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Bicycle helmet use among persons 5 years and older in the United States, 2012☆

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Abstract

Introduction—In 2013, injuries to bicyclists accounted for 925 fatalities and 493,884 nonfatal, emergency department-treated injuries in the United States. Bicyclist deaths increased by 19% from 2010 to 2013. The greatest risk of death and disability to bicyclists is head injuries. The objective of this study was to provide estimates of prevalence and associated factors of bicycle riding and helmet use among children and adults in the United States.

Method—CDC analyzed self-reported data from the 2012 *Summer ConsumerStyles* survey. Adult respondents (18+ years) were asked about bicycle riding and helmet use in the last 30 days for themselves and their children (5 to 17 years). For bicycle riders, CDC estimated the prevalence of helmet use and conducted multivariable regression analyses to identify factors associated with helmet use.

Results—Among adults, 21% rode bicycles within the past 30 days and 29% always wore helmets. Respondents reported that, of the 61% of children who rode bicycles within the past 30 days, 42% always wore helmets. Children were more likely to always wear helmets (90%) when their adult respondents always wore helmets than when their adult respondents did not always wear helmets (38%). Children who lived in states with a child bicycle helmet law were more likely to always wear helmets (47%) than those in states without a law (39%).

Conclusions—Despite the fact that bicycle helmets are highly effective at reducing the risk for head injuries, including severe brain injuries and death, less than half of children and adults always wore bicycle helmets while riding.

Practical application—States and communities should consider interventions that improve the safety of riding such as policies to promote helmet use, modeling of helmet wearing by adults, and focusing on high risk groups, including Hispanic cyclists, occasional riders, adults, and children ages 10 to 14.

Keywords

Bicycle; Helmet; Children; Adults

☆The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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1. Introduction

Although the increased physical activity-related health benefits of bicycling arewell established (Mueller et al., 2015), in 2013 bicyclist injuries accounted for 925 fatalities and 493,884 nonfatal, emergency department (ED)-treated injuries in the United States (Web-based Injury Statistics Query and Reporting System, 2015). The number of fatalities from all motor vehicle crashes, including bicyclists, declined by 1% from 2010 to 2013; however, the number of bicyclist deaths increased by 19% during the same time period (National Center for Statistics and Analysis, 2015). From 2010 to 2013, bicyclist deaths accounted for approximately 2% of all motor vehicle crash-related fatalities (National Center for Statistics and Analysis, 2015; Williams, 2014) and approximately 70% of total bicycling fatalities involved motor vehicles (Web-based Injury Statistics Query and Reporting System, 2015). It is important to note that although many bicycling deaths involve motor vehicles, nearly one-third do not (Mueller et al., 2015; Web-based Injury Statistics Query and Reporting System, 2015).

Among adults in the United States, bicycling demographics are changing (National Center for Statistics and Analysis, 2015; National Household Travel Survey, 2009). From 2001 to 2009, the number of bicycling trips per person doubled among persons ≥30 years, while the number of trips per person among those younger than 30 years decreased by approximately 20% (National Center for Statistics and Analysis, 2015). Although bicycling fatalities among children have decreased for the past 4 decades (Highway Loss Data Institute, 2013), bicycling was the 6th leading cause of nonfatal, ED-treated injury for children 5–9 years and the 5th leading cause of nonfatal, ED-treated injury for children 10–14 years in 2012 (Web-based Injury Statistics Query and Reporting System, 2015).

The most common non-fatal injuries among bicyclists include soft tissue and musculoskeletal injuries, while nearly one-third are head injuries (Haileyesus, Annest, & Dellinger, 2007) and head injuries pose the greatest risk of death and disability to bicyclists (Haileyesus et al., 2007; Thompson & Rivara, 2001; Thompson, Rivara, & Thompson, 1999). Multiple studies show that bicycle helmets reduce the risk of death and are highly effective at reducing the likelihood of severe head injuries (Amoros, Chiron, Martin, Thelot, & Laumon, 2012; Bambach, Mitchell, Grzebieta, & Olivier, 2013; Boufous, de Rome, Senserrick, & Ivers, 2012; Cripton, Dressler, Stuart, Dennison, & Richards, 2014; McNally & Whitehead, 2013; Persaud, Coleman, Zwolakowski, Lauwers, & Cass, 2012). The most recent reports of bicycle helmet use in the literature indicate that less than one-half of children (45%) and less than one-third of adults (28%) in 2012 (Schroeder & Wilbur, 2013) wore bicycle helmets for every ride; however, the report does not include associated factors for reported helmet use.

The objective of this study was to provide the prevalence of bicycle riding and bicycle helmet use and to identify factors associated with bicycle helmet use among children (5 to 17 years) and adults (18+years) in the United States.

