Table 5. Reviewed studies

AUTHORS	YEAR (area)	LOCA-TION	Active Commu-ting (average)	PARTICI-PANTS age (sample)	FINDINGS (Scope) Significant effect factors on active commuting to school. Main findings and limitations	METHODS	INDICATORS				
							A	B	C	D	E
Carver et al.	2019 (health)	Australia Melbourne	28%	5–12 (n=1024)	(P&W) Distance, level of walkability around home and school. To increase ACS - investing in infrastructure designed to improve walkability around schools, coupled with campaigns that target whole households to promote age-appropriate independent mobility rather than adult accompaniment.	Q Questionnaire (TREK)	•	n	•	©	•
Christiansen et al	2014 (geography)	Denmark	85% (15% walk 70% cycle)	11–13 (n=1250)	(P&W) Distance, supportive environments - speed limits, cycle paths and safe crossings. Association between the urban form surrounding schools and ACS. Medium and highly walkable school sites in combination with a distance to school below 2 km, no speeding traffic and many paths.	Q &L Questionnaire Travel diary (TREK)	•	n	•	•	•
Curtis et al.	2015 (Urban Planning)	Australia; Brisbane, Melbourne Perth and Rock-Hampton	42%	9-13 (n=273)	(P&W) Distance. Licences and boys can travel more freely than girls. Parents' perceptions and attitudes towards built environment and independent mobility (interplay between both). While built environment is important, a decisive role for children's active travel to school and other places is seen in the combination of preferences and licences.	Q Questionnaire cluster analysis to explore factors linked to children's ACS	•	n	•	•	n
Hino et al.	2021 (health)	Japan, Chiba	82%	6–12 (n=1545)	(P&W) Walking to school was positively associated with crime safety, neighbourhood connections, and schools sited in new towns. Recent social changes such as declining birthrate, decline in public elementary schools, and increasing after-school activities may change parental attitudes toward children's walking to/from school. Multidisciplinary approaches are required ACS in the long term.	Q Questionnaire online survey (NEWS-Y)	•	•	•	©	•
Huertas-Delgado et al.	2018 (health)	Equator, Riobamba	16%	9-12 (n=172)	(P&W) Traffic volume/speed, crime, and distance are the main Ecuadorian parental barriers. New strategies should improve parental safety perception and traffic in school areas. Educational programs and promotional campaigns (e.g.)*. Since the parental perceptions of the barriers are context specific (i.e., culture, geography, sociodemographic characteristics, and policy), more studies are essential to develop effective ACS interventions.	Q Questionnaire paper-based survey PACO project	*	•	•	©	•
Huertas-Delgado et al.	2017 (health)	Spain Granada	49%	(n=628)	(P&W) Among Spanish parents, the most common barriers reported by parents of children were traffic volume and dangerous intersections, whereas the most frequent barriers reported by parents of adolescents were distance to school and dangerous intersections, namely absence of a policeman at crosswalks* Also among Spanish parents, parental barriers to active commuting are influenced by children's age, gender and mode of commuting to school.	Q Questionnaire PACO project	*	n	•	•	n
Ikeda et al.	2020 (society)	New-Zealand, Auckland	42% (34% walk 7,6% cycle)	8–13 (n=1085)	(P&W) Significant differences in child variables, school socioeconomic status, and cycle lanes and traffic lights around school were found between children who actively travelled or used public transport to school and those driven to school. This study demonstrated the important role of school policy and procedures and the potential application of an intersectoral approach for interventions to support changes in school travel behaviour (e.g. cycle lanes and traffic lights around school, programs for road safety education and skills training are need)	Q & L Questionnaire Semi-structured interview (TREK)	•	•	•	•	•
Kunaratnam et al.	2022 (transportation)	Canada, Toronto	*64% (61% Walk 2% Bike)*	*4–13*	(W) A significant association between proportion recent immigrants and ACS. Built environment varies across social factors, suggesting the need to account for equity when promoting ACS. Children in low-income/high new immigrant population neighbourhoods walk at high rates in both walkable and less walkable environments. Important policy implications emerge from this research related to equity in active transportation, in that it must be ensured that children in low-income or high immigrant population neighbourhoods be provided with walking environments which have both enjoyable and safe conditions. Improvements to the built environment and interventions that consider ethno-cultural differences may be best to ensure safe and active travel for all children.	Q Observers (Walk Score®)	•	n	n	•	n

