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Bicycle helmet use patterns in Italy. A description and analysis of survey data from an Italian friends of cycling association



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ABSTRACT

Cycling is becoming one of the most popular forms of recreation and transport the world over, but cyclists still have a high level of vulnerability. A bicycle helmet is an important safety device available to cyclists, but little is known regarding possible determinants of helmet use among adults. This study aims at providing information on helmet usage patterns in Italy and identifying the factors associated with bicycle helmet use. Data on 2072 bicycle riders from an Italian friends of cycling association aged 18 years or older who had ridden a bicycle in the last month were collected using an ad-hoc questionnaire via the web. The sample was equally distributed among subjects who always, most of the time, sometimes, rarely, or never use a helmet. To evaluate the association among socio-demographic and bicycle use characteristics and helmet use, a multinomial logistic regression model was performed. The results show a higher propensity to use a helmet among males, riders coming from Central and Southern Italy, people who cycles more than 60 kilometres in a week, cyclists who have already had a crash, people who do not cycle daily or almost daily, riders of sport bikes. Moreover, the propensity to use a helmet increases with age. The survey provided a first step in approaching the lack of data on cycling behaviour and the wearing of a helmet in Italy.

1. Introduction

Cycling, being easy, inexpensive and healthy, is becoming one of the most popular forms of recreation and transport the world over. Cycling for transport has the additional benefits of reducing traffic congestion, improving the quality of life in cities, reducing carbon emissions, and lowering the costs of transport and parking (Australian Bicycle Council, 2017). As a result, the cyclist population is growing in Europe (Küster, 2013; Van Hout, 2008).

But cycling is not without risk. Between 2004 and 2013, the total number of bicycle fatalities in the European Union (EU) countries decreased by 32%, but the share of bicycle fatalities in all road fatalities increased from about 6% to almost 8%, especially from 2010 to 2012. In 2013, 2017 cyclists were killed in road accidents in the EU. More than 40% of the cyclists were at least 65 years old when they died; most cyclist fatalities are male (79%), and 55% of cyclist fatalities occurred inside urban areas. About one-third of cyclist fatalities occurred during July, August and September, with a quarter of cyclist fatalities occurring in poor lighting conditions and 30% at junctions. Fatalities occurring at junctions were highest for bicycles compared to the other modes of transport. Cyclists, while relatively small in proportion with

respect to motorized vehicles, have a high level of vulnerability, thereby creating a significant need to better understand the characteristics specific to this user group (European Road Safety Observatory, 2017).

A good insight into the problem provides an opportunity to improve the safety of this inexpensive, convenient and environmentally safe mode of transport. A bicycle helmet is the primary safety device available to cyclists. Helmets reduce bicycle-related head injuries for bicyclists of all ages involved in all types of crashes, including those involving motor vehicles (Thompson et al., 1999). Bicycle helmets have been shown to be effective at reducing the severity of injuries, particularly brain injuries, in the event of a crash (Attewell et al., 2001; Davison et al., 2013; Hollingworth et al., 2015). Not wearing a helmet while cycling is associated with an increased risk of sustaining a fatal head injury (Persaud et al., 2012; Kopjar and Wickizer, 2000; Everett et al., 1996), and helmets are an important means of preventing or reducing head trauma (Everett et al., 1996). A biomechanical investigation has shown that contemporary bicycle helmets are highly effective at reducing head injury metrics and the risk for severe brain injury in head impacts, which are characteristics of bicycle crashes (Crompton et al., 2014).

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Several studies have examined the factors associated with helmet use in children (Rezendes, 2006; Pierce et al., 2014; Finnoff, 2001; O'Callaghan and Nausbaum, 2006), but far less is known regarding possible determinants of helmet use among adult bicyclists (Porter, 2016). Moreover, most of the studies on this topics were conducted in North America, USA and Canada. Some of the more recent researches were carried out in USA by Cathorall et al. (2015), Basch et al. (2014), and Porter et al. (2016) and in Canada by Grenier et al. (2013) and Teschke et al. (2012), while we found one paper about Europe, specifically Germany, published in 2011 (Ritter et al., 2011).

In an observational study, Cathorall et al. (2015) examined helmet use and related factors in a North Carolina city. Helmet use was observed for 25% of the sample. Demographic factors related to helmet use were being female, 26 years old or older, and white. It was found that bicyclists riding on the road with traffic were more likely to wear a helmet than bicyclists riding on the sidewalk.

Basch et al. assessed the prevalence of helmet use among cyclists in New York City (NYC) bike lanes. Over a two-month period, cyclists were filmed in five NYC locations with bike lanes. Half of all riders were observed wearing a helmet. The prevalence of helmet use was significantly higher among males than females and cyclists observed during recreational time periods were also less likely to be wearing a helmet than those observed during commuting time periods (Basch, 2014).

