

Article

Measuring the Effect of Built Environment on Students' School Trip Method Using Neighborhood Environment Walkability Scale

Saeed Esmaeli ¹, Kayvan Aghabayk ^{1,*} and Nirajan Shiwakoti ²

¹ School of Civil Engineering, College of Engineering, University of Tehran, Tehran 14563-11155, Iran; saeedesmaili.se@ut.ac.ir

² School of Engineering, RMIT University, Melbourne 3001, Australia; nirajan.shiwakoti@rmit.edu.au

* Correspondence: kayvan.aghabayk@ut.ac.ir; Tel.: +98-2161112273

Abstract: School trips affect different aspects, such as air pollution and urban traffic, and of personal wellbeing, such as students' physical and mental health. The increasing concern about environmental sustainability has prompted a reevaluation of daily activities, including school transportation. While different factors that affect students' school trips have been investigated in the literature, the effect of the built environment has been evaluated only sporadically in previous studies. To fulfil this knowledge gap, this study aims to investigate the effect of the built environment on students' school trips by adapting and extending the well-known Neighborhood Environment Walkability Scale (NEWS) questionnaire. The questionnaire survey was conducted with parents from 36 schools in Yazd, Iran, providing a sample of 1688 students aged 7–18 years. The items from the NEWS questionnaire were placed in nine factors by performing factor analysis. The Multinomial Logit Regression model was applied to check the predictive power of these nine factors. It was found that the variables of land use mix-diversity, land use mix-access, crime, age, gender, household income and car ownership had a significant effect on students' school trips. The more easily students have access to different places, the less they use public services and cars compared with the active travel mode. The use of public services and cars increases with the increase in crime rate along the route to school. The findings indicate that built environment features may impact students' shift from traditional transportation modes to active alternatives, such as walking and cycling, contributing to the attainment of broader sustainability objectives.

Keywords: school trip mode; active transport; built environment; Neighborhood Environment Walkability Scale (NEWS); mode choice; sustainable transport



Citation: Esmaeli, S.; Aghabayk, K.; Shiwakoti, N. Measuring the Effect of Built Environment on Students' School Trip Method Using Neighborhood Environment Walkability Scale. *Sustainability* **2024**, *16*, 1937. <https://doi.org/10.3390/su16051937>

Academic Editors: Sunghoon Kim and Sehyun Tak

Received: 8 January 2024

Revised: 22 February 2024

Accepted: 23 February 2024

Published: 27 February 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Sustainable transport plays a pivotal role in addressing multiple United Nations Sustainable Development Goals (SDGs) by contributing to environmental, social and economic objectives. Daily transport trips represent people's day-to-day activities. Such transport trips are based on various purposes, such as work, shopping, recreation and school trips. School trips are regarded as significant, as the safety of children during school trips is of great concern to the parents. In addition to parents, city officials or local councils, particularly in the areas of traffic and environment, are concerned about this issue since the method of making this trip can affect different aspects of the environment such as the level of air pollution [1–3] and urban traffic density [4,5]. Moreover, the way students travel to school has a significant effect on physical health [6–10], mental health [11,12] and personal development [13]. The use of active modes of transport for school trips, such as walking and cycling, promotes physical activity, leading to improved health and well-being, aligning with SDG no. 3 of ensuring healthy lives and promoting well-being for all at all ages. Furthermore, it can substitute for motorized travel and can have significant

lifecycle carbon emissions benefits [1]. Through the adoption and promotion of sustainable transport practices, such as the use of public transportation systems and active modes of travel, progress can be made toward achieving SDGs. The World Health Organization has suggested sustainable transport modes such as active school transport (walking or cycling to school) to students so that in this way, children achieve the standard amount of daily physical activity and contribute towards lowering CO₂ emissions [6]. In one study, the assessment of carbon emission reductions attributable to active transport was accompanied by thorough estimation and valuation processes. Employing a discount rate of 3.5%, the calculated benefit/cost ratio stood impressively at 11:1 [2].

A review of past studies showed that there are four main factors affecting school trips: (1) children and family characteristics, (2) parental concerns, (3) social and economic factors and (4) built environment factors. For the first factor, the effect of some features such as gender and age of the student [14–20], the number of children in the household [21,22], race [23], the level of parents' education [24] and the status of parents' driving license [25] were examined. For the parental concerns factor, parents' concerns about convenience, reliability and safety were studied [26–28]. For the evaluation of social and economic factors, household income [29,30], car ownership [19,24] and flexibility of parents' work schedule [20,23] were considered.

Aside from children's and their families' characteristics, parental concerns, and social and economic factors, another factor that could have a greater effect on the students' school trip is the built environment. Based on previous studies, the most significant built environmental feature is the distance between school and home. This was observed in the majority of the studies, which found that an increase in the distance to school results in a reduction in students' willingness to use active trip methods [20,22,30–32]. This then increases their tendency to use motorized vehicles for school trips [29,33,34]. For instance, [35] indicated that the probability of an active trip decreases by 86% if the distance from school to home increases by one kilometer.

Another variable studied in the built environment factor was the land use mix of the buildings around the students' residences or the school. In previous studies, it was found that the higher the population density, the lower the rate of using active trips [22,33]. However, in some studies, contradictory results were achieved [15,18–20]. In addition to the population density, it was observed that the tendency to use active trips decreases with more diverse land use regarding the buildings around the students' school [33]. In addition, previous studies showed less active trip were undertaken where there were more intersections and main roads on the students' route to school [14]. Furthermore, previous studies concluded that if parents' knowledge about traffic safety is greater [25], a higher percentage of the streets on the students' trip route have sidewalks [30]. The connection of the streets on the students' trip route should be wider [35], traffic density and speed should be lower, and students need to be less exposed to traffic [20]. Further, students are more likely to choose cars if their departure time is during peak hours compared with departing at other times [34]. If students' departure time avoids peak hours, the probability of students walking to school may increase.

The widespread embrace of active transport for school travel presents a promising avenue for alleviating traffic congestion and air pollution, especially in urban areas adjacent to schools during peak commuting hours [22]. This underscores the critical role of community engagement in advancing sustainable school travel policies. By encouraging and facilitating active modes of transportation, communities can collectively contribute to a healthier and more environmentally sustainable future, addressing pressing concerns associated with traffic and air quality in urban settings.