Table 5. Reviewed studies (cont.1)

AUTHORS	YEAR (area)	LOCATION	Active Commuting (average)	PARTICIPANTS	FINDINGS (Scope) Significant effect factors on active commuting to school. Main findings and limitations	METHODS	INDICATORS				
							A	B	C	D	E
Lee et al.	2020 (health)	US, Seattle	51%	8–11 (n¼315)	(W) living within 1.5 km from schools. Improving micro-level (comfort) school walkability. Many street-level built environments can be readily modified for improvement at a relatively low cost; thus, improving the street conditions, such as increasing sidewalk connectivity, removing trashes on the streets, and improving the visual quality of the street design could be a cost-effective approach for SRTS programs.	Q GIS-based school Walkability Index (WI)	•	•	•	©	•
Lee	*2020 (Urban Planning)*	US, North Carolina, Chapel Hill-Carrboro	*67.8%*	*9-11 (n=367)*	(W) Significant differences were discovered in neighbourhood form and active school travel (AST). New urbanist design principles may support children's ACS more than conventional neighbourhood designs.	Q&L Questionnaire Travel diary & devices (GPS)	•	n	n	•	n
Lopes et al.	2014 (geography)	Portugal, $urban_{n1}$, moderate $urban_{n2}$; non-$urban_{n3}$	$15\%_{n1}$ $30\%_{n2}$ $24\%_{n3}$	M_{age}=9 3rd-6th grade (223_{n1} 192_{n2} 137_{n3})	(P&W) Increase of urbanization leads to a decrease of children's licenses. Parental fear of traffic, stranger danger and low sense of community are more prevalent in urban $settings_{n1}$. The discussion also shows that children's freedom of movement in the highly urbanized setting is very restricted due to a pervasive automobile dependence, proposing a shift from a motorized to a walkable city.	Q Questionnaire 6(CIM)Sense of community	•	•	•	©	•
Macdonald et al.	2019 (OA)	Scotland	60%	10–11 Years (n=713)	(P&W) Distance and walkability: - provide infrastructure; - to support opportunities Investment is needed in existing less walkable neighbourhoods to provide the infrastructure to support opportunities for ATS. Those involved in developing urban and transport policies should work towards improved street connectivity. Education authorities should collaborate with planning and public health professionals and consider dwelling density and school catchment size when siting schools.	Q & L. (GPS) Observational study (SPACE) & 8 interviews	•	n	n	©	•
Mah et al.	2017 *(health)*	Canada, British Columbia	57%	4–7 grades (n=341)	(P&W) Parental support is key indicator. Thus, interventions that focus solely on changes to the built environment may not be enough to encourage ACS. Therefore, interventions should involve parents and children in the planning process.	Q Questionnaire (NEW-Y)	*	n	•	•	n
Masoumi et al	*2020 (health)*	Netherlands, Poland (others not representative)	9-12 *(n=1304)*	9-12 *(n=1304)*	(P&W) Safety is a major concern behind children's ACS. Bike ownership, parent's perception of safety, parent's evaluation of the sidewalk quality, driving licenses, accessibility-public transport, distance, and density. Poland & Netherlands revealed significant differences - independent school mobility. Due to the significant difference in bike ownership, the number of household members working outside of the house, household size, commute distances of parents, and driving license possession.	Q Questionnaire	•	•	•	•	n
Michail et al.	*2021 (health)*	UK, Newcastle	9–10 *n=145*	9–10 *n=145*	(P&W) The study identified four primary domains (environmental context, emotions, social influences and trip factors). Multi-disciplinary approach-planning the built environment around schools. Engaging the community and relevant stakeholders during research or pre-intervention process.	Q Questionnaire	•	n	n	•	•
Molina-García et al.	*2020 (health)*	Spain, Almería, Granada, Murcia	80% Walk urban 77% rural walk *0%bike*	M12.2 n=1362 urban n=209 *rural*	(W) Age and distance. Density, number of four-way intersections, and residential density were positively related to ACS in urban participants, but negatively in rural participants. relevance of built environment factors for ACS depends on - urban or rural.	Q Questionnaire	•	•	•	•	n

