PERCEPTION OF THE ENVIRONMENT FOR ACTIVE TRANSPORTATION IN HIGH SCHOOL STUDENTS IN CHILE

PERCEPCIÓN DEL ENTORNO PARA EL TRANSPORTE ACTIVO EN ESCOLARES SECUNDARIOS DE CHILE

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Abstract

The problem of physical inactivity is responsible for more than five million deaths per year. In view of this problem, active transportation (walking or cycling) is considered as an accessible, economical and sustainable method to increase daily physical activity in schoolchildren. In this context, the present study aims to evaluate the association between the perception of the characteristics of the environment and the type of transportation to and from school among Chilean adolescents. Through a quantitative, descriptive and cross-sectional approach, and by means of a non-random and convenience sample, 753 high school students from public and private schools in the Maule region participated in the study. A battery of questionnaires with instruments validated in this population was applied, considering sociodemographic information, perception of the environment and active transportation and physical activity. The results indicate that the most relevant environmental characteristics for active transportation are distance, density, local facilities, general infrastructure, maintenance, safety, bicycle and pedestrian network and connectivity. It is concluded that men have a higher perception of favorable characteristics for active transportation, coinciding with scientific studies. Finally, the predictive power of the models was higher for the home-to-school commute.

Keywords: Physical activity, active transportation, built environment, students, school.

Resumen

El problema de la inactividad física es responsable de más de cinco millones de muertes al año. Ante este problema, el transporte activo (caminar o andar en bicicleta) es considerado como un método accesible, económico y sostenible para incrementar la actividad física diaria en escolares. En este contexto, el presente estudio tiene como objetivo evaluar la asociación entre la percepción de las características del entorno y el tipo de transporte hacia y desde la escuela en adolescentes chilenos. A través de un enfoque cuantitativo, de tipo descriptivo y de corte transversal, y por medio de una muestra no aleatoria y por conveniencia, se obtuvo una participación de 753 estudiantes de enseñanza secundaria pertenecientes a colegios públicos y privados de la región del Maule. Se aplicó una batería de cuestionarios con instrumentos validados en esta población, considerando información sociodemográfica, percepción del entorno y transporte activo y actividad física. Los resultados señalan que las características del entorno más relevantes para el transporte activo son distancia,

densidad, instalaciones locales, infraestructura en general, mantenimiento, seguridad, red de bicicletas y peatones y conectividad. Se concluye que los hombres tienen una mayor percepción de las características favorables para el transporte activo, coincidiendo con estudios científicos. Finalmente, el poder de predicción de los modelos fue mayor en el trayecto de la casa al colegio.

Palabras clave: Actividad física, transporte activo, entorno construido, estudiantes, escuela.

Introduction

Physical inactivity is defined as non-compliance with the physical activity guidelines established by the World Health Organization (WHO), which in the case of children under 18 years of age are at least 60 minutes a day of aerobic activity at a moderate-vigorous intensity (WHO, 2020). However, global statistics up to 2022 indicate that 81% of adolescents aged 11-17 years do not comply with these recommendations (WHO, 2021). In the case of Chile, physical inactivity rates in the school population reach an alarming 69.1% (Aguilar-Farias et al., 2020; Ministerio del Deporte, 2021). Thus, physical inactivity represents one of the main challenges for humanity, being responsible for 3.2 million deaths worldwide and putting pressure on health systems (Kohl et al., 2012; Lee et al., 2012).

Factors contributing to physical inactivity in the school-age population include changes in the behaviors of the world's population, driven by technological advances and social changes, which have resulted in the adoption of new lifestyles marked by sedentary behaviors (Aguilar-Farias et al., 2020; WHO, 2018). In this context, the WHO identifies school as one of the causes of low levels of physical activity in the school population, as a result of long school days with low energy expenditure within the school environment (WHO, 2009), a situation that is supported by studies indicating that the times of greatest physical activity in the school environment are usually before classes (during transport), recess, during lunch and after school (Aznar et al., 2011).

