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Is there a relationship between physical fitness and the way of commuting to and from school? Findings from a southern Chilean school health and performance survey 2018

¿Existe una relación entre la aptitud física y la forma de desplazarse hacia y desde la escuela? Hallazgos de una encuesta de rendimiento y salud escolar del sur de Chile 2018

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Abstract. Although current research indicates that the active mode of displacement commuting influences the health of schoolchildren, what is known about the relationship between self-reported physical fitness and its relationship with active commuting to school (ACS) is known less so. In addition, trends highlight the need to conduct country-specific analyses to understand each context better. The aims of this study were a) to analyze self-reported physical fitness and the ACS, and b) to determine the association between self-reported physical fitness and the ACS through an extensive survey in southern Chile. A cross-sectional analytic design was conducted. The sample consisted of 733 schoolchildren (aged 10 to 16, 46.1% girls) from Chilean public schools. The International Fitness Scale (IFIS) was used to determine the self-reported physical fitness. The ACS was assessed using separate questions about commuting to and from school. The main results showed that the boys presented better self-reported physical fitness than the girls, except in the self-perception of flexibility (p= 0.041). In addition, an association was observed between the ACS and the self-reported flexibility (OR:1.53, p=0.022; OR:1.47, p= 0.036), an association that was maintained when adjusting for sex and age (OR:1.55, p=0.020; OR:1.50, p= 0.030), and self-reported speed and agility was associated only with active commuting from school (OR:1.60, p=0.005), also after adjusted model (OR:1.81, p=0.024). In conclusion, this study provides evidence regarding the relationship between self-reported physical fitness and active ways of ACS. Strategies that favor ACS should be sought to promote health in schoolchildren.
Keywords: Active Commuting; Physical Fitness; Chile; IFIS; Schoolchildren

Resumen. Aunque las investigaciones actuales indican que el modo activo de desplazamiento influye en la salud de los escolares, lo que se sabe sobre la relación entre la condición física autoinformada y su relación con la forma de desplazarse activamente hacia y desde la escuela (ACS, por sus siglas en inglés) se sabe menos. Los objetivos de este estudio fueron a) analizar la aptitud física autoinformada y la ACS, y b) determinar la asociación entre la aptitud física autoinformada con ACS a través de una encuesta realizada en el sur de Chile. Se realizó un diseño analítico transversal. La muestra estuvo compuesta por 733 escolares (de 10 a 16 años, 46,1% niñas) de colegios públicos chilenos. Se utilizó la *International Fitness Scale* (IFIS) para determinar la aptitud física autoinformada. Se evaluaron los modos de desplazamiento de los estudiantes a la escuela mediante preguntas separadas sobre ACS. Los principales resultados mostraron que los niños presentaron una mejor aptitud física autoinformada que las niñas, excepto en la autopercepción de flexibilidad (p= 0,041). Además, se observó asociación entre el tipo de ACS y la flexibilidad autoinformada (OR:1,53, p=0,022; OR:1,47, p= 0,036), asociación que se mantuvo al ajustar por sexo y la edad (OR:1,55, p=0,020; OR:1,50, p= 0,030), la velocidad y la agilidad autoinformada se asociaron sólo con el desplazamiento activo desde la escuela (OR:1,60, p=0,005), también después del modelo ajustado (OR:1,81, p=0,024). En conclusión, este estudio proporciona evidencia sobre la relación entre la aptitud física autoinformada y las formas de ACS. Para promover la salud en los escolares se deben buscar estrategias que favorezcan los ACS.
Palabras clave: Desplazamiento Activo; Condición física; Chile; IFIS; Escolares.

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Introduction

Physical activity (PA) reduces the risk of premature mortality and is an effective preventive strategy for at least 25 chronic medical conditions (Warburton & Bredin, 2017). However, a recent worldwide report (Guthold et al., 2020) has shown that 81% of adolescents (11-17 years old) have insufficient PA levels, with a higher prevalence in women than in men (Guthold et al., 2018). In Chile, 18,9% of adolescents 15 years old and 27,4% of children between 9-11 years old meet these PA international recommendations (Aguilar-Farias et al., 2018). Lack of PA is one of the main risk factors associated with cardiovascular disease development (Kraus et al., 2019; Lacombe et al., 2019; Lear et al., 2017) and metabolic diseases across all ages (Catley & Tomkinson, 2013; Kriemler et al., 2008; Mintjens et al., 2018; Suriano et al., 2010).

