

## Factors That Influence the Parents Perspective of Allowing Their Children to Walk to / From School- An Overview

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### ABSTRACT

*Walking is claimed as the best mode to school due to its benefits towards the environment and health. In the past, walking to school was a common mode. Nowadays, the safety and environmental issues, however, become decisive factors that prevent the parents to allow their children from walking. Despite its advantages, several investigations have shown that walking as a mode choice continues to suffer from narrow and weak foundations that impede to provide a unified identification of factors affecting the parents' decision on walking as a mode choice. Addressing this issue, this article aims to provide a review of previous study on regards the factors affecting the parents' decision to allow their children to walk to/from schools, the limitation of review is that the review was conducted on the published studies between 1995 and January 2019. The contribution identifies some factors affecting the parents' decision about walking to school. It conceptualizes the relationship between different factors that affecting on parents' decision. Out of 310 research articles 112 of them were the key of achieving the research objective as to element the founding that factors such as distance, safety, traffic, sidewalks, built environment, demography, and parents' perception have a great influence on parents' decision to allow their children to walk to-and-from school. The findings of this review can be used to offer a better deal with parents' concern about their children to travel actively and safely to school.*

*Keywords: Commuting mode choice, distance, safety, built environment, parent' perception, public transportation.*

### INTRODUCTION

Childhood obesity is a serious public health issue worldwide, and its prevalence has increased at an alarming rate. The number of overweight children younger than 5 years is estimated to be more than 43 million worldwide by 2020, whereas about up to 35 million are living in developing countries and the rest are living in developed countries (Mori et al. 2012). Walking to school is an essential daily source of physical exercise for kids. (Lee et al. 2008; Lu et al. 2014; Omura et al. 2019). Because walking to and from school allows youngsters to walk 5 days a week. Using public transportation and reducing the number of children transported to school are other global ways to promote daily physical activity among youngsters. (Wen et al. 2007). It is considered that allowing more youngsters to walk or cycle would improve their health. (McDonald 2008a; Tudor-Locke et al. 2003). Scholars argued that Active Commuting to School (ACS) using walking or biking increases children's daily physical activity and helps them maintain a healthy weight (Lee et al. 2008; Lu et al. 2014). The journey to school and from school has the potential to increase physical activity levels thereby encouraging an active lifestyle and assisting disease prevention in later life.

The first walk to school program was in 1997, with just five primary schools taking part in Hertfordshire. Walk to School Day began in the United States of America (USA) as a one-day event. The first-ever International Walk to School Day launched in 2000. Today the International Walk to school day is celebrated in more than 40 countries and in thousands of schools across the United States of America (USA). The programs were extended to Canada, United Kingdom (UK), United States of America (USA), Ireland, Cyprus, and Gibraltar, (Rauworth 2017). In 2003 the International Walk to School Day extended to become a week of activities in 33 countries including the United States of America (USA), Belgium, Canada, Australia, and New Zealand supported the activities. In 2006 the first International Walk to School Month was launched (Kirby and Inchley 2013). Every October, Victoria primary school encourages kids to walk, ride or scoot to and from school, local councils and communities also encouraged to make active travel easy, safe, and accessible. Currently, 759 primary schools across Victoria take part in Walk to School, with 140,303 primary school kids walking more than 1.6 million kilometers during October, the equivalent of walking two return trips to the moon (VicHealth 2018).

In Western countries, dependency on car use for taking children to/from schools is being a serious subject of research on the behavior of school travel modes. Some authorities such as environmental groups, health authorities, and schools have noted this trend with concern across many of these countries. Several investigations in the United Kingdom (UK) (Sustrans 1999, Transport 1996), United States of America (USA) (Alternatives 2002, Tudor-Locke et al. 2001), Australia (Seaton & Wall 2001), and in Canada (Kowey, 1999), have indicated that the proportion of children being chauffeured to schools by parents has increased over the past few decades. Similarly, statistics show that walking to school has recently decreased (Mehdizadeh et al. 2018). Kinds of the literature confirmed that parents are the key persons in decision-maker circles regarding school travel mode.

Research on factors affecting walk to school has drawn increased attention in the current literature. Scholars cast light on a broad range of factors that articulated at different perspectives from studying the consequences of active commuting to the school e.g., physical activity, weight status, and other health outcomes (Sirard & Slater 2008). Highlighting factors that affect walking phenomena and the parent's decision of walking as a mode choice or highlight issues should be addressed in future research regarding active commuting to school (Chillón et al. 2011). Although it has become a significant area of study, current research on walking to school continues to suffer from important challenges that lessen its effective contribution to the knowledge. For example, many works are built on the premise that parents differently concern about their children's safety when deciding on school traveling mode (Rothman et al. 2018). But it is far less clear whether this concern resulted from personal experience of safety, or from other environmental conditions that encourage this concern. Studying the correlation between different factors that influence parents' decisions will help to provide a unified identification of factors affecting the parents' decision on walking as mode choice and highlight issues that should be addressed in future research regarding active commuting to school. In real-life situations, the decision of walk to school could often be dominated by many environmental or economic variables that work together to form parents' decisions. As a result, it's questionable the extent to which current literature offers real reasons for parents' decision.

To help address these concerns, this article provides a review of the literature between 1995 and 2019 relating to the Factors that influence the parents' perspective of letting their children walking to/from school and their choice of walking as a mode choice for their children. Thus, in this context, some urgent questions need to be addressed: **(i)** What factors affecting the parents' decision to allow their children to walk to/from schools? **(ii)** what factors that would possibly affect the parent's decision of walking as a mode choice for their children; and **(iii)** Are there any differences between parents who are car travelers and non-car travelers in allowing children to walk to/from schools. This article

contributes to the body of knowledge through **(i)** identify factors affecting the parents' decision about walking to school; **(ii)** conceptualize the relationship between different factors that influences on parents' decision; **(iii)** identify avenues for future research, and **(iv)** understanding factors that affect the parent's decision to allow children walking to/from school will help policymakers to take strategic decisions to increase the proportion of walking to school.

