated number of traffic signals passed during commute

Participants indicated how familiar they were with state bicycling legislation. They were also required to specify up to which age bicyclists are required to wear a helmet in Florida. Figure 3 shows that out of those who correctly guessed the age of 16, 47% always wear a helmet while 31% sometimes do. A clear understanding of the law can affect perceived benefits to wearing a helmet.

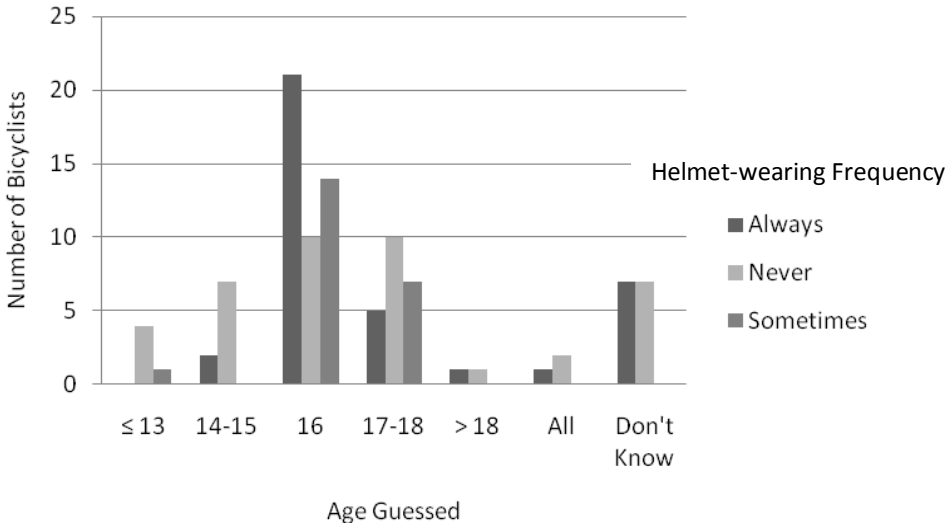

FIGURE 3 Guesses for helmet age requirement in Florida

Lastly, non-users share several reasons that underlie their decision. Looks and storage were the most prevalent factors, while discomfort and cost were also mentioned. These factors seem to taint their personal image and produce an overall inconvenience, despite the advantages of wearing a helmet.

DISCUSSION AND CONCLUSIONS

This study reveals that the three most significant factors behind helmet-wearing trends at the University of Florida can be traced back to psychological behavior models. Commute distances, number of traffic signals passed, and law familiarity associate with several aspects of the HBM. Greater commute distances or number of traffic signals passed often increase a bicyclist's perceived risk. This induces a greater perception of the susceptibility to and severity of an accident that could result in a head injury, causing more bicyclists to feel inclined to use a helmet. These results uphold the assertion made by Arnold and Quine that helmet users were more likely to feel vulnerable to bicycle accidents *(1)*. Familiarity with bicycle legislation affects the perceived benefits of wearing a helmet. Various sources that state helmet laws in Florida usually also incorporate information regarding safety and the importance of being a role model to others. Such elements promote the advantages of wearing a helmet. A previous case study indicates that the overall perceived benefits tend to outweigh psychological costs for helmet users *(1)*. Therefore, if educational campaigns intend on increasing helmet use, they must emphasize the benefits of wearing a helmet.

The common reasons behind the decision of non-users are significantly influenced by peers, or subjective norms as described in the TPB. This supports previous findings that subjective norms help predict helmet use intentions *(15, 16)*. Most non-users consider it a threat to their appearance to wear a helmet or to carry one around. Studies by Arnold and Quine, the CPSC, and AAA showed that adolescents are concerned with helmets negatively impacting their image *(1, 21)*, and this study indicates that those feelings continue through adulthood. Along with the inconvenience of storage, discomfort, and cost, these factors increase the perceived barriers to wearing a helmet. The combination of subjective norms and increased perceived barriers causes too many bicyclists to ride without helmets.

Helmet manufacturers and educational campaigns have a significant influence on helmet-wearing trends. If manufacturers inexpensively improve aesthetics and create convenient storage capacities, then the perceived barriers

to wearing a helmet may decrease. Organizations should target college students as they promote bicycling safety. Further studies on how to best appeal to college-aged bicyclists might create opportunities to share relevant statistics and the reality of the protection that helmets provide. Such measures can alleviate social pressures and accentuate the benefits of wearing a helmet. The helmet law may not apply to students at the University of Florida, but encouraging helmet use among college students may prevent them from becoming statistics.

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