Search Terms Used

(1) **target population** using terms such as "Children" "youth" or "kids" or "primary school aged children", (2) **exposures of social neighbourhood** "Perceived safety from crime", "Social neighbourhood", "Neighbourhood safety", "Measured crime", "Fear of crime", or "Perception of crime", "road safety", "traffic safety". (3) **moderators and mediators** of "Parents' perception of safety from crime" "parents' and children's perception of safety from crime" or "children perception" "age 5-11" "gender", "ethnicity". (4) The **spatiotemporal** aspects: "spatiotemporal measures, Geographic Information Systems GIS, time geography", "space and time geography" "Objective measures" or "GPS". (5) the **outcome** such as "Active Mobility", "Free play", Medium to Vigorous Physical Activity". "Outside school hours". A combination of at least three keywords was alternated to find the possible variety of papers related that could be scanned and retrieved.

Search strategy in Scopus

Search by document type (ALL), Search in (Article title, Abstract, Keywords), Access Type (ALL), Limit is (Published all years). The source type is articles. Language is in English. Keywords (e.g., "Children" OR "primary school aged children" OR "youth", OR "Active mobility" OR "Active behaviour" OR "Physical activity" OR "Active play" OR "active travel") AND ("Neighbourhood") AND ("Safety" OR "Parents Perceived Safety" OR "Children Perceived Safety" OR "Road safety" OR "Crime") AND ("Outside school hours)" AND ("Spatial data" OR "GIS" Or "GPS" OR "Spatiotemporal").

Search strategy in Google scholar

Search by document type (Article), Search alternate keywords (e.g., "Children" OR "primary school aged children" OR "youth", OR "Active mobility" OR "Active behaviour" OR "Physical activity" OR "Active play" OR "active travel") AND ("Neighbourhood") AND ("Safety" OR "Parents Perceived Safety" OR "Children Perceived Safety" OR "Road safety" OR "Crime") AND ("Outside school hours)" AND ("Spatial data" OR "GIS" Or "GPS" OR "Spatiotemporal").

Search strategy in PubMed

Search Terms: Include related keywords terms of (e.g., "Children" OR "primary school aged children" OR "youth", OR "Active mobility" OR "Active behaviour" OR "Physical activity" OR "Active play" OR "active travel") AND ("Neighbourhood") AND ("Safety" OR "Parents Perceived Safety" OR "Children Perceived Safety" OR "Road safety" OR "Crime") AND ("Outside school hours)" AND ("Spatial data" OR "GIS" Or "GPS" OR "Spatiotemporal"). Select English language, Publication Year No limit

Search strategy in Science Direct

Search for peer-reviewed journal articles (including open access content)

Find articles with these keywords' terms of (e.g., "Children" OR "primary school aged children" OR "youth", OR "Active mobility" OR "Active behaviour" OR "Physical activity" OR "Active play" OR "active travel") AND ("Neighbourhood") AND ("Safety" OR "Parents Perceived Safety" OR "Children

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Perceived Safety" OR "Road safety" OR "Crime") AND ("Outside school hours)" AND ("Spatial data" OR "GIS" Or "GPS" OR "Spatiotemporal"). No limit for Publication Autor(s) or Year(s)

Search strategy in ProQuest

Use command line to use search terms keywords such as (e.g., "Children" OR "primary school aged children" OR "youth") AND ("Active mobility" Or "Active behaviour" OR "Physical activity" OR "active play" OR "active travel") in Anywhere AND ("Neighbourhood Safety" OR "Parents Perceived Safety" OR "Children Perceived Safety" OR "Road safety" OR "Crime") in Anywhere. Add a row of AND ("Outside School Hours") in Anywhere. Add a row of AND ("Spatial Data" OR "GIS" Or "GPS" Or "Spatiotemporal"). Limited to (Peer reviewed), Publication date (All dates), Language (English).

Search strategy in Web of Science

Basic Search: Alternate search terms keywords such as (e.g., "Children" OR "primary school aged children" OR "youth", OR "Active mobility" OR "Active behaviour" OR "Physical activity" OR "Active play" OR "active travel") AND ("Neighbourhood") AND ("Safety" OR "Parents Perceived Safety" OR "Children Perceived Safety" OR "Road safety" OR "Crime") AND ("Outside school hours)" AND ("Spatial data" OR "GIS" Or "GPS" OR "Spatiotemporal"). Search in Topic. Timespan (all Years). Default Number of Search Fields to Display

Table 1. Characteristics of included studies and findings of evidence of influences on children outdoor active mobility behaviour

#	Study's author(s)/year of data collection n = Participants number/ (sex/gender: number/% of M/F)/ Age (or mean age)/Grade	Country/ Study Design/ [Project]	Measures				Findings of Associations
			Safety (Perceived by)/ Measured/ Level of study	Active Behaviour Outcome / Measures	Definition of neighbourhood	Study accounted cofounders and other examined variables	
1	Alton, Adab, Roberts, and Barrett (2007)/-/ n= 473 (250 M and 60 F)/ 9-11 years old/	United Kingdom Cross-section	Children/questionnaire on the perception of local environment + preferred travel method/ In Six primary schools in a range of socio-economic classification	Level of walking (high walkers, low walkers)/ Self-report Past 7-days	Local area	Sex/gender, race/ethnicity (Asian, black, Chinese, mix, others, white), family characteristics (cars ownership and number of rooms in primary residence) as a proxy for SES)	Child from ethnic minority walks significantly less. Perception of high parental concerns over road safety and heavy traffic associated with a higher walking level. The authors explained this unexpected correlate as children who are high walker may be often warned by their parents about road danger, and therefore children perceive roads as dangerous. Child perception of lack of suitable leisure space in the neighbourhood and worry about a stranger is associated with less walking levels. Child perceptions of the local environment correlate with walking level.
2	(Carver, Timperio, & Crawford, 2008)/between July and December 2004/ n = 188 (44% boys) 8-9 years old	Australia Cross-section from [CLAN] longitudinal study	Parents survey for personal characteristics +frequency of children walking and cycling to 15 destinations + Measured road safety[1]/ From 19 state primary schools of varying socio-economic states across Melbourne.	*MVPA Outside school hours Accelerometer for 8-days	800 m around participant home	Sex/gender, age + Active transport +MVPA + measured road environment	No association between children likelihood of making at least seven walking/cycling trips per week to neighbourhood destination and roads environment
3	Carver, Timperio, Hesketh, and Crawford (2010)/2001 n = 170 (51% M)/ 10-11 years old 15-17 years old (excluded) 2001-2005 longitudinal study	Australia Cross-section from [CLAN] longitudinal study	Parents questionnaire Indices for (avoidance and defensive behaviour, and perceived risk) + active transportation to 15 destination/ In 10 high and ten low socio-economic areas across Melbourne	*Active transport/MVPA outside school hours/ Accelerometer	Local area	Sex/gender + Parents (avoidance, defensive and perceived risk)	The lower level of active transport and lower level of MVPA in a neighbourhood outside school hours associated with constrained behaviour exhibited by parents on both boys and girls. Reduced MVPA associated with constrained behaviour on weekends for boys. Higher constrained behaviour associated with higher MVPA for girls (limitation of study)
4	(Carver, Panter, Jones, & van Sluijs, 2014)/T1 (April-July 2007) n= 1121 (9-10) years old (43%M) T2 (April-July 2008) n= 491 (39%M)	United Kingdom Longitudinal from [SPEEDY] study	Parents perception questionnaire (social/physical environment + rules regarding their children physical activity + perception of traffic safety concerns)/At 1600m of their school in urban/rural areas	Independent mobility to school/ from children questionnaire	Within 800 m pedestrian network buffer around the home (10 min walk)	Sex/gender, sociodemographic (siblings, cars ownership, parents' education) + environmental characteristics around the home and (within 100 m buffer of the shortest route to school	Car access is associated longitudinally with boys decreased odd of walking/cycling independently to school. The proportion of main roads in the neighbourhood and parental encouragements of walking/cycling associated longitudinally with girls walking/cycling to independently to school. Land use mix is associated positively with girls walking cycling independently to school. Boys that are allowed by their parents to play outside have higher odd to walk/cycle independently to school.
5	(Davis & Jones, 1996)/-/ n = 492 of children (not reported gender)/ 9-11-years-old 13-14 years old (excluded)	United Kingdom Cross-section	Children (focussed group discussion)./ From four schools in broadly working-class areas.	Independent mobility/ discussion	Local destination	Sex/gender, age + stranger danger and traffic danger	In children's view, traffic and stranger danger, social and cultural factors create barriers on children being active for both genders, especially for girls. Car escort journey developing unhealthy habits of sedentary living with its associated risks of increased cardiovascular illness.
6	(Fagerholm & Broberg, 2011)/ Sep.-Oct. 2009 n = 35 children (18M/17F)/ 10-11 years old	Finland Cross-section	Parents questionnaire (children and parent) mobility patterns + mobility licences, perceived safety./From two residential areas	*Active route (home to destinations)/ GPS + Travel diary for 7-days	Buffer 500-m from home	Sex/gender + Land use types	Gender difference shows in the distance and speed children travel actively to the boys' advantages. Land-use type associated with different mobility patterns (increase in urban areas). A high perception of safety from parents in residential areas resulted in a high level of independent mobility.