#### LITERATURE SEARCH

The review process as described on Figure 1 Systematic review process flowchart was conducted to identify relevant articles relating to the parent's perspective of letting their children walking to/from school. Searches were conducted between 1995 and January 2019. A series of keyword searches in four reference databases: **(i)** Web of Science; **(ii)** PubMed, **(iii)** Scopus, and **(iv)** Abstracts (via ProQuest ABI/ INFORM). The Boolean operators "AND," "OR" and "NOT" are used to refine search parameters by combining or limiting terms (Wolf 2010). Petticrew and Roberts (2008), revealed the importance of using keywords and Boolean operators in systematic reviews. The combination of the following keywords and Boolean operators were used for the first stage of the review: "distance AND safety" OR "traffic" OR "built environment AND demography" OR "sidewalks AND car travelers" OR "school travel mode." OR "parents' perception". Thus, focusing on the authors' own words will limits selection biases in this article, and augments the content validity of selected articles. For all the four databases, article to be included for review had to meet the following criteria:

**(1)** Publication between 1995 and January 2019 (inclusively): This article chose the starting point of 1995 because it corresponds to the publication date of the earliest report about the children's' walking distance which has fallen 28% since 1995, partly because car travel has replaced walking on many school journeys (DiGuseppi et al. 1998).

**(2)** The article's title, abstract, and/or keywords should include the following keyword combinations (and associated derivatives): distance, safety, traffic, sidewalks, built environment, demographics, parents' perceptions, automobile travellers, and school travel mode. The articles that mentioned at least 1 search term from each of 9 categories were included in this search. The articles that included in this review, had restricted to distance, safety, traffic, sidewalks, built environment, demography, parents' perception, car travelers and school travel mode because these articles explicitly examine active walking as a mode choice. This is also done to ensure that the identification of possibly relevant articles depends not on this article interpretation, but rather on the authors' own words.

**(3)** Publication in a peer-reviewed scientific publication is a significant accomplishment (as per database records). This aids in narrowing our search results to publications that publish academic research, rather than general journals.

(4) Present primary quantitative, qualitative, or mixed-methods research.

(5) Discussions of models/frameworks were excluded.

The subject areas for the first step of filtering were chosen when it was discovered that the majority of the first search results (310 articles) were published under these subject areas, resulting in the elimination of 100 documents. The results were then filtered by “document type” (e.g. Web of Science, PubMed, and Abstracts (through ProQuest ABI/ INFORM) and “year of publication” (e.g. 1995-2019); 93 papers were removed, leaving 117 to move on to the next stage. As part of the second step of a systematic review technique, papers were first screened by looking at their title/keywords, and then their eligibility was determined by

assessing their appropriateness. This procedure resulted in the retention of 117 papers (39 from Web of Science; 29 from PubMed; 26 from Scopus; and 23 from Abstracts (through ProQuest ABI/ INFORM) for the following stage. The abstracts and conclusions of the publications were studied in depth in the second stage of the systematic review to determine their eligibility for inclusion, which resulted in the elimination of three papers, leaving 114 to advance to the next step. The final stage of the evaluation involved reviewing the complete texts of all of the articles that had been chosen. The opening section, the paper’s major goal, the methodology used, the gaps found, and the articles’ main contributions all received special attention. This resulted in the deletion of 2 studies, leaving just 112 papers for inclusion in the literature review in the fourth stage.