In this scenario, the use of active transport, such as walking or cycling to and from school, presents an opportunity to increase students' physical activity levels (Stanley et al., 2015). This alternative is not only cost-effective, but also has a positive impact on the health of schoolchildren and contributes to the preservation of the environment (Aarts et al., 2013; Costa et al., 2019). This claim finds support in a systematic review with meta-analysis suggesting that active transport can contribute between 23% and 36% of daily physical activity in the school population (Martin et al., 2016). Another study underlines this relationship (Denstel et al., 2015) and it has even been considered as a strategy aligned with the United Nations Sustainable Development Goals (Salvo et al., 2021).

An association with reduced adiposity (Martin-Moraleda et al., 2022), improved academic performance (Ruiz-Ariza et al., 2015) and reduced risk of cardiovascular disease (De Nazelle et al., 2011) has also been observed. These findings have been corroborated by two systematic reviews that highlight the benefits of this type of intervention in educational settings (Larouche et al., 2022).

The proportion of students who opt for active transport varies between countries (Uddin et al., 2019), and tends to gradually decrease as the socio-economic level of each nation is considered (Carver et al., 2005; Frömel et al., 2020). In the Chilean context, research on student transport patterns is still limited (Observatorio Urbano, 2010, 2016; Rodríguez-Rodríguez et al., 2017), with values exhibiting disparities across countries. However, the rates reported in Chilean studies are lower than those observed in several cities around the world.

Several factors influence the lack of active transport uptake during the school years, including demographic characteristics, individual and family factors, school-related aspects such as the school environment, and neighborhood or city environmental and organizational factors (Ikeda et al., 2018; McDonald, 2007). Research that has addressed existing barriers identifies parents as the main barrier to promoting active transport use (Dalton et al., 2011). A recent study supports this finding by noting that parents' choice of how to transport their children is influenced by the distance between home and school (Mandic et al., 2020).

Addressing the challenge of physical inactivity is a global concern; however, most research and public policy efforts focus predominantly on biological and behavioral factors in the population, with little effect (Bauman et al., 2012). In this context, evidence suggests that designing strategies to promote physical activity from a holistic perspective may be more successful (D'Haese et al, 2015; Sallis et al, 2008; Sarmiento et al., 2021). Under this premise, the ecological model of physical activity recognizes that physical activity behavior is influenced by multiple levels of interaction, ranging from individual to environmental factors and highlights the influence of these factors on decision-making to be physically active (Sallis et al., 2008). Thus, by intervening in each of these factors, it is possible to increase physical activity levels in the community (Sallis et al., 2008).

Based on the ecological model (Sallis et al., 2008), several studies internationally investigate the impact of the characteristics of the school environment, especially the built environment (streets, buildings, parks, etc.) on physical activity levels (Adams et al., 2014; Aubert et al., 2018; Cerin et al., 2013, 2015; Ding et al., 2012; Lee & Cubbin, 2009; Sarmiento et al., 2021). In this context, the ecological model provides a more complex analysis, allowing the school to be examined as a specific unit that interacts with its environment, including family, neighborhood and sport organizations (Calahorro, 2017; Fairclough et al, 2008; Knuth & Hallal, 2012; Santos et al, 2009; Velasquez et al, 2009). Numerous studies explore the connection between the environment (particularly the neighborhood) and physical activity levels in children and adolescents (Calahorro, 2017; Fairclough et al., 2008; Knuth & Hallal, 2012; Santos et al., 2009; Velasquez et al., 2009), concluding that it is essential to measure not only physical activity levels or how children transport themselves, but also all factors related to the ecological model that influence the decision to be physically active (Pan American Health Organization [PAHO], 2019). Under this idea, the present study aims to evaluate the association between the perception of the characteristics of the environment and the type of transport to and from school in Chilean adolescents.

Materials and Methods

The study is quantitative, descriptive-correlational, non-experimental and cross-sectional in secondary school students from educational establishments in the Maule region. This study is part of a larger study that seeks to evaluate an active transport educational intervention using the ecological model (Merellano-Navarro et al., 2024). The entire procedure was carried out following the Declaration of Helsinki and was approved by the Ethics Committee of the Universidad Católica del Maule, Chile (code: N°27-2024).

Participants

The sample was non-random and by convenience, composed of 753 secondary school students from educational establishments in the Maule region. The study established the following inclusion criteria: i) active enrolment in secondary education in one of the invited schools; ii) attendance on the day the questionnaires were administered; iii) acceptance of informed consent. The exclusion criteria were: iv) failure to answer the questionnaire in full. It should be noted that each parent or guardian of the student had to sign and authorize by means of an informed consent previously sent, respecting the Helsinki declaration of 1,964 and its subsequent updates.