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						Weekdays and weekends have different mobility patterns in term of proximity (near the home on weekdays) with more time out on weekends.
7	Faulkner, Mitra, Buliung, Fusco, and Stone (2015)/ April2010 – May2011 n = 736 (47% M and 52%F) included in the analysis/ (10-12 years old), grade 5-6	Canada Cross-section from [BEAT] project	Parents questionnaire (child outdoor active play + parents' perception of personal and road the neighbourhood safety/ From 16 elementary primary/intermediate schools in the city of Toronto	*Outdoor playing time MVPA/ GPS + Accelerometer for 7-days	Neighbourhood	Sex/gender, age, SES of the neighbourhood (neighbourhood income) + neighbourhood perception (roads, personal safety, accessibility of facility)	Time spent outdoor was significantly associated with (MVPA) and with sex/gender, but age didn't play a role in this relation. Parental safety perception plays an inverse relation with the duration of outdoor play on weekdays. Parental concerns play a barrier role for children outdoor play. Association of outdoor play duration with the perception of safety (stranger danger and traffic safety), differ between weekdays and weekends.
8	(Janet E. Loebach & Jason A. Gilliland, 2016)/ During April and May of 2010 and 2011. n = 143 (49M/94F) two groups of 9- 11 and 12-13 years-old/grade 5 - 8	Canada Cross-section from [STEAM] project	Parents & Children Questionnaires/ From seven schools in London	Neighbourhood Activity Space (NAS)/ GPS for 7-days	NAS found within 400, 800 m of home, the second set those found within 1,600 m.	Sex/gender, age, car availability + parents and children environmental perception + neighbourhood types + parental IM licenses to children	IM awarded to a child is associated with parents' perception of neighbourhood safety and a strong predictor for distance travelled. Distance to school predicts active travel. Gender or age was not associated with NAS size. No association between parents' perception of neighbourhood and child spend their time closer to home. Children perception correlate with time spend closer to home but were not as strongly predictive as parental mobility restriction. Neighbourhood types (Residential) was a predictor of time spend out and (commercial) to distance travelled (over 800 m). Smaller home to school distance facilitate active travel and more frequent and distant neighbourhood travel
9	(Helbich et al., 2016)/between December 2008 – April 2009/ n = 97 (60%F) /Aged 6 – 11 years	The Netherlands, Part of [SPACE] project	Road traffic Safety exposures within 100 m buffer width around using GIS/ From six elementary schools located in five neighbourhood	Active trips to school and transport mode of choice GPS for 8-days	Home to school trip	Sex/gender, age + active trips to school + built environmental variables (land use mix, density, closeness and in between indices) + traffic safety control variables (major roads availability, distance, the proportion of cycling path and road accidents) +street density) weather	Gender is significantly associated with AST. Age is significantly associated with AST. Negative association with the distance. Negative weak association of AST with major road. Traffic safety (exposure to major roads/highways) is negatively correlated with AST. Cycling path availability positively corollate with AST.
10	Lin et al. (2017)/between 2011 and 2012 n = 254 (100M, 133F) and 239 parents/ 8–13 years (mean age of 10.5)	New Zealand from [KITC]	CATI-Parents Survey (perception of neighbourhood cohesion using social cohesion scale, + neighbourhood social connection using intergenerational closure scale and parents' concerns of places that will not let their children go alone)/ From nine schools across Auckland	*Independent mobility /Travel diary for 7-days	Neighbourhood	Sex/gender, age, race/ethnicity, household profile + built environment (street connectivity, destination accessibility)	Shorter distance to school accounted for the effect of neighbourhood cohesion and connection associated with higher children independent mobility (IM). IM associated with having an older sibling and limited access to cars. Parent's perception is not associated with children independent mobility though concerns of safety which differed by ethnicity (pacific/Asian).
11	Mehdizadeh, Mamdoohi, and Nordfjaern (2017)/-/ 735 parents of (364M, 371F)/ 7-9-year-old in 9 schools of 735	Iran Cross-section	Parents questionnaire via their children/from nine schools	Perceived Walking Time to school (PWTS)/ questionnaires	Environment around school	Sex/gender, demographics, household characteristics (father/mother driving licence, car owner) SES	Perceived walking time to school (10 min) is the maximum threshold where the proportion of active mode started to decrease. Certain demographics: parental age, household income, accessibility to public transport, type of school (public or private), school service status and psychological factors (parents attitude towards walking in dirty, vandalised and unsafe streets), SES of children and household variables were significant predictors of a PWST to eligible school. Sex didn't have a consistent and definite role in active travel.
12	(Nguyen, Borghese, & Janssen, 2018)/ Jan. 2015 and Dec. 2016/ n= 458 (230M/228F)/ aged 10-12	Canada Cross Section	Parent's questionnaire (perceived pedestrian safety) + Objective measures of Pedestrian safety/ Recruited through social media and study flyer.	Average of minutes per day of active outdoor play/ Accelerometer + GPS in a smartwatch for 7-days	1 km buffer zone around participants home	Sex/gender Race (white, non-white) Family characteristics (single or dual parents' household, number of siblings, household income, parental education, parents' value of outdoor	No association between pedestrian safety measures and outdoor active play. No association between objective and perceived pedestrian measures. Perceived measures of traffic volume, traffic calming and pedestrian infrastructure were not associated with outdoor active play.