2. Methods

The Centers for Disease Control and Prevention (CDC) analyzed self-reported data from the 2012 *Summer ConsumerStyles* survey. The annual *ConsumerStyles* panel survey administered by Porter Novelli (Washington, D.C.) measures health knowledge, attitudes, and behaviors of adults in the United States. Panel members are randomly recruited by probability-based sampling (using both random-digit dial and address-based sampling methods). In 2012, all surveys were conducted online. If needed, households were provided with a laptop computer and access to the Internet. The sample was weighted based on region, household income, population density, age, race/ethnicity, socio-economic status, and household size to estimate prevalence for the U.S. population. All analyses were conducted using weighted data. *ConsumerStyles* methods are provided as Appendix A and the response rate in 2012 was 65% (Pollard, 2001).

In the summer of 2012, 4170 surveys were completed. For this study, we use the term “bicycle riders” to describe the adults and children who had ridden a bicycle at least once during the past 30 days. Respondents were asked “During the past 30 days, about how often did you ride a bicycle?” Responses include: “every day,” “several times a week,” “once a week,” “a few times a month,” “once a month,” or “never” to the question. “Never” responses were considered “non-bicyclists.” “During the past 30 days, how often did you wear a helmet when riding a bicycle?” Responses include: “alwayswore a helmet,” “more than half of the time,” “about half of the time,” “less than half of the time,” or “never wore a helmet.” Adult respondents (aged 18 and older) with children (N = 1220, 29%) between the ages of 5 and 17 were asked the same two questions about bicycle riding and helmet use for the youngest child.

Prevalence of bicycle riding (daily, once/week, several times/week, once/month, or a few times/month) and helmet use (always, sometimes, or never) was reported by age group and, for children, whether the respondent resided in a state with a child helmet law.

Multivariable analysis was conducted to determine the factors associated with always wearing a helmet among adults and children. The multivariable analysis model for adults included annual household income (less than $40,000, $40,000 to $84,999, or $85,000+), education (≤high school graduate or ≥some college), employment (working or not working [retired, disabled, temporarily unemployed, or looking for work]), metropolitan statistical area (MSA) or non-metropolitan statistical area (non-MSA) of residence, marital status (married or not married [widowed, divorced, separated, or never married]), race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, or non-Hispanic other race), gender, age group (18–29, 30–44, 45–59, or 60+ years), and ride frequency in the past 30 days (daily [rode every day], weekly [rode less than daily but at least once/week], or monthly [rode less than once/week but at least once in the past 30 days]) as independent variables to calculate Poisson adjusted prevalence ratios (aPRs) and 95% confidence intervals (95% CI) (Coutinho, 2008). The dependent variable was helmet use (always or less than always). Some categorical variables (e.g. employment, marital status, race/ethnicity, ride frequency, and helmet use) were condensed due to small cell sizes.

The multivariable analysis model for children (5 to 17 years) included respondent's annual household income, respondent's education, respondent's employment, presence of state laws requiring helmet use for children (Helmet Laws for Bicycle Riders, 2015), MSA or non-MSA of residence, respondent's marital status, respondent's race/ethnicity, respondent's gender, respondent's age group, child's age group (5–9, 10–14, or 15–17 years), child's ride frequency (daily, weekly, or monthly), and respondent's helmet use (always or less than always) as independent variables to calculate aPRs and 95% CI (Coutinho, 2008). The dependent variable was child's helmet use (always or less than always). These analyses were completed using SPSS version 21 (IBM Armonk, New York).

To supplement the self-reported behavioral data on bicycle riding and helmet use, 2012 National Vital Statistics System (NVSS) death certificate data (National Vital Statistics System, 2015) were used to calculate rates for unintentional bicyclist (e.g., riders of two-wheel, nonmotorized vehicles) and other cyclist (e.g., riders of nonmotorized vehicles such as tricycles and unicycles powered solely by pedals) (National Center for Statistics and Analysis, 2015) deaths (on and off public roads) per 100,000 population by age group. For ease of reference, we will use the term “bicyclist deaths” to refer to “bicyclist and other cyclist deaths.” NVSS data were analyzed with the Web-based Injury Statistics Query and Reporting System (WISQARS). WISQARS presents national fatal and non-fatal injury data by cause of death or mechanism of injury and by intent or manner of death (Web-based Injury Statistics Query and Reporting System, 2015).

3. Results

Within the preceding 30 days, 21% of the 4170 adult respondents reported riding a bicycle. Of the 863 adult bicycle riders, 5% rode a bicycle every day, 25% rode several times per week, 15% rode once a week, 27% rode a few times per month, and 27% rode once per month. Only 29% reported always wearing a helmet while 56% reported never wearing one. The proportion of adults never wearing a helmet was 62% among those aged 18–29 years, 59% aged 30–44 years, 55% aged 45–59 years, and 66% aged 60+ years. The bicyclist death rates per 100,000 population were 0.2 among adults aged 18–29 years, 0.3 aged 30–44 years, 0.5 aged 45–59 years, and 0.4 aged 60+ years (Fig. 1).