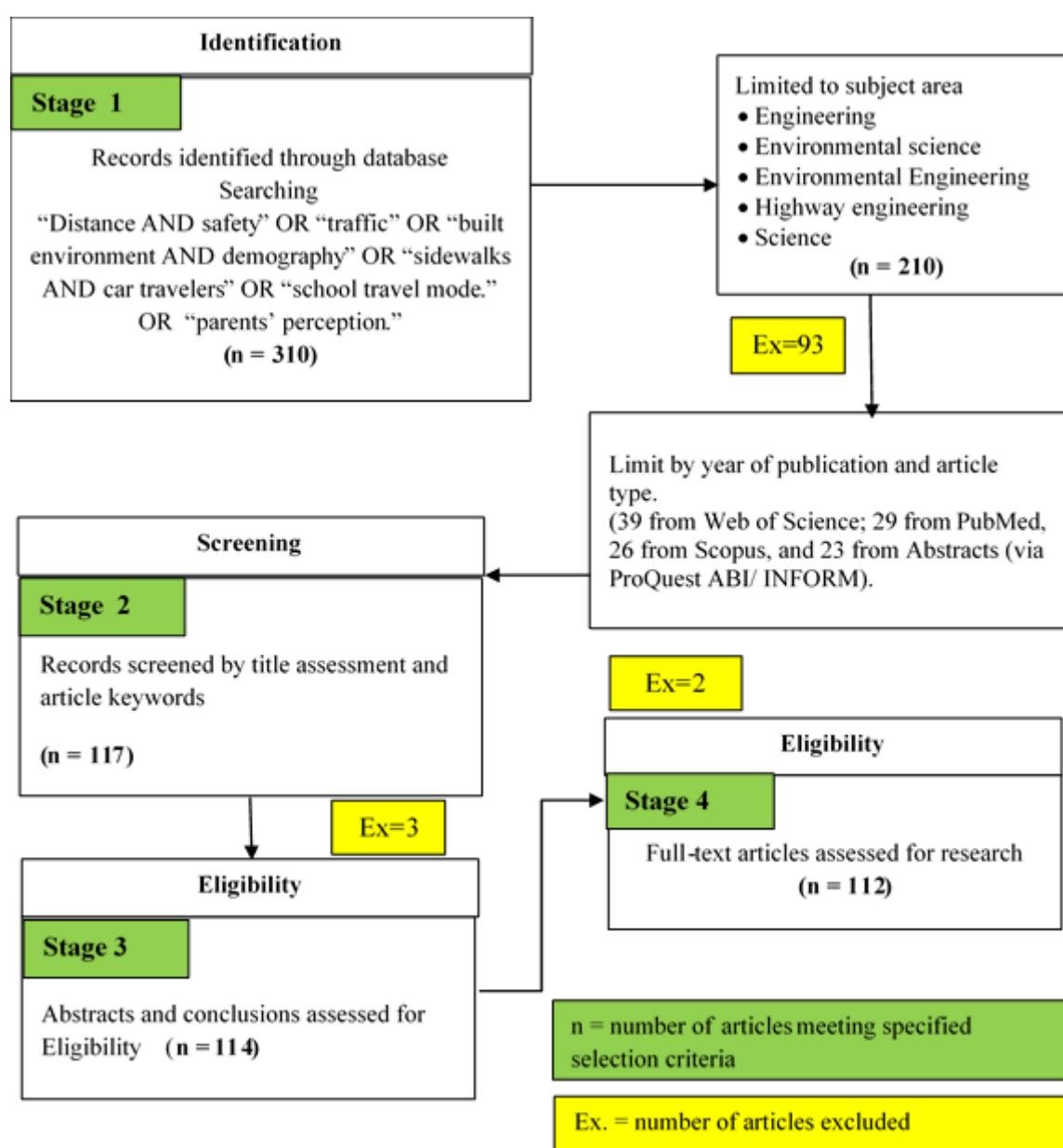


FIGURE 1. Systematic review process flowchart

There are increasing numbers of articles relating to walking to and from school published each year in a broad set of scientific journals. The literature shows that a rich set of factors related to parents' decision that suggests that walking to/from school research is making contributions that are perceived as both significant and valuable. Factors such as distance, safety, traffic, sidewalks, built environment, demography, and parents' perception have made great advances in parents' decision (Pate et al. 2018; Rothman et al. 2018; Tetali et al. 2016; Ziviani et al. 2004).

For example, Ziviani et al. (2004) conducted an online poll of 40,000 primary and secondary school children on their walking to and from school, finding that around half walked or cycled, while the other half took public or private transportation. Distance, excessive traffic, risky road crossings, and poor footpath maintenance were all identified as major barriers to walking to school. Tetali et al. (2016) used stratified cluster sampling to conduct a cross-sectional survey and found that 90 % of students lived within five kilometres and 36 % lived within one kilometre of school; further distance to school was strongly associated with the use of motorised transport. There was a significant increase in the number of students who rode or walked to school if they lived near their school. In Hyderabad, the majority of students walk (57%) or cycle (6%). Another study by McMillan (2007) believed that the parents, not the children, made the final decision regarding whether or not to walk to school. As a result, the trip decision was most likely made by the parents rather than the child's schedule, limits, or preferences. They also claimed that distance, safety, traffic, sidewalks, built environment, demographics, and parents' perceptions all influence parents' judgments concerning children's travel behaviour. America's national centre for chronic disease prevention and health promotion examined obstacles to children walking and cycling to school (Pate et al. 2018, Rothman et al. 2018). As seen in Figure 2, roughly 11% of families walked, 3% cycled, 33% used public transportation, and 50% used private transportation. Other difficulties to walking were distance (55%) traffic (40%) weather (25%) and personal safety (20%). (25 %).

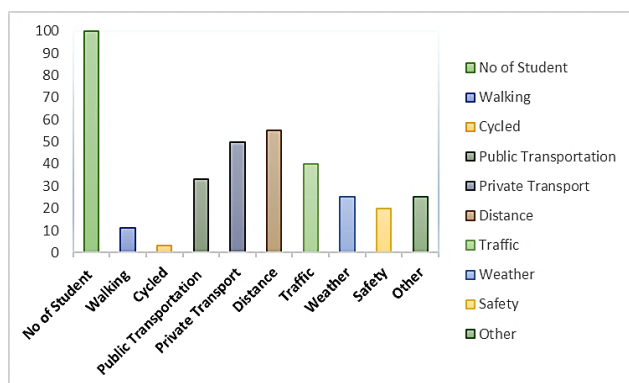


FIGURE 2. Children in the questionnaire surveyed to 611 households (Pate et al. 2018, Rothman et al. 2018).

Some experts say parents are worried about traffic and abduction or harassment (Martin and Carlson 2005; Martin et al. 2007). Therefore, parents have restricted their children's time spent in public, and the limitations affect females more than boys (McDonald 2008b; Valentine 1997). The relative pattern of school transportation method remained stable regardless of the weather (Chaufan et al. 2012). Figure 3 depicts that the majority of students commuted in their family vehicle, with only a small number walking, carpooling, taking the school bus, cycling, or taking public transportation.

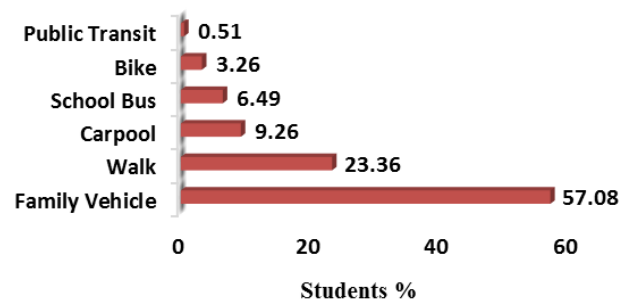


FIGURE 3. Modes of school transport among students (Chaufan et al. 2012).

