

A Bibliometric Review of Six Decades of Road Safety Education Research

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Abstract: Road safety has increased over the last decades. Nevertheless, road accidents remain the leading causes of death and injuries, especially for teenagers. Road safety education is, therefore, essential to enable teenagers to be attentive to road safety measures. This study aims to scrutinize the bibliometric review of road safety education based on the evolution of publications, leading countries, distribution of institutions, contributing to research areas, preferred journals, and reference analysis. There were 173 publications on road safety education retrieved from 1958 to 2020 in the Scopus database. The retrieved data were exported to Microsoft Excel and Publish or Perish (PoP) for further review. The results revealed conflicting patterns in road safety education over six decades of publications. The most prominent publication country was the United Kingdom. Accident Analysis and Prevention became the most preferred journal in publishing road safety education research. The article entitled "The effect of age, gender, and driver status on pedestrians' intentions to cross the road in risky situations" obtained more citations from previous researchers. Based on this bibliometric review, road safety education offers vital information for future studies in benefitting road safety practitioners and researchers worldwide.

Keywords: Bibliometrics, road accidents, road safety education, publication trends, Scopus database.

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INTRODUCTION

Road accidents were the leading causes of death and injury, with 35% to 40% entailed teenagers [1]. Despite the growing emphasis on road safety over the last decades, teenagers are still over-represented in road accidents, especially motorcyclists and bikers [2]. The increased risk of road accidents was associated with human factors such as lack of experience as a traffic agent, undeveloped cognitive and emotional, extreme social dynamics at work, negative peer pressure, and the use of alcohol and drugs [3, 4]. Furthermore, teenagers might be suffered from distraction and drowsy driving [5].

The importance of preventing road accidents and the awareness that teenagers are particularly vulnerable are expressed in the scope of

road safety education [6]. Road safety education, therefore, encourages teenagers to be attentive to road safety measures [7-9]. The quality of road safety education initiatives varies and may not always effectively reduce accident rates [10]. Also, there was a lack of consistency in road safety measures [11].

Due to the diversity of assessment approaches, the effect of road safety education is still minimal [12]. It is specified that road safety education must be evidence-based and be compatible with teenage growth and the degree of freedom of road users [13]. Correspondingly, the importance of proper road safety education is required to promote safe road behaviour through knowledge, skills training, or fears of appeal [2, 14] and to reduce the rate of fatalities [15]. Additionally,

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although road safety has been extensively studied over six decades, no systematic bibliometric review of road safety education has been published in Scopus indexed journal publications.

This study aims to inspect the bibliometric review of road safety education based on the evolution of publications, leading countries, distribution of institutions, the contribution of research areas, preferred journal, and reference analysis. The information presented in this review is projected to deliver a clear outline of the road safety education research direction that could allow road safety practitioners and researchers to review the information that benefits their studies. This review would also anticipate making significant contributions to current research in road safety education.

METHODOLOGY

Data collection and retrieval strategy

Bibliometric is a method that provides a convenient and non-reactive tool for research collaboration and assessment of scientific publications [16]. Bibliometric analysis was carried out using the Scopus search engine, retrieved on October 10, 2020. The Scopus database was selected because it has extensive documents compared to the Web of Science and Pubmed [17] and has been frequently cited in previous studies [18, 19]. The bibliometric review was initiated with the identification of precise keywords, appropriate information, and the specific objective of the analysis based on the research design proposed by Zare et al., [20]. The keyword “road safety education” based on TITLE-ABS-KEY was used to collect data on publications. The quotation marks were used to produce accurate search results [21].

The keyword “road safety education” was retrieved from 1958 to 2020 and generated 173 publications. Out of the 173 publications, 133 were articles from various journal sources, 22 were conference papers, 9 were review papers, and less than five other publications such as books, book chapters, and reports. A total of 162 publications were written in English, and the rest were written in other languages such as Chinese, Spanish, and French. Data in Comma Separated Values (CSV) and Research Information Systems (RIS) format such as years, authors, the field of study, article sources,

countries, and languages were exported to Microsoft Excel, Publish or Perish (PoP), and VOSviewer software for further analysis.

RESULTS

Evolution of publications, leading countries, and distribution of institutions

Scientific productivity can be measured easily by quantifying the published content. Yet, it is more complicated in practice since several issues need to be deliberated. Figure-1 illustrates the evolution of road safety education publications. The publications were launched in 1958, with a stagnating period until 2004. The number of publications was fewer than five per year. The publication had rocketed sharply into seven documents in 2005 and slipped to one in 2006. In 2007, more than five publications witnessed a substantial rise until 2020. The results reveal the concern on road safety education has increased rapidly. The highest number of road safety education publications was 16, which is in 2018. This evolution of publications has different strands and are connected to a certain pivotal point of view.