The World Health Organization emphasizes in the new

PA guidelines that engaging in some physical activity is better than being inactive (Bull et al., 2020). Among the various physical activities of daily life, there is also active commuting, such as walking or riding a bicycle (World Health Organization, 2018). In particular, the evidence indicates that children and adolescents who use active commuting to school (ACS) are more likely to meet the weekly PA recommendation (Aparicio-Ugarriza et al., 2020; Huang et al., 2021; Peralta et al., 2020). This is because they can accumulate between five and 37 additional minutes of PA per day compared to passive commuting methods such as car, bus, and train (Faulkner et al., 2009).

Furthermore, ACS in children and adolescents has been linked to better physical fitness (Henriques-Neto et al., 2020; Larouche et al., 2014), which is considered an important marker of health at these stages of life (Ortega et al., 2008). Physical fitness refers to the ability to perform daily tasks, sports, or occupations without undue fatigue (Bianco et al., 2015; Caspersen et al., 1985; Ortega et al., 2008) and is recognized as a set of attributes, including cardiorespiratory fitness, body composition, muscular strength, muscular endurance, motor fitness, and flexibility (Caspersen et al., 1985). A systematic review found that daily commuting in children and adolescents is linked to fitness levels, including cardiorespiratory capacity and muscle strength (Henriques-Neto et al., 2020). A study in 2,887 children and adolescents aged 9 to 17 in Colombia found that those who regularly engaged in ACS were more likely to exhibit greater agility and speed, as measured by the 4x10-meter shuttle run, and higher cardiorespiratory fitness, as measured by the 20m Shuttle Run Test (Ramirez-Velez et al., 2017). Another recent study of 81 Chileans aged 11 to 14 found that those who ACS had higher cardiorespiratory fitness, measured by the Course Navette test, than schoolchildren who passively commuted (Concha et al., 2024).

Laboratory and field measurements have generally assessed physical fitness (Aguilar-Farias et al., 2018). In a school setting, it takes about two hours and 30 minutes to conduct a physical fitness assessment on 20 students, which is more than three 55-minute physical education classes (Ortega et al., 2011). Consequently, these types of evaluation require time, facilities, and equipment and, therefore, may be less feasible in population-based studies (De Moraes et al., 2019; Ortega et al., 2011). The International Physical Fitness Scale (IFIS) is a simple and convenient self-reported assessment tool widely used for children and adolescents (Ortega et al., 2011, 2013; Sánchez-López et al., 2015). Evidence on the association between active commuting and IFIS self-reported physical fitness use is limited. Only two studies have investigated this relationship, and only one is a school population. A study conducted in public school children aged 11 to 17 in southeastern China found no significant association between ACS and IFIS self-reported physical fitness (Shi et al., 2022). Another study, although carried out in a university population, observed that both male and female university students in Chile, especially men who used active commuting, met PA recommendations and had better IFIS self-reported physical fitness than those who used passive commuting (Palma-Leal et al., 2022).

Therefore, the objectives of our study were a) to analyze self-reported physical fitness and the way of commuting to and from school and b) to determine the association between self-reported physical fitness and commuting to and from school through an extensive survey in southern Chile.

Materials and Methods

Design

An analytic cross-sectional study in which data from the Southern Chilean School Health and Performance Survey was conducted in 2018 (SCHPS 2018). This cross-sectional study followed the STROBE guidelines (Cuschieri, 2019).

Participants and recruitment

This study is comprised of 733 adolescents (aged 10 to 16, 46.1% girls) recruited from five public urban schools in the Bio Bío province (Chile) using the SCHPS 2018. The SCHPS 2018 was conducted with a purposive convenience sample of adolescents from 5th to 8th grade located in a region in southern Chile who completed the entire survey. Thirty-two schoolchildren were excluded for not attending the evaluation days and 18 for not signing informed consent. All measurements were taken in May 2018. The five schools were in the same region and had similar weather conditions: the average temperature during the collection was 11±5 °C.