When Ziviani et al. (2004) looked at parents' transportation to school history, their perceptions of the importance of physical activity in their own lives and their children's lives, traffic concerns, and personal safety concerns, they discovered that any attempt to increase incidental physical activity in children requires a family focus and parental attitude. They claimed that if parents are convinced of the benefits of increasing their children's fitness by walking, they can use their influence to lobby local governments to improve routes, traffic conditions, and other safety concerns.

As seen in Figure 4, the most common reasons for parents driving their children to school are distance (13.3 %), having to drive the same road again (20.8 %), bad weather (20.8 %), and/or the child being late are the most common (12.5 %). The majority of parents believed their children's school path was safe (63.5 %). Those who believed it was dangerous were most worried about traffic hazards (84.9%), as well as hostility or harassment from other children (14.0%) or adults (12.1%) and were much more likely to accompany their children to school (Bringolf-Isler et al. 2008).

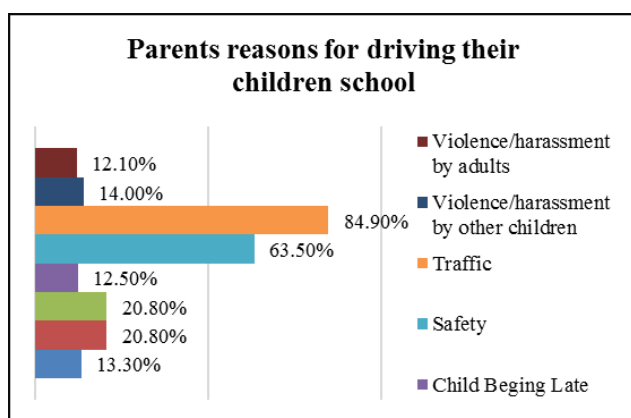


FIGURE 4. Parents reasons for driving their children school (Bringolf-Isler et al. 2008)

#### FACTORS ASSOCIATED WITH PARENTS OF CAR TRAVELERS AND NON-CAR TRAVELERS

In order to be successful, walk-to-school efforts must recognise and address the relationship between the form of transportation used by parents and the path taken by children to school. The fact that parents go to work in a vehicle has been revealed to be the most substantially associated factor with children being driven to school. Wen et al. (2007), for example, discovered that a significant number of kids were driven to school despite living within walking distance. They came to the conclusion that driving to school was the most common form of transportation for the kids in their survey. McCarthy et al. (2017) found that the majority of factors impacting mode choice among families with young children tend to favour driving. They suggested that, while vehicles are a crucial mode of transportation for families with young children to access activities and services, excessive car use could be harmful. It has also been argued that, in order to reduce automobile use among families with young children, governments should focus on addressing the factors that discourage alternate forms of transportation rather than enacting rules restricting car use.

When a person uses a private car for a journey, Ermagun et al. (2015) stated that the chance of utilising other modes, such as walking or taking the school bus, should not vary equally if the correlation between these three possibilities is taken into account. The circumstances that led to the use of a private car, such as distance or convenience, are still influencing this person's decision. While Setiawan et al. (2017) found that a family's practice of driving affects their mode choice when they have young children.

There is a significant difference between parents who drive their children to school and parents who do not drive their children to school, as seen in Figure 5. For example, a lower percentage of parents driving their children to or from school agree or strongly agree that "my child's school encourages children to walk to school" (38 % vs 51 %), and a higher percentage of parents driving their children agree or strongly agree that "my child does not have the road

safety skills necessary to walk to school" (34 % vs 21 %). Additionally, there was a considerably greater number of parents of vehicle passengers who agreed with the statement, 'There are certain highways that are unsafe to cross on the route to school,' when compared to non-car travellers (73 % vs. 58 %) (Wen et al).

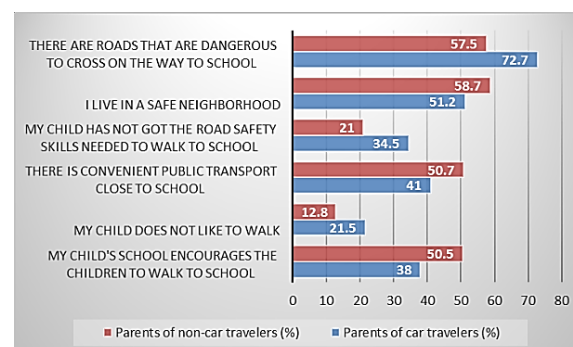


FIGURE 5. Parents of car travelers and non-car travelers (Wen et al. 2007)

#### SUMMARY OF THE RELATED STUDIES ON PARENTS OF CAR TRAVELERS AND NON-CAR TRAVELERS.

About 112 articles in this review have investigated the role of factors associated with parents of car travelers and non-car travelers. These studies seek to explore the travel behavior mode of school children with correlation to their parents' travel mode that has got a growing interest in the current literature. Children lack decision-making autonomy; thus, they are dependent on their parents to make decisions regarding school travel (Mehdizadeh et al. 2018). If parents decide to accompany their children to school, the parents and children will probably travel in a private car. Accompaniment of children results from parents' concern about safety (Stewart 2018) and convenience (Mehdizadeh et al. 2018). These critical concerns are amplified when walking, biking, and public transit. Given parental concerns about safety and convenience, the accompaniment of children has increased in school trips (McDonald and Aalborg 2009).

Research shows that parents' journey to work using a car has strongly associated factor with children being driven to school. Thus, car ownership plays a significant role in children's school travel mode, even though children lived within a short distance from the school (Ermagun et al. 2015; Wen et al. 2007). Car use habit is also another determinant that affects mode choice among between families with their young children (Setiawan et al. 2017). Thus, policymakers need to focus on the link between parent mode of travel and student journey to school when they develop alternative programs that encourage active school travel mode.