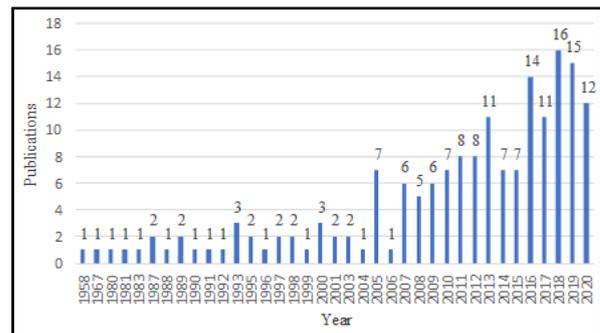


Fig-1: The number of publications each year

Scholars from four different countries have contributed to disseminating road safety education publications with at least ten publications, as indicated in Table 1. The top of the list is the United Kingdom, with a total of 24 publications (11.54%), followed by Australia (15 publications, 7.21%), the United States (11 publications, 5.29%), and Malaysia (10 publications, 4.81%). The results indicated that developed countries had dominated the publishing of road safety education over six decades. The role of the institutions in road safety education was also considered in this analysis based on at least ten publications.

Table-1: Leading countries

Rank	Country	Frequency	Percentage (%)
1	United Kingdom	24	11.54
2	Australia	15	7.21
3	United States	11	5.29
4	Malaysia	10	4.81

Table-2: Distribution of institutions

Institutions	Frequency	Percentage (%)
Queensland University of Technology	5	2.33
SWOV Institute for Road Safety Research	5	2.33
University of Strathclyde	5	2.33
Maastricht University	4	1.86
Monash University	4	1.86

Table-2 displayed Queensland University of Technology, SWOV Institute for Road Safety Research, and the University of Strathclyde had the highest number of publications with five publications (2.42%), respectively. This information designated that academicians and professional experts had been actively engaged in road safety education for 62 years and played a considerable role in the publications.

Contribution of research areas, preferred journal, and reference analysis

The contribution of the research areas showed the empirical assortment of research categories. An analysis of the research areas of 295 publications was divided into 20 themes. As seen in Table 3, the top five research areas are led by medicine (27.46%), social science (27.12%), engineering (20.34%), psychology (7.12%), and computer science (3.73%). Medicine became a top-notch area because the field of medical research has a strong socioeconomic impact by offering valuable knowledge on risk factors, effects of medication or public health interventions, functional capabilities, trends of care, and costs and use of health care [22].

Table-3: Contributing of research areas

Rank	Research Area	Frequency	Percentage (%)
1	Medicine	81	27.46
2	Social Sciences	80	27.12
3	Engineering	60	20.34
4	Psychology	21	7.12
5	Computer Science	11	3.73

Table-4: Top five journals

Rank	Journal	Frequency
1	Accident Analysis and Prevention	12
2	Traffic Injury Prevention	6
3	British Journal of Educational Psychology	4
4	International Journal of Environmental Research and Public Health	3
5	Journal of Traffic Medicine	3

Table-4 list the top five journals, with Accident Analysis and Prevention, which has the highest publications with a frequency of 12. This phenomenon may be because this journal reaches more readers. Reference analysis is one of the primary bibliometric analysis documentations [23]. The degree to which the publications have been cited in the following scientific literature is often used to measure the scientific impact and international visibility. Table 5 summarized the most top-five cited articles (based on the citation

number of the text) as per the Scopus database. Holland and Hill [24] published the highest number of citations (154 citations), equivalent to 11.85 citations per year for the article entitled “The effect of age, gender and driver status on pedestrians’ intentions to cross the road in risky situations”. The article was published by Accident Analysis and Prevention. The number of citations can be described as actual data, which means that the article’s citation continues to increase.

Table-5: Top five most cited articles

Authors	Year	Title	Sources	Cites	Cites Per Year
C. Holland, R. Hill	2007	The effect of age, gender and driver status on pedestrians’ intentions to cross the road in risky situations	Accident Analysis and Prevention	154	11.85
Ampofo-Boateng, K., Thomson, J.A.	1991	Children’s perception of safety and danger on the road	British Journal of Psychology	97	3.34
C.A. Holland	1993	Self-bias in older drivers’ judgments of accident likelihood	Accident Analysis and Prevention	47	1.74
A. Tolmie, J.A. Thomson, H.C. Foot, K. Whelan, S. Morrison, B. McLaren	2005	The effects of adult guidance and peer discussion on the development of children’s representations: Evidence from the training of pedestrian skills	British Journal of Psychology	46	3.07
B.M. Yang, J. Kim	2003	Road traffic accidents and policy interventions in Korea.	Injury control and safety promotion	41	2.41