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					and income) + Pedestrian safety (traffic volume, traffic speed, traffic calming and pedestrian infrastructure + season	Parents perceived moderate to high traffic speeds had higher outdoor active play value than children whose parents perceived low traffic speed. Objective measure of traffic volume, traffic calming and pedestrian infrastructure but not traffic speed was associated with outdoor active play.
13	Noonan, Boddy, Knowles, and Fairclough (2016), n = 194 children/ 9-10 years old Gender not reported	United Kingdom Cross-section	Parents questionnaire on environment perception using NEWS_Y + Children self-reported PA using PAQ-C. From 10 primary schools in Liverpool	IM/ Self-Reported PA	High and low deprived areas	Home environment, Area deprivation, parent's perception walkability Index	Home environment for HD provides more opportunities for sedentary behaviour and less opportunity for PA, less access to bedroom media equipment, and greater independent mobility were *strongly associated* with higher PA in HD and MD children, respectively.
14	Oliver et al. (2015)/ Between 2011 and 2012/ n = 236 (104 M/132) for weekday analyses, n = 210 (91M/119F) children for weekend days analyses. /age 9-13 Age mean 9.8 from 9 schools/grade 5-8	New Zealand Cross-section from [KITC] project	CATI-Parents questionnaire (Perceived parents safety) + measured roads connectivity/ From nine schools in Auckland	*% MVPA/ accelerometer + GPS for 7-days	Buffer of 800-1000 m around school	Sex/gender, age, race/ethnicity (New Zealand European, Maori, Pacific Island, Indian/Asian/Other Ethnicity), SES+ Neighbourhood street connectivity, street space, destination accessibility+ distance to schools + ratio of high-speed roads around schools + street connectivity. .	On weekdays: Females & access to car accumulated less %MVPA than males. On weekends: Female and ethnicity (Indian, Asian or "other" ethnic group) made less %MVPA. Street connectivity and distance to school were related to the proportion of active trips on both weekends and weekdays. The ratio of high-speed roads associated with %MVPA (weekdays after school). Improved streetscape for active travel was related to %MVP on weekdays. Ethnicity and %MVPA differ by day type. Age, access to cars was negatively associated with %MVPA. Inconclusive evidence of socio-economic association. Parent's perceptions of neighbourhood safety is positively associated with the proportion of active trips on weekdays.
15	(Oluyomi et al., 2014)/-/ n= 830 and their parents of 4th grade (412M/418F)	United States Cross-section from [T-COPPE] longitudinal project	Parents' questionnaire adapted from several surveys including the National Centre for Safe Routes to School Parents Survey, SPAN, (UH-PEAK), NEWS, and EnVivo) Personal safety + Traffic Safety/ From 81 elementary school across Texas	Walking to school (WTS) /parents' questionnaire of National Safe Route to School. Captured safety of en-route to school, home neighbourhood, and school environment)	Within walking distance of 3.2 km to school from the residential address of students	Race/ethnicity (the majority were Hispanic) car ownership, public assistance) Examined two environments (home neighbourhood and en-route environment to school)	Parents Perception of road safety (higher sidewalk availability, well-maintained sidewalks and safe road crossing) is associated with students more likely to walk to school. On route to school: parents' perception of sidewalk, Speed and amount of traffic and intersection along school route, also associated with WTS Parents reported safe walking to a school associated with reported higher children WTS. On Personal safety, parents concern about general neighbourhoods' safety, stray or dangerous animals and the availability of adults with whom child can walk associated with lower en-route to school.
16	(Page, Cooper, Griew, & Jago, 2010)/ between 2006 and 2008 n = 1307 (639 M, 661 F)/ 10-11 years old from 23 schools	United Kingdom Cross-section from [PEACH] longitudinal study	(computerised) children questionnaire perception of the environment (Aesthetics, Safety, Social Norms, Nuisance, constraints, accessibility, minutes of daylight from 3 pm till sunset)/ From 23 schools.	Frequency of participation in outdoor play, exercise and active travel home to school/ questionnaire	School-home	Age, sex/gender, race/ethnicity (white, non-white, but not accounted in analysis), + perception of the environment + the level of deprivation (using Index of Multiple Deprivation (IMD) and derived from seven categories of deprivation + daylight + pubertal status	Boys had a more positive perception of the environment than girls (personal safety and traffic safety) for Local-IM and Area-IM. No gender differences in school travel Boys scores significantly lower in the Constrained scale than girls Physical activity, structured sport and active travel to school weakly significantly correlate to each other. Boys who have greater independent mobility scores had more time of playing out than boys who played less. Girls with a higher positive perception of neighbourhood correlate with playing outdoor often. For boys and girls, and increased likelihood of walking or cycling to school was associated with higher levels of local-IM. Distance from home to school is a predictor for both boys and girls
17	Roberts, Knight, Ray, and Saelens (2016)/Sep.-Dec.2014/ n = 144(72M,72F)/7-12 years old (mean age of 9.7 children)/	United States Cross-section	Parents' questionnaire (perception of the environment)/ From nine counties and cities.	Active children (met the 60 min daily PA)/	Metropolitan area	Sex, demographics race/ethnicity (Hispanic/Latino, African American, American, Indian/Alaska Native, Asian American, White, Other) + perceived parents' safety	Parents' better perception of neighbourhood associated with active kids yet reported a high crime rate and being a victim of a crime of their neighbourhood. Parental perception of street barriers associates with children physical activity. Closer proximity to play areas was significantly associated with greater odd of children meeting the 60 min/day play. Gender (male more active) and race disparities associated with active behaviour.

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18	(Santos, Pizarro, Mota, & Marques, 2013)/ 2010/2011 n= 354 (156M) of grade 6th (mean age 11.63) and their parents	Portugal Cross-section from [SALTA] longitudinal study	Parents questionnaire (parental physical activity, and perception (adapted from NEWS and previous studies) + Children questionnaire to derive mobility style/ From nine middle schools	IM/ questionnaire of previous week physical activity based on IPAQ	Local destinations	Age, sex/gender, family demography (parents age, education, parental PA, parents' perception of neighbourhood safety (sidewalk, street safety, fear from strangers, crime and traffic safety).	Parental perception of sidewalks and street safety is associated with IM Parents physical activity was significantly associated with more active children. Perception of fear from a stranger, crime and traffic safety was not significantly associated with child IM.
19	(Shokoohi, Hanif, & Dali, 2012)/ Jan.-Feb. 2009 /-/ Grades 3- 5 (48.8%M,51%F)	Iran Cross-section	Parents + children questionnaire on the perception of environmental factors that prevent children from walking to school/From 18 school sites	Walking to school from parent's survey. Differed the trips from home to school and from school to home.	Home-school	Socio-economic status (three income groups of parents)	Parents and children with a negative perception of neighbourhood safety tended to use motor vehicles or to escort their children while walking to and from school.
20	Stark, Frühwirth, and Aschauer (2018)/-/ n = 190 (49%F) from two public schools/ 6-9(10) years old	Austria Cross-section	Parents questionnaire. From two schools of different location in the outskirt of the city of Vienna	AIM/ One weekday and one weekend Travel Diary using (KONTIV-format)	School active travel	Parental attitude, Parents and household characteristics	The most influential variables on IM are: Shorter trip distance to school, higher age and parents perceived social safety and traffics. Working status of parents. The type of school (all-day/half-day primary school) is relevant. Parental attitude (Promoters, Pragmatists and Protectors) strongly influence the degree of AIM.
21	Stephanie H. Kneeshaw-Price et al. (2015)/between Sep. 2007 and Jan 2009 n = 145 (71M, 74F) / 6–11-years-old	United States Cohort study [NIK]	Police report crime + parents' prior crime victimisation survey + parents' perception (stranger danger, general crime, and disorder)	MVPA/ accelerometer for 7-days	Census block	Age, race/ethnicity (non-Hispanic white, Hispanic, and non-Hispanic non-white), Household income + NEWS + collective efficacy	Lower children's physical activity was associated with more neighbourhood crime but not with parents' perception of stranger danger, disorder and neighbourhood safety. Lower MVPA didn't account for race/ethnicity as the majority was non-Hispanic (white).
22	Suminski, Robson, May, Blair, and Orsega-Smith (2018)/ T1 n = 2108/50.5%F/ 5-11-years-old	United States longitudinal study	Measured crime using CRI Index (a higher number than 100 indicate a greater chance of crime) for each zip code in an urban neighbourhood	Body Mass Index/(BMI) score/ measured at baseline and three years later	Zipcode	(BMIz scores, Sex/gender, family characteristics (income, education Race/Ethnicity White, African American, Hispanic, Asian)	Actual, neighbourhood-level crime predicts changes in BMIz scores in white children This relationship varies as a function of race/ethnicity (i.e. in White children but not African American, Hispanic or Asian American)
23	Timperio, Crawford, Telford, and Salmon (2004)/ n = 291 (150M/141F)/ Aged 5–6 years n = 919 (424M/495F)/ aged 10–12 years from 19 primary schools	Australia Cross-section	Parents & Children Survey Compared parents to own children (aged 10-12) view	Frequency of walking and cycling/ parents survey	Local destinations	Sex, Family background: the first language spoken, marital status, parents' education (SES), cars' ownerships, siblings	Parents' perception of the neighbourhood is *associated* with a lower likelihood of walking or cycling (girls in particular). Children perceive parents' perception of their local neighbourhood safety more negative than their own. Children are reporting less concern about heavy traffic, stranger dangers and road safety and lack of parks or sports ground than parents. Age & SES is associated positively with the frequency of trips made to destinations. Sex is not associated with the frequency of active trips for the young group, but Boys are more still active than girls in the 10 – 12 years old.
24	(Tung, Ng, Chin, & Mohd Taib, 2016) n = 256 (42%M/58%F and their parents aged 9-12 years	Malaysia Cross-section	Parents perception using NEWS Constrained behaviour of parents	Children PA level 7-days questionnaire	-	Sociodemographic (age, parents' gender and ethnicity (Malay, Chinese, and were Indian), highest education level, parent's occupation and monthly income) + parents' perception+ children PA	Sex/gender associated with the level of PA (boys accumulate more than girls). Correlates found between parental perception of neighbourhood safety and constrained behaviour of children active play. Land use mix (access) was correlated positively with higher PA level
25	(van den Berg, Waygood, van de Craats, & Kemperman, 2020)/ Fall of 2018/(315M/341F)/ n= 660 children and parents/ aged 7 – 12/ grade 5-8 (mean age 9.5)	The Netherland Cross-section	Parents survey for perceived pedestrian safety Objective measures of Pedestrian safety/ From 14 primary school in the Netherland	Travel mode to school/ children survey (at school)	Participants were of Home-school Within 1 km distance	Age, Sex/gender Household (income, car ownership), weather, street connectivity	Parental perceptions are related to the child's age, income, perception of neighbourhood infrastructure, travel distance and social cohesion. Parents that are less concerned let their children travel actively
26	Vonderwalde, Cox, Williams, Borghese, and Ian Janssena (2019)/ between Jan. 2015 and Dec.2016/	Canada	Measured crime (person, Property) 24 months before measures of active behaviour	Active transportation/ GIS loggers	Crime in 1 km distance to	Sex/gender, age, race (85% white)	Children living in neighbourhoods in the highest neighbourhood crime rate quartile engaged in significantly more active transportation than children living in neighbourhoods in the lowest neighbourhood crime