Instruments

A battery of questionnaires including instruments validated in this population were applied, covering areas such as sociodemographic information, physical activity and perception of the environment and active transport. The application of the instruments was carried out by students in their final year of Physical Education Pedagogy, trained in the application of the instruments, during class time, always in the presence of teachers from each establishment, with a duration of 60 minutes.

Socio-Demographic Information

Data such as name, age, gender, nationality, type of school, type of transport to and from school, location of school and whether or not they have any diagnosed pathology were requested.

Level of Physical Activity

The International Physical Activity Questionnaire (IPAQ) was used. The short version was used, consisting of seven questions that provide valid information on the time spent in moderate and vigorous intensity activities, walking and sitting (Hagstro et al, 2006). By quantifying daily activities during one week (frequency), compliance with WHO physical activity recommendations was calculated.

Perception of the Environment

The use of the Alpha Project Perceptions of the Environment, Active Transportation and Physical Activity Questionnaire, Long Version (ALPHA environmental questionnaires) (Spittaels et al., 2010), was considered in order to measure students' perceptions according to certain environmental aspects of physical activity in the general adult population and in school population. This questionnaire comprises 49 items grouped into nine themes with their respective sub-themes and response scales. It has been validated in Spanish (Garcia-Cervantes et al., 2014) and includes questions on: type of residences in the neighborhood (three items), distance to facilities (eight items), infrastructure for pedestrians and cyclists in the neighborhood (four items), maintenance of infrastructure for pedestrians and cyclists (three items), neighborhood safety (six items), how pleasant the neighborhood is for walking or cycling (four items), network for pedestrians and cyclists (four items), home environment (six items) and school environment (eleven items). By means of a syntax, a score is generated for: i) density, ii) distance to local facilities, iii) total infrastructure, iv) cycling infrastructure, v) walking infrastructure, vi) maintenance, vii) total safety, viii) safety from crime, ix) safety from traffic, x) pleasantness, xi) aesthetics, xii) cycling and pedestrian network, xiii) connectivity, xiv) home environment and xv) school environment.

Procedure

Authorization was formally requested from the directors and teachers of the participating schools by means of a letter and an explanatory meeting. Subsequently, a meeting was held with the students, where they were invited to participate and the purposes and scope of the study were explained to them. At that time, they were given the informed consent form for parental signature and informed assent. The data collection was carried out on a second day, virtually and in the computer rooms of these establishments, where the voluntary nature and anonymity of their participation was again explained to them. The research team was present at all times to guide the students on how to complete and answer each item according to the corresponding section.

Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics 27.0.1 software. In order to determine the normality of the sample, the Kolmogorov-Smirnov test was applied. The characteristics of the sample were obtained through a descriptive analysis, using means ± standard deviation for continuous variables by means of the students t-test, and frequency distribution with the chi-square test for categorical variables, estimating a statistical significance of $p \leq .05$. The response format is varied, taking into account the peculiarities of the variable formulated, so that Likert-type responses are found, with variables of four to five possibilities, in addition to the perception of each individual with respect to the amount of PA performed over the course of a week. Finally, a binary logistic regression analysis was performed, with type of transport to and from school as the dependent variable, including all the variables from the environmental perceptions questionnaire together with sex and age as independent variables. The final model was obtained using the backward wald method.

Results

Table 1 presents the characteristics of the sample assessed, separated by total population, men and women. The mean age for the total group was 15.1 years (15.08 ± 1.4 in males vs. 15.2 ± 1.5 in females). Of the students, 70.3% were from urban schools.