The present study was conducted according to the guidelines in the Declaration of Helsinki (World Medical Association, 2013), and all procedures were carried out according to the Declaration of Helsinki for research with human subjects. The SCHPS 2018 has been reviewed and ethically approved by the bioethics and biodiversity committee of the Universidad de Concepción, Chile (protocol code and approved date RZL-Abril/2018). All participants of the SCHPS 2018 provided informed consent from parents, and their informed assent was signed before participation.

Procedures

An agreement was made between the research team and the Head of Education of the region to have the local authorities be aware of the aim and relevance of the study. This agreement allowed the school director and teachers, along with the researchers, to select the different variables that were assessed and to determine the study design. School teachers had a training session to perform the survey, thus decreasing inter-evaluation bias. The adolescent parents/tutor, school director, and teachers were taught about the purposes of the

study by a written description letter. The SCHPS 2018 was scheduled to be performed simultaneously in each center at the same time and on the school day.

Self-reported physical Fitness

The International Fitness Scale (IFIS) was used to determine self-reported physical fitness. The IFIS was originally developed to be used in adolescents within the project HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) as a tool to assess physical fitness in larger study populations (Ortega et al., 2011). This scale is a simple and short self-administered scale that can be completed in a few minutes. The IFIS is composed of five Likert-scale questions (1, very poor; 2, poor; 3, fair; 4, good; and 5, very good) asking about the perceived overall fitness of the adolescents, cardiorespiratory fitness, muscular fitness, speed and agility, and flexibility in comparison with their physical fitness of their friend. For this study, the categories "very poor" and "poor" were considered dissatisfactory physical fitness, and the categories "fair," "good," and "very good" were considered satisfactory physical fitness, where a higher IFIS score means greater self-rated fitness. The IFIS questionnaire has been translated into nine different languages and has been used in different populations (De Moraes et al., 2019; Fonseca-Camacho et al., 2014; Ortega et al., 2011) and, importantly, validated among the Chilean population (Merellano-Navarro et al., 2017).

Active Commuting to School (ACS)

Student ways of commuting to school were assessed using separate questions about the commute: "How do you usually commute to school/come back from school?". Ways of commuting were categorized as active, i.e., "walking" and "cycling," or passive, i.e., by "car," "motorcycle," "school bus," "public bus," "subway," "train," or "tram." Since there is no subway, train, or tram in the Bio Bío province, these categories were omitted, as was "other," since the participants did not describe any other modes of commuting.

In addition, participants were categorized as active or passive commuters to and from school using criteria such as the frequency of the weekly commute to and from school. For each way of commuting, the following question was asked: "How do you commute to and from school each day?" Participants were classified as active commuters if they made at least two full round trips to school (4 out of 10 possible trips/week) using active ways of transportation. Otherwise, they were classified as passive commuters (Barranco-Ruiz et al., 2018). This questionnaire was proposed as one of the most appropriate to ask about the mode of commuting to school (Herrador-Colmenero et al., 2014; Palma et al., 2020) and is a valid measure (Chillón et al., 2017).

Sociodemographic and school characteristics

Children and adolescents self-reported their age and sex (boys and girls). Characteristics of the school were collected, such as academic schedule, public or private administration, location, and educative project. School performance was determined with a scale from 1.0 to 7.0 by the "*Ministerio de Educación de Chile*" (Mineduc et al., 2020).

Statistical analyses

Qualitative data is presented as frequency and percentage, while quantitative data is presented as mean ± standard deviation (SD). Normal distribution was assessed by the Shapiro-Wilk test; meanwhile, the association of variables such as school performance and type of transportation/self-reported physical fitness was determined by the Chi-squared test. Average grades comparison and physical fitness variables differences were determined by unpaired t-Test.

Logistic regression models were performed to determine the association between the relative dimensions of the Self-perception of physical fitness. The crude model is adjusted by the type of transportation to and from school to home (Commuting). Model 1 is also adjusted by sex and age. The results are presented as Odds Ratio (OR) with a confidence interval of 95% (CI-95%). The significant level was established at $p \leqslant 0.05$). All statistical analysis was performed using STATA 15 (StataCorp.2017. Stata Statistical Software: Release 15. College Station, TX: Stata Corp LP).