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						family profile (single or dual-parent, parent income education), walkability index+ Season change	rate quartile and persisted after adjustment for several individual, family, and environmental covariates. Association of AS and crime against a person but not against a property.
	n = 387(185M, 182F)/ 10–13 years old (mean age 11.5)	Longitudinal from [Active Play Study]			participants home		
27	Villanueva et al. (2012)/ July – December 2007/ n = 926 (463M,463F)/ 10-12 years old included in the analysis.	Australia Cross-section from [TREK]	Parent and Child Questionnaires/ Schools in neighbourhood within three socio-economic state (low, medium, high)	Activity Space/ steps count Pedometer + mapping activity for 7-days	within 800 and 1600 meter of child's home high and low walkable areas	Age, sex/gender, maternal education + School-specific walkability level	Children in high walkable neighbourhood's schools had larger AS. Girls had smaller AS for if parents perceived living on a busy road. Utilitarian destinations were associated with a smaller AS. Sex is associated with AS areas and daily pedometer. Boys' and girls' own confidence in travelling independently was positively associated with covering larger AS areas. Despite some environmental barriers, individual and social-cultural factors likely to encourage children to roam in their local environments.
28	(Waygood & Susilo, 2015)/ 2006 survey/ n = Roughly 31,000 households' participants (52% boys) aged 10-11 years	Scotland Cross-section	Parents survey/ from 2006 Household Survey	Walking to school	Home to school	Sex/gender, Family background +built environment, deprivation index	Car's availability is negatively associate with walking to school Distance to school was strong determinate for children walking to school. Parental perception Good local shops are positively associated with children active travel to school and slow traffic or safe was negatively associated variable,
29	Zhu and Lee (2008)/-/ Children from 73 elementary schools/-/	United States Cross-section	Measured Crime Geocoded 8 major crimes rate/ From 73 public elementary schools	Potential walkers/ neighbourhood-level walkability index	School attendance areas	Race/Ethnicity (Hispanic, non-Hispanic, and White), Poverty + Neighbourhood-level walkability + Neighbourhood-level safety SWI	Poverty associated with negative conditions and low perceived safety. Ethnicity associated with increased crime, traffic danger and poor safety. Unsafe neighbourhoods and poor street conditions may influence not only children's school travels but also their play activities and the overall physical activities of all residents.

Notes: /-/ = data was not reported, M = males, F = Female, BMI = Body Mass Index, IM = independent mobility, AST = active school transport, PA = physical activity, AS = activity space, SES = socioeconomic status, HD = high deprivation, MD = medium deprivation, WTS = walking to school, NAS = Neighbourhood Activity Space, CLAN = Children Living in Active Neighbourhoods, SES = Socioeconomic status, MVPA = Medium-to vigorous Physical Activity, SPEEDY = Sport, Physical activity and Easting Behaviour Environmental Determinants in Young People, BEAT = Built Environment and Active Transport, GPS = Global Positioning System, STEAM = Spatio-Temporal Exposure and Activity Monitoring, KITC = kids in the City, PAQ-C = Physical Activity Questionnaire for Older Children, NIK = Neighbourhood Impact on Kids, CRI = Crime Risk Index (measured crime using actual crime statistics) TREK = Travel Environment and Kids Project, CATI = Computer-aided Telephone Interview, KIC = Kinds in the City, T-COPPE survey = Texas Childhood Obesity Prevention Policy Education project, IMD = Index of Multiple Deprivation is a composite score based on seven categories of deprivation (income, employment, health and disability, education skills and training, housing and geographical access to service), PEACH = Personal and Environmental Association With Child's Health, SPAN = School Physical Activity and Nutrition, UH-PEAK = Urban Hispanic Perceptions of Environment and Activity Among Kids, En Vivo = TV reduction intervention study, NEWS = Neighbourhood Environment Walkability Scale, NEWS-Y = Neighbourhood Environment Walkability Scale for Youth used to assess parental perceptions of neighbourhood design, SALTA = Environmental Support for Leisure and Active Transport, KONTIV = format of travel diary survey for non-home activity patterns, GIS = geographic information systems, IPAQ questionnaire = International Physical Activity Questionnaire, Local-IM = destinations of best friend's house, school, local shops and park or playground, Area-IM = destinations of swimming pool, library, cinema, arcade, bus stop, sports and shopping centre, SWI = School Walkability Index derived from network connectivity and traffic volume, Neighbourhood-level walkability index derived from an (estimate of potential walkers, pedestrian facilities, residential density, street connectivity, land use mix), Neighbourhood-level safety = derived from (traffic danger and the crime rate in a year), TREK = Travel Environment and Kids

Studies denoted with * = Study measures and analysis accounted for temporal changes (weekend/weekdays or outside school, i.e., before and after school hours).

[1] = Objective road measures using GIS were: street network total length, local road index, No of intersections, the total length of walking track, no of speed humps, no of traffic /pedestrian lights, no of barriers

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Table 2. Methodological measure quality assessments and output per study.