Table 1
Characteristics of the Sample

Variable	All (*n* = 753)	Female (*n* = 292)	Male (*n* = 461)	*p*
Age	15.11 ± 1.42	15.15 ± 1.50	15.08 ± 1.4	.54
Geographical location				
Urban	529 (70.3%)	199 (68.2%)	330 (71.6%)	.00
Rural	224 (29.7%)	93 (31.8%)	131 (28.4%)	
Journey to school				
Motorised transport	534 (71.7%)	218 (76.5%)	316 (68.7%)	.02
Active Transport	211 (28.3%)	67(23.5%)	144 (31.3%)	
Type of Active Transport to school				
Walking	175 (23.3%)	63 (21.6%)	112 (24.3%)	.00
Bicycle	39 (5.2%)	7 (2.4%)	32 (7%)	
Journey from school				
Motorised transport	244 (32.8%)	120 (42.1%)	124 (27%)	.00
Active Transport	501 (67.2%)	165 (57.9%)	336 (73%)	
Type of Active Transport from school				
Walking	242 (32.2%)	88 (30.1%)	154 (33.5%)	.00
Bicycle	39 (5.2%)	7 (2.4%)	32 (7%)	
Sedentary Behaviour (min)	334.52 ± 248.61	373.15 ± 281.08	310.05 ± 222.51	.00
Total METs in a Week	1,763.30 ± 1,590.17	2,580.78 ± 2,625.80	2,716.25 ± 3,458.88	.01
Physical Activity				
Low	171 (22.7%)	84 (28.8%)	87 (18.9%)	.03
Moderate	354 (47.0%)	155 (53.1%)	199 (43.2%)	
High	228 (30.3%)	53 (18.2%)	175 (38.0%)	
WHO Recommendations				
Yes	23 (3.1%)	2 (0.7%)	21 (4.6%)	
No	730 (96.9%)	290 (99.3%)	440 (95.4%)	

In relation to the type of transport used, 71.7% of the students use motorized transport to travel to school, a figure that drops to 32.8% for the journey home, while 28.3% use active transport for the journey to school and 67.2% for the journey home. Regarding the type of active transport used, 23.3% walk to school and 5.2% cycle to school, while 32.2% walk to school and 5.2% cycle home.

For sedentary behavior values, the total group averages 334.52 minutes per day, with females having significantly higher values. For the level of physical activity, 47% of the total group reported a moderate level of physical activity and 30.3% a high level. When comparing by gender, 38% of men reported a high level of physical activity, while in women the percentage dropped to 18%. Finally, 96.9% of the sample studied did not meet the WHO physical activity recommendations.

Table 2 presents the results of the perception of the environment as a function of gender. Distance, maintenance, pleasure, aesthetics, connectivity, home environment and school environment showed statistically significant differences between men and women. In pleasure, aesthetics, connectivity and home environment, the perception was higher in females.

Table 2
Gendered Perceptions of the Environment

Variable	All (*n* = 753)			Female (*n* = 285)			Male (*n* = 459)			*p*
Density	113.74	±	55.86	110.56	±	52.66	115.75	±	57.76	.21
Distance	24.20	±	6.67	25.10	±	6.62	23.62	±	6.64	.00
Cycling infrastructure	4.39	±	2.14	4.30	±	2.10	4.45	±	2.16	.33
Walking infrastructure	10.23	±	3.47	10.06	±	3.52	10.34	±	3.44	.28
Maintenance	6.96	±	2.91	6.67	±	2.85	7.14	±	2.94	.02
Security against crime	9.28	±	2.35	9.22	±	2.34	9.31	±	2.36	.57
Traffic safety	9.25	±	2.62	9.15	±	2.73	9.32	±	2.56	.37
Pleasure	12.35	±	2.02	12.62	±	1.93	12.18	±	2.06	.03
Aesthetics	9.25	±	1.63	9.52	±	1.58	9.08	±	1.64	.00
Connectivity	7.76	±	2.10	7.78	±	2.04	7.74	±	2.13	.03
Home environment	4.74	±	0.44	4.77	±	0.42	4.73	±	0.45	.03
School environment	6.80	±	1.39	6.80	±	1.29	6.80	±	1.44	.01

Tables 3 and 4 present the results of the predictive model of the characteristics of the built environment for the type of transport to and from school. The results show as a significant model for predicting transport to school (table 3), the characteristics of distance (*OR* = 0.953), walking infrastructure (*OR* = 1.043), neighborhood amenity (*OR* = 0.602), neighborhood aesthetics (*OR* = 1.290), walking and cycling network (*OR* = 1.356), connectivity (*OR* = 0.663), home environment (*OR* = 0.582), school environment (*OR* = 1.185) and age (*OR* = 0.887). The significant prediction model of the characteristics of the built environment and the way they walk from school to home (table 4) presents as predictors: walking infrastructure (*OR* = 1.151), cycling infrastructure (*OR* = 0.925), pleasure offered by the neighborhood (*OR* = 0.907), walking and cycling network (*OR* = 1.232), connectivity (*OR* = 0.770), home environment (*OR* = 0.581), age (*OR* = 1.131), being female (*OR* = 0.566) and being male (*OR* = 1.210).