Although the effect of the built environment in previous studies has been explored from different perspectives, it has rarely been examined in a unified, comprehensive way by considering various built environmental characteristics related to the school trips. In addition, in past studies, less attention has been paid to the built environmental parameters during the students' commute to school. Therefore, it is necessary to pay more atten-

tion to the built environmental parameters during students' trips to school. One of the questionnaires which measure built environmental characteristics comprehensively is the Neighborhood Environment Walkability Scale (NEWS) questionnaire, which assesses the perception and attitude of the residents of each neighborhood towards their living environment [36]. This questionnaire has 54 items and considers environmental characteristics in eight factors, including (1) residential density, (2) land use mix-diversity, (3) land use mix-access, (4) street connectivity, (5) walking/cycling facilities, (6) aesthetics, (7) pedestrian traffic safety, and (8) crime. However, in this questionnaire little attention was paid to studying the effect of built environmental characteristics on students' school trips. Overall, a growing body of literature recognizes that the built environment of schools significantly influences children's mobility, highlighting that transitioning from motorized to active travel can concurrently benefit the environment and the economy [37]. Thus, it is important to study the characteristics of school trips separately, particularly the factors affecting students' school trips.

This study aims to investigate the effect of the built environment during students' trip to school in a unified, comprehensive way by adapting and extending the NEWS questionnaire. The original NEWS questionnaire measures the built environmental parameters of neighborhoods, and in this study, the questions were modified in such a way that the built environmental parameters are measured during the students' travel to school. In particular, this study aims to answer the following research questions:

- (1) How can the impact of built environmental parameters on the students' trips be measured?
- (2) Are there specific built environmental variables that can influence students' school trips?

To answer these research questions, we modified the NEWS questionnaire in such a way that it can be used to measure the impact of built environmental parameters on students' school trips via a questionnaire survey. Through this modified questionnaire survey, one can ascertain whether there are specific variables that can influence students' school trips or not. In addition, the effect of some socio-demographic features, such as the age and gender of the student, household income, and car ownership, were also measured.

2. Materials and Methods

In this section, first, the items which were asked in the questionnaire are described in detail. A description of data collection follows. Finally, the statistical population used in this study is explained.

2.1. Measures

The questionnaire used in this study consists of three parts. In the first part, questions on the student's age and gender, household income and household car ownership were asked. The household income is graded from 1–5 based on the average monthly income, where 1 represents the lowest and 5 represents the highest level of income. In the second part, questions were asked about the students' trip to school. In this study, the school trip method was divided into three categories. The first category included the use of a passenger vehicle, involving both the use of a private household car and the use of taxis. The second category was the use of public services involving the use of school transport services or public transportation, and finally, the third category was an active trip (cycling and walking). Table 1 shows the number and percentage of each of these trip methods.

The third part of the questionnaire used in this study was the NEWS questionnaire. In the main NEWS questionnaire, the environmental parameters that are measured are about the neighborhood where the respondents live. Therefore, before using this questionnaire, it was necessary to modify the questions in such a way that instead of measuring the environmental parameters of the neighborhoods, the parameters are measured during the students' journey to school. For this purpose, the questions were modified in consultation with 3 relevant experts in this field. According to the opinions of these people, the phrase "commuting route to school" should be mentioned in all the questions and the text of

the questions should be modified in such a way that the respondent understands that this question aims to measure the environmental parameters during the student's journey to school. Since the survey was conducted in Iran, the Back Translation approach was adopted to translate the original questionnaire into Persian and then translate the Persian questionnaire back into the source language to determine whether the translated items convey the same concepts as the original questionnaire items or not. After a slight change in the translation of the items, the final 54 items translated into the Persian language were used for the survey. A pilot study was conducted on 150 parents to determine whether the questions could convey the concept well. After numerous meetings with these 150 parents and investigating the studied city's environmental conditions, it was decided to summarize 23 items from the land use mix-diversity category into seven items. Thus, the 54 items of the original NEWS questionnaire were shortened into 38 items under eight factors as described below:

1-Residential density: For this factor, questions were asked to parents about the types of residential buildings on the route students take to school, as shown below:

"How many residential houses are there on your child's walking route to school of the following type?"

1. detached single-family residences,
2. town houses or row houses of 1–3 stories,
3. apartments or condos of 1–3 stories,
4. apartments or condos of 4–6 stories,
5. apartments or condos of 7–12 stories,
6. apartments or condos of more than 13 stories

These six items were asked on a 5-point Likert scale (from 1-none to 5-all).

Table 1. Descriptive statistics of the statistical population.

Variable	Groups	Number	Percentage
Gender	Boy	819	48.5
	Girl	869	51.5
Income	Level 1	316	18.7
	Level 2	455	27
	Level 3	626	37.1
	Level 4	237	14
	Level 5	54	3.2
Car ownership	Zero	235	13.9
	One car	1254	74.3
	Two cars	183	10.8
	Three cars or more	16	0.9
School trip method	Passenger car	656	38.9
	Public services	636	38.7
	Active trip method	396	23.5

Based on the density of the population living in each building, each of the above questions was scored [38]. For this purpose, the higher the number of stories in a building, the higher the density of the population living in that building, and the higher the score received. The points in the above-mentioned questions for the six questions were equal to 1, 12, 10, 25, 50 and 75, respectively. In the next step, the Likert point that the respondent assigns to each question was multiplied by the score of that question (which was explained in the previous sentence) and a number was obtained for each question. At the end, by summing the numbers obtained for each of the 6 questions in the previous step, the final score for this factor was obtained for each respondent. In general, the higher the score for this factor, the higher the density of the residential population on the way to/from school.

2-Land use mix-diversity: For this factor, parents were asked:

"How many buildings with the following uses are on your children's commuting route to school?"

1. Places for convenience and service use (includes supermarket, convenience/small grocery store, hardware store, fruit/vegetable market, laundry/dry cleaners and clothing store items from the main questionnaire),
2. Places for government use (includes post office, library, elementary school, other schools, your job or school and bank/credit union from the main questionnaire),
3. Places for food sales (includes fast food restaurants, coffee shops and non-fast food restaurant items from the main questionnaire),
4. Places for cultural and artistic use (includes book store and video store items from the main questionnaire),
5. Places for health and beauty use (includes pharmacy/drug store and salon/barber shop items from the main questionnaire),
6. Places for recreational and entertainment use (includes park, recreation center and gym or fitness facility items from the main questionnaire), and
7. Places for the use of urban transportation services (includes the bus or train stop item from the main questionnaire).

These seven questions were answered on a 5-point Likert scale (1-none to 5-all). The scores of the questions were added together, and their average was taken to finally obtain the land use mix-diversity score. In the original questionnaire for this factor, there were 23 items, which were decreased to seven items (as described above) considering Iranian culture and after surveying 150 parents. In general, higher scores for this factor indicate that there were more diverse land uses on the route that students commute to/from school.