Characteristics of walking, such as acceptable travel distance and accessibility of various facilities based on acceptable travel distance, walking behavior of people in religious gatherings, and formulation of acceptable walking distance formulas, including exploring demographics / social economy, the relationship between factors and acceptable

travel time / distance, and leads to how acceptable travel time / distance between different groups changes (Verma et al. 2018).

#### DEMOGRAPHY

An important demographic factor that has been prioritised in much research is age. For example, Samimi and Ermagun (2012) and Yeung et al. (2008) discovered that as one becomes older, the proclivity to choose active means of transportation declines. According to Oliver et al. (2018), the distance walked by schoolchildren aged 11–16 in the United Kingdom (UK) almost quadrupled from little over 2 miles to over 3.7 miles in 2013. This is a significant shift in distance since there is a 3 km threshold distance beyond which active transportation reduces rapidly. In Canada, however, more than half of children aged 5–17 depend only on sedentary forms of transportation to and from school, and as Canadian's age, their activity levels decline (Craig et al. 2001).

Gender is another demographic factor whose influence has been thoroughly researched in previous studies. Despite various research finding that males are more likely than girls to walk or bike to and from school (Bungum et al. 2009; Hume et al. 2009; Larsen et al. 2009; McDonald 2007; Nelson et al. 2008), other studies have indicated that this is not the case (Kerr et al. 2007, Martin et al. 2007; Salmon et al. 2007; Wilson et al. 2010). The reasons for the disparities in walking to school between men and women have not been clearly established, and relatively few research have presented a viable explanation for this discrepancy. Bungum et al. (2009), for example, stated that females may be concerned that wearing a bike helmet may mess up their hair and hence are less likely to ride bikes to school; consequently, they indicated that, for certain females, hair upkeep is a barrier to walking to and from school.

Sex-related differences are most apparent among young adults aged 18-24, where 60% of women are insufficiently active compared with only 36% of men. A considerable gap is also evident among adults aged 65 and older, where 79% of women versus 64% of men are not active enough (Craig et al. 2001). Girls are less likely than boys to walk, and the disparities are particularly noticeable at an early age (Evenson et al. 2003, Larsen et al. 2018). According to several research, parents prefer to stroll their sons more than they do their daughters (Mehdizadeh et al. 2018). Furthermore, when it comes to choosing active modes of

transportation, females have less tolerance than males. As time goes on, even with greater economic pressure, girls are still more tolerant of reducing their usage of active modes of transportation (Samimi & Ermagun 2012).

#### FACTORS INFLUENCING SCHOOL WALK MODE

Walking to school is an important source of physical activity for children. Scholars argued that ACS using walking or biking increases children's daily physical activity and helps them to maintain a healthy weight (Lee et al. 2008; Lu et al. 2014). Literature confirmed that parents are the key decision-makers regarding school walk mode. Many factors have been identified in the current literature that influences parents' decision to school walk mode choice for their children. For example, Household factors such as car ownership and parents driving to work have been found to affect the mode choice (Bradshaw and Atkins 1996, DiGuseppi et al. 1998; Ginja et al. 2018). Other scholars found that parents' perceptions of traffic safety being an important factor in the decision-making process (Rothman et al. 2015). While, He and Giuliano (2017), stated that a child's walk mode during school trips is influenced by the parent's escort decision. Walk distance also has a great influence on mode selection, when the distances to school greater than 0.8 km, active mode choice decreased (Wilson et al. 2010).

Another research focusing on Japan revealed that the children's walk mode and whether parents escort the children are closely related. It is mentioned that, even though Japan has an extensive public transport system, children escorted by parents are more likely to be transported by car. Further, the effect of flexible working hours option is obvious, because it allows parents to arrange more escort trips (Mori et al. 2012). Ermagun and Samimi (2015), found that safety has very influential on walking to school, thus, addressing the safety concern of parents is expected to increase the propensity of walking to school by around 60 %. A 1% increase in walking to school is projected with every 0.04 % rise in car travel time, 0.07 % increase in the normalized-to-income cost of driving, 0.08 drop in vehicle ownership, 0.03 % increase in distance to public transport, or 2.37 % decrease in walking distance. Decisions made by parents regarding mode choice and escorting for children's school trips are interdependent (Yarlagadda & Srinivasan 2008). Table 1 provides a summarizing of factors that influence school travel mode as identified by the related literature.

TABLE 1. A summarizing of factors that influence school travel mode as identified by the related literature