Results of multivariable analysis of helmet use (Table 1) showed that adult helmet use was lower among Hispanics (aPR 0.89, 95% CI: 0.84, 0.95) compared with non-Hispanic Whites. No significant differences in helmet use were observed between non-Hispanic Blacks or non-Hispanic persons of other races when compared with non-Hispanic Whites. Adult respondents living in an MSA (aPR 1.09, 95% CI: 1.01, 1.17) or having household income greater than $85,000 per year (aPR 1.13, 95% CI: 1.05, 1.20) were more likely to wear helmets, as compared with non-MSA residents or those earning less than $40,000 per year, respectively. Adult helmet use was lower among monthly riders (aPR 0.89, 95% CI: 0.80, 0.99) as compared with those who reported riding daily.

Among the 1220 children aged 5 to 17 years, respondents reported that 61% rode a bicycle in the past 30 days. Among those child bicycle riders, 11% rode every day, 38% rode several times per week, 15% rode once per week, 24% rode a few times per month, and 13% rode

once per month. Respondents reported that 42% of the children always wore a helmet and 31% never wore a helmet while riding a bicycle.

Multivariable analysis revealed associations with helmet use among children (Table 2). The strongest predictor of child helmet use was living with an adult who always wore a helmet (aPR 1.38, 95% CI: 1.25, 1.54). Children in MSAs were 19% more likely to wear helmets than those in non-MSAs (aPR 1.19, 95% CI: 1.03, 1.38). Other characteristics that were associated with children being less likely to wear a helmet were household income between $40,000 and $84,999 per year (aPR 0.85, 95% CI: 0.75, 0.97), Hispanic ethnicity (aPR 0.85, 95% CI: 0.75, 0.97), other race, non-Hispanic ethnicity (aPR 0.68, 95% CI: 0.54, 0.86), and child's age group 10 to 14 years (aPR 0.88, 95% CI: 0.80, 0.98). Also, children who lived in states with a state law that required a child to wear a helmet while riding a bicycle were more likely to wear a helmet than those in states that did not have a state law (aPR 1.14, 95% CI: 1.03, 1.25). Of the children who lived in states with a child helmet law, 51% of respondents reported that their child always wears a bicycle helmet, as compared with 40% of those living in states without a law. Conversely, 35% of children living in states without a state law were reported to never wear a helmet compared with 21% of children in states with a state law (Fig. 2). In addition, children were no more likely to ride a bicycle within states that had state helmet laws (PR 0.96, 95% CI: 0.85, 1.09) as compared to those with no state helmet laws.

4. Discussion

Strategies to prevent bicycling-related crashes, fatalities, and injuries include improved environmental infrastructure (Vanparijs, Int Panis, Meeusen, & de Geus, 2015), following traffic laws, respecting rules for sharing the road, and using proper turn signals for both motorists and bicyclists (National Center for Statistics and Analysis, 2015). However, in the event of a crash, bicycle helmets are effective for the prevention of serious head injuries and deaths (Amoros et al., 2012; Bambach et al., 2013; Boufous et al., 2012; Cripton et al., 2014; McNally & Whitehead, 2013; Persaud et al., 2012).

Our study found that in 2012, an estimated 21% of adults and 61% of children in the United States rode a bicycle during the preceding 30 days. Of those bicycle riders, 29% of adults and 42% of children always wore a helmet and 56% of adults and 31% of children never wore a helmet when riding a bicycle. The prevalence of bicycle riding and helmet use, including higher use among children reported in this study was similar to other U.S. studies (Bolen, Kresnow, & Sacks, 1998; Dellinger & Kresnow, 2010; U.S. Bicycling Participation Benchmarking Study Report. Measuring How America Rides, 2015).

One finding of particular interest is that the strongest predictor of child helmet use is adult helmet use. Children were almost 40% more likely to always wear their helmets if the adult respondents always wore their helmets than if the adult respondents did not always wear helmets. Parents' behavior of wearing helmets influences children's bicycle helmet use (Morrongiello, 2008). Furthermore, research has shown that children's safety behaviors are more likely predicted by their parents modeling safe behavior rather than simply receiving

information from their parents about bicycle safety (Morrongiello, 2008). Modeling of helmet use by parents is an effective strategy to promote children's helmet use.

In addition, children who lived in states with a child bicycle helmet state law were more likely to always wear helmets than those who lived in states without such a law. As of February 2016, 22 states and the District of Columbia had state-wide bicycle helmet use laws for children. The existing state laws cover children younger than and through 11 to 17 years (average coverage is through 15 years of age), depending on the state (Helmet Laws for Bicycle Riders, 2015). Systematic reviews report that states with helmet use laws are associated with increases in use (Karkhaneh, Kalenga, Hagel, & Rowe, 2006; Thompson et al., 1999), consistent with our study's finding of higher reported helmet use among children in states with helmet use laws. Several studies in Canadian provinces and local U.S. jurisdictions that adopted bicycle helmet legislation for children have also reported declines in child head injury rates, although the amount of decline varied widely across studies from 2% to 45% (Lee, Schofer, & Koppelman, 2005; Macpherson et al., 2002; Pardi, King, Salemi, & Salvator, 2007).