3-Land use mix-access: For this factor, the ease of access to places with different uses was measured. For this purpose, 6 items on a 4-point Likert scale (1-strongly disagree to 4-strongly agree) were applied. The parents were asked to state their level of agreement for the following:

1. Stores are within easy walking distance,
2. Parking in a shopping area is easy,
3. There are many places to go within easy walking distance,
4. It is easy to walk to a transit stop (bus, train),
5. The streets in my children's route are hilly, making the route difficult to walk in, and
6. There are major barriers to walking in my children's route that make it hard to get from home to school (e.g., freeways).

The score for this category was obtained by averaging the scores of the items. In general, higher scores for this factor indicate that it was easier to access facilities on the students' commute to/from school.

4-Street connectivity: For this factor, the way that the streets connect on the route students walk to school was asked about using 3 items on a 4-point Likert scale (1-strongly disagree to 4-strongly agree). The parents were asked to state their level of agreement for the following:

1. The streets do not have many cul-de-sacs (dead-end streets),
2. The distance between intersections are usually short (90 m or less), and
3. There are many alternative routes for my children (they do not have to go the same way every time).

The score for this category was obtained from the average score of the items. In general, higher scores for this factor indicate that the street network of the school's commuting route had better connections.

5-Walking/cycling facilities: For this factor, facilities for pedestrians and cyclists on the route students walk to school were investigated using a 4-point Likert scale (1-strongly disagree) to (4-strongly agree). Here, the parents were asked to comment on their perceptions of the sidewalk by stating the extent of their agreement with the following:

1. There are sidewalks on most of the streets,
2. Sidewalks are separated from the road/traffic by parked cars, and
3. There is a grass/dirt strip that separates the streets from the sidewalks.

The score for this category was obtained from the average score of the question. In general, a higher score for this factor indicates that on the students' route to school, walking and cycling facilities were better provided for.

6-Aesthetics: In addition to land use issues and traffic issues in the NEWS scale, the aesthetics of the route were also measured. Visual perspectives were questioned using four items and on a 4-point Likert scale (1-strongly disagree to 4-strongly agree). In these four items, the parents were asked to state their level of agreement for the following:

1. There are trees along the streets,
2. There are many interesting things to look at while walking,
3. There are many attractive natural sights (such as landscaping, views), and
4. There are attractive buildings/homes.

The score for this category was obtained from the average score for the question. In general, the higher the score for this factor, the more beautiful the landscape of the students' commuting route to school was and the more attractive this route was for students.

7-Pedestrian traffic safety: In this part, the walking routes of students to school were measured from the perspective of traffic safety. For this purpose, six items were used, and the parents were asked to state their level of agreement for the following:

1. There is so much traffic along nearby streets that it makes it difficult or unpleasant to walk,
2. The speed of traffic on most nearby streets is usually slow (50 km/h or less),
3. Most drivers exceed the posted speed limits while driving,
4. The streets on the route my children take are well lit at night,
5. Walkers and bikers on the streets can be easily seen by people in their homes, and
6. There are crosswalks and pedestrian signals to help walkers cross busy streets.

These six items were asked on a 4-point Likert scale (1-strongly disagree to 4-strongly agree). The score for this category was obtained from the average score for the question. In general, the higher the score for this factor, the higher the traffic safety for students to/from school.

8-Crime: The last variables evaluated in the NEWS questionnaire were the features related to the rate of crime. For this purpose, the parents were asked the extent to which they agreed with the following:

1. There is a high crime rate on the route,
2. The crime rate on my children's route makes it unsafe to go on walks during the day, and
3. The crime rate on my children's route makes it unsafe to go on walks at night.

These three items were measured on a 4-point Likert scale (1-strongly disagree to 4-strongly agree). The score for this category was obtained from the average scores of these 3 items. In general, a higher score for this factor indicates that students feel safer on the way to and from school from the point of view of crime.

2.2. Procedure

In order to collect data, 36 schools were selected in Yazd (the capital of Yazd province in Iran). These 36 schools were selected in such a way that they represented various social and economic levels of the city. Due to the COVID-19 pandemic, the questionnaire survey was conducted online using Porsline (a trusted market service provider for academic research in Iran). It should be noted that Porsline includes data quality check features such as preventing duplicate messages, avoiding half-completed questionnaires, preventing multiple responses with a specific ID, recording the date and time of responses, etc. The responses were collected anonymously and confidentially, and to assure the respondents that their privacy would be maintained, the following phrase was added at the beginning of the respondents' entry to the answer page:

"This questionnaire is designed to investigate the way children go to school. This questionnaire is a subset of Tehran University's research works and is used for academic

and scientific purposes and it is not used for any other purpose. The information collected in this questionnaire is completely confidential and anonymous and will not be disclosed to any person, group, or organization. The research team of this study has made every effort not to ask for any personal information. In addition, at any moment during the answering time, if you feel that you are being asked personal questions, you can leave the answering page, in which case none of your answers will be recorded. If you are satisfied, please press the start button and enter the answer page.”

The purpose of doing this was to obtain respondent’s consent to answer the questionnaire. The approximate time for filling out the questionnaire was 15 min. Data collection was carried out from the last week of June 2020 to the end of September 2021. The ethics approval for the survey was obtained from the College of Engineering, University of Tehran. SPSS v24 software was used for the data analysis.

2.3. Participants

A total number of 1878 responses were received from the survey. Only 1688 (90% validity rate) were used for the study as 190 responses were deemed unsuitable due to errors within them. The age range of the students evaluated in this study was 7–18 years with a mean age of 14.40 years and a standard deviation of 2.60. In addition, 48.5% of respondents were girls, and 51.5% were boys. Table 1 shows the descriptive statistics of the final valid data.

3. Results

At first, factor analysis was conducted to summarize the critical information using a smaller set of factors from the NEWS questionnaire. After identifying the factors from the NEWS questionnaire, the effect of these factors was measured in predicting the students’ school trips using the Multinomial Logit Regression (MLR) model.

3.1. Factor Analysis

The principal component analysis (PCA) method with varimax rotation was applied to conduct factor analysis in this study. By conducting factor analysis on thirty-eight items of the NEWS questionnaire, it was found that four items should be removed due to high correlation in more than one factor. These four items were (1) How common are apartments or condos of 1–3 stories in your children’s route to school, (2) There are many alternative routes for my children (they do not have to go the same way every time), (3) Most drivers exceed the posted speed limits while driving, and (4) There are sidewalks on most of the streets. The remaining thirty-four items were categorized into nine factors, which was slightly different from Cerin’s study [38].