Table 3
Binary Logistic Regression Model for Perception of the Built Environment as a Predictor of Type of Transport to School

	R^2 Cox y Snell						95% C.I. para EXP(*B*)	
		β	*DE.*	*Wald*	*p*	*OR*	Lower	Upper
Distance	.093	-0.048	0.015	10.336	.001	0.953	0.925	0.981
Infrastructure Walking		0.147	0.053	7.565	.006	1.158	1.043	1.286
Pleasure		-0.298	0.107	7.812	.005	0.742	0.602	0.915
Aesthetics		0.254	0.131	3.764	.052	1.290	0.997	1.668
Web		0.305	0.104	8.588	.003	1.356	1.106	1.663
Connectivity		-0.411	0.138	8.908	.003	0.663	0.506	0.868
Home Environment		-0.541	0.202	7.144	.008	0.582	0.392	0.866
School Environment		0.169	0.073	5.345	.021	1.185	1.026	1.368
Age		-0.120	0.065	3.436	.064	0.887	0.781	1.007
Constant		3.900	1.695	5.293	.021	49.388		

Note. Predictor variables: (Constant), Age, Home Environment, School Environment, Distance, Connectivity, Aesthetics, Infrastructure Walking, Pleasure, Networking.

Table 4
Linear Regression Model for Built Environment Perception as a Type Predictor of School-to-Home Transportation

	R^2 Cox y Snell						95% C.I. para EXP(*B*)	
		β	*DE.*	*Wald*	*p*	*OR*	Lower	Upper
Walking Infrastructure	.082	0.141	0.049	8.366	.004	1.151	1.046	1.266
Bicycle Infrastructure		-0.078	0.045	2.974	.085	0.925	0.846	1.011
Pleasure		-0.098	0.044	4.889	.027	0.907	0.832	0.989
Network		0.208	0.096	4.676	.031	1.232	1.020	1.488
Connectivity		-0.261	0.127	4.223	.040	0.770	0.601	0.988
Home Environment		-0.543	0.214	6.443	.011	0.581	0.382	0.884
Age		0.123	0.061	4.098	.043	1.131	1.004	1.273
Female Gender		-0.569	0.900	0.400	.527	0.566	0.097	3.302
Gender Male		0.194	0.896	0.047	.828	1.215	0.210	7.027
Constant		2.160	1.705	1.604	.205	8.669		

Note. Predictor variables in the model: (Constant), Gender, Safety_Crime, 3. Age, Environment_Home, Connectivity, Distance, Infrastructure_Bicycle, Infrastructure_Walking, Pleasure, Network.

Discussion

The rate of active transport use in the sample studied differed according to the journey, being higher on the journey from school to home. Furthermore, on both routes, the rate of active transport use was higher among men. Previous studies carried out in Chile only present data in relation to the type of transport to school (Observatorio Urbano, 2010; Rodríguez-Rodríguez et al., 2017), being these results lower than those obtained in this sample (8.9% and 18.1% respectively), however, the results of the present study, presents that the rates in both journeys (to and from school) are lower than those obtained in the cities of Bogotá (72.14%) and Helsinki (81.1%) (González et al., 2020). The type of active transport is also an element of analysis, with 23.3% of students walking to school versus 32.2% walking home from school and only 5.2% cycling both ways. These values are lower than those reported in developed countries, where more than 60% of schoolchildren walk to and from school (Rodríguez-López et al., 2013; Vanwolleghem et al., 2016) and 31.8% use bicycles as a means of transport (Aarts et al., 2013). These differences could be due to the culture of each country, where Chile, as a middle-income country, differs in terms of infrastructure conducive to active transport (Buehler & Pucher, 2012). In addition, safety in Latin American countries is a variable to consider, which may explain the lower results in Chile (Aarts et al., 2013; Rodríguez-Rodríguez et al., 2017). Under this idea, the design of active transport promotion strategies is supported (Ministerio de Sanidad de España, 2022; Gálvez-Fernández et al., 2021; Mandic et al., 2016), however, all of them have been tested in high-income country contexts. In this line, the Chilean MO-VES study, which underpins this research, responds to the call to design strategies adjusted to the local reality, in order to promote active transport in the Chilean school population (Merellano-Navarro et al., 2024).