Children are not the only ones at risk. Adults are also at risk of head-related injury and death while bicycling (National Center for Statistics and Analysis, 2015). In our study, adults (18+ years) had higher death rates and lower helmet use rates than children. The death rate of bicyclists increases with age, with a notable increase among those >44 years (Web-based Injury Statistics Query and Reporting System, 2015). Although existing laws at the state level in the U.S. only cover children (Bicycle Helmet Use, 2015), there are 49 local jurisdictions with universal helmet laws (i.e., mandatory helmet use regardless of age) at the community, city, or county level (Helmet Laws for Bicycle Riders, 2015). In our study, sample size and limited data did not allow for analysis at the local level to determine the potential effect of these laws. However, studies from other countries have found significant increases in helmet use after passage of universal bicycle helmet laws (Karkhaneh et al., 2006). For example, helmet use increased by approximately 44% in Australia when the law required universal use, from 10% to 46% in Canada (depending upon location), and by 59% in New Zealand (Karkhaneh et al., 2006; Karkhaneh, Rowe, Saunders, Voaklander, & Hagel, 2011). Only 15% of the U.S. population (all ages) is currently covered by any bicycle helmet law (Helmet Laws for Bicycle Riders, 2015). The U.S. population has low helmet law coverage and low helmet use; however, many people support helmet legislation for children and adults. A national survey conducted by the National Highway Traffic Safety Administration in 2012 indicated that 87% of respondents supported helmet laws for children and 63% supported laws for adults (Schroeder & Wilbur, 2013).

A commonly voiced concern of implementing bicycle helmet laws is the potential consequence of decreases in bicycle riding. However, our data found no correlation with child state helmet laws and decreases in ridership, only an increase in helmet use among children who lived in these states. Our findings are consistent with other research on this topic (Karkhaneh et al., 2006; Molina-Garcia & Queralt, 2016). Research that has found that bicycle helmet laws decrease ridership (Carpenter & Stehr, 2011) are limited and have not been duplicated (Department of Transportation, 2004).

Annual income and its effect on helmet use have varied across studies and are not fully understood. After controlling for other factors, respondents with the highest household income were more likely than those with the lowest to report always wearing helmets. One study in Canada found that after implementing legislation helmet use increased in lower and middle income families but only slightly increased in higher income families (Parkin, Khambalia, Kmet, & Macarthur, 2003). The slight increase in the higher income families could be due to a ceiling effect (Karkhaneh et al., 2006) or other confounding variables.

Barriers to helmet use, such as individual perceptions and external influences, need to be addressed. The last study on reasons children did not wear helmets was conducted in 1995 and found that esthetics were the main reason they did not wear helmets (Consumer Product Safety Commission, 1995). This research needs to be updated given the wide variety of helmets now available for children. Recent reasons adults stated that they do not wear helmets included: only on a short trip (55%), don't have a helmet (50%), uncomfortable (43%), too hot (39%), vanity (27%), forget (25%), don't think they provide protection (15%), cost (13%), obstruct vision (11%), and don't need one (5%) (Schroeder & Wilbur, 2013). A recent contribution to the lack of helmet use among adults is the increasingly popular Bikeshare programs in U.S. cities. Bikeshare programs allow riders to rent and return bicycles for local travel. Typically, they do not offer helmets with bicycle rentals and a cross-sectional, observational study of cyclists in Washington, D.C. found that helmet use among Bikeshare users (26%) was less common than private bike users (70%) (Kraemer, Roffenbender, & Anderko, 2012). One study found a higher proportion of head injuries in ED visits in cities after the implementation of Bikeshare programs as compared with cities without a Bikeshare program (Graves et al., 2014). Although the study did not account for increased ridership, it is notable that these programs continue to grow and efforts to increase helmet use should include the special case of Bikeshare users.

A study conducted by the CDC indicated that more traumatic brain injury ED visits from 2001–2012 were associated with bicycling than any other recreational activity (Coronado et al., 2015). Helmet use remains low in the United States, despite the evidence that bicycle helmets are effective at reducing head injury and death. Studies of both hard- and soft-shelled helmets consistently find a significant reduction in head and brain injuries compared to no helmet use (Amoros et al., 2012; Bambach et al., 2013; Boufous et al., 2012; Cripton et al., 2014; McNally & Whitehead, 2013; National Center for Injury Prevention and Control & Centers for Disease Control and Prevention, 1995; Persaud et al., 2012). One study examined helmeted and non-helmeted ED-treated patients. The non-helmeted patients were more likely to suffer from skull and facial fractures as compared to the helmeted patients (Joseph et al., 2014). While studies repeatedly demonstrate protection from head and brain injuries, it is less clear what effect they have on neck injuries. Published studies have reported either no association (Amoros et al., 2012; Rivara, Thompson, & Thompson, 2015) or an increased risk (McDermott, Lane, Brazenor, & Bebney, 1993; Wasserman & Buccini, 1990) for neck injuries with helmet use. However, a recent computational simulation of typical, real-world bicycle crashes found no risk of neck injuries from bicycle helmets that met Consumer Product Safety Commission (CPSC) standards and further found that these helmets reduced the risk of neck injuries in many types of crashes (McNally & Whitehead, 2013). All bicycle helmets sold in the United States must meet the CPSC safety standards

