Bicycle Helmets in Miami Dade County: a Crash Course in a Public Health Crisis

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Abstract

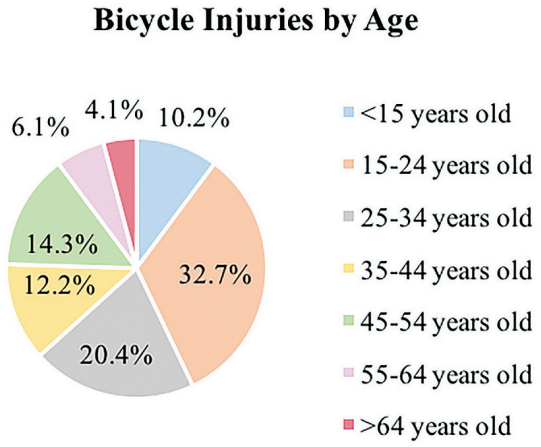
In 2013, bicycle accidents accounted for approximately 494,000 emergency room visits and 900 fatalities in the United States. In Miami-Dade County, there were 9.1 hospitalizations due to bicycle accidents for every 100,000 people. Bicycle accidents are a common cause of traumatic brain injury and hospitalization, costing over $6 billion a year in healthcare costs and loss of work. Helmets have been proven to significantly decrease the rate of traumatic brain injury following a bicycle accident. This paper seeks to identify possible solutions to increase helmet use by children aged 17 and younger in Miami-Dade County. Community-level public health interventions and "common-sense" legislation have been proven to increase the levels of helmet use. Specific interventions for Miami-Dade County are suggested as a three-pronged approach of: 1) passing helmet use legislation 2) community level education program 3) a helmet distribution program to increase ownership and use.

Background

In 2013, bicycle accidents accounted for approximately 494,000 emergency room visits and 900 fatalities in the United States[1]. In Miami-Dade County in 2014, there were 11.2 hospitalizations due to bicycle accidents for every 100,000 people[2]. While without comparison this figure may appear small, it is higher than the number of people hospitalized due to assault with a firearm in Miami Dade County[2]. Over 160,000 people rely on bicycles for their daily commute, and the rates of bicycle commuting are unequally distributed, placing a burden on the lower income neighborhoods in Miami-Dade County[3]. In the neighborhood of Northeast Miami for example, it is estimated that between 1.6-2.0% of the population relies on bicycles to get to and from work. This is more than two and a half times the rate of 0.62% for the rest of Miami Dade County[3]. While no data exists to validate this claim, it is fair to assume that these areas of higher bicycle commuters will bear an unequal burden of bicycle accidents.

The use of bicycle helmets for those commuting is the not the only concern; children and young adults aged 5 to 24 accounted for approximately 41% of all bicycle-related injuries in the United States in 2013 (Figure 1)[4]. While data reporting the use of bicycles among Miami's youth is unavailable, it is an understandable concern of parents. Nationally, data shows that African-American children and those insured through Medicaid are less likely to use bicycle helmets than any of their peers[5]. Traumatic head injuries at any age are of huge concern, but when they happen at a younger age they have a greater impact on the health and potential future earnings of the individual.

Figure 1. Percent of population injured in bicycle accidents by age group.



The CDC estimates that more than $1.4 billion was spent in 2013 for the treatment and immediate release of patients suffering from a bicycle accident[6]. When patients required an extended hospital stay and the costs were adjusted for work time lost, that figure drastically increased to about $6 billion.

Multiple studies have shown that bicycle helmets work with satisfactory results to reduce the number and severity of head injuries in bicycle accidents. A study on Glasgow coma scales, a rating system for coma and brain injury with a maximum of 15 and minimum of 3, following bicycle accidents found that

cyclists wearing helmets had a Glasgow Coma Score (GCS) of 15 upon admission—a higher score than their non-helmeted counterparts[8]. Additionally, helmeted cyclists were 72% less likely to sustain a traumatic brain injury than their non-helmeted counterparts.

