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SCOPING REVIEW: TRAVEL MODE CHOICE IN SAFE ROUTES TO SCHOOL PROGRAMME

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Abstract:

This scoping review aims to explore the travel mode choice in safe routes to school programme, as review in existing literature. A scoping literature review is performed by searching Scopus database and identified 189 related studies. However, only 53 studies throughout 2007 – 2022 were identified as meeting the criteria established for the study. The aspects contained in this study includes existing studies which provide information on the safe routes to school (SRTS) programmes and their travel mode choice. This paper could be very beneficial for researchers, policy makers and whoever interested in undertaking future studies related to SRTS.

Keywords:

"Scoping Review", "Safe Routes", "School", "Travel Mode", "Children"

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Introduction

Travelling to and from school is part of children's daily routine either travel actively or passively. Globally, current situation of travelling mode of the children to school is through motorise vehicles but still some countries are aiming for safe routes to school where safety is the main aspect to be considered by most parents. Literature review form a crucial art in academic research (Xiou & Watson, 2019). The generation of new knowledge found its based mostly in previous literature. Thus, it is important for researchers to conduct literature review in their attempt to analyse, interpret and evaluate existing body of knowledge. This process will enable them to establish precedents results and findings, understand the depth and details of existing knowledge and ascertain gaps for future studies. Traditionally, researchers conducted literature review with broad scope and rigorous method to accomplish their research. Contrary to the traditional method of doing literature review, a scoping review helps researchers in focusing and filtering future research. This scoping review aims to identify gaps in literature on travel mode choice in safe routes to school programme, as review in existing literature.

Literature Review

There are two points will be discussed in literature review including the understanding of safe routes to school (SRTS) and challenge and fear to school effect travel mode choice.

Safe Routes to School (SRTS)

SRTS, or Safe Routes to School, is a movement dedicated to fostering the well-being, safety, and sustainability of transportation systems for children commuting to and from school. The initiative originated in response to a decline in walking and biking rates among school children residing nearby, as highlighted in studies by McDonald and Aalborg (2009), Anderson (2017), and Pabeyo et al. (2010), as cited by Aibar Solana et al. (2018). It was initially introduced in the United States during the 1990s, with the first federally funded program emerging in 2005. Over time, the program has undergone statutory and procedural changes, with funding directed towards infrastructure development and programming to create a safer environment that encourages walking or biking to school.

The primary objectives of the SRTS program include promoting healthy habits of walking and biking, providing safer and attractive transportation alternatives for school travel, and contributing to sustainable planning and project implementation (Voulgaris et al., 2021). To effectively implement SRTS, the incorporation of the six E's framework—engagement, equity, engineering, encouragement, education, and evaluation—is essential (Zimmerman & Lieberman, 2019). The program places a particular emphasis on equity by targeting schools and communities with the greatest need for improved walking and biking conditions, especially in low-income and minority communities where poor physical environments contribute to a higher incidence of injuries and fatalities during school commutes.

Zimmerman and Lieberman (2020) outlined numerous health and safety benefits associated with SRTS programs for both students and communities. These benefits encompass healthier and safer students, enhanced community connectedness, reduced costs, decreased traffic-related injuries and fatalities, improved environmental conditions, reduced traffic congestion, and better academic performance. Schools with specific policies, procedures, and programs designed to ensure student safety have observed positive outcomes (Ikeda et al., 2020).

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According to United Nations (2021), private car transport is dominantly use for passenger mobility. Overall, SRTS programs demonstrate a clear alignment with the principles of the Sustainable Development Goals, particularly Goal 3 (Good health and well-being) for school children and their communities that specifically target on road safety, and Goal 11 (Sustainable cities and communities) by fostering inclusive, safe, resilient, and sustainable environments for both.