After conducting the factor analysis and removing four items, categorizing the remaining thirty-four NEWS items in this study had three main differences from the study conducted by Cerin [38]. The first difference was that in this study, the items were classified into nine factors, and the two items, “number of single villa houses” and “number of 1–3 story villa houses”, were classified as separate factors. In addition, the residential density factor in this study was divided into two residential density factors of apartment and villa type, while in Cerin’s study [38], residential density was only in one category and villa and apartment houses were not separated.

The second difference between the present study and Cerin’s study [38] was that two items from the category of walking/cycling facilities were grouped together as one item from the category of aesthetics from the NEWS questionnaire. This formed a new factor named “separation of the pedestrian path from the street”. Also, this factor more reasonably represented the specific traffic environment of Iran.

The third (last) difference between this study and Cerin’s study [38] was that the street connectivity category was not observed in this study. However, two items from this category, along with two items from the land use mix-access category and one item from the pedestrian traffic safety category, formed a new factor called “environmental and traffic barriers”. All the items under this new factor were somehow related to problems

and obstacles for walking, and included both environmental factors (uneven roads, dead ends and obstacles on the way) and traffic factors (a large number of intersections on the route and heavy traffic). For this reason, this new factor was referred to as “environmental and traffic barriers”.

Table 2 indicates the results of factor analysis. The value of the KMO coefficient for factor analysis was equal to 0.858, and Bartlett’s test was significant at the confidence level of 99%, indicating the suitability of factor analysis. The value of the total variance in this factor analysis was equal to 62.5. Variance and Cronbach’s alpha for each factor are indicated in Table 2. Cronbach’s alpha was in the good and appropriate range (>0.7) for all factors, except for the three factors “pedestrian traffic safety”, “separation of the sidewalk from the street” and “villa-type population density” which was between 0.6 and 0.7. However, the literature suggests that this range is acceptable with some tolerance in scientific studies [39].

Table 2. Results of factor analysis.

Items	Load Factor	Factor in Cerin’s Study
Factor 1: land use mix-diversity (Cronbach’s alpha: 0.875, Variance: 12.47)		
Places for food sale use	0.818	land use mix-diversity
Places for government use	0.766	land use mix-diversity
Places for health and beauty use	0.762	land use mix-diversity
Places for cultural and artistic use	0.75	land use mix-diversity
Places for service and comfort use	0.708	land use mix-diversity
Places for urban transportation services use	0.703	land use mix-diversity
Places for recreational and entertainment use	0.636	land use mix-diversity
Factor 2: environmental and traffic barriers (Cronbach’s alpha: 0.708, Variance: 6.98)		
The streets do not have many cul-de-sacs (dead-end streets)	0.73	street connectivity
There are major barriers to walking on my children’s route that make it hard to get from home to school (e.g., freeways)	0.72	land use mix-access
The streets on my children’s route are hilly, making the route difficult to walk on	0.684	land use mix-access
The distance between intersections is usually short (90 m or less)	0.62	street connectivity
There is so much traffic along nearby streets that it makes it difficult or unpleasant to walk	0.518	pedestrian traffic safety
Factor 3: crime (Cronbach’s alpha: 0.845, Variance: 6.81)		
The crime rate on my children’s route makes it unsafe to go on walks during the day	0.866	crime
The crime rate on my children’s route makes it unsafe to go on walks at night	0.85	crime
There is a high crime rate on the route	0.798	crime
Factor 4: land use mix-access (Cronbach’s alpha: 0.741, Variance: 6.79)		
Stores are within easy walking distance	0.79	land use mix-access
There are many places to go within easy walking distance	0.757	land use mix-access
Parking in a shopping area is easy	0.74	land use mix-access
It is easy to walk to a transit stop (bus, train)	0.605	land use mix-access
Factor 5: residential density of apartment type (Cronbach’s alpha: 0.811, Variance: 6.65)		
How common are apartments or condos of 7–12 stories on your children’s route to school?	0.895	residential density
How common are apartments or condos of more than 13 stories on your children’s route to school?	0.812	residential density
How common are apartments or condos of 4–6 stories on your children’s route to school?	0.776	residential density
Factor 6: aesthetics (Cronbach’s alpha: 0.795, Variance: 6.62)		
There are many attractive natural sights (such as landscaping, views)	0.81	aesthetics
There are attractive buildings/homes	0.778	aesthetics
There are many interesting things to look at while walking	0.697	aesthetics
Factor 7: pedestrian traffic safety (Cronbach’s alpha: 0.643, Variance: 5.76)		
The streets on my children’s route are well lit at night	0.74	pedestrian traffic safety
Walkers and bikers on the streets can be easily seen by people in their homes	0.738	pedestrian traffic safety
There are crosswalks and pedestrian signals to help walkers cross busy streets	0.535	pedestrian traffic safety
The speed of traffic on most nearby streets is usually slow (50 km/h or less)	0.496	pedestrian traffic safety
Factor 8: the degree of separation of the sidewalk from the streets (Cronbach’s alpha: 0.681, Variance: 5.41)		
There is a grass/dirt strip that separates the streets from the sidewalks	0.815	walking/cycling facilities
Sidewalks are separated from the road/traffic by parked cars	0.724	walking/cycling facilities
There are trees along the streets	0.625	aesthetics
Factor 9: residential density of villa type (Cronbach’s alpha: 0.677, Variance: 4.56)		
How common are detached single-family residences on your children’s route to school?	0.851	residential density
How common are townhouses or row houses of 1–3 stories on your children’s route to school?	0.845	residential density

3.2. Multinomial Logit Regression (MLR)

After determining the factors from the NEWS questionnaire, the MLR model was used to measure the strength of each of these factors in predicting the mode of transport used for students' school trips. In addition to the factors from the NEWS questionnaire, student's age and gender, income and car ownership variables were also included in the MLR model. Table 3 shows the dependent and independent variables included in the MLR model.

Table 3. Variables included in the MLR model.