Helmets are a relatively inexpensive and simple way to prevent the most serious and expensive injuries associated with bicycling. Efforts to increase helmet use among riders and to develop good helmet practices in children is essential to engraining a culture of safety within today's bicycle riding youth[8].

Interventions

While legislation is an effective method for ensuring the use of helmets[9], population-based methods targeting children are also highly effective, especially when combined with a subsidized or free helmet program[10]. Programs targeting bicycle skills rather than helmet use do not reduce the number of bicycle related injuries[11], suggesting the need for a three-pronged approach of legislation, population-based helmet use intervention, and helmet distribution to increasing helmet use and decrease preventable bicycle injury.

When measured in terms of helmet use or reduction of head injuries and mortality rates, a significant positive outcome was almost always seen after implementation of legislation. Additionally, there is little to no evidence to support the often suggested theory that helmet legislation acts to reduce the numbers of cyclists, indicating that societal impacts of helmet-use legislation are predominantly beneficial[9].

The cost of a helmet could pose a barrier for groups of lower socioeconomic status, especially if the legislative program is enacted without any free or subsidized helmet program. Interestingly, a prospective study found that legislation actually had the greatest effect in low- and middle-income areas as opposed to high-income areas. After passage of legislation, it was found that, in low- and middle-income areas, helmet use increased by 28% and 29%, respectively, while helmet use increased by only 4% in high-income areas (Figure 2). It is important to note that in low-income areas, helmet use was very low before legislation was passed (at 33%) but higher in middle- and high-income areas (50% and 77%, respectively)[12]. The findings suggest that legislation and the possibility of a fine may serve as a lynchpin for children and families to begin using helmets.

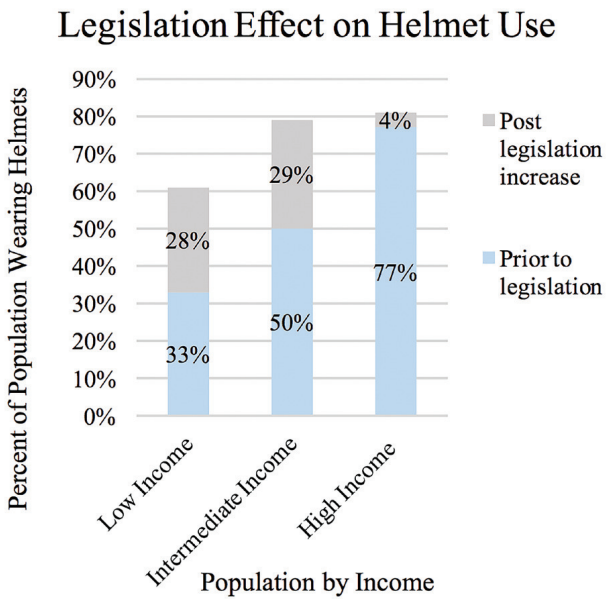


Figure 2. Prior to passage of legislation in a Toronto suburb, helmet use was 33%, 50%, and 77% in low, intermediate, and high income areas, respectively. After passage of legislation, helmet use increased by 28%, 29%, and 4%, respectively.

While legislation is a good method for providing a punitive system for encouraging helmet use, programs that focus on education and the benefits of helmets are also remarkably effective in increasing helmet use in children. Community-based education programs are highly successful at increasing both observed and reported helmet use[11]. The majority of these programs focus on benefits, proper use, and behavioral contracts signed by the children. Additionally, when these community-based methods were combined with a free helmet program, the rates of reported use and ownership, as well as observed use, increased significantly. Other types of education and interventions took place in schools or health care settings. These two settings, while showing significant increases in helmet use, had less of an effect on the rates of use when compared with the community-based programs[11]. School-based programs may not be as effective in comparison because they only target children, not parents. This only serves to educate the children about the importance of helmet use and may not result in full buy-in and support by the parents. On the other hand, the delivery of helmet education in a healthcare setting may be less effective in comparison with the community-based method because the parents and children are distracted by the circumstances that brought them to the healthcare setting. Interestingly, interventions of children under 12 appeared to result in better rates of helmet use as opposed to interventions targeting all children under 18[11].