Study citation	Study Objectives, design, target population, random sampling (0.25 each)	study participants, inclusion/exclusion, study population, participants recruitments (0.25 each, total 1)	Response rate, data collection, data sources, missing data. (0.25 each, total 1)	Did the active behaviour data collection was objectively measured? (0.25 for each method, total 1 point,)	Did the measure of active behaviour account for temporal characteristics? (0.5 point)	Has the perceived safety measured the temporal characteristics? Or has measured safety used geocoded data in actual crime for personal safety or in road safety? (0.5 point)	Did the study delineate the exposure area "neighbourhood" objectively (0.5 point)	Did the study evidence Accounted For spatiotemporal behaviour in output (1 point)	Was it clearly described the statistical method and to assess significance association, or did the study describe the method of spatial analysis? (0.5)	Did the study account for the four cofounders (age, sex, ethnicity and family characteristics) (0.25 each, total 1 point)	Quality score total	%	overall rating of evidence Quality
(Alton et al., 2007)	1	0.75	0.5	0.25	0	0	0	0	0.5	1	4	50.0	Moderate
(Carver et al., 2010)	1	1	0.75	0.5	0.5	0.5	0	1	0.5	0.5	6.25	78.1	Robust
(Carver et al., 2014)	1	1	0.75	0.25	0	0	0.5	0	0.5	0.75	4.75	59.4	Moderate
(Carver et al., 2008)	1	1	0.75	0.25	0	0	0.5	0	0.5	0.75	4.75	59.4	Moderate
(Davis & Jones, 1996)	1	0.5	0.25	0.25	0	0	0	0	N/A	0.5	2.5	35.7	Poor
(Fagerholm & Broberg, 2011)	1	0.75	1	1	0.5	0	0.5	0.5	0.5	0.5	6.25	78.1	Robust
(Faulkner et al., 2015)	1	1	1	0.5	0.5	0	0	0.5	0.5	0.75	5.75	71.9	Robust
(Lin et al., 2017)	1	0.5	0.75	0.25	0	0	0	0	0.5	1	4	50.0	Moderate
(Janet E Loebach & Jason A Gilliland, 2016)	1	1	1	0.5	0.5	0	0.5	0	0.5	0.75	5.75	71.9	Robust
(Helbich et al., 2016)	1	0.75	0.5	0.25	0	0.5	0.5	0.5	0.5	0.5	5	62.5	Moderate
(Mehdizadeh et al., 2017)	1	1	1	0.25	0	0	0	0	0.5	0.75	4.5	56.3	Moderate
(Noonan et al., 2016)	1	1	0.75	0.25	0	0	0	0	0.5	0.25	3.75	46.9	Poor
(Nguyen et al., 2018)	1	1	0.75	1	0	0.5	0.5	0	0.5	1	6.25	78.1	Robust
(Oliver et al., 2015)	1	1	1	1	0.5	0.5	0.5	1	0.5	1	8	100.0	Robust
(Oluyomi et al., 2014)	1	1	1	0.25	0	0	0.25	0	0.5	0.5	4.5	56.3	Moderate
(Page et al., 2010)	1	1	0.75	0.25	0	0	0	0	0.5	0.75	4.25	53.1	Moderate
(Roberts et al., 2016)	1	1	0.75	0.25	0	0	0.25	0	0.5	0.75	4.5	56.3	Moderate
(Stephanie H. Kneeshaw-Price et al., 2015)	1	1	0.5	0.5	0	0.5	0	0	0.5	0.25	4.25	53.1	Moderate
(Santos et al., 2013)	1	1	0.75	0.25	0	0	0	0	0.5	0.5	4	50.0	Moderate
(Shokoohi et al., 2012)	1	0.5	0.5	0.25	0	0	0.25	0	0.25	0	2.75	34.4	Poor
(Stark et al., 2018)	1	1	0.75	0.25	0	0	0	0	0.5	0.5	4	50.0	Moderate
(Stephanie H. Kneeshaw-Price et al., 2015)	1	1	0.5	0.5	0	0.5	0	0	0.5	0.25	4.25	53.1	Moderate

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|													
(Suminski et al., 2018)	1	1	1	N/A	N/A	0.5	0.5	1	0.5	1	6.5	108.3	Robust
(Timperio et al., 2004)	1	1	0.75	0.25	0	0	0	0	0.5	0.75	4.25	53.1	Moderate
(Tung et al., 2016)	1	1	0.5	0	0	0	0	0	0.5	1	4	50.0	Moderate
(van den Berg et al., 2020)	1	0.75	1	0.25	0	0	0.25	0	0.5	0.5	4.25	53.1	Moderate
(Villanueva et al., 2012)	1	1	0.75	1	0	0	0.5	0	0.5	0.75	5.5	68.8	Moderate
(Vonderwalde, Cox, Williams, Borghese, & Ian Janssena, 2019)	1	1	1	1	0	0.5	0.5	0.5	0.5	1	7	87.5	Robust
(Waygood & Susilo, 2015)	1	0.75	0.5	0	0	0	0	0	0.5	0.5	3.25	40.6	Poor
(Zhu & Lee, 2008)	1	N/A	N/A	0	0	0.5	0.5	0	0.5	0.5	3	50.0	Moderate

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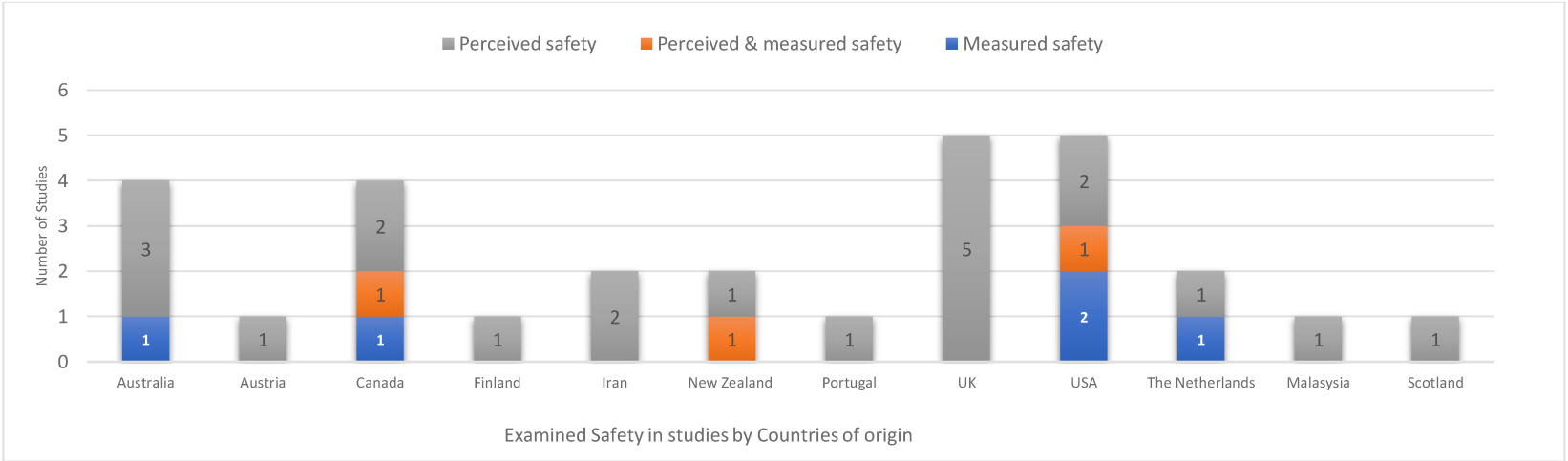
Diagram 1. Country of origin of the studies included in this review including examined neighbourhood safety types.

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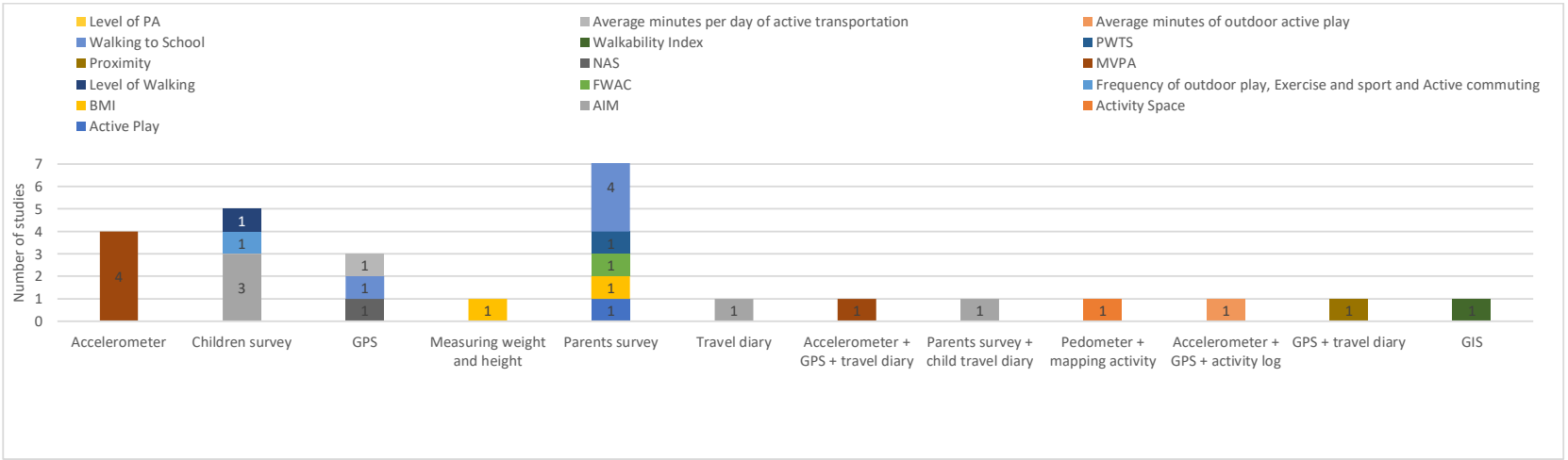
Diagram 2. Variances in measurement methods of children active mobility behaviour and the outcome of measures in 29 studies. Abbreviations: PA = physical activity, AIM = active independent mobility, BMI = body mass index, FWAC = frequent walking and cycling, MVPA = moderate-to-vigorous physical activity, NAS = neighbourhood activity space, PWTS = perceived walking to school, GPS = global positioning system, GIS = geographic information system

