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A systematic Review on the Effects of Bicycle Helmet Legislation on Cycling

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1 INTRODUCTION

Helmet wearing for pedal cyclists has been shown in many biomechanical and epidemiological studies to be beneficial in mitigating bicycle related head injuries in a crash or fall [1-5]. In an effort to increase bicycle helmet wearing, several jurisdictions around the world have enacted mandatory helmet legislation (MHL). This includes legislation adopted in Argentina, Australia, Austria, parts of Canada, Chile, Czech Republic, Croatia, Estonia, Finland, France, Iceland, Israel, Japan, Jersey, Latvia, Lithuania, Malta, New Zealand, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, United Arab Emirates and parts of the United States.

Countries with MHL have observed a sustained increase in helmet wearing. In particular, helmet wearing for Swedish children 0-10 years of age increased from 35.2% in 2004 to 64.8% in 2005 post-legislation [6]. In New South Wales (NSW), Australia, there were drastic increases in all-age helmet wearing from about 20% to 85% from the pre- to post-MHL period [7]. Bicycle helmet wearing in New Zealand was around 5% in the mid-1980's and has hovered around 90% since their MHL became effective in January 1994 [8].

In response, critics of MHL and the promotion of helmet wearing in general cite declines in ridership as an unintended consequence. For example, Robinson [9] used the counts of cyclists from the NSW and Victorian helmet use reports to conclude cycling ridership declined by 30-40% following legislation. This research is often cited as a reason to not mandate helmet use or repeal current laws [see, for example, 10, 11]. Similar arguments have been made to repeal the Swedish law [12].

Conversely, a substantial body of research has found MHL is not associated with declines in cycling. For example, Macpherson, Parkin and To [13], and Dennis, Potter, Ramsay and Zarychanski [14] did not find cycling declines in Canada while more recent Australian studies have drawn similar conclusions [15,16]. Consequently, the literature is decidedly mixed on the effect MHL has on cycling ridership.

The literature on the impact of bicycle helmet legislation lacks comprehensiveness across all relevant countries. That is, although there are 26 countries with some form of MHL, the research literature has focused almost solely on Australia, Canada, New Zealand and the US. The effects of MHL in other 22 countries have been largely overlooked. Given that peer-reviewed publications are not the standard mode of communication for government agencies, relevant reports and/or data might exist for our purposes in the grey literature. Therefore, a systematic review through the peer-reviewed and the grey literature would greatly improve identifying relevant

data which in turn would improve our knowledge of the effects of MHL on cycling. The aim of the present study is to conduct and report the findings from such a review.

2 METHOD

The current systematic review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [17]. A search of five databases (Embase, Medline, Compendex, Scopus, and Web of Science) for peer-reviewed articles was conducted on 16 February 2017. The grey literature will be identified by contacting road safety organizations in countries with existing MHL, searching through abstracts of international conferences and websites sponsored by pro- and anti-helmet organizations. Other grey literature platforms (e.g., Trove and Worldcat) and datasets (e.g., ProQuest) will also be searched. The exact details of each law (e.g., effective date, age of cyclists, level of enforcement) will also be identified from government websites and by contacting government representatives or road safety researchers.

The included studies will be assessed against quality criteria. The quality criteria are modified from the Effective Public Health Practice Project [18], Critical Appraisal Checklist for a Meta-Analysis or Systematic Review [19], and the Joanna Briggs Institute Reviewers' Manual [20]. The seven quality criteria relate to: selection bias, exposure for jurisdiction, measurement reliability, sample size, appropriate analysis, confounding, and response rate. Studies will be rated as weak, moderate, or strong against each quality criterion. In compliance with PRISMA, documents for this review will be independently searched and extracted by two reviewers. Discrepancies will be also discussed by the authors and a third party will adjudicate unresolved issues.

3 CONCLUSIONS

The findings of this ongoing systematic review will enhance our knowledge of the effects of MHL. Past reviews have focused primarily on the peer-reviewed literature from English speaking countries [e.g., 21, 22], while our review will attempt to gather relevant data from all 26 MHL countries.

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