The results of the study show statistically significant differences between men and women in energy expenditure (2,716.25 ± 3,458.88 versus 2,580.78 ± 2,625.80 respectively) and sedentary behavior (373.15 ± 281.08 versus 310.05 ± 222.51 minutes respectively). These results are in line with those reported in the 2021 national survey of physical activity habits in Chile, which indicates that women between the ages of 11 and 17 years present a higher level of inactivity than men (Ministerio del Deporte, 2021). A similar situation has been reported in another study, where these differences are maintained, being significantly lower in males ($p \leq .05$) (63 minutes difference between males and females) (Aguilar-Farias et al., 2021). These values are worrying due to the positive relationship between more time spent in sedentary behavior and a higher risk factor for chronic non-communicable diseases (Bácsné et al., 2023; García-Monteagudo, 2019).

In relation to the perception of the built environment and gender, men show a greater positive appreciation according to the indicators of infrastructure, maintenance and safety, however, only in the perception of distance, maintenance, pleasure, connectivity, home environment and school there are statistically significant differences with women ($p \leq .05$). These results may be due to the fact that men tend to make greater use of the infrastructure available for walking, cycling, or other means of transport; and that they (women) are influenced by the perception of safety in use, which, despite not showing statistically significant differences, did show higher rates in men, which means that they perceive themselves to be at less risk of being victims of robbery and mugging while doing physical activity. This is consistent with the results of international studies (Jacobsen, 2003; Márquez, 2015; Veitch et al., 2017) and a quality of urban life report developed by the Chilean Ministry of Housing and Urban Planning (MINVU), which indicates that women are more insecure when walking in the streets and green areas during the day (MINVU, 2018). In this sense, different studies affirm that traffic safety corres-

ponds to an important variable to consider for the adoption of the type of transport for their children, as the safety of their children is paramount, affecting the decision making of the form of transport (Giles-Corti et al., 2009; Rodríguez-López et al., 2013; Smith et al., 2019).

As for the perception of women, they had a higher appreciation in the variables of aesthetics, connectivity and home environment; with which it can be inferred that in general they have a higher appreciation for the aesthetics of the built environment of the neighborhood in which they live and how this impacts on the decision of the type of transport they use (Ries et al., 2008). Another relevant result is that, in the pleasure dimension, women have significantly higher values than men. Evidence indicates that a more pleasant and enjoyable environment, such as the presence of recreational and/or green areas, can act as motivating agents towards the practice of active transport and/or physical activity (Ries et al., 2008), likewise, it could be affirmed that when there is a greater and better dedication towards the creation and maintenance of the safe environment, it moves towards more active lifestyles, which could contribute to avoid sedentary behaviors and thus decrease the high rates of sedentary behavior in children (Smith et al., 2019).

When comparing the results of the perception of the environment with similar studies, values stand out that differ from international studies and are relevant to analyses (Herrador-Colmenero et al., 2015; Oliveira et al., 2020). In the case of the perception of distance as an agent that hinders the choice of active transport, the results of this study indicate values that are higher than those of a Spanish study (Orzanco-Garralda et al., 2016) and another Portuguese study (Santos et al., 2009), which may respond to the characteristics of Chile's educational system, in which the choice of educational establishment is not conditioned by the proximity to the neighborhood, but rather by the quality offered and the accessibility of payment (Bellei & Munoz, 2023). On the other hand, the accessibility of infrastructure for walking and cycling is also lower (Herrador-Colmenero et al., 2015; Oliveira et al., 2020). These results were expected, due to the low km2 built in Chile for these purposes in contrast to developed countries (Vega et al., 2024). One element that is relevant and deserves attention is the low scores found in perception of the home and school environment, which means that access to everything needed for active transport at school or home is insufficient. In relation to this, the results may be influenced by socio-economic status, which in Latin American countries is a determinant of access to and quality of the built environment (streets, parks, pavements, etc.) (Buehler & Pucher, 2012).