Variable	Variable Classes	Variable Type
School trip method	1-Passenger vehicle 2-Public services 3-Active trip method (reference class)	Nominal-dependent
Gender	1-Boy 2-Girl (reference class)	Nominal-independent
Income	1-Very low 2-Below average 3-Average 4-Above average 5-Very High	Ordinal-independent
Car ownership	1-Zero 2-One 3-Two 4-Three cars or more (reference class)	Ordinal-independent
Age	-	Scale
Land use mix-diversity	-	Scale
Environmental and traffic barriers	-	Scale
Crime	-	Scale
Land use mix-access	-	Scale
Residential density of apartment type	-	Scale
Aesthetics	-	Scale
Pedestrian traffic safety	-	Scale

After the implementation of the MLR model, it was found that the Chi-square of the likelihood ratio test of this model was 273.68, and it was significant at the 1% error level, indicating the suitability of the MLR model to predict school trips. The Pseudo R-square coefficient for this model was in the range of 8–17%, indicating that the independent variables could explain 8–17% of the variance of the dependent variable. Table 4 presents the output results of the MLR model. From Table 4, it can be observed that the age, gender, income, car ownership, land use mix-diversity, crime and land use mix-access have a significant effect on trip prediction. Students' education and other variables had no significant effect.

Table 4. MLR model results.

Variables	Chi-Square	Sig.
Age	10.937	0.004
Gender	8.005	0.018
Income	23.633	0.003
Car ownership	61.235	0.000
Land use mix-diversity	64.032	0.000
Environmental and traffic barriers	0.438	0.803
Crime	11.751	0.003
Land use mix-access	15.072	0.001
Residential density of apartment type	12.175	0.002
Aesthetics	1.491	0.474
Pedestrian traffic safety	1.331	0.514
The degree of separation of the sidewalk from the street	1.443	0.486
Residential density of villa type	3.369	0.186

In the implemented MLR model, it is necessary to consider one of the trip methods as the reference class and measure the other two trip methods based on the reference class to investigate the effect of independent variables on students' school trip method. In this model, the active travel mode was considered as the reference class. Accordingly, the model's results were estimated and presented in Table 5.

Table 5. Predictability of variables.

School Trip Method	Variables	B	Wald	Sig.	Odds Ratio
Ratio of passenger vehicle to active travel mode	age	−0.068	5.768	0.016	0.934
	land use mix-diversity	0.907	45.635	0.000	2.477
	environmental and traffic barriers	−0.060	0.427	0.514	0.942
	crime	0.207	5.180	0.023	1.230
	land use mix-access	−0.330	10.226	0.001	0.719
	apartment density	0.002	8.521	0.004	1.002
	aesthetic	0.054	0.299	0.585	1.055
	pedestrian traffic safety	−0.132	1.180	0.277	0.876
	the degree of separation of the sidewalk from the street	0.008	0.007	0.936	1.008
	house density	0.009	3.120	0.077	1.009
	[gender = 1]	−0.391	7.567	0.006	0.677
	[gender = 2]	-	-	-	-
	[income = 1]	−1.240	6.736	0.009	0.290
	[income = 2]	−0.917	3.873	0.049	0.400
	[income = 3]	−0.531	1.325	0.250	0.588
	[income = 4]	−0.284	0.335	0.563	0.753
	[income = 5]	-	-	-	-
	[car ownership = 1]	−2.229	3.976	0.046	0.108
	[car ownership = 2]	−0.887	0.648	0.421	0.412
	[car ownership = 3]	−0.183	0.026	0.871	0.833
	[car ownership = 4]	-	-	-	-
Ratio of public services to active travel mode	age	−0.091	10.611	0.001	0.913
	land use mix-diversity	0.990	54.420	0.000	2.691
	environmental and traffic barriers	−0.032	0.123	0.726	0.969
	crime	0.304	11.549	0.001	1.355
	land use mix-access	−0.380	13.829	0.000	0.684
	apartment density	0.002	10.861	0.001	1.002
	aesthetic	−0.047	0.230	0.631	0.954
	pedestrian traffic safety	−0.121	1.010	0.315	0.886
	the degree of separation of the sidewalk from the street	0.101	0.950	0.330	1.106
	house density	0.008	2.300	0.129	1.008
	[gender = 1]	−0.323	5.233	0.022	0.724
	[gender = 2]	-	-	-	-
	[income = 1]	−0.514	1.047	0.306	0.598
	[income = 2]	−0.453	0.842	0.359	0.635
	[income = 3]	−0.172	0.124	0.725	0.842
	[income = 4]	0.113	0.048	0.827	1.120
	[income = 5]	-	-	-	-
	[car ownership = 1]	−2.037	3.379	0.066	0.130
	[car ownership = 2]	−1.299	1.405	0.236	0.273
	[car ownership = 3]	−0.857	0.584	0.445	0.424
	[car ownership = 4]	-	-	-	-

3.2.1. Ratio of Passenger Vehicle to Active Travel Mode

In this section, the ratio of using a passenger vehicle instead of the active travel mode is studied, and the variables that significantly affect this probability are introduced. Based on Table 5, an increase of one unit in the age variable caused the ratio of using a passenger

vehicle instead of the active travel mode to be 0.934. In addition, an increase of 1 unit in the land use mix-diversity, crime and land use mix-access variables caused the ratio of the use of passenger vehicles to the active trip to be 2.477, 1.230, and 0.719, respectively.

This shows that with the increase in the land use diversity on the way to and from school and the increase in crime rates, the tendency of students to use vehicles has increased. The more students on their way to and from school have easier access to transit stops and stores (i.e., greater land use mix-access) the tendency to use the active trip method increases. Furthermore, it was determined using the MLR model that female students use cars to go to school more than boys. The amount of household income also has a significant effect on the student's trip method. It was observed that the less the household income is at a low level, the ratio of using a passenger vehicle instead of the active trip decreases. The last variable which had a significant effect on this ratio was the car ownership variable. It was found that the ratio of using a passenger vehicle for students to travel to school in families with one or more personal cars was nine times more compared with families that do not have a personal car.

3.2.2. Ratio of Public Services to Active Travel Mode

In this section, the effect of independent variables on the ratio of students' use of public services (use of school transport services or public transportation) to active trips is studied. As can be observed in Table 5, an increase of 1 unit in the variables of age, land use mix-diversity, crime and land use mix-access causes the ratio of using public services to making active trips to be 0.913, 2.691, 1.355 and 0.684, respectively. This shows that as the age of students increases, the tendency to use public services decreases. Further, the increase in the variety of uses of the existing buildings on the student's commute to school and the increase in the crime rate increase the use of public services instead of the active trip. Nevertheless, easier access to transit stops and stores (i.e., greater land use mix-access) reduces the tendency to use public services. Further, the tendency of boys to use public services was less than that of girls.

4. Discussion

This study investigated the effect of the built environment on students' school trips by adapting and extending the NEWS questionnaire. The items of the NEWS questionnaire were placed in nine factors by performing factor analysis. Then, the MLR model was applied to check the predictive power of these nine factors. Using this model, it was concluded that land use mix-diversity, land use mix-access, crime, age, gender, household income and car ownership had a significant effect on students' school trip method. In particular, it was found that the built environment is one of the most significant factors.