Knowing what works to increase helmet use and decrease bicycle-related morbidity and mortality is just as important as knowing what doesn't work. Non-legislative interventions found a very modest effect if the intervention was an "education only" intervention that did not provide a free helmet[9]. Additionally, implementation of bicycle-skills courses found that, while there was a significant increase in the skills rating of the participants after the course, this increased skill did not translate to fewer accidents or injuries[11]. This would indicate that bicycle related injuries are due to the environment (including motor vehicles), not the bicyclists. While these skills are important, they do little to help prevent injury when compared with a helmet.

Population-based interventions that focus on education about the proper use of helmets combined with either a subsidized or free helmet are proven to increase the understanding and proper use of helmets among children under 18[11]. Considering that children covered by Medicaid are less likely to use a helmet than their peers who have private insurance, it seems prudent to focus the interventions in the areas of Miami-Dade that have the highest rates of children covered by Medicaid. While school-based programs will effectively reach those of school age, it has been shown that these programs, while successful, have marginal benefits when compared to other types of community-based interventions. Additionally, the adoption of a common-sense helmet law requiring all children under 18 years old has been proven to increase observed helmet use[9]. By analyzing the data regarding helmet use and interventions, one can come up with a simple, "common-sense" law to engage the community to increase helmet use and to get the support of Miami-Dade County and the city of Miami. This two-pronged intervention involves engaging the public and increasing public support for helmet use while also engaging the city legislature to adopt a "common-sense" helmet use law.

Miami-Dade County currently has no required helmet use laws for children under 18. Adoption of a "common-sense" law should be supported by law makers, though some opposition can be expected from those who strongly oppose public government intervention in all its forms. In other cities that have adopted a helmet-use law, critics have stated that this will cause a shift away from bicycle use. However, this statement was explicitly addressed and debunked by a meta-analysis that investigated the effectiveness of helmet use legislation[9].

Engaging the public is equally important, if not more so, than passing a "common-sense" law. With community support, parents are better equipped to impress upon their children the necessity and benefits of helmets. Community based interventions require mobilizing community assets and leaders. The first steps should involve direct contact with community leaders to discuss the importance of helmet use. Discussions should be individualized for each community leader to ensure complete buy-in. Furthermore, there are grants for free-helmet programs from organizations such as Safe Kids USA, Elks, Masons, Oddfellows, and Rotary USA. Church groups and other religious organizations can institute a donation system for purchasing helmets for children. Another possible route could involve directly reaching out to helmet manufacturers to inquire about charitable giving.

After securing funding for helmets, the educational intervention needs to take place. This requires having experts in the field (medical doctors, nurses, physician assistants, among others) partner with community leaders to deliver the message regarding the necessity and benefits of helmet use. This needs to happen at a micro-level at churches, barber shops, beauty salons, and other gathering spaces. Small-group interactions allow for questions and tailored explanations. Other less-traditional approaches can include organizing a "Community Science Day" for grade-school children, offering a unique forum toe blend science and helmet use education. Specifically, a "Brain Day" can involve presentations about how helmets work, creating an educational experience about the physics of helmets. This allows children to ask questions and gain a better understanding of the helmets and their function, culminating in them receiving their own helmet at the end of the day.

Increasing helmet use will not happen overnight. Legislation regarding helmet use, while a seemingly common-sense safety measure, will face opposition simply because it represents a change in the status quo, and inertia is a difficult force to overcome. In today's hyper-partisan political climate, gaining bipartisan support for any measure, no matter how common-sense, will be difficult. The community-based intervention is a fantastic method to get out and educate community members about the importance of helmets. Ensuring that this is done on a level that allows for exchange of questions and information; as well as the support from healthcare professionals, will strengthen the validity and importance of the issue. Finally, involving children is absolutely essential as they are ultimately responsible for their actions.

Conflict of Interest

None of the authors nor any member of his or her immediate family has funding or commercial associations (eg. consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that may pose a conflict of interest in connection with the submitted article.

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