N	Factors	Results	Mode	Illustrative Studies
1	Trip Type	<ul style="list-style-type: none"> <li>The children have become highly dependent on adults to drive them to the schools, that happened because the schools increasingly consolidate into larger buildings built far from residential areas.</li> <li>The principal determinant of driving children to schools were because the Car ownership.</li> <li>For those independent schools Children are still more likely to travel by car.</li> </ul>	Car	(Schlossberg et al. 2005) (McMillan, 2003) (Singh and Vasudevan, 2018) (DiGuseppi et al. 1998) (Sirard et al. 2005)
2	Distance to school, race/ethnicity, education level, and household income	<ul style="list-style-type: none"> <li>The most prevalent obstacle to walking to school was distance (51.3%), followed by traffic hazards (46.2%), weather (16.6%), "other" hurdles (14.7%), and criminality (14.7%). (11.3 %).</li> <li>The difficulties identified by parents varied according to the distance to school, the age of the youngest child, race/ethnic origin, level of education, and household income.</li> <li>Safe Routes to School projects might help improve the number of children walking to school.</li> </ul>	Walk	(Omura et al. 2019)
3	Distance	<ul style="list-style-type: none"> <li>The likelihood of active walk to school decreases, when the distance increases,</li> <li>Those who live within a one-mile radius of the school are more likely to walk to / from school.</li> <li>The number of automobiles owned by a household has little influence on the method of transportation used to get to and from school.</li> </ul>	Walk, Bike & Auto	(McMillan, 2007) (Rothman et al. 2018) (Schlossberg et al. 2007, Schlossberg et al. 2006, Schlossberg et al. 2005) (Wen et al. 2007)
4	School attribute	<ul style="list-style-type: none"> <li>Children's commute mode and total miles travelled rise when they go to and from a school that is not in their immediate area.</li> <li>School type, money, and race all have an impact on parents' views on school choice.</li> <li>There are fewer students who walk, bike, or use public transportation to get to school in larger geographic areas than there are in smaller communities.</li> <li>The views of parents regarding transportation vary by race and school type.</li> </ul>	Walk, & Auto	(Wilson et al. 2010, Wilson et al. 2007)
5	School site selection	<ul style="list-style-type: none"> <li>School officials and planning organisations function independently, thus opportunities to identify the best school sites are often wasted.</li> <li>Additionally, students who travelled through locations with sidewalks on major thoroughfares were more likely to walk.</li> </ul>	Walk	(Kouri, 1999) (Braza et al. 2004) (Ewing et al. 2004)
6	Child characteristic	<ul style="list-style-type: none"> <li>Most American children do not walk or bike to school; around one-third take the school bus, and half drive themselves.</li> </ul>	Walk or bike	(Dellinger et al. 2002)
7	Gander	<ul style="list-style-type: none"> <li>Gender influences school travel mode, where the female always considered and worried about safety.</li> </ul>	Walk	(McMillan, 2007) (Evenson et al. 2003) (McDonald, 2007)
8	Household characteristic	<ul style="list-style-type: none"> <li>The presence of a car in the home and the work position of parents influence school transport modes.</li> </ul>	Walk, & Auto	(Ewing et al. 2004) (Wilson et al. 2010) (Cheng et al. 2019)
9	Population density	<ul style="list-style-type: none"> <li>Population densities, number of intersections and live farther from school reduce the likelihood likely to walk or bike to school.</li> </ul>	Walk	(McDonald, 2007) (Braza et al. 2004) (Ewing et al. 2004)
10	Residential density	<ul style="list-style-type: none"> <li>Residential density and family socio-demographic background affect substantially children's activity and travel behavior within the same city.</li> </ul>	Walk	(Leung et al. 2019)
11	Walkability index	<ul style="list-style-type: none"> <li>Active commuting to school is linked to parent concerns as well as the built environment.</li> </ul>	Walk	(Kerr et al. 2006)

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12	Sidewalk	Walks to school are strongly linked to the amount of sidewalk coverage in both the starting and ending points of the journey.	Walk	(Ewing et al. 2004)
13	Street connectivity	Active commuting was found to have strong connections with perceived land use and street connectedness, according to the researchers.	Walk	(Schlossberg et al. 2006) (Kerr et al. 2006)
14	Commuting to school and overweight	Active commuting to school (ACS) using walking or biking increases children's daily physical activity and helps them maintain a healthy weight.	Walking or biking	(Lu et al. 2014) (Lee et al. 2008)
15	Housing markets	School commuting patterns appear to be influenced by house costs, distance and mode of transport to school, and the quantity of surplus commuting in the metropolitan system.	Walking or biking	(Easton and Ferrari, 2015) (Ferrari and Green, 2013)

#### OUTLINES OF WALKING TO/FROM SCHOOL

As a result, the conceptual foundations of walking as mode choice research have remained largely implicit. This has led to (i) confusion and misunderstandings that have made it difficult to directly address the real challenges that walking as mode choice research confronts, and (ii) high levels of confusion created difficult for the parents to decide on allowing children walking to/from school. As a result, it's notable that research consistently demonstrates the declining prevalence of active school transport in the United States of America (USA) (McDonald 2007; McDonald 2008a), Australia (Van der Ploeg et al. 2008), and the United Kingdom (UK) (Black et al. 2001).

Reviewing walking as mode choice research, this study notes that scholars have focused on walking to and from school from a different point of views, which can summaries in three axes to articulate walking as a mode choice. For example, some scholars focused on studying factors that affect the parent's decision of walking as mode choice; other scholars have focused on factors that influence school travel mode; while other scholars focused on factors associated with parents of car travelers and non-car travelers. Through these studies, scholars have offered many valuable frameworks and discussions. The following sections review some of these studies in each axis.

#### DISTANCE

The amount of time spent walking or the distance travelled from home to school has been proven to have a significant impact on the likelihood of students choosing active modes of transportation during school trips. KIM et al. (2005); Väänänen et al. (2002) contribute to our understanding of the distance function. For instance, several studies conducted in the United States of America (USA) (McMillan et al. 2006; McMillan, 2007; Schlossberg et al. 2006), the United Kingdom (UK) (Black et al. 2001), and Australia (Timperio et al. 2006) have established that distance is a critical factor in children's walking. The nature of children's school journeys has shifted in the United States of America, where automobiles increasingly transport students to school (USA). As a result, the number of youngsters walking to

school has decreased significantly. What precipitated this shift? The research provides several factors, including distance and decreased residential density, which increases the average distance between schools (He and Giuliano 2018). For example, a New York City city planner felt that children should not cross a busy roadway on their way to or from school or a park, and that both destinations should be within walking distance of residences; otherwise, children are less likely to walk to/from school (Rothman et al. 2018). According to Falb et al. (2007), walking routes are those that require pedestrians to take paths that depart from straight lines. When people are required to walk 40% more than straight-line distances, they typically use a shortcut if one is available or avoid active transportation altogether.