Challenge and Fear to School Effect Travel Mode Choice

According to Raoniar et al., (2019), the association between transport mode choice and income component was mostly consistent with prior research in developed countries that basically involved facilities and infrastructure provision. The problem with transport infrastructure and facilities is one of the challenges that effect the travel mode choice despite of the accidents and safety issues. This is regarding the ability of the children to commute safely and conveniently to and from school (Adom-Samoah et. al. (2015). Furthermore, parents believe that having too many items to carry negatively influences children's use of actively travel on the way home from school (Wilson et al., 2018). The assessment of fear within the school context encompassed six dimensions, which included a sense of insecurity within the school premises, avoidance of specific locations, avoidance behaviours, degradation of the physical environment, aspects related to the social environment, and experiences of indirect victimization (Abdul Wahab & Md Sakip, 2017) and from all six dimensions, a pilot study done by Abdul Wahab & Md Sakip (2017) discovered the behaviour and reaction towards physical environment components is effective and sensitive. There are variables that are included in the feature of child-friendly infrastructure, such as pedestrian separation (Rini et al., 2019). There was a study where children who cycled to school tended to avoid streets with high accident rates. Both for walking and cycling, they favoured residential streets over other types and typically steered clear of streets with zebra crossings. The variations between the routes children took and the shortest possible routes can largely be attributed to their preference (or that of their parents) for avoiding busy roads (Dessing et al., 2016). Therefore, residential preference explicit a wide scope of mobility intentions including children that begin with residents' desired choice of houses, neighbourhood, and places. Residential location choice specifies residents' desired housing location. Residents may want their house to be close to their children's school or the city centre to decrease their travel time regardless of whether the desired area has traffic congestion during peak hours (Abdul Fattah & Badarulzaman, 2018).

Table 1: Summary of Literature Review

Author	Benefits
Voulgaris et al. (2021	Promoting healthy habits of walking and biking, providing safer and attractive transportation alternatives for school travel
Zimmerman and Lieberman (2020)	Numerous health and safety benefits associated with SRTS programs for both students and communities
Author	**Challenges**
McDonald and Aalborg (2009), Anderson (2017), and Pabeyo et al. (2010), as cited by Aibar Solana et al. (2018).	Decline in walking and biking rates among school children residing nearby

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Adom-Samoah et. al. (2015)	The ability of the children to commute safely and conveniently to and from school
Wilson et al., 2018	Parents believe that having too many items to carry negatively influences children's use of actively travel on the way home from school
Abdul Wahab & Md Sakip (2017)	Sense of insecurity within the school premises, avoidance of specific locations, avoidance behaviours, degradation of the physical environment, aspects related to the social environment, and experiences of indirect victimization
Dessing et al., 2016	The variations between the routes children took and the shortest possible routes can largely be attributed to their preference (or that of their parents) for avoiding busy roads

Author	Solutions
Abdul Fattah & Badarulzaman (2018)	Residents may want their house to be close to their children's school or the city centre to decrease their travel time regardless of whether the desired area has traffic congestion during peak hours

Methodology

Qualitative method is applied is this research through scoping review. The scoping review was carried out following the framework outlined by Arksey & O'Malley (2005). Comprehensive searches based on the safe routes to school (SRTS) programmes were conducted in Scopus database, with no limitations applied. Articles were screened at the title and abstract level and at full text by three reviewers. One reviewer extracted data that were analysed descriptively to map the available evidence. A total of 189 articles were screened at the title and abstract level, of which 55 were also assessed at full text for eligibility. Time taken for overall review process is around two months. To ensure the validity and reliability of this scoping review, a transparent and replicable five stages of scoping review by Arksey & O'Malley (2005) are outlined below:

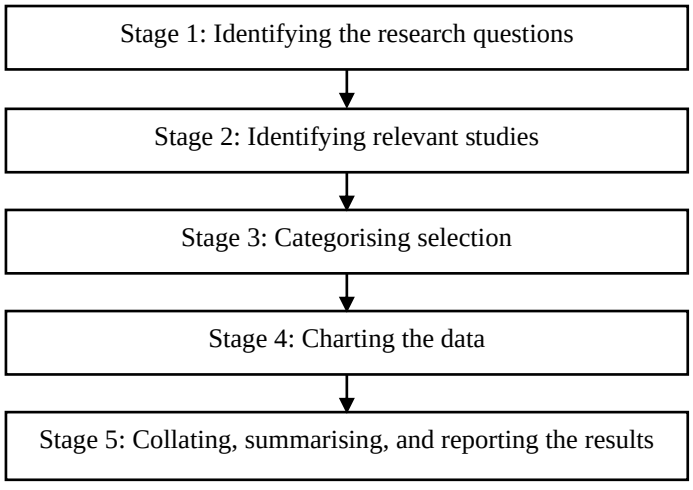

Figure 1: Scoping Review stages by Arksey & O'Malley (2005)

A broad research question was formulated to guide literature search. Then relevant articles were selected, data from the articles was tabulated before summarising and synthesising were done data, and finally, the findings were reported and disseminated.