Results

Participants characteristics

Sample characteristics are shown in Table 1. The mean age of the sample was 12.1 ± 1.3 years old, where 395 were boys and 338 were girls, representing 53.9% and 46.1% of the sample, respectively. Students from fifth (5°, 22.1%), sixth (6°, 25.5%), seventh (7°, 27.0%), and eighth grade (8°, 25.4%) were included. Only 19.3% of the sample participated in the National Program of School Integration ($p < 0.05$), with a significant participation of boys than girls.

Table 1.
Socio-scholar variables

Characteristics	Boys	Girls	Total	p-value
n (%)	395 (53.9)	338 (46.1)	733 (100)	
Age, years (Mean ± SD)	12.1 ± 1.3	12.0 ± 1.2	12.0± 1.3	NS
Grade				
Fifth Grade, n (%)	94 (23.8)	68 (20.1)	162 (22.1)	NS
Sixth Grade, n (%)	98 (24.8)	89 (26.3)	187 (25.5)	
Seventh Grade, n (%)	96 (24.3)	102 (30.2)	198 (27.0)	
Eight Grade, n (%)	107 (27.1)	79 (23.4)	186 (25.4)	
Program of School Integration (PIE)				
Yes, n (%)	88 (22.3)	53 (15.7)	141 (19.2)	0.024*
No, n (%)	307 (77.7)	285 (84.3)	592 (80.8)	

Caption: Quantitative data is presented as mean ± Standard Deviation. Qualitative data is presented as absolute and percentual frequency. NS: not significant. *Chi-Square test $p<0.05$.

Physical fitness self-reported

Self-reported results of physical fitness are presented in Table 2. Satisfactory self-perception ("fair," "good," or "very good") was significantly higher than dissatisfactory self-perception across all IFIS items in both boys and girls. On top of this, there were significant differences in general cardiorespiratory fitness, muscular strength, velocity/agility, and flexibility when comparing categories of self-reported between sexes. Thus, the perception of poor and very poor physical fitness in cardiorespiratory fitness (8.6% vs. 10.4%), muscular strength (6.9% vs. 10.4%), and velocity/agility (6.9% vs. 11.8%) were significantly lower when boys were compared to girls ($p<0.05$). Otherwise, the perception of poor and very poor physical fitness in flexibility (23.5% vs. 18.1%) was significantly higher when boys compared themselves to girls ($p<0.05$).

Table 2.
Physical fitness self-reported in boys and girls

	Categories	Boys n (%)	Girls n (%)	Total n (%)	p-value
		General physical fitness			
Dissatisfactory	Very poor	0 (0)	2 (0.6)	2 (0.3)	
	Poor	30 (7.6)	30 (8.9)	60 (8.2)	
Satisfactory	Fair	123 (31.1)	92 (27.2)	215 (29.3)	
	Good	162 (41.0)	152 (45.0)	314 (42.8)	NS
	Very good	80 (20.3)	62 (18.3)	142 (19.4)	
		Cardiorespiratory fitness			
Dissatisfactory	Very poor	2 (0.5)	8 (2.4)	10 (1.4)	
	Poor	32 (8.1)	27 (8.0)	59 (8.0)	
Satisfactory	Fair	99 (25.1)	111 (32.8)	210 (28.6)	
	Good	155 (39.2)	130 (38.5)	285 (38.9)	0.006*
	Very good	107 (27.1)	62 (18.3)	169 (23.1)	
		Muscular Strength			
Dissatisfactory	Very poor	1 (0.3)	4 (1.2)	5 (0.7)	
	Poor	26 (6.6)	31 (9.2)	57 (7.8)	
Satisfactory	Fair	127 (32.2)	129 (38.2)	256 (34.9)	
	Good	161 (40.8)	136 (40.2)	297 (40.5)	0.005*
	Very good	80 (20.3)	38 (11.2)	118 (16.1)	
		Speed/Agility			
Dissatisfactory	Very poor	1 (0.3)	2 (0.6)	3 (0.4)	
	Poor	26 (6.6)	38 (11.2)	64 (8.7)	
Satisfactory	Fair	109 (27.6)	98 (29.0)	207 (28.2)	
	Good	145 (36.7)	131 (38.8)	276 (37.7)	0.032*
	Very good	114 (28.9)	69 (20.4)	183 (25.0)	
		Flexibility			
Dissatisfactory	Very poor	17 (4.3)	10 (3.0)	27 (3.7)	
	Poor	76 (19.2)	51 (15.1)	127 (17.3)	
Satisfactory	Fair	157 (39.7)	122 (36.1)	279 (38.1)	
	Good	105 (26.6)	98 (29.0)	203 (27.7)	0.041*
	Very good	40 (10.1)	57 (16.9)	97 (13.2)	