(U.S. Government Publishing Office).Wearing a helmet that hasmet industry standards decreases the risk of head injury and death compared to not wearing a helmet (Cripton et al., 2014; McNally & Whitehead, 2013; National Center for Injury Prevention and Control & Centers for Disease Control and Prevention, 1995). It will be important to monitor the effects of any future changes in helmet design.

The findings in this study are subject to limitations. First, *ConsumerStyles* is a cross-sectional survey and not population-based. However, random-digit-dial and Internet panel probability samples could be more generalizable than nonprobability samples (Yeager et al., 2011). Second, we were unable to analyze data at a local level to determine effects on universal (all ages) helmet laws. Studies from other countries have shown an increase in helmet use when universal laws are implemented and promoted (Karkhaneh et al., 2006). Third, the state laws for children varied by the age coverage of the law; while most state laws covered children under 16 years, some did not. For example, Delaware's bicycle helmet law covers children under 18 years while Pennsylvania covers children under 12 years (Helmet Laws for Bicycle Riders, 2015). Fourth, the adults sampled responded for their children and therefore may be over-reporting the use of bicycle helmets due to a social desirability bias or due to a lack of knowledge about children's helmet wearing behavior, particularly when the children are not in the presence of those adults. Fifth, we were unable to examine helmet use based on type of bicycling (commuter vs. recreational). Other studies have reported variability of helmet use among type of bicycling for children and adults alike. Commuters are less likely to wear helmets than recreational users (Kakefuda, Stallones, & Gibbs, 2009; Karkhaneh et al., 2011; Larsson, 2015). Finally, the data were collected during the summer of 2012 and our findings on the frequency of bicycling and/or bicycle helmet use may be influenced by seasonal patterns in bicycle riding.

5. Conclusion

In 2012, U.S. bicycle riders self-reported that only 29% of adults and 42% of their children (5 to 17 years) always wore a helmet and 56% of adults and 31% of children never wore a helmet when riding a bicycle in the last 30 days. In 2013, bicyclists sustained injuries from a variety of mechanisms, including being hit by a car (29%), falling (17%), ill-repair roadway (13%), or rider error (losing control, speeding, performing stunts, or inexperience; 13%) (National Center for Statistics and Analysis, 2015). Although many bicycling deaths involve motor vehicles, nearly one-third do not (Mueller et al., 2015). Injury risks occur whether traveling on- or off-road and helmet use is important to reduce injury and death risks. The greatest risk for severe injury or death to bicyclists is head injuries (Haileyesus et al., 2007; Thompson et al., 1999). In spite of the fact that bicycle helmets are highly effective at reducing the risk for severe brain injury and death (Cripton et al., 2014; McNally & Whitehead, 2013; Schroeder & Wilbur, 2013), most adults and children do not always wear helmets while riding bicycles.

Practical application

States and communities can consider effective interventions to increase bicycle helmet use. Options include state policies that require wearing bicycle helmets while riding, modeling of

helmet wearing by adults, and focusing on high risk groups such as those identified in this study including Hispanic cyclists, occasional riders, adults, and children aged 10–14 years. There are opportunities to promote effective interventions that increase helmet use and prevent head injuries (Attewell, Glase, & McFadden, 2001; Coronado et al., 2015; National Center for Injury Prevention and Control & Centers for Disease Control and Prevention, 1995) during hospital or ED visits, bicycle registration processes, and enforcement of helmet laws.

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Appendices

Appendix A. ConsumerStyles methods, 2012

Styles 2012

Methodology

In 2012, Porter Novelli Public Services conducted all of our surveys online. All data were collected by Knowledge Networks: A GfK Company.

Knowledge Networks has recruited the first online research panel (KnowledgePanel®) that is representative of the entire U.S. population. Panel members are randomly recruited by probability-based sampling (using both random-digit dial and address-based sampling methods) to reach respondents regardless of whether or not they have landline phones or Internet access. If needed, households are provided with a laptop computer and access to the Internet. The panel is continuously replenished and maintains approximately 50,000 panelists.

The initial wave – *SpringStyles* – was fielded from March 31 to April 12, 2012. The survey was sent to a random sample of 11,636 panelists ages 18 or older. Email reminders were sent to all non-responders on April 3rd. Additional reminders were sent to those in selected demographic groups (18–34 year olds, African Americans and Hispanics, those with less than high school education) on April 9th, to maximize response in those groups. The survey

took approximately 61 min (median) to complete. Respondents were not required to answer any of the questions and could exit the survey at any time. Those who completed the survey received 10,000 cash-equivalent reward points (worth approximately $10) and were eligible to win an in-kind prize through a monthly sweepstakes.1 Respondents who did not answer at least half of the questions were removed from the data as incomplete (n= 52). A total of 6728 completed the survey for a response rate of 57.8%.