Table 5. Reviewed studies (cont.2)

AUTHORS	YEAR (area)	LOCATION	Active Commuting	PARTICIPANTS	FINDINGS	METHODS	INDICATORS				
							A	B	C	D	E
Moran et al.	2017 (health)	Israel, Rishon LeZion	70%	10–12 (n=92)	(W) Children who walked differs from those who not(driven), in navigation skills & city space. Planning strategies (e.g. Re-designing school registration zones to minimize distances between elementary schools and residential areas; Ensuring that shortest/direct routes pass through compact urban areas with high residential and intersection densities; Ensuring that shortest/direct routes pass through retail streets and/or include retail land uses en-route) should be accompanied by community interventions to promote active travel to school.	Q & L Mapping activity (GIS WI)	•	•	•	©	n
Noonan et al.	2017 (health)	England, Liverpool	53%	9–10 (n=194)	(W) Schoolchildren who lived in more-deprived neighborhoods perceived by parents as being highly connected, unaesthetic and having mixed land-use were more likely to commute to school actively. The findings should encourage researchers and policy makers to be equally mindful of the social determinants of health when advocating behavioral and environmental health interventions.	Q Questionnaire (NEW-Y)	•	n	•	•	n
Ozbil et al.	*2021* (health)	Turkey Istanbul	*65.8%walk to 74% walt from 0%bike*	*12-14 (n = 1802)*	(P&W) ACS - complex factors, including objective conditions and parental perceptions of the built-environment. Barriers - distance (33.8%), roads being unsafe in terms of crime (28%), traffic (16.9%), bad weather (13.8%), and relatively small n. of other children walking along the streets (5.8%). Children's travel mode decisions are governed by a variety of complex factors, including objective conditions and parental perceptions of the built environment. Therefore, a combination of both objective and subjective environmental factors should continue to be examined to facilitating "walking to school", local urban conditions that are conducive to this mode will provide for a safe, sustainable, and healthy environment.	Q Questionnaire *(GIS Space-syntax)*	•	•	•	•	n
Race et al.	2017 (health)	Canada, Vancouver	*81% urban 69% suburban*	*9-13*	(P&W) Urban and suburban children were shown to experience similar barriers and facilitators to AST. Barriers such as proximity & personal safety to commute to/from school each day, we recommend that schools engage children in the design of AST programs. We also recommend that future school travel studies, include focus groups with parents.	Q &L Questionnaire Focus groups (Walk Score®)	•	•	•	•	n
Rodríguez-Rodríguez et al.	2021 (health)	Spain, Granada & Chile, Valparaíso	*39%*	*N=438*	No car availability and shorter distance to work were positively associated with higher Independent Mobility to school in children (OR = 2.22 and 2.29, respectively). Parental sociodemographic factors, such as salary, distance to work and car availability associated with independent mobility (IM) to school. I*t is* important to continue implementing schools' interventions based on socioecological models that include their close connections, parents and their factors to promote ACS and IM to school in children and adolescents. Likewise, it is necessary to involve families and the whole school community to provide tools to facilitate IM motivating them to active commuting and less use of the car.	Q Questionnaire PACO project	*	n	n	•	n

Table 5. Reviewed studies (cont.3)