DISCUSSION

The bibliometric review was conducted to explore the publication trend of road safety education over the last six decades in the Scopus database. It is essential to determine the research’s efficacy related to the specific context to be carried out by future researchers [25]. From the review, the researchers found that a total of 173 road safety education publications were published between 1958 and 2020, with a stagnating period until 2004. The publication rocketed sharply into seven documents in 2005 and slipped to one in 2006. This information indicated that road safety education is still not favored among the current researchers. And, this is also could deliberate the number of road accidents were keep on rising. The highest number of road safety education publications was only 16, which is in 2018. Successful publications have shown that the value of road safety education has started after five decades of publications. Assailly [1] suggested that road safety education affects parents, the social environment, education, emotions, and accident participation impact historical trends. Aghdam et al., [14] argued that education is the centerpiece of a decade of road safety, which has minimized the number of deaths caused by accidents due to a sound education program’s circumstance. Thus, road safety is one of the critical priorities of a constructive approach to evaluating the road safety education program, which has made a significant scientific contribution over the last century [26].

In the sense of contributions by countries, the United Kingdom, Australia, and the United States were countries of great significance for publishing road safety education. This is attributed to researchers in developing countries who are constantly evaluating the efficacy of road safety education in resolving the challenges of the current

progress to prevent road accidents. Surprisingly, Malaysia ranked fourth in the contribution country to publish ten road safety education publications in this bibliometric review. It has been shown that improving road safety and the effectiveness of the road safety management system in Malaysia sustainably improve by addressing the current reliance on funding from the government agencies, heterogeneity of decision-making in this de facto multidisciplinary area, legislative structure for road safety and public awareness [27]. This information designated that Malaysia is striving to ensure road safety education is given priority in reducing road accidents. Thus, future researchers should develop a road safety curriculum in the Malaysian education system.

In terms of contribution journals, the Accident Analysis was the most influential source. This information was supported by Scopus preview in 2020 [28], where the Accident Analysis and Prevention cites score was 6.4 and 93% of the highest percentile in 2019. This journal was based in the United Kingdom under the Elsevier production and classified as a high-impact publisher by Scopus with the First Quartile (Q1) [28]. This information would enable readers and other researchers to obtain a good source of road safety education publications as a guide in their studies.

This bibliometric review has also compiled a list of five authors with a rank of the Hirsch h-Index to identify the author of influential research on road safety education. C. Holland and R. Hill were the most influential authors with Hirsh’s h-Index of 154 for the article entitled “The effect of age, gender and driver status on pedestrians’ intentions to cross the road in risky situations” and followed by Ampofo-Boateng, K., and Thomson, J. A., with Hirsch’s h-Index of 97 for the article entitled

“Children’s perception of safety and danger on the road”. This insight had helped to provide the most prominent road safety education researchers to be considered in future studies.

One limitation of this article is the inability to classify the keywords most commonly used, as the data on the database was inadequate, resulting in marginal tests. Also, the essence of a bibliometric review per se is minimal. Only publications that meet the search criteria and refining specifications set out in the methodology (“road safety education”) have been included. It is a weakness of this study, which limits empirical findings and does not allow various organizations to understand road safety education fully. Confining the results of the Scopus database is another limitation. Further studies should be conducted to determine the trend of road safety education publications in a real context, such as road safety education programs or interventions and road safety education based on specific targeted groups, program content, educational methods, instructors, resources, and evaluation.

CONCLUSION

This bibliometric review promotes examining and integrating established directions in road safety education research, and new trends are emerging. Based on a bibliometric review of six decades of road safety education, the researchers found that the information below will be able to provide the readers, road safety practitioners, and researchers:

1. The number of publications on road safety education has fluctuated, and the highest number of publications was 16 copies in 2018.
2. In terms of countries, the United Kingdom, Australia, and the United States were active publishing countries. Besides, Malaysia became one of the developing countries actively researched road safety education.
3. The Accident Analysis and Prevention was the most influential source with a cites score of 6.4 and 93% of the highest percentile in 2019. This journal was based in the United Kingdom under the Elsevier production and classified as a high-impact publisher by Scopus with the First Quartile (Q1).
4. The most influential author for road safety education publications was C. Holland and R. Hill, with Hirsh’s h-Index of 154 for the article entitled “The effect of age, gender, and driver status pedestrians’ intentions to cross the road in risky situations”.

Road safety education is thus obviously a critical element in the promotion of road safety across communities worldwide. Consequently, based on this bibliometric review, road safety practitioners

and researchers could identify the essential information to assess road safety education information in their future studies.

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