Caption: Data presented as absolute and percentual frequency. NS: not significant. *Chi-Square test $p<0.05$.

School commuting characteristics

School commuting to and from school results are found in Table 3. An average of 46.5% of the total sample declared using an active mode of transportation to school, while 53.5% preferred passive transportation. Walking to school was the most used activity to get to school, with 46.2% of the total sample, whereas the car was the most preferred choice among passive transportation (28.6%), followed by private school bus (21.7%). Regarding commuting from school to home, an average of 61.2% of the schoolchildren declared using an active mode of transportation to school. Walking is, again, the main activity preferred (61.1%). When comparing by sex, we found no differences in this item.

Table 3.
Way of home-school and school-home commuting

Categories		Boys n (%)	Girls n (%)	Total n (%)	p-value
		Way of Habitual Commuting from home to school			
Active Commuting	Walk	183 (46.3)	156 (46.2)	339 (46.2)	
	Bike	1 (0.3)	1 (0.3)	2 (0.3)	
Passive Commuting	Car	109 (27.6)	101 (29.9)	210 (28.6)	
	Motorcycle	4 (1.0)	2 (0.6)	6 (0.8)	
	Private School Bus	87 (22.0)	72 (21.3)	159 (21.7)	NS
	Taxi	1 (0.3)	0 (0)	1 (0.1)	
	Other	10 (2.5)	6 (1.8)	16 (2.2)	
		Way of Habitual Commuting from school to home			
Active Commuting	Walk	244 (61.8)	204 (60.4)	448 (61.1)	
	Bike	1 (0.3)	0 (0)	1 (0.1)	
Passive Commuting	Car	67 (17.0)	62 (18.3)	129 (17.6)	
	Motorcycle	2 (0.5)	1 (0.3)	3 (0.4)	
	Private School Bus	71 (18.0)	65 (19.2)	136 (18.6)	NS
	Taxi	0(0)	0(0)	0(0)	
	Other	10 (2.5)	6 (37.50)	16 (2.2)	

Caption: Data presented as absolute and percentual frequency. NS: none significative. *Chi-Square test $p<0.05$.

Table 4 shows the ways of commuting from home to school and from school to home, as reported by the physical fitness self-report. We found no significant differences between those who habitually moved actively and those who moved passively, according to general physical fitness, cardiorespiratory fitness, muscular strength, and velocity/agility on the way to school and back home. However, an association was observed between the perception of flexibility and the type of regular commuting, suggesting that schoolchildren who are satisfied with their flexibility commute more actively than those with a dissatisfactory perception of flexibility. This result was observed both for the commute from home to school (48.7% vs. 38.3%; $p<0.05$) and from school to home (63.2% vs. 53.9%; $p<0.05$).

Table 4.
Way of home-school and school-home commuting.