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Diagram 3, 4 and 5 illustrated evidence of modified child active behaviour synthesised by individual and family, and neighbourhood safety.
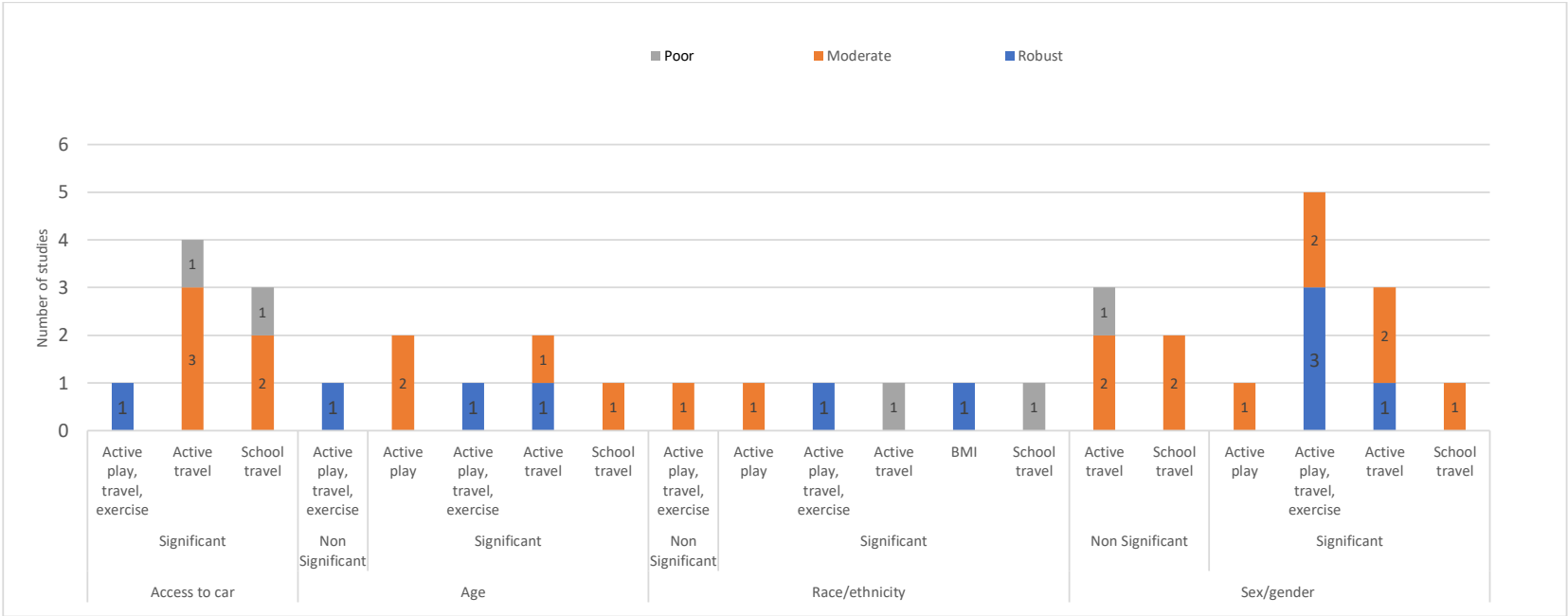
Diagram 3. Findings of Individual and family layers of association to children various type of active behaviour in studies examined neighbourhood safety. Studies were re-grouped each by the examined active behaviour into four categories of (Active travel, active play, school travel and active play, travel, and exercise) and as appraised by the methodological quality assessment. x-Axis depicted variable addressed at the individual and family level and the examined type of child active behaviour. y-Axis represents the number of studies accumulated.

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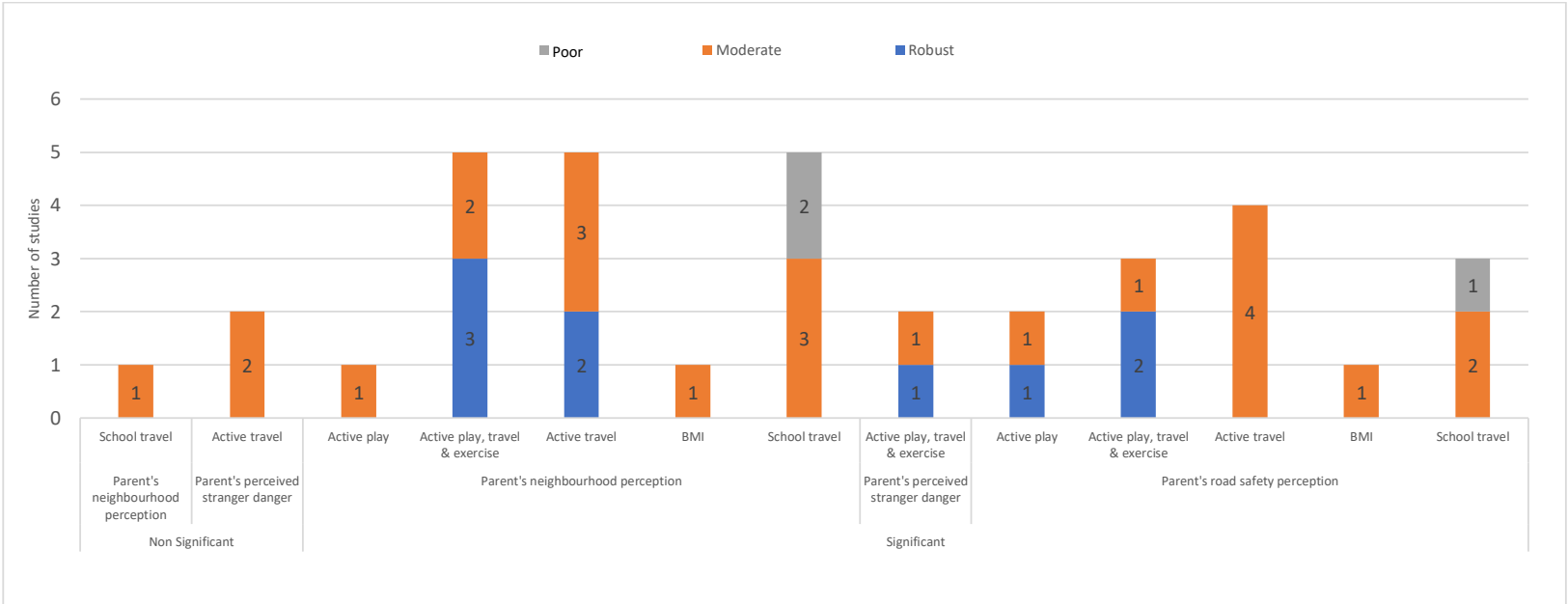
Diagram 4. Findings of parents perceived safety layers of association to children various type of active behaviour. Studies were re-grouped by active behaviour into four categories of (Active travel, active play, school travel and active play, travel, and exercise) and as appraised by the methodological quality assessment. x-Axis depicted variable addressed at the neighbourhood perceived level and the examined type of child active behaviour. y-Axis represents the number of studies.

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Table 3. Studies re-grouped output measure of active behaviour to enable synthesis of evidence.