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Stage 1: Identifying The Research Question

The research question asked to guide literature search was "Which existing studies provide information on the safe routes to school (SRTS) programmes?". In addition, only articles studied on travel mode choice were selected.

Stage 2: Identifying Relevant Studies

The relevant studies safe routes to school programmes are filtered in Scopus database from any year of research published.

Stage 3: Categorising Study Selection

Therefore, the third stage is the selection criteria for article acceptance were studies conducted on travel mode choice.

Stage 4: Charting The Data

At this stage, the relevant literature sources were mainly derived from Scopus database journals related to SRTS. Combination of word technique was applied using string search of "Safe Routes to School" for more focused results (refer to Table 1). After reviewing the search results, one-hundred-eighty-nine (189) potentially relevant articles were identified from 1970 to 2022 (refer to Table 2).

Table 2: Format on Articles

Database	Search Terms	Search String	Number of articles found
Scopus	Safe routes to school	TITLE-ABS-KEY ("safe routes to school"	189
		Filter results to TITLE-ABS-KEY (travel mode choice)	55

Stage 5: Collating, Summarising, And Reporting The Results

References from open sources were chosen as they are convenient to be accessed, cross checked by others, more transparent (good for validity and reliability) and economically viable. Initial search for articles published ranged from 1970-2022 resulting in189 articles from Scopus database.

Main Results

This review employed quantitative data analysis. The quantitative method used involve counting the total articles according to the year of publication, research design, subject area, source title of articles and list of the most active contributors. Data gathered from articles were tabulated and grouped together.

Year of Publication

The researcher reviewed and recorded all journals published from 2004 to 2022 with a total of 55 articles. However, two articles are not applicable in the database. Results on 53 articles review are explained in table 2 until table 8. From the 53 articles, the greatest number of related articles were published in 2012 which recorded 8 articles and followed by 2022, 2014 and 2008 that recorded 5 articles each year. This shows that the interest in studying travel mode choice in SRTS programmes is gaining momentum every year.

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Table 3: Number of Publication by Year

Year of Publication	Number of Articles
2022	5
2021	2
2020	4
2019	4
2018	2
2017	3
2016	2
2015	1
2014	5
2013	3
2012	8
2011	2
2010	2
2009	3
2008	5
2007	2
Total	53

Research Design

The biggest number of articles, which were twenty-four, reported studies employing quantitative research approach which involved data from parents and students and secondary data of travelling to school (refer table 4).

Table 4: Research Approach

Year of Publication	Research Approach			Total
	Qualitative	Quantitative	Mixed methods	
2022	2	3		5
2021		1	1	2
2020	2	2		4
2019		3	1	4
2018		2		2
2017	1	2		3
2016	1		1	2
2015			1	1
2014		1	4	5
2013			3	3
2012	6	2		8
2011			2	2

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2010	1	1		2
2009		3		3
2008		3	2	5
2007		1	1	2
Total	13	24	16	53

Table 5 recorded the most data collection methods used are research is through questionnaire, focus group discussion, observation, interview, and article review with frequency of 6 to 23 articles. The greatest number recorded from articles with method on questionnaire survey. This method involved school students with several schools as case study.

Table 5: Data Collection Method

Data Collection Method	Total
Questionnaire	23
Focus group discussion	12
Observation	8
Interview	7
Article review	6
Systematic review	2
Secondary data	2
Parents survey	2
Rapid realist review	1
Serial cross-sectional study	1
Quasi-experimental	1
Coding and parameters	1
Analytical methods	1
Urban assessment tool	1
Cognitive mapping methods	1
Narrative review	1
Community-based participatory	1
Case studies	1
Multinomial logit model	1

The types of analysis mainly used in the research include descriptive, chi-square, t-test, thematic, correlation, content, regression model and mapping or spatial analysis (refer to table 6).