The first summer wave (*SummerStyles*) and *YouthStyles* were fielded together from June 19 –July 3, 2012. Given the desire to collect adult-youth dyad data, the survey was sent to a random sample of 4754 panelists ages 18 or older as well as a supplemental sample of 1648 panelists with children ages 12–17 who answered *SpringStyles*. Email reminders were sent to non-responders on June 23rd and June 30th. Survey completion times were approximately 38 min (median) for adults and 17 min (median) for youth. Respondents were not required to answer any of the questions and could exit the survey at any time. Those who completed the survey received 10,000 cash-equivalent reward points and were eligible to win an in-kind prize through a monthly sweepstakes. Respondents who did not answer at least half of the questions were removed from the data as incomplete (n=42). A total of 4170 adults and 847 youth completed the survey for response rates of 65% and 51%, respectively.

To keep the summer survey length from exceeding respondents' attention spans, a second survey was administered immediately following the first summer wave, from June 28 to July 31. The Summer2 survey was sent to a random sample of 4703 panelists ages 18 or older who answered SpringStyles. Email reminders were sent to non-responders on July 1st, July 17th, and July 27th. The survey took approximately 18 min (median) to complete. Respondents were not required to answer any of the questions and could exit the survey at any time. Those who 2 completed the survey were eligible to win an in-kind prize through a monthly sweepstakes. Respondents who did not answer at least half of the questions were removed from the data as incomplete (n= 71). A total of 4044 completed the survey for a response rate of 86%.

The adult data are weighted using 9 factors: Gender, age, household income, race/ethnicity, household size, education, census region, metro status, and prior Internet access. The youth data are weighted using the same factors, with the exception that the number of teenagers aged 12–17 was used rather than overall household size. The weights are designed to weight the data to match U.S. Current Population Survey (CPS) proportions. Each survey includes a separate weighting variable (weight, weight_summer, weight_Teen, weight_summer2). When using data points from multiple surveys in combined analyses, it is recommended that the *SpringStyles* weight (weight) be used.

Prizes vary and are generally worth under $500, such as an iPad, television, camcorder, or gift card.

Biographies

Amy Jewett, MPH, is an epidemiologist with the Transportation Safety Team, Division of Unintentional Injury Prevention. Her research interests include drugged driving, teen driving, and bicycle safety.

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Grant Baldwin, PhD, MPH, is the Director of the Division of Unintentional Injury Prevention at the Injury Center. He has served in this capacity since September 2008.