#	citation	Neighbourhood Safety	Active Type	Re-Grouped Active Mobility Behaviour
1	(Alton et al., 2007)	Perceived	Level of Walking	Active travel
2	(Carver et al., 2010)	Perceived	MVPA	Active play, travel & exercise
3	(Carver et al., 2014)	Perceived	AIM	School travel
4	(Carver et al., 2008)	Perceived & measured	MVPA	Active play, travel & exercise
5	(Davis & Jones, 1996)	Perceived	AIM	Active travel
6	(Fagerholm & Broberg, 2011)	Perceived	Proximity	Active travel
7	(Faulkner et al., 2015)	Perceived	MVPA	Active play, travel & exercise
8	(Helbich et al., 2016; Oliver et al., 2015)	Perceived	MVPA	Active play, travel & exercise
9	(Janet E Loebach & Jason A Gilliland, 2016)	Perceived	NAS	Active travel
10	(Lin et al., 2017)	Perceived	AIM	Active travel
11	(Mehdizadeh et al., 2017)	Perceived	PWTS	School travel
12	(Noonan et al., 2016)	Perceived	BMI	BMI
13	(Nguyen et al., 2018)	Perceived & measured	Average minutes of active outdoor play	Active play
14	(Oliver et al., 2015)	Perceived & measured	MVPA	Active play, travel & exercise
15	(Oluyomi et al., 2014)	Perceived	Walking to School	School travel
16	(Page, Cooper, Griew, Davis, & Hillsdon, 2009)	Perceived	Frequency of outdoor play, Exercise and sport and Active commuting	Active play, travel & exercise
17	(Stephanie H. Kneeshaw-Price et al., 2015)	Perceived & measured	MVPA	Active play, travel & exercise
18	(Roberts et al., 2016)	Perceived	Active Play	Active play
19	(Stark et al., 2018)	Perceived	AIM	Active travel
20	(Suminski et al., 2018)	Measured	BMI	BMI
21	(Shokoohi et al., 2012)	Perceived	Walking to school	School travel
22	(Santos et al., 2013)	Perceived	AIM	Active travel
23	(Timperio et al., 2004)	Perceived	FWAC	Active travel
24	(Tung et al., 2016)	Perceived	MVPA	Active play, travel & exercise
25	(van den Berg et al., 2020)	Perceived	Walking to School	School travel
26	(Villanueva et al., 2012)	Perceived	Activity Space	Active play, travel & exercise
27	(Vonderwalde, Cox, Williams, Borghese, & Ian Janssena, 2019)	Measured	Average minutes per day of active transportation	Active travel
28	(Waygood & Susilo, 2015)	Perceived	Walking to school	School travel
29	(Zhu & Lee, 2008)	Measured	Walkability Index	Active travel

Notes: we categorised each study as per the active behaviour examined in each study: If a study addressed total MVPA it is grouped under "Active travel, play and exercise". If walking to school, the study grouped under "Active school travel". If the addressed active behaviour is the frequency of walking or cycling or independent mobility travel (IM), the study categorised it as "active travel", and when addressed active playing behaviour, it is "active play". Assessed impact on BMI was left as "BMI". Then we grouped studies to synthesise evidence of influences on modifying types of COAMB.

Table 4. Findings of correlates across the socio-ecological levels and modified child types of outdoor active mobility behaviour.

Effective domains		+ - 0	Correlation with children active mobility
Individual (child)			
P_Survey Sex: Female	Carver et al. (2010)	+	avoidance behaviour[1]
	(Oliver et al., 2015)	–	%MVPA (F) weekdays
	(Timperio et al., 2004)	–	walking/cycling, after dark (F) of (10-12 YOLD)
		0	5- 6-year-old age group
	(Faulkner et al., 2015)	–	time outdoor (weekends and weekdays)
	(Villanueva et al., 2012)	–	activity Space (F)
	(Carver et al., 2014) greater land use mix (residence/retail outlets, sports facility) at T2	+	walking and cycling to school (F)
Sex: Male	Carver et al. (2010)	+	made more active trips (M)
	(Roberts et al., 2016)	+	active behaviour
	(Fagerholm & Broberg, 2011)	+	Distance travelled, and speed children travel
	(Villanueva et al., 2012)		walking/cycling, after dark (M) of (10-12 YOLD)
		+	Steps count
	(Mehdizadeh et al., 2017)	0	Perceived walking to school
	(Helbich et al., 2016)	0	Active school travel
	(Carver et al., 2014) being allowed by parents to play outside	+	odd of walking/cycling independently to school
	(Tung et al., 2016)	+	PA (reported)
C_Survey Gender	(Alton et al., 2007)	0	walking trips
	(Page et al., 2010) playing and taking part in structured sport	+	local-IM: (M) more than F
	(Page et al., 2010)	0	Active commuting to school
Age Adult Survey	(J. Loebach & J. Gilliland, 2016)	+	time spend outdoor, distance & IM (older).
	(Stark et al., 2018)	+	IM with older children
	(Timperio et al., 2004) of age 5-6 compared to 10-12	+	walking or cycling with age in particular for (M).
	(Oliver et al., 2016)	+	%MVPA weekdays
	(Faulkner et al., 2015)	0	MVPA
	(Helbich et al., 2016)	+	ATS
	(van den Berg et al., 2020)	+	active school travel
Parents/Family background characteristics			
SES	(Timperio et al., 2004) (boys) 10 -12	+	Frequency of walking or cycling to public transport (active trips) in high SES more than in medium SES.
	(Timperio et al., 2004) 10- 12 F	+	walked and cycled more to school in high SES.
	(Timperio et al., 2004) age 5-6 years old) M	+	in high SES
	(Timperio et al., 2004) age 5-6 years old) F	0	association to SES
	(Tung et al., 2016) high SES	+	PA
	(Timperio et al., 2004)	0	concerns of stranger danger (F)
	(Mehdizadeh et al., 2017) mothers with driving licence		Reduced active travel to school
	(Oliver et al., 2016)	–	(Inconclusive)
	(Noonan et al., 2016) in high deprivation	+	BMI level
		+	self-reported PA
C_Survey And SES	(Timperio et al., 2004) concerns of traffic in (M)	x	found in children in low SES more than children in high SES
Poverty	(Zhu & Lee, 2008)	–	safety & walking
Household income P_survey	Mehdizadeh et al., 2017	+	perceived walking to school
	(van den Berg et al., 2020)	x	increased income & increased perception of safety
Mother driving licence	Mehdizadeh, Mamdoohi, & Nordfjaern, 2017)	–	active travel
Parental age	Mehdizadeh, Mamdoohi, & Nordfjaern, 2017)	+	perceived walking to school
Employments Status (mother)	(Stark et al., 2018)	+	IM licence
Home environment (access to Media)	(Noonan et al., 2016)	x	in High Deprivation
Having older siblings	(Lin et al., 2017)	+	IM
	(Carver et al., 2014)	+	IM
P_Survey	(Alton et al., 2007)	–	level of walking