In the last two decades, due to changes in land use, the distance between schools and homes has increased (Beck and Greenspan 2008). McDonald (2008a) proposed that improved integration of land use, transportation, and school design is required. Using distance from school as a planning criterion could be a good strategy to modify community design and encourage people to walk. This coordination is especially important in moderate and high-density locations, as well as sites where large-scale developments are being planned. Planners can maximise school and development placement even in low-density areas such that a large majority of children live within walking distance of their school. Similarly, Oliver et al. (2018), reported that car usage is further favored by the time of land-use change and societal opportunities. Larger facilities at fewer sites bring increased trip lengths which affect parental choice, including a selection of private schools by wealthier families, means that the local school is no longer the default option. In the same vein, Samimi and Ermagun (2012), concluded that the distance between home and school is the most important factor influencing the propensity to use active modes of transportation, with an increase in distance between school and home, the propensity to use active modes of transportation decreases.

Given the positive relationship between distance and aversion to active modes of transportation, policymakers may want to consider local schools when promoting active modes of transportation. According to Cervero's (2002) research, having residences within walking distance of schools, thereby lowering the distance of routes, and



the presence of pedestrians along the routes emerged as the most important predictors of route selection. This is consistent with previous research, which found that building communities with residential destinations within walking distance of residences and designing streets to encourage greater pedestrian flows are important factors in influencing navigation choices. Furthermore, larger levels of active land-uses opening into streets found to be associated with the frequency of certain segments (Kubat et al. 2012). This backs up the results of other studies emphasising the importance of nonresidential destinations near pedestrian-oriented nodes, such as schools and transit stops, in influencing walking behaviour (Cervero 2002; Lee et al. 2013).

#### SAFETY, TRAFFIC, AND SIDEWALKS

According to a World Health Organization study (2010), the World Bank is collaborating with partners such as the United Nations to accomplish the Decade of Road Safety Action 2011-2020 aim. Vehicle speeds in school zones are normally limited to 30 km/h, which is often broken in school districts. Drivers who violate traffic regulations face harsher penalties than those who violate laws in other public areas. Safe Routes to School aims to enhance the environment and educate children about road safety (McMillan 2007; Jensen 2008). Further, the aim of Safe Routes to School (SRTS) programmed is to consist of and a suite of coordinated efforts designed to create safe, convenient and fun opportunities for children to walk to and from their schools (Stewart 2018).

The reasons that students do not walk to school are likely to be numerous. Some scholars have shown that distance, traffic, and crime are three key factors preventing students from walking to and from schools (Boarnet et al. 2005; Chung, 2002; Staunton et al. 2003). Safety appears to have significant influence among younger students (Giles-Corti and Donovan 2003). Shokoohi et al. (2018), stressed that improving the infrastructure in front of the main gate of the schools help to improve the parental perception of traffic safety in the neighborhood. Lack of pedestrian infrastructure such as sidewalks was also mentioned in some studies (Boarnet et al. 2005, Saelens et al. 2003, Schlossberg et al. 2006; Sener et al. 2019).

Factors that negatively influencing walking to school also includes parental perceptions of heavy traffic within their neighborhood (Zhou et al. 2010). Parents express concern about traffic dangers and the risk of abduction or harassment. Perceived "stranger danger", or danger of assault, and danger from increased traffic have been identified as the most significant determinants of students walking to schools (Parisi and Hondorp, 2005, Tranter and Pawson 2001; Zhou et al. 2010).

However, statistics reveal that, while the number of children travelling to school has reduced recently, pedestrian injuries have climbed. Some parents who drive their children to school do not give pedestrian youngsters due consideration. As a result, the streets nearest to schools

are frequently the riskiest for children walking to school (Ahlport et al. 2008).

The walkability scores for each of the three sites indicate changes of varying magnitudes in walkability. The results reveal a significant shift in pedestrian volumes and walking experience at the locations between baseline and follow-up, but no significant change in pedestrian volumes in the control regions during the same time period. Bigger changes in walkability were linked to a higher rise in pedestrian volumes and a more favourable impact on walking experience. Smaller-scale increases in walkability, on the other hand, were linked to a less pronounced shift in pedestrian volumes and walking experience (Cambra and Moura 2020).

Bike-sharing, often known as public bicycle programmes, is becoming more popular as a partial answer. Bike-sharing allows users to borrow a bicycle from one of several stations located across a city, ride it, then return it to any of these stations. Europe, North America, South America, Asia, and Australia have all seen a rise in bike-sharing programmes (Lu et al. 2018).

#### ENVIRONMENT

Walking to school appears to be influenced by the environment in a minor but important way. The environment impacts on travel time and distance, which have always been as the preliminary impediment for children in their walking to school. For example, Mehdizadeh et al. (2018), based on a study in Osaka, Japan, found that environment factors might increase children's independent travel to school, environment factor needs to be addressed to influence parents to choose more active transport for their children.

Numerous aspects were considered, including perceived community aesthetics and qualities, as well as the existence of traffic lights, improved pedestrian crossings, and walking or biking lanes (Boarnet et al. 2005; Ewing et al. 2005; Joshi and MacLean 1995; McMillan et al, 2006; Nasar et al. 2015). For instance, Boarnet et al. (2005) and Ewing et al. (2005) discovered a favourable correlation between the existence and condition of sidewalks and children's physical activity, whereas Mota et al. (2005) discovered no correlation. Similarly, in a study of Oregon middle schools, Schlossberg et al. (2006) discovered an association between walking to school and urban form as assessed by higher junction densities and lower percentage of dead ends. While McMillan's (2007) research of elementary students in California discovered a tenuous association between urban form and walking.