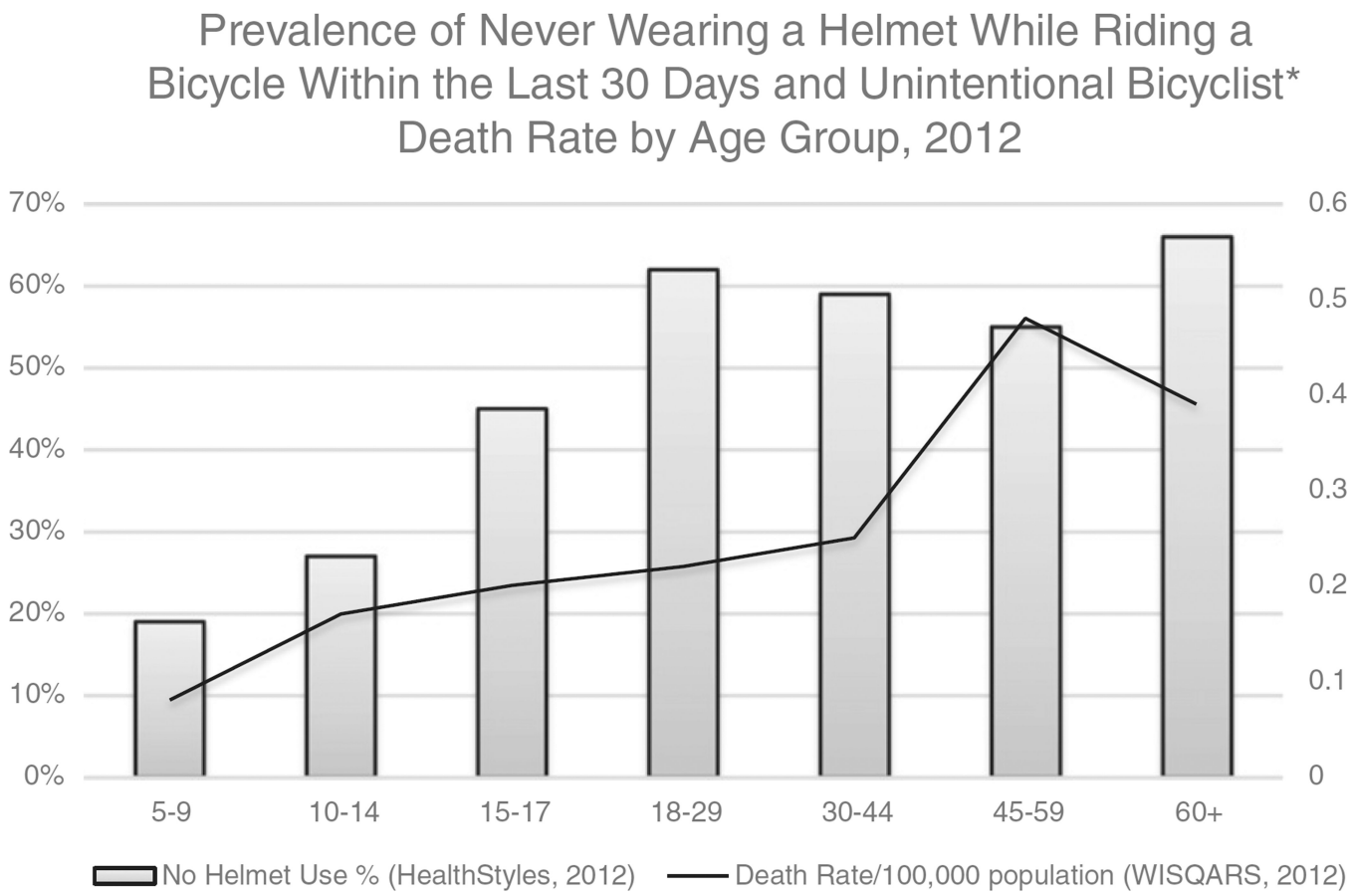

Fig. 1.

*Includes bicyclists and other cyclists (e.g., riders of nonmotorized vehicles such as tricycles and unicycles powered solely by pedals)

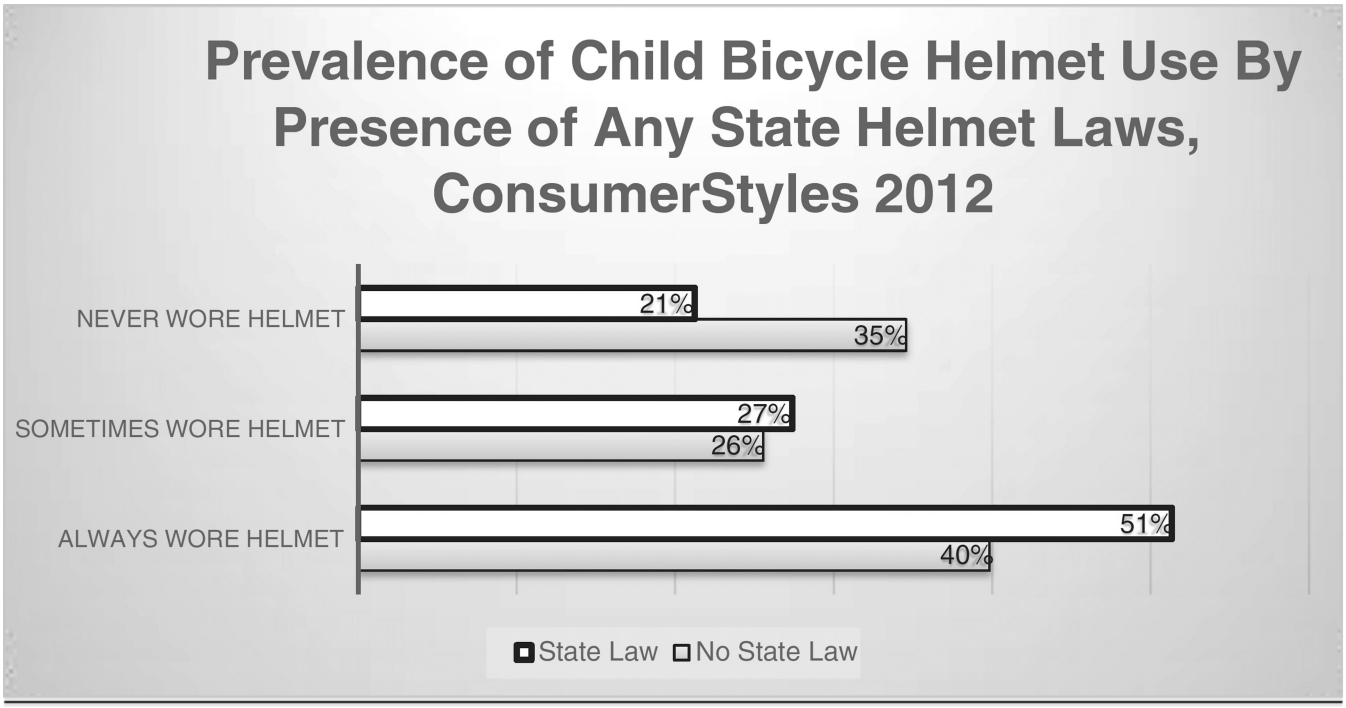

Fig. 2.