	Physical fitness self-perception		
	Satisfactory n(%)	Dissatisfactory n(%)	p-value
Way of Habitual Commuting from home to school			
	General physical fitness		
Active Commuting	310 (46.2)	31 (50.0)	NS
Passive Commuting	361 (53.8)	31 (50.0)	
	Cardiorespiratory fitness		

	Physical fitness self-perception		
	Satisfactory n(%)	Dissatisfactory n(%)	p-value
Way of Habitual Commuting from school to home			
	General physical fitness		
Active Commuting	406 (60.5)	43 (69.4)	NS
Passive Commuting	265 (39.5)	19 (30.6)	
	Cardiorespiratory fitness		

Active Commuting	310 (46.7)	31 (44,9)	NS	Active Commuting	411 (61.9)	38 (55.1)	NS
Passive Commuting	354 (53.3)	38 (55.1)		Passive Commuting	253 (38.1)	31 (44.9)	
		Muscular Strength				Muscular Strength	
Active Commuting	309 (46.1)	32 (51.6)	NS	Active Commuting	410 (61.1)	39 (62.9)	NS
Passive Commuting	362 (53.9)	30 (48.4)		Passive Commuting	261 (38.9)	23 (37.1)	
		Speed/Agility				Speed/Agility	
Active Commuting	313 (47.0)	28 (41.8)	NS	Active Commuting	415 (62.3)	34 (50.7)	NS
Passive Commuting	353 (53.0)	39 (58.2)		Passive Commuting	251 (37.7)	33 (49.3)	
		Flexibility				Flexibility	
Active Commuting	282 (48.7)	59 (38.3)	0.022*	Active Commuting	366 (63.2)	83 (53.9)	0.035*
Passive Commuting	297 (51.3)	95 (61.7)		Passive Commuting	213 (36.8)	71 (46.1)	

Caption: Data presented as absolute and percentual frequency. NS: none significative. *Chi-Square test p<0.05.

Self-reported physical fitness and commuting association

No adjusted model showed an association between commuting and flexibility on the way to school (OR: 1.53; p = 0.022) and back home (OR: 1.47; p = 0.036). These associations were maintained when adjusted by sex and age (model 1), both on the way to school (OR: 1.55; p = 0.020) and on the way back home (OR: 1.50; p = 0.030), which suggests that schoolchildren who are satisfied with their flexibility are more likely to have an active commute from home to school and from school to home. Additionally, it was observed in the unadjusted model (OR: 1.60; p = 0.005) that schoolchildren who perceived themselves as satisfied with their speed were more likely to be physically active. This result was maintained in the adjusted model (OR: 1.81; p = 0.024) and was observed only when commuting home from school (Table 5).

Table 5.
Self-reported physical fitness and commuting association.

	Model of Logistic regression					
	Model 0 (no adjusted)			Model 1(adjusted)		
	Type of Habitual Commuting from home to school					
Physical fitness self-perception	Passive Commuting	Active Commuting OR (95% CI)	p-value	Passive Commuting	Active Commuting OR (95% CI)	p-value
General physical fitness (Satisfactory)	1.00 (Ref.)	0.86 (0.51; 1.45)	NS	1.00 (Ref.)	0.91 (0.54; 1.54)	NS
Cardiorespiratory fitness (Satisfactory)	1.00 (Ref.)	1.07 (0.65; 1.77)	NS	1.00 (Ref.)	1.14 (0.06; 1.88)	NS
Muscular Strength (Satisfactory)	1.00 (Ref.)	0.80 (0.48; 1.35)	NS	1.00 (Ref.)	0.80 (0.47; 1.36)	NS
Speed/Agility (Satisfactory)	1.00 (Ref.)	1.24 (0.74; 2.05)	NS	1.00 (Ref.)	1.36 (0.81; 2.29)	NS
Flexibility (Satisfactory)	1.00 (Ref.)	1.53 (1.06; 2.20)	0.022*	1.00 (Ref.)	1.55 (1.07; 2.23)	0.020*
	Type of Habitual Commuting from school to home					
Physical fitness self-perception	Passive Commuting	Active Commuting OR (95% CI)	p-value	Passive Commuting	Active Commuting OR (95% CI)	p-value
General physical fitness (Satisfactory)	1.00 (Ref.)	0.68 (039; 1.19)	NS	1.00 (Ref.)	0.72 (0.41; 1.27)	NS
Cardiorespiratory fitness (Satisfactory)	1.00 (Ref.)	1.33 (0.80; 2.18)	NS	1.00 (Ref.)	1.42 (0.86; 2.36)	NS
Muscular Strength (Satisfactory)	1.00 (Ref.)	0.93 (0.54; 1.59)	NS	1.00 (Ref.)	0.93 (0.54; 1.59)	NS
Speed/Agility (Satisfactory)	1.00 (Ref.)	1.60 (1.00; 2.66)	0.005*	1.00 (Ref.)	1.81 (1.08; 3.03)	0.024*
Flexibility (Satisfactory)	1.00 (Ref.)	1.47 (1.03; 2.10)	0.036*	1.00 (Ref.)	1.50 (1.04; 2,15)	0.030*