Porter et al. conducted a cross-sectional study to identify domain-specific (recreation versus transportation) correlates of helmet use among U.S. adult bicyclists, using nationally representative data from 2012. They found that among recreation cyclists, helmet use was significantly associated with income, safety training, not riding at night, feeling threatened while riding, and using bike lanes/paths. Helmet use among transportation riders was significantly associated with education, income, unemployment, safety training, and injury while riding within the past two years (Porter, 2016).

Teschke et al. (2012) estimated use of helmets, lights, and visible clothing among cyclists and examined trip and personal characteristics associated with their use, using data from a study of transportation infrastructure and injuries to adult cyclists in Toronto and Vancouver. They found that factors positively associated with helmet use included bike light use, longer trip distances, hybrid bike type, not using alcohol in the 6 h prior to the trip, female sex, older age, higher income, and higher education.

Grenier et al. (2013) described bicycle helmet use among Montreal cyclists by mean of a cross-sectional study. They showed that women had a higher helmet-wearing proportion than men and that youth had the highest helmet-wearing proportion, while young adults had the lowest.

Regarding Europe, the study from Germany reported that several socio-demographic factors were associated with helmet use among adult bicyclists, including gender, urban versus rural residency, income, and the presence of children in the household (Ritter, 2001).

In Italy, helmet use among adult cyclists is not compulsory and there is not a lot of data on the prevalence of helmet use among Italian cyclists. Monthly data collection was carried out in 2008 and 2009 in Florence, Tuscany, by means of direct observation. In 2008 and 2009, 789 and 753 cyclists were observed, respectively. Overall, 37% of cyclists in 2008 and 28.3% in 2009 used a helmet, with a significantly higher prevalence in use for men as opposed to women (44% vs 14% in 2008 and 34.7% vs. 8.2% in 2009). Nevertheless, it is interesting to note that helmets are especially used by individuals in a sporting context: among cyclists not involved in a sporting activity, only 4% in 2008 and 2.8% in 2009 wore a protective helmet. On the other hand, the prevalence in helmet use was 91% and 90.4%, respectively, for those practicing a sport. Moreover, stratifying the data for other variables that were considered for this latter group, no statistically-significant difference emerged in terms of gender and type of rider (youth/adults) (Agenzia Regionale per la Protezione Ambientale della Toscana, 2010).

In this context, the objectives of this study were: (i) to provide information on current helmet usage patterns in Italy and (ii) to identify the factors associated with bicycle helmet use.

2. Materials and methods

The study is based on Italian data collected as part of a multi-country survey of bicycle use, attitudes, patterns of use of helmet, and crash experiences by adult bicyclists in 17 countries. The European Union funded a collaborative network, COST Action TU1101: "Towards safer bicycling through optimization of bicycle helmets and usage", in order to design and conduct an international bicycling survey (European Cooperation in Science and Technology, 2017; Shinar et al., 2016; Otte et al., 2016; Morandi et al., 2016). The questionnaire was made available online. The software used to administer the online questionnaire was KeySurvey©.

2.1. Data collection

The investigation collected a great amount of information on current helmet use patterns and the reasons why bicyclists use or do not use a helmet. An ad-hoc questionnaire was set up using new scale items and items from previous bicycle safety surveys, including the Queensland Cycling Survey (Haworth and Schramm, 2011). The items were worded to maximise the relevance and usefulness of information collected from both wearers and non-wearers of helmets. The questionnaire contains items related to: (1) cyclists' socio-demographic characteristics, (2) the frequency of cycling and the amount of cycling for different purposes and in different environments, (3) the frequency and circumstances regarding the use and non-use of a helmet, and attitudes and reasons for this choice, and (4) involvement in crashes and the level of reporting to the police.

In the questionnaire, different type of questions were reported. More precisely, i) to investigate "circumstances regarding the use and non-use of a helmet, and attitudes and reasons for this choice" items were based on five elements of Likert scale (from strongly disagree to strongly agree); ii) to describe cyclists about their "frequency of cycling and the amount of cycling for different purposes" answers required to report the average of kilometres travelled; iii) to collect "socio-demographic characteristics and involvement in crashes and the level of reporting to the police" the questions have a binary or multiple choice answers.

2.2. Study population

In Italy, the web-based survey interviews were conducted between June and August 2014. The convenience sampling represented the recruitment strategy for this study. Subjects of the study were bicycle riders from an Italian friends of cycling association with members throughout the country. Participants were restricted to adults (18 years of age or older) who had ridden a bicycle in the last month. They were approached via e-mail, newsletter and a link on the association website. Cyclist responses were both anonymous and confidential. After having eliminated uncompleted questionnaires or questionnaires not meeting the inclusion criteria, the final sample size for analysis was equal to 2072 subjects.

2.3. Variables for analysis

The interview solicited information about the type of bike used, cycling experience in the past year, involvement in a road accident as a cyclist, if the individual wore a helmet, and helmet use. Demographic items were recorded for each subject including sex (male/female), whether or not the subject has minor children (yes/no), age group in years (18–24, 25–44, 45–64, 65+), geographical area (North, Centre, South), education level (secondary school, high school, university),

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