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Table 6: Types of Analysis

Types of Analysis	Total
Descriptive analysis	4
Chi-square analysis	3
t-test	3
Thematic analysis	2
Correlation analysis	2
Content analysis	2
Regression model	2
Spatial/ mapping analysis	2
Realist logic of analysis	1
Multilevel logistic models	1
Modal choice model	1
Desire line analysis	1
Effective Public Health Practice Project (EPHPP) quality assessment tool & Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) approach	1
Cross-sectional analysis	1
Complete Streets Assessment Tool	1
Bixiariate analysis	1
count data analysis	1
Complete Streets Assessment Tool	1
Fractional legit model	1
Longitudinal analysis	1
Factors model	1
Urban form model	1
Best-fit model	1

Subject Area of Articles

Table 7 shows that covered subject areas are mainly from social sciences, medicine, engineering, and environmental science.

Table 7: Subject Area of Articles

Subject Area of Articles	Total
Social Sciences	34
Medicine	23
Engineering	18
Environmental Science	15
Decision Sciences	4
Business, Management and Accounting	3
Economics, Econometrics and Finance	2

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Energy	2
Health Professions	2
Psychology	1
Computer Science	1
Arts and Humanities	1
Nursing	1
Total	53

Sources of Articles

The highest number of articles published are basically from Journal of Transport and Health, Transport Policy and Transport Research Record which recorded 4 articles from each source (refer to table 8).

Table 8: Sources of Article

Sources of Articles	Total
Journal of Transport and Health	4
Transport Policy	4
Transportation Research Record	4
American Journal of Preventive Medicine	3
International Journal of Environmental Research and Public Health	3
Advances in Transportation Studies	2
Journal of Physical Activity and Health	2
Journal of The American Planning Association	2
Journal of Transport Geography	2
Transportation Research Part A Policy and Practice	2
2013 Tac Conference and Exhibition Transportation Better Faster Safer Tac Atc 2013	1
50th Annual Transportation Research Forum 2009	1
American Journal of Health Promotion	1
BMC Public Health	1
Central European Journal of Public Health	1
Circulation	1
Cities and Health	1
Cleaner and Responsible Consumption	1
Environment and Behavior	1
Environment and Planning	1
European Journal of Public Health	1
Evaluation and Program Planning	1
ITE Journal Institute of Transportation Engineers	1
International Journal of Behavioral Nutrition and Physical Activity	1
International Journal of Sustainable Transportation	1

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Journal of Planning Education and Research	1
Journal of Planning Literature	1
Journal of School Health	1
Journal of Transport and Land Use	1
Journal of Transportation Safety and Security	1
Journal of Urbanism	1
Preventive Medicine Reports	1
Proceedings of the 8th International Conference of Chinese Logistics and Transportation Professionals Logistics the Emerging Frontiers Of Transportation And Development In China	1
Reviews on Environmental Health	1
Socio Economic Planning Sciences	1
Transportation	1
Transportation Research Interdisciplinary Perspectives	1
Total	55

List of the Most Active Contributors

There are seven authors who consistently contribute to Safe Routes to School research namely McDonald, Zhour, Yang, Hoelscher, Hsu, Ross and Schlossberg and with three and more related articles (refer to table 9).

Table 9: List of the Most Active Contributors

The Most Active Contributors	Total
McDonald, N.C.	7
Zhou, H.	5
Yang, Y.	4
Hoelscher, D.M.	3
Hsu, P.	3
Ross, A.	3
Schlossberg, M.	3

Conclusion

This scoping review sheds some light on knowledge on safe routes to school (SRTS) programmes which focus on travel mode choice of students to school. The main aim of this scoping review was to identify gaps in literature on SRTS through previous research that can be used as directions for further research. It was found that the research on SRTS is consistently published every year with higher number on quantitative method recorded. Therefore, further research should be done using data from questionnaire survey by applying several analysis techniques highlighted in this study. This research can contribute to new knowledge in understanding about safe routes to school programs that benefits community on the importance of children safety and at the same time can enhance children ability to actively move to school.

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