Caption: OR= Odds Ratio; CI-95%=Confidence interval of 95%. *Significant values when p<0.05.

Discussion

Self-reported physical fitness and active commuting in schoolchildren

The findings of satisfactory self-reported physical fitness were significantly higher than the unsatisfactory self-perception in both boys and girls. In this regard, Albornoz-Guerrero et al. (2022) conducted a study on Chilean schoolchildren, where similar results of perception of physical fitness are reported. Points out that because the self-perception of physical fitness is part of the multidimensional construct of physical self-concept, it can, therefore, be affected by aspects such as body composition, body image, and level of physical activity, among others (Fernández-Bustos et al., 2019; Fox, 2000). In this sense, a recent study in Chilean schoolchildren suggests that physical activity is positively related to the physical and global self-concept of schoolchildren (Ferrari et al., 2022). In the same direction, another recent study, but in a Chinese school population, reported that those who met 24-hour movement guidelines had higher levels of IFIS self-reported fitness (Chen et al., 2022). Considering that in the present study, most students reported walking to and from school, these levels of physical activity are possibly related to a better physical self-concept of schoolchildren. Promoting active commuting from an early age may be particularly relevant, as it not only fosters physical activity habits that can enhance physical self-concept but also contributes to the development of key motor skills such as agility and speed (Villa-González et al., 2015), which are crucial for overall physical fitness. This provides a plausible explanation for finding a satisfactory

physical condition in most students.

Regarding our findings on the differences in the self-perception of physical fitness according to the sex of the schoolchildren. Similar results were reported by Palma-Leal et al. in Chilean university students, where men presented a better self-perception in all their physical fitness components, except flexibility, than women (Palma-Leal et al., 2022). In this sense, a possible explanation could be that there are different societal stereotypes, such as greater flexibility being associated mainly with women. Therefore, regardless of the self-administered questionnaire evaluation, the female participants may consider their flexibility a high point of their physical fitness.

Regarding the use of ACS, it was found that 61% of boys and girls made active commuting home from school, and 46% made active commuting to school from home, mainly done by walking. These ACS results are like those reported in Spain, where 62% of schoolchildren walk or cycle to school (Rodríguez-López et al., 2013), or Belgium, where 65% of children use ACS (Vanwolleghem et al., 2016). However, they are higher than those reported in North American schoolchildren, where 15% of Canadian 13-year-old students walked to school (Herrador-Colmenero et al., 2014). They are also higher than in a previous study on Chilean schoolchildren, where only 10% of boys and girls and around 25% of adolescents used ACS (Vanwolleghem et al., 2016). Regarding the difference that we have reported in the use of ACS when returning home from school compared to when going to school (61% vs. 46% respectively), These results contrast with a study in a Chilean university population, where the proportion of students who use active commuting is higher to go to university than to return home (Barranco-Ruiz et al., 2019). Few studies have examined the causes of differences in ACS between school and home (Rodríguez-Rodríguez et al., 2017). Future studies are required to investigate what individual, psychosocial, and environmental factors might determine these differences.