AUTHORS	YEAR (area)	LOCA-TION	Active Commu-ting (average)	PARTICI-PANTS age (sample)	FINDINGS (Scope) Significant effect factors on active commuting to school. Main findings and limitations	METHODS	INDICATORS				
							A	B	C	D	E
Rothman et al.	2015 (health)	Canada, Toronto	65%	4–6 grades	(P&W) parents' perceptions of traffic safety crucial decision-making process. Parent's traffic concerns along the school route but not at the school site were associated with school travel mode. Parents' perception of danger is not always in accordance with objective measures of traffic danger. Safe road design along school routes is important to influence traffic safety and walking to school; however, safe road design must also be directed to the immediate school environment where collision densities are high.	Q Questionnaire	•	•	•	•	n
Smith et al.	2024 (health)	New-Zealand, Aotea-roa	*37% at 6y 34% a 8y*	*1-2(6y) and 3-4 (8y) n=642*	(P&W) *Distance or* living closer to school, parent-reported importance of living close to school, and child-reported peer relationships/liking school at 8 Years. Findings from this study highlight an urgent need for policy and practice to enable and encourage active travel modes for young children and their families.	Q Questionnaire Longitudinal (at 6 years and 8 years)	*	n	n	•	•
Terró-Pérez et al	2018 (health)	Spain Valencia	78%	3–5 (n=96, parents)	(P&W) Distance to school and parents' perceived barriers to ACS in preschool-aged children. Our findings suggest that greater involvement of institutions and educational communities will be required to create education programs that provide tools for overcoming psychosocial and planning barriers.	Q&L Focus groups followed by Questionnaire	•	•	•	©	•
Wang et al.	*2022* (geography)	China, Beijing	*52%*	*M.9*	(W) Children are more likely ACS when they live in neighborhoods with lower street walkability, while higher street enclosure was associated with higher odds of walking for all respondents. A non-linear but overall negative relationship was observed between the odds of walking and street. schoolchildren's household car ownership, educational, and income modify the built environment-walking to school association.	Q&L Survey (BOHTS) 24-h Travel diary & (GIS - street view images)	•	•	•	•	**n**
Yang et al.	2020 (geography)	China, Hong Kong	37.11%	11-13 primary schools n=1,148	(W) Girls (51.3%) walk more than Boys (48.7%). Using three urban greenery measures (number of parks, NDVI, and street greenery with GSV images), we found that street greenery in the area surrounding a school was significantly associated with children's ACS. Future planning and design practice should consider the visibility of greenspaces as well as more traditional planning parameters such as the size or number of greenspaces.	Q&L Interviews & (GIS)	n	•	n	•	n
Zavareh et al.	2023 (transporta-tion)	Iran, Tehran	73.9%	7-12 n=272	(P&W) Distance (or walking time). factors ACS was significantly different between short and long journeys (crosswalks, walkways, and physically permeable frontages in walking journeys). Environmental factors matter most in parental decisions to walk when the distances are longer. Continuous walkways, and street lighting would enhance walking quality from distant areas to schools. Parental worry was a barrier for children walking longer than 12.5 min journeys to school. Need to incorporate the design and maintenance of safer facilities for the children integrated with knowledge campaigns for parents.	Q Questionnaire ROC	•	•	•	•	**n**

LEGEND:
US: United States. UK United Kingdom
METHODS:
Q: Quantitative studies. L: Qualitative studies. Q&L: Mixed-methods studies that include both qualitative and quantitative data analysis (existing tools used).
INDICATORS:
A: Built environment (e.g., distance, density, street connectivity, use). B: Comfort (e.g., tree density and green areas, pedestrian and cycling paths, and urban furniture such as benches and public restrooms). C: Safety (e.g., traffic speed, crime-related safety, and dangerous driver behaviours such as parking near or on crosswalks and sidewalks). D: Social Environment (e.g., social support, time constraints, schedules and convenience)

- n: not included.
- * indicates that distance was the only built environment indicator considered.
- © indicates that only children's characteristics were considered (age and gender).