*State laws differ in age requirements and not all children up to 17 years old are covered under every state law. Adult respondents answered bicycle helmet use questions for their youngest child.

Table 1

Prevalence of and adjusted prevalence ratios for always wearing bicycle helmets among adult bicycle riders, by selected characteristics *Summer ConsumerStyles* 2012.

Characteristic		Sample N = 850[a]	Always wears helmet (weighted)	aPR (95% CI)
Annual household income	<$40,000	223	16%	<ref>
	$40,000–$84,999	314	22%	1.02 (0.96, 1.09)
	$85,000 +	312	37%	1.13 (1.05, 1.20)[b]
Education	≤High school graduate	311	18%	<ref>
	≥At least some college	538	30%	1.05 (0.99, 1.10)
Employment	Working	519	28%	<ref>
	Not working	330	22%	1.01 (0.95, 1.06)
MSA status	Non-metropolitan	122	17%	<ref>
	Metropolitan	727	27%	1.09 (1.01, 1.17)[b]
Marital status	Married	515	30%	<ref>
	Not married	334	19%	0.96 (0.91, 1.01)
Race/ethnicity	Non-Hispanic White	579	28%	<ref>
	Non-Hispanic Black	76	28%	1.05 (0.97, 1.14)
	Hispanic	150	11%	0.89 (0.84, 0.95)[b]
	Other race, non-Hispanic	44	34%	1.03 (0.93, 1.14)
Gender	Male	475	27%	<ref>
	Female	375	24%	0.98 (0.93, 1.02)
Age (years)	18–29	211	18%	<ref>
	30–44	261	28%	1.06 (0.99, 1.13)
	45–59	237	18%	1.07 (1.00, 1.14)
	60 +	141	28%	1.08 (1.00, 1.17)
Ride frequency	Daily	46	30%	<ref>
	Weekly	362	32%	0.99 (0.89, 1.10)
	Monthly	441	20%	0.89 (0.80, 0.99)[b]

aPR (95% CI) = adjusted prevalence ratio, 95% confidence interval.
MSA = metropolitan statistical area.
Other race, non-Hispanic = other single race or any 2 + races.

[a] Not all participants answered every question.

[b] P-value <0.05.

Table 2

Prevalence of and adjusted prevalence ratios for always wearing bicycle helmets among child bicycle riders (5–17 years), by selected characteristics *Summer ConsumerStyles* 2012.

Characteristic		Sample N = 630[a]	Always wore helmet (weighted)	aPR (95% CI)
Annual household income	<$40,000	191	28%	<ref>
	$40,000–$84,999	241	40%	0.85 (0.75, 0.97)[b]
	$85,000 +	198	59%	0.86 (0.75, 1.00)
Respondent education	≤High school graduate	237	32%	<ref>
	≥At least some college	393	49%	1.11 (1.00, 1.25)
Respondent employment	Working	434	46%	<ref>
	Not working	195	34%	0.99 (0.89, 1.10)
State helmet law[c]	No	350	39%	<ref>
	Yes	279	47%	1.14 (1.03, 1.25)[b]
MSA status	Non-metropolitan	89	20%	<ref>
	Metropolitan	540	46%	1.19 (1.03, 1.38)[b]
Respondent marital status	Married	515	45%	<ref>
	Not married	115	32%	1.14 (0.99, 1.32)
Respondent race/ethnicity	Non-Hispanic White	399	48%	<ref>
	Non-Hispanic Black	63	25%	0.86 (0.73, 1.00)
	Hispanic	120	32%	0.85 (0.75, 0.97)[b]
	Other race, non-Hispanic	49	41%	0.68 (0.54, 0.86)[b]
Respondent gender	Male	282	49%	<ref>
	Female	348	37%	0.98 (0.89, 1.08)
Respondent age (years)	18–29	66	29%	<ref>
	30–44	382	43%	1.19 (1.00, 1.42)
	45–59	170	46%	1.23 (1.00, 1.52)
	60 +	11	36%	1.03 (0.74, 1.44)
Youngest child age (years)	5–9	221	48%	<ref>
	10–14	258	42%	0.88 (0.80, 0.98)[b]
	15–17	150	35%	0.89 (0.79, 1.02)
Child ride frequency	Daily	80	31%	<ref>
	Weekly	331	45%	1.11 (0.97, 1.26)
	Monthly	219	43%	1.16 (1.00, 1.35)
Adult helmet use	Less than always	165	38%	<ref>
	Always	49	90%	1.38 (1.25, 1.54)[b]

aPR (95% CI) = adjusted prevalence ratio, 95% confidence interval.
MSA = metropolitan statistical area.
Other race, non-Hispanic = other single race or any 2 + races.

[a]Not all participants answered every survey question.

[b] P-value <0.05.

[c] Indicates whether state helmet law status was in place in 2012.