Many studies have been conducted to examine the environmental factors that impact children's walking to and from school (Bere et al. 2008; Dalton et al. 2011; Mendoza et al. 2010; Mitra and Buliung 2012; Rossen et al. 2011; Yu and Zhu 2016). A lengthy travel distance has been identified as the most important and consistent obstacle to walking to and from school. Other environmental factors,

such as sidewalk coverage, were shown to have a significant influence on walking choice (Dalton et al. 2011; McDonald 2007; Yu and Zhu 2016).

New Urbanism is a popular development tool that advocates for dense and accessible neighborhoods that are more conducive to generating walking and neighboring activities (Stanislav and Chin 2019).

Students were generally aware of environmental issues and showed worry about the influence of cars and pollution to global warming, according to Kirby and Inchley (2013). They also explored the links between active transportation and helping to alleviate environmental problems.

Schoolchildren are disproportionately exposed to air pollution during their commute to and from school for a variety of reasons, including proximity to high-traffic roads and peak volumes (Ahmed et al. 2020).

#### SUMMARY OF THE RELATED FACTORS INFLUENCING SCHOOL TRAVEL MODE

In this review, 35 articles have been reviewed by a total of 15 different independent/ explanatory factors that influence school travel mode. Table 1 above summarizes some of these factors. Some of these articles that shared background such as economics concern (Easton and Ferrari 2015; Ferrari and Green 2013; Omura et al. 2019), tended to emphasize distinct sets of variables. For example, Omura et al. (2019), focuses on the effects of household income on school travel mode. Other scholars show a similarly high degree of focus, they focus on house prices to the distance and mode of travel to school (Easton and Ferrari 2015; Ferrari and Green 2013). By comparison, other groups of articles display a broader range of factors and different articulations of environmental background. For instance, some articles have emphasized on walkability index, sidewalk and street connectivity as determinants of children's active commuting to school (Kerr et al. 2007; Kerr et al. 2006; Schlossberg et al. 2006). While some articles tended to emphasize sociological factors such as gender, household characteristic, population density and residential density (Braza et al. 2004; Cheng et al. 2019; Evenson et al. 2003; Ewing et al. 2004; Leung et al. 2019; McDonald 2007; Wilson et al. 2010). They found a significant correlation between these factors and school travel mode choice. Throughout all these articles, it can be concluded that parents' decision to choose school travel mode for their children has resulted from a group of economics, sociological and environmental factors.

#### CONCLUSIONS

Distance, safety, traffic, sidewalks, the environment, demography, and parents' perceptions have all been found to have a significant impact on parents' decision-making (Pate et al. 2018; Rothman et al, 2018; Tetali et al. 2016; Ziviani et al. 2004). In general, families appear to be limiting their children's walking time. Walking to and from

school is also significantly more sensitive than driving in youngsters, reflecting the fact that the majority of people are unwilling to travel long distances. The beneficial effects of walking to and from school have been postulated and confirmed in the present research. However, some believe that pupils prefer to walk to and from school only if they live close by. The scenarios demonstrate that significant improvements in walk on group may be achieved if the majority of kids lived within a one- to two-kilometer radius of their school. National programs must address the safety, traffic, and sidewalks of walking to school, which can limit parent's decisions because these issues will lead to safety problems. The traffic safety system has to be considered to reduce the parent's concern. The physical environment, such as perceived neighborhoods aesthetics and characteristics, traffic light presence, pedestrian crossing enhancements, and walking or cycling paths, appears to have a substantial impact on the walk to and from school. The review has shown that demography has also an effect. The female students always consider and worry about safety imposed. Parents accompany their children to school because of safety concerns, so, they travel in a private car. Thus, national programs must address the safety, traffic, and sidewalks of walking to school, which can limit the parent's decision to accompany their children to/from school. This is because these issues will lead to safety problems. Furthermore, understanding the link between parent mode of travel and student journey to/from school will help national policymakers to develop alternative programs that encourage active school travel mode.

Furthermore, by discussion of 112 published articles about walking as mode choice between 1995 and January 2019, this study notes that for all its achievements, current literature on walking to/from school has yet to leverage the full potential of the walking perspective. Results indicate that most of Factors that influence the parents' perspective of letting their children walking to/from school are studied only a few articles, also indicates that the rapid development of research relating to walking to/from school may not have led to articulate unified identification of these factors.

Moreover, the reviews found that the Parents and schools can play a major role in encouraging to walk to/from school. However, to help parents to decide on walking as mode choice, the novelty and the recommendation of this review are to have: **(i)** reduce parents concern about distances, safety and traffic danger that are the primary barriers to their children walking to/from school; **(ii)** Land use, transportation, and school planning must be better integrated. The criteria might be used to improve neighbourhood design and promote walking to/from school; **(iii)** Any national planning of cities must take into account neighborhoods aesthetics and features, such as the existence of traffic signals, pedestrian crossing improvements, and walking paths; and **(iv)** Walk to/from school initiatives must recognise and address the link between parent mode of transportation and student journey to school in order to be effective. **(iiv)** teachers need to be effective, walk to/from

school programs activity to support and encourage parents' perspective of letting their children walking to/from school.

Despite the fact that it has grown in importance, contemporary research on walking to and from school continues to face substantial hurdles, limiting its useful contribution to knowledge. Thus, (i) to better understand how, when, and why different factors play a role parents' decision, this article encourages that future research on these factors to fully articulates these factors and provides a unified identification of factors affecting the parents' decision on walking as a mode choice. Furthermore, (ii) to better understand the role of factors affecting the parents' decision to allow their children walking to/from school and their choice of walking as a mode choice for their children, this article encourages future research to pay attention not only to identify these factors but also to the correlation between different factors that effect on parents' decision. This will help to highlight issues that should be addressed in future research regarding active commuting to school.

This review can be helpful to the researchers and practitioners to understand the effects of different factors on children using active transportation to/from school, thus, create future strategies to promote active school travel mode.

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#### DECLARATION OF COMPETING INTEREST

None

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