By using the MLR model, it was observed that the more the variety of existing buildings on the student's commuting route to school, the more the use of public transport or public services will increase instead of the active trip. In previous studies, the effect of the diversity of building use on students' trips has been shown in two ways. Some results found that the variety of building uses does not have a significant effect on student's trip [19,30]; however, in another study, a different result was obtained, and higher building diversity resulted in less active trip methods [33].

The next variable from NEWS that significantly affects students' trips is access to various places. This study revealed that the more easily students have access to different places (e.g., access to transit stops or stores), the less they use public services and cars compared with the active travel mode. This observation is expected because as students' access increases, the active trip becomes more attractive and fun for students; thus, they are more likely to use the active travel mode. In studies, it was also shown that land use diversity is related to walkability [40,41]. In previous studies, only access to public transportation was measured, and it was found that the use of school buses by students decreases with increasing access to public transportation services [14,30]. It has also been shown in study by Saghapour et al. [42] that the more accessible the neighborhoods are,

the more active travel modes are used in those neighborhoods [42]. In the present study, the results from the land use mix-access variable revealed the important role of students' access to different places, which was paid less attention in previous studies.

Another result of this study is that the use of public services and vehicles increases instead of the active trip with the increase in crime rate along the route to school. In other words, on the routes where the crime rate is high, parents prefer their children not to use the active travel mode. Previous studies found that if parents' main priority is children's security issues, students are less likely to walk to school [26,43]. Around 75% of parents fear strangers and criminals, and thus avoid their children travelling via active travel mode to school [27].

The first demographic variable which had a significant effect was the age of the students. In this study, it was found that as the age of the students increases, the ratio of using public services and the use of passenger vehicles decreases in comparison to the active trip method. In other words, the tendency to use the active travel mode increases among students with an increase in age. The result achieved in this study confirms those of previous studies, in which it was found that the use of the active travel mode or non-car travel mode for commuting to school has a direct relationship with the age of students [17,18,20,26].

In this study, it was observed that there was a significant gender difference regarding the active travel mode selection. Boys were more likely to select an active travel mode for school travel than girls. Normally, in Iran, because of cultural and religious beliefs, parents are more sensitive toward female children than boys. This indicates that the gender effect in the selection of active travel modes may depend on the culture of societies. As such, contradictory results have been observed in past studies regarding the gender effects on active travel mode selection. For example, in some societies, boys select an active travel mode more than girls [16,20,26,32] while in some other societies, the opposite is observed [15,26,35]. In the field of work travel mode, another observed result suggests a higher inclination among men to use private cars compared with women. [44].

The results of this study showed that the amount of monthly income of the family has a significant effect on the way students select active travel modes. In families with a monthly income of less than 2.5 million Tomans (Iran's currency; USD 1 = approx. 25,000 Tomans as per the January 2021 exchange rate), trips from the passenger vehicle in comparison to the active travel mode has been significantly less than families with a monthly income of more than 6 million Tomans. In fact, among low-income families, the use of a passenger vehicle to bring students to school was less than 40% compared with the active trip method. Previous studies showed that the higher the monthly income of families, the more likely they are to select motorized trip methods for their children to go to school and the less likely they are to select the active travel mode [20,21,26,30,37].

Limitations

Social desirability bias may occur in a questionnaire survey [45]. This study attempted to minimize this bias by making the questionnaires confidential and anonymous. Another limitation of this study was the data collection approach. In this study, it was not feasible to collect data in person because of the COVID-19 pandemic and the closure of schools. For this reason, the questionnaire responses were collected online. The COVID-19 pandemic may affect the students' travel decisions to school in future, which is outside the scope of this study. More studies in different regions using the approach followed in this study may average out the geographical bias in this study.

5. Conclusions

In this study, the effect of built environment variables, along with variables such as student age and gender, household income, and car ownership, on students' school trip method was investigated. A shortened version of the NEWS questionnaire was applied to evaluate the effect of built environment variables. Using factor analysis, the items of

the NEWS questionnaire were placed in nine categories, including land use mix-diversity, environmental/traffic barriers, crime, land use mix-access, apartment density, aesthetics, pedestrian traffic safety, the degree of separation of the sidewalk from the street and house density. The MLR model was applied to measure the effect of independent variables on students' school travel mode. It was found that older students and male students were more inclined to go to school using active travel modes. As the income and the number of cars in the households increase, the use of active travel modes decreases. In regard to the effect of built environment variables, it was found that with an increase in different building uses and an increase in the crime rate on the route to school, the tendency to select active travel modes decreases. With easier access to different facilities (e.g., transit stations, stores), the likelihood of the selection of active travel modes increases. The effect of the NEWS questionnaire on students' school trip methods has been less investigated in previous studies. Thus, it is recommended that this questionnaire is used in future studies relating to students' trips to school and that it is calibrated for other countries with different cultures. Furthermore, other geographic data can be applied in future studies along with the NEWS questionnaire for a more comprehensive analysis.

The outcomes of this study hold significant policy implications for advancing sustainable travel, particularly in the realm of school transportation. The identified factors influencing students' school trips, including land use mix-diversity, land use mix-access, crime rates, age, gender, household income and car ownership, offer actionable insights for policymakers aiming to foster sustainable travel practices. To encourage the adoption of eco-friendly transportation modes like walking and cycling, urban planning policies could prioritize the creation of mixed-use neighborhoods, ensuring that schools are easily accessible by foot or bicycle.

In response to the findings regarding the impact of crime rates on transportation choices, policymakers can strategize interventions to enhance safety along school routes. This could involve collaborations between the education and law enforcement sectors to implement targeted safety measures, such as increased police presence during peak school travel times. Additionally, recognizing the influence of socio-economic factors, policymakers might consider incentive programs or subsidies specifically designed to support low-income families in utilizing sustainable transportation options.

Infrastructure investments are crucial in promoting active modes of travel, and policymakers can allocate resources to develop pedestrian-friendly pathways and cycling infrastructure around schools. Furthermore, policy initiatives that emphasize education and awareness about the benefits of sustainable travel can complement infrastructure improvements. By incorporating these insights into urban planning and transportation policies, policymakers can actively contribute to the promotion of sustainable travel behaviors among students, aligning with broader environmental sustainability objectives and fostering healthier, more resilient communities.