Differences in the way of commuting to and from school according to self-reported physical fitness

These results support the evidence between ACS and better physical fitness in schoolchildren (Concha et al., 2024; Henriques-Neto et al., 2020; Larouche et al., 2014; Lubans et al., 2011) and better self-reported physical fitness by IFIS (Palma-Leal et al., 2022). In this sense, it was observed that schoolchildren who perceived themselves to be satisfied with their velocity and agility were more prone to ACS, this was maintained only for commuting from school to home. Similar results were reported by a study in a Spanish school population of 8 to 11 years old, where ACS was associated with higher levels of objectively measured speed and agility (Villa-González et al., 2015). At the local level, Concha et al. (2024) found that Chilean schoolchildren aged 11 to 14 years using active commuting have significantly higher cardiorespiratory fitness compared to those using passive commuting. However, cardiorespiratory fitness was assessed using a field test (Concha et al., 2024). Another of our findings was that schoolchildren with a satisfactory self-perception of their flexibility present a significantly higher level of ACS than those with an unsatisfactory self-perception. In this sense, a study carried out by Palma-Leal et al. (2022) on Chilean university students reported a relationship between a better self-perception of their flexibility in those who used active commuting compared to students who used private means of transportation (Palma-Leal et al., 2022). To our knowledge, there is little evidence of the association between ACS and speed, agility, and flexibility, which could provide a plausible explanation for this relationship.

Strengths and limitations

On the one hand, this study presents some strengths to highlight. This study analyzed data from a large sample of adolescents, helping to bridge the gap in this area of research. To the best of our knowledge, this could be one of the first studies that consider the self-perception of physical fitness and mode of commuting in the south of Chilean schoolchildren, alongside considering sex.

On the other hand, several limitations should be considered when interpreting the results of this study. Additionally, the variables of perception of physical fitness and ACS used self-reporting instruments, so the responses of the schoolchildren were subject to their mood, knowledge, and even maturity to understand the relevancy of their responses. Nevertheless, the teachers who used the surveys answered all the doubts of the children. This method of collecting information is widely used in non-experimental studies (Albornoz-Guerrero et al., 2022), allowing data collection from a large sample or the data of a city or region in a short time. In addition, the study design only allows for the comparison of self-perception of physical fitness with the mode of commuting to school between boys and girls.

Future research should study the relationship between active commuting and self-perception of physical fitness from a mixed approach. Active commuting is preferably collected through objective physical activity measurement with accelerometers and a global positioning system (GPS) (Campos-Garzón et al., 2023). And through qualitative methods to deepen the understanding of personal, family, and environmental factors that determine the self-perception of physical fitness of schoolchildren, which could be influencing the type of transport they choose to go to and from school.

Conclusions

This study supports evidence of the association between

self-perceived physical fitness and active movement in the school population. It also provides evidence of the differences between transportation to and from school and their relationship with self-reported physical fitness in the school population.

The present study observed that many schoolchildren present satisfactory self-reported physical fitness, both in boys and girls. Boys reported better self-reported cardiorespiratory fitness, muscle strength, and speed/agility, while girls had better self-rated flexibility. Active commuting was higher when schoolchildren traveled from school to home than from home to school. Walking was the most used active commuting by both sexes to and from school. Schoolchildren who were satisfied with their flexibility are more likely to actively commute to and from school than those with an unsatisfactory perception of flexibility. Likewise, we also observed an association between the way of commuting to and from school and the self-perception of flexibility, an association that was maintained when adjusting for sex and age. In the case of self-reported speed/agility, this association was observed before and after model fitting but only in active commuting from school.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the bioethics and biodiversity committee of the Universidad de Concepción, Chile (protocol code and approved date RZL-Abril/2018).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper.

Conflicts of Interest

The authors declare no conflict of interest.

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Author Contributions

Conceptualization, I.C. and R.Z.-L.; methodology, I.C. and R.Z.-L.; formal analysis, I.C. and R.Z.-L., C.M. and M.M.-A.; investigation, I.C. and R.Z.-L. and M.M.-A.; data curation, I.C. and R.Z.-L. and M.M.-A.; writing—original draft preparation, I.C. and R.Z.-L., C.M., C.S.-G., D.R.-M., C.C.-M., G.L.-M., A.A.C., J.G.-T., M.M.-A., J.B. and M.M.-A.; writing—review and editing, I.C. and R.Z.-L., C.M., C.S.-G., D.R.-M., C.C.-M., G.L.-M., A.A.C., J.G.-T., M.M.-A., J.B. and M.M.-A.; supervision, I.C.; project administration, I.C. All authors have read and agreed to the published version of the manuscript.

Additional information

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