The results of the regression models show the association of the perception of the characteristics of the environment with the type of transport to and from school. The first model presented (table 3) shows the variables that are significant in predicting the type of transport to school, being composed of distance to school, walking infrastructure, pleasure offered by the environment, neighborhood aesthetics, road network, road connectivity, home and school environment to offer active transport, and finally, age. All these characteristics are positively associated with the choice of active transport to school. The association of distance to school (*OR* = 953) stands out, being widely referenced by other studies, which indicate that distance is a determinant when opting for the type of transport to school (Aarts et al., 2013; Rodríguez-Rodríguez et al., 2017). On the other hand, the relevance of walking infrastructure, enjoyment, connectedness, connectivity and aesthetics are predictors of the type of transport. Several studies deepen these associations, pointing out that home, neighborhood and school environment characteristics predict walking or cycling as a mode of transport, suggesting an important predictive role of social and environmental characteristics with the type of transport (walking and cycling) to school (Aarts et al., 2013; Ding et al., 2012; Sarmiento et al., 2021). Finally, the age component, which indicates that for each year of school age, the probability of using active transport increases by 8.9%. This is consistent with the findings of a Danish study, which indicates that the higher the age, the higher the percentage of schoolchildren who use active transport (Cooper et al., 2005). On the other hand, the significant prediction model of the form of transport from school (table 4) presents almost the same associated variables as the previous model; however, gender stands out as a predictor of the type of transport, with males having a higher *OR*. This is consistent with the results of several studies that show a higher prevalence of active transportation in men (Rodríguez-Rodríguez et al., 2017), which, in Latin American contexts, may be a variable to consider due to the safety factor that is relevant for parents (Smith et al., 2015). Both models incorporate important characteristics associated with the accessibility of infrastructure that favours active transport, which, by their nature and in accordance with the ecological model of physical activity, transcend the possibility of change of the schoolchild or family, as well as the school. Scientific evidence indicates that by intervening in quality and conducive infrastructure, this will have an impact on the population's healthy habits (Ding et al., 2012; Sallis et al., 2015; Sarmiento et al., 2021).

A curious result was that in both models the characteristics related to safety against traffic and crime were not associated, so it was not possible to incorporate them into the final model. As mentioned above, the perception of safety is relevant for parents, being a determinant for the choice of type of transport for their children (Smith et al., 2015), however, apparently, in the Chilean context and at the time the study was conducted, it was not a relevant variable, however, we believe the need to delve deeper into this area, especially in the facilitators and barriers to the choice of type of transport in the Chilean context.

Conclusions

The present study assessed the association between the perception of environmental characteristics and the type of transport to and from school in Chilean adolescents. Environmental characteristics associated with distance, infrastructure, aesthetics, pleasure and connectivity were associated with the type of transport chosen. The predictive power of the models is higher for the home-to-school journey. On the other hand, men have a higher perception of the characteristics for active transport, consistent with scientific studies.

The results of this study provide data that could enhance the Chilean evidence on active travel patterns in schoolchildren, as an input that could be relevant for the strengthening of public policies that directly benefit the school population.

The study has limitations, such as the low number of participants, the low heterogeneity of cities and the fact that it did not study a representative sample, situations that do not allow us to generalize the findings. Another limitation is the lack of a socio-economic distinction between schools, which, in the Chilean context, could influence the environment. The strength of this study is to investigate variables for which so far there is little scientific evidence in the Chilean population, which will be useful to prevent and treat the problem of physical inactivity.

Ethics Committee Statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Universidad Católica del Maule (N° 27-2024).

Conflict of Interest Statement

The authors declare no conflict of interest.

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Authors' Contribution

Conceptualization EM-N y AG-C.; Methodology EMN y AGC.; Software EMN.; Validation EMN y AGC.; Formal Analysis X.X.; Investigation JA-P.., OC-L, CH-P, CT-P; Resources X.X.; Data Curation JA-P, OC-L, CH-P, CT-P ; Writing – Original Draft E.M-N, JA-P., OC-L, CH-P, C. T-P.; Writing – Review & Editing EM-N y AG-C.; Visualization EM-N y AG-C.; Supervision EM-N y AG-C.; Project Administration EM-N.; All authors have read and agree with the published version of the manuscript.

Data Availability Statement

Data available on request from the author of the correspondence (andres.godoy@uautonoma.cl).

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