This study is a practical study in the field of urban planning, and its results can be used to determine the necessary policies to encourage students to use active travel modes for commuting to school. Therefore, in future studies, different policies in the field of urban planning can be examined and the impact of each of these policies on the travel mode can be evaluated. This is a case study that was undertaken in Iran; it can be conducted in other countries that have different cultures and explore any geographical bias. In addition, this study only examined the travel modes used for school trips and did not pay attention to trips for other purposes, which can be the subject of future studies.

Author Contributions: Conceptualization, S.E. and K.A.; methodology, S.E. and K.A.; software, S.E.; validation, K.A. and N.S.; formal analysis, S.E.; investigation, S.E.; resources, S.E.; data curation, S.E.; writing—original draft preparation, S.E.; writing—review and editing, S.E., K.A. and N.S.; visualization, S.E.; supervision, K.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was approved by the College of Engineering, University of Tehran (protocol code: 82-C-110; date of approval: 25 September 2018).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data can be made available by contacting the corresponding author, Kayvan Aghabayk (kayvan.aghabayk@ut.ac.ir).

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Brand, C.; Dons, E.; Anaya-Boig, E.; Avila-Palencia, I.; Clark, A.; de Nazelle, A.; Gascon, M.; Gaupp-Berghausen, M.; Gerike, R.; Götschi, T.; et al. The climate change mitigation effects of daily active travel in cities. *Transp. Res. Part D Transp. Environ.* **2021**, *93*, 102764. [\[CrossRef\]](#)
2. Chapman, R.; Keall, M.; Howden-Chapman, P.; Grams, M.; Witten, K.; Randal, E.; Woodward, A. A Cost Benefit Analysis of an Active Travel Intervention with Health and Carbon Emission Reduction Benefits. *Int. J. Environ. Res. Public Health* **2018**, *15*, 962. [\[CrossRef\]](#)
3. Neves, A.; Brand, C. Assessing the potential for carbon emissions savings from replacing short car trips with walking and cycling using a mixed GPS-travel diary approach. *Transp. Res. Part A Policy Pract.* **2019**, *123*, 130–146. [\[CrossRef\]](#)
4. Albalade, D.; Fageda, X. Congestion, Road Safety, and the Effectiveness of Public Policies in Urban Areas. *Sustainability* **2019**, *11*, 5092. [\[CrossRef\]](#)
5. Litman, T. *Evaluating Active Transport Benefits and Costs*; Victoria Transport Policy Institute: Victoria, BC, Canada, 2016; pp. 134–140.
6. Peralta, M.; Henriques-Neto, D.; Bordado, J.; Loureiro, N.; Diz, S.; Marques, A. Active Commuting to School and Physical Activity Levels among 11 to 16 Year-Old Adolescents from 63 Low- and Middle-Income Countries. *Int. J. Environ. Res. Public Health* **2020**, *17*, 1276. [\[CrossRef\]](#)
7. Larouche, R.; Saunders, T.J.; Faulkner, G.E.J.; Colley, R.; Tremblay, M. Associations Between Active School Transport and Physical Activity, Body Composition, and Cardiovascular Fitness: A Systematic Review of 68 Studies. *J. Phys. Act. Health* **2014**, *11*, 206–227. [\[CrossRef\]](#) [\[PubMed\]](#)
8. Laverty, A.A.; Hone, T.; Goodman, A.; Kelly, Y.; Millett, C. Associations of active travel with adiposity among children and socioeconomic differentials: A longitudinal study. *BMJ Open* **2021**, *11*, e036041. [\[CrossRef\]](#) [\[PubMed\]](#)
9. Machado-Rodrigues, A.M.; Santana, A.; Gama, A.; Mourão, I.; Nogueira, H.; Rosado, V.; Mota, J.; Padez, C. Active commuting and its associations with blood pressure and adiposity markers in children. *Prev. Med.* **2014**, *69*, 132–134. [\[CrossRef\]](#)
10. VTan, V.P.; Macdonald, H.M.; Kim, S.; Nettlefold, L.; Gabel, L.; Ashe, M.C.; McKay, H.A. Influence of Physical Activity on Bone Strength in Children and Adolescents: A Systematic Review and Narrative Synthesis. *J. Bone Miner. Res.* **2014**, *29*, 2161–2181. [\[CrossRef\]](#)
11. Biddle, S.J.H.; Asare, M. Physical activity and mental health in children and adolescents: A review of reviews. *Br. J. Sports Med.* **2011**, *45*, 886–895. [\[CrossRef\]](#)
12. Phansikar, M.; Ashrafi, S.A.; Khan, N.A.; Massey, W.V.; Mullen, S.P. Active Commute in Relation to Cognition and Academic Achievement in Children and Adolescents: A Systematic Review and Future Recommendations. *Int. J. Environ. Res. Public Health* **2019**, *16*, 5103. [\[CrossRef\]](#) [\[PubMed\]](#)
13. Marotz, L.R. *Health, Safety and Nutrition for the Young Child*, 9th ed.; Delmar Publishers: Clifton Park, NY, USA, 2014.
14. Broberg, A.; Sarjala, S. School travel mode choice and the characteristics of the urban built environment: The case of Helsinki, Finland. *Transp. Policy* **2015**, *37*, 1–10. [\[CrossRef\]](#)
15. Ermagun, A.; Levinson, D. Public transit, active travel, and the journey to school: A cross-nested logit analysis. *Transp. A Transp. Sci.* **2017**, *13*, 24–37. [\[CrossRef\]](#)
16. Haug, E.; Smith, O.R.F.; Bucksch, J.; Brindley, C.; Pavelka, J.; Hamrik, Z.; Inchley, J.; Roberts, C.; Mathisen, F.K.S.; Sigmundová, D. 12-Year Trends in Active School Transport across Four European Countries—Findings from the Health Behaviour in School-Aged Children (HBSC) Study. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2118. [\[CrossRef\]](#)
17. Loureiro, N.; Marques, A.; Loureiro, V.; de Matos, M.G. Active Transportation to School. Utopia or a Strategy for a Healthy Life in Adolescence. *Int. J. Environ. Res. Public Health* **2021**, *18*, 4503. [\[CrossRef\]](#)
18. McDonald, N.C. Children's mode choice for the school trip: The role of distance and school location in walking to school. *Transportation* **2008**, *35*, 23–35. [\[CrossRef\]](#)
19. Mitra, R.; Buliung, R.N.; Roorda, M.J. Built Environment and School Travel Mode Choice in Toronto, Canada. *Transp. Res. Rec. J. Transp. Res. Board* **2010**, *2156*, 150–159. [\[CrossRef\]](#)
20. Sener, I.N.; Lee, R.J.; Sidharthan, R. An examination of children's school travel: A focus on active travel and parental effects. *Transp. Res. Part A Policy Pract.* **2019**, *123*, 24–34. [\[CrossRef\]](#)
21. Zavareh, M.F.; Abolhasannejad, V.; Mamdoohi, A.; Nordfjærn, T. Barriers to children's walking to school in Iranian and Chinese samples. *Transp. Res. Part F Traffic Psychol. Behav.* **2020**, *73*, 399–414. [\[CrossRef\]](#)

22. Ikeda, E.; Stewart, T.; Garrett, N.; Egli, V.; Mandic, S.; Hosking, J.; Witten, K.; Hawley, G.; Tautolo, E.S.; Rodda, J.; et al. Built environment associates of active school travel in New Zealand children and youth: A systematic meta-analysis using individual participant data. *J. Transp. Health* **2018**, *9*, 117–131. [\[CrossRef\]](#)
23. He, S.Y.; Giuliano, G. Factors affecting children's journeys to school: A joint escort-mode choice model. *Transportation* **2017**, *44*, 199–224. [\[CrossRef\]](#)
24. Mehdizadeh, M.; Nordfjaern, T.; Mamdoohi, A. The role of socio-economic, built environment and psychological factors in parental mode choice for their children in an Iranian setting. *Transportation* **2018**, *45*, 523–543. [\[CrossRef\]](#)
25. Mehdizadeh, M.; Nordfjaern, T.; Mamdoohi, A.R.; Mohaymany, A.S. The role of parental risk judgements, transport safety attitudes, transport priorities and accident experiences on pupils' walking to school. *Accid. Anal. Prev.* **2017**, *102*, 60–71. [\[CrossRef\]](#)
26. Ermagun, A.; Rashidi, T.H.; Lari, Z.A. Mode Choice for School Trips. *Transp. Res. Rec. J. Transp. Res. Board* **2015**, *2513*, 97–105. [\[CrossRef\]](#)
27. McDonald, N.C.; Aalborg, A.E. Why Parents Drive Children to School: Implications for Safe Routes to School Programs. *J. Am. Plan. Assoc.* **2009**, *75*, 331–342. [\[CrossRef\]](#)
28. Wangzom, D.; White, M.; Paay, J. Perceived Safety Influencing Active Travel to School—A Built Environment Perspective. *Int. J. Environ. Res. Public Health* **2023**, *20*, 1026. [\[CrossRef\]](#) [\[PubMed\]](#)
29. Singh, N.; Vasudevan, V. Understanding school trip mode choice—The case of Kanpur (India). *J. Transp. Geogr.* **2018**, *66*, 283–290. [\[CrossRef\]](#)
30. Ewing, R.; Schroeder, W.; Greene, W. School location and student travel: Analysis of factors affecting mode choice. *Transp. Res. Rec.* **2004**, *1895*, 55–63. [\[CrossRef\]](#)
31. Aranda-Balboa, M.J.; Chillón, P.; Saucedo-Araujo, R.G.; Molina-García, J.; Huertas-Delgado, F.J. Children and Parental Barriers to Active Commuting to School: A Comparison Study. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2504. [\[CrossRef\]](#)
32. Easton, S.; Ferrari, E. Children's travel to school—The interaction of individual, neighbourhood and school factors. *Transp. Policy* **2015**, *44*, 9–18. [\[CrossRef\]](#)
33. Ermagun, A.; Levinson, D. Intra-household bargaining for school trip accompaniment of children: A group decision approach. *Transp. Res. Part A Policy Pract.* **2016**, *94*, 222–234. [\[CrossRef\]](#)
34. Zhang, R.; Yao, E.; Liu, Z. School travel mode choice in Beijing, China. *J. Transp. Geogr.* **2017**, *62*, 98–110. [\[CrossRef\]](#)
35. Giles-Corti, B.; Wood, G.; Pikora, T.; Larnihan, V.; Bulsara, M.; Van Niel, K.; Timperio, A.; McCormack, G.; Villanueva, K. School site and the potential to walk to school: The impact of street connectivity and traffic exposure in school neighborhoods. *Health Place* **2011**, *17*, 545–550. [\[CrossRef\]](#)
36. Cerin, E.; Macfarlane, D.J.; Ko, H.-H.; Chan, K.-C.A. Measuring perceived neighbourhood walkability in Hong Kong. *Cities* **2007**, *24*, 209–217. [\[CrossRef\]](#)
37. Ermagun, A.; Samimi, A. Promoting active transportation modes in school trips. *Transp. Policy* **2015**, *37*, 203–211. [\[CrossRef\]](#)
38. Cerin, E.; Saelens, B.E.; Sallis, J.F.; Frank, L.D. Neighborhood Environment Walkability Scale: Validity and Development of a Short Form. *Med. Sci. Sports Exerc.* **2006**, *38*, 1682–1691. [\[CrossRef\]](#)
39. Taber, K.S. The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Res. Sci. Educ.* **2018**, *48*, 1273–1296. [\[CrossRef\]](#)
40. Ewing, R.; Cervero, R. Travel and the Built Environment: A meta-analysis. *J. Am. Plan. Assoc.* **2010**, *76*, 265–294. [\[CrossRef\]](#)
41. Sales, D.; Matsudo, V.; Fisberg, M.; Drenowatz, C.; Marques, A.; Ferrari, G. Perception of the Neighborhood Environment, Physical Activity by Domain and Sitting Time in Brazilian Adults. *Int. J. Environ. Res. Public Health* **2022**, *19*, 15744. [\[CrossRef\]](#) [\[PubMed\]](#)
42. Saghapour, T.; Moridpour, S.; Thompson, R. Sustainable transport in neighbourhoods: Effect of accessibility on walking and bicycling. *Transp. A Transp. Sci.* **2019**, *15*, 849–871. [\[CrossRef\]](#)
43. Torres, M.A.; Oh, H.W.; Lee, J. The Built Environment and Children's Active Commuting to School: A Case Study of San Pedro De Macoris, the Dominican Republic. *Land* **2022**, *11*, 1454. [\[CrossRef\]](#)
44. Mercado, R.G.; Paez, A.; Farber, S.; Roorda, M.J.; Morency, C. Explaining transport mode use of low-income persons for journey to work in urban areas: A case study of Ontario and Quebec. *Transportmetrica* **2011**, *8*, 157–179. [\[CrossRef\]](#)
45. Sullman, M.J.; Taylor, J.E. Social desirability and self-reported driving behaviours: Should we be worried? *Transp. Res. Part F Traffic Psychol. Behav.* **2010**, *13*, 215–221. [\[CrossRef\]](#)

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.