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Cars ownership/ access	(Davis & Jones, 1996)	–	IM
	(Lin et al., 2017)	–	IM
	(Mehdizadeh et al., 2017)	–	active travel
	(Oliver et al., 2015)	–	# of active trips (weekdays)
	(Timperio et al., 2004) Parent of 5-6 years old (F) who owned more than one car associated with	–	less likely of walking or cycling to destinations
	(Waygood & Susilo, 2015)	–	Walking to school
	(Carver et al., 2014)	–	odd of boys walking and cycling to school at T2
C_Survey rooms in the house	(Alton et al., 2007)	–	(significant only for 2.1%)
Parental attitude towards walking	Mehdizadeh, Mamdoohi, & Nordfjaern, 2017)	+	short perceived walking time to school
Parental Physical Activity	(Santos et al., 2013) Parental physical activity	+	independent mobility
Ethnicity	(Alton et al., 2007)	–	level of walking in minority
	*(Oliver et al., 2016)	+	%MVA Pacific, European and Maori accumulates (weekdays only). %MVA Indian/Asian/others (weekend days) than their counterparts/Pacific on weekdays
	(Suminski et al., 2018) crime risk index	–	BMI (white children)
	(Roberts et al., 2016)	+	in minority
	(Zhu & Lee, 2008) (Hispanic)	+	in crime & traffics
Access to public transport	Mehdizadeh, Mamdoohi, & Nordfjaern, 2017)	–	active travel
Attending Public School	(Mehdizadeh, Mamdoohi, & Nordfjaern, 2017)	–	perceived walking to school
Neighbourhood, Perceived (Personal and Road Safety)			
P_Survey low personal safety perception	(Fagerholm & Broberg, 2011)	–	Independent mobility after dark and by distance (only F)
	(Stark et al., 2018)	–	IM
	(Timperio et al., 2004)	–	frequency of walking
	(Mehdizadeh et al., 2017)	–	activity space after 10 min walking
	(J. Loebach & J. Gilliland, 2016)	–	time outdoor and travelled distance
	(Faulkner et al., 2015)	–	outdoor playtime (outdoor plat and MVPA)
	(Roberts et al., 2016)	+	active children
	(Villanueva et al., 2012)	–	Activity space F
	(Oliver et al., 2016)	–	active trips (weekdays)
	(Noonan et al., 2016)	–	outdoor play in MD
	(Carver et al., 2010)	–	active transport (M/F) in 10 -11 years old
	Constrained behaviour (avoidance and Defensive behaviours)	–	MVPA (M) weekends
	(Lin et al., 2017)	0	IM (though parents had concern of safety)
	(Oluyomi et al., 2014)	–	walking to school general neighbourhoods' safety, stray or dangerous animals and availability of adults
	(Carver et al., 2014)	–	walking and cycling to school at T1
	(Shokoohi et al., 2012)	–	walking to school
	(van den Berg et al., 2020)	–	children travel actively
	(Waygood & Susilo, 2015)	–	School active travel
	(Tung et al., 2016)	–	PA
C_Survey Low perceived safety	(Villanueva et al., 2012)	-	activity space
	(Janet E. Loebach & Jason A. Gilliland, 2016)	-	time spend close to home
	(Shokoohi et al., 2012)	–	walking to school
	(Page et al., 2010) positive perception	-	playing out for girls
	(Page et al., 2010) positive perception of the environment	-	greater IM
	(Page et al., 2010) exercising or doing sport every day associated	-	local-IM (boys)
P_Survey Perceived Stranger danger	(Faulkner et al., 2015)	+	on weekdays
	(Lin et al., 2017)	0	though parents have safety concerns
	(Stephanie H. Kneeshaw-Price et al., 2015)	–	MVPA
	(Santos et al., 2013)	0	IM
C-Survey Perceived Stranger danger	(Alton et al., 2007)	–	less walking
	(Davis & Jones, 1996)	–	in particular (F)

	(Timperio et al., 2004)	–	low SES (F) than high SES
P_Survey Increased social Cohesion/Social Norms	(Lin et al., 2017)	+	IM
	(van den Berg et al., 2020) increase perception of social cohesion	+	parents perceived safety
C-Survey Neighbourhood high aesthetics / Nuisance Social Norms	(Noonan et al., 2016) Neighbourhood aesthetics	0	self-reported PA
	(Noonan et al., 2016) Neighbourhood aesthetics	–	BMI
	(Page et al., 2010) higher score of social norms	+	frequency of outdoor play
P_Survey Perception of Road Safety Low perceived road safety	(Noonan et al., 2016)	–	independent mobility
	(Stark et al., 2018)	–	independent mobility (general traffic safety)
	(Timperio et al., 2004) Parents believe of (heavy traffic) in (5-6 years old) boys	+	Frequency of walking (sidewalks or bike lanes, safe crossing
	(Timperio et al., 2004) Parents believe (for M) of 10 – 12 years old of no lights or crossing.	–	walking and cycling
	(Timperio et al., 2004) The parental belief of F needs to cross many roads to reach play area 10 - 12	–	likelihood of walking or cycling
	(Villanueva et al., 2012) safe neighbourhood crossing	–	activity space in particular girls,
	(Faulkner et al., 2015) Fast drivers (weekdays),	–	MVPA (active play)
	(Roberts et al., 2016) if parents perceived a lack of sidewalk and signals on a busy street.	–	active children
	(Santos et al., 2013) perceived sidewalk and street safety	–	independent mobility
	(Oluyomi et al., 2014) road safety in the home environment of higher sidewalk availability, Speed, amount of traffic, intersection safety, road crossing problem and availability of crossing guard.	–	Likelihood of walking to school
	(Carver et al., 2014) concern about traffic.	-	likely for boys and girls to cycle independently
	(Tung et al., 2016) traffic hazards (perceived_)	–	PA
	(Waygood & Susilo, 2015) slow or safe traffic	+	Walking to school
	(Davis & Jones, 1996) traffic	–	Independent mobility
	(Nguyen et al., 2018) parents' perception of high or moderate traffic speed higher	+	outdoor active play
Perceived increased street connectivity	(van den Berg et al., 2020) increased connectivity	+	parental perception of safety
Destination accessibility	(Oliver et al., 2016)	+ –	the proportion of trips in active mode (weekdays) %MVPA (weekend)
Improved streetscape (measured)	(Villanueva et al., 2012)	+	Activity space
C_Survey Road safety	(Alton et al., 2007)	–	road safety and heavy traffic and level of walking
	(Villanueva et al., 2012)	–	activity space
	(Davis & Jones, 1996)	–	IM in particular F (traffic danger)
	(Timperio et al., 2004)	–	low SES (M) than in high SES
	(Page et al., 2010)	+	local and Area-IM with traffic safety (for girls) positive perception of road safety (+ IM) for girls
Neighbourhood's Safety –Perception of other elements related to safety in the Physical environment			
P_Survey Perceived **lack of leisure facility**, Parks and sport ground	(Timperio et al., 2004)	–	likely to walking &cycling three times a week (10-12) F
	(Alton et al., 2007)	–	with a crossing of no light or crossings
	(Faulkner et al., 2015)	0	duration of playout
Land use diversity: Residential/ Commercial/ Industrial/	(Fagerholm & Broberg, 2011)	+	mobility mainly in urban structure (residential, commercial and traffic areas)
	(Villanueva et al., 2012)	–	AS in utilitarian destination (within 800 m)
	(Janet E. Loebach & Jason A. Gilliland, 2016)	+	Time spend close to home (residential) and (+) distance travelled and time spends in commercial (beyond 800m).
		–	mobility in agricultural and industrial (on 400-800m buffer)
	(Faulkner et al., 2015)	+	time playing outside (Residential &Commercial)

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	*(Oliver et al., 2016)	0	%MVPA
	(Helbich et al., 2016) urban environment and well-connected street and lights	+	Active school travel
	(Carver et al., 2014) (land use mix of residential, retail shops, sports centre)	+	walking/cycling independently to school (F)
Land use mix (access)	(Tung et al., 2016)	+	PA
P_Survey proximity to destinations	(Stark et al., 2018)	–	AIM
	*(Fagerholm & Broberg, 2011)	–	trajectory (with increased distance),
	*(Oliver et al., 2016) distance to school	–	the proportion of trips made in active mode, + distance to school
	(Lin et al., 2017)	–	AIM
	(Mehdizadeh et al., 2017) perception of more than 10 min walking	–	perceived walking to school distance and active travel
	(Roberts et al., 2016)	+	to play area, active behaviour
	(Janet E. Loebach & Jason A. Gilliland, 2016)	–	majority of time spent closer to home (400 m buffer around the home)
		–	school travel and neighbourhood travel
	(Helbich et al., 2016)	–	AST
	(Waygood & Susilo, 2015)	–	Walking to school
	(van den Berg et al., 2020)	–	school active travel
C_Survey proximity	(Janet E. Loebach & Jason A. Gilliland, 2016)	+	distance travelled and activity space near home
	(Page et al., 2010)	–	longer route and active commuting to school (for both boys and girls Active commuting
P_Survey perception of limited access to public transportation	(Timperio et al., 2004)	–	likely of walking or cycling F of 5-6-year-old.
		–	likely of walking or cycling F of 10-12-year-old.
P_Survey Availability of Neighbourhood Amenities	(J. Loebach & J. Gilliland, 2016)	+	neighbourhood activity space
P_Survey High walkable neighbourhood	(Villanueva et al., 2012)	+	activity space
P_Survey High Neighbourhood aesthetics	(Roberts et al., 2016)	+	active children
	(Noonan et al., 2016)	–	BMI z-score and waist circumference
	Mehdizadeh et al., 2017	+	Perceived walking to school
P_Survey Owning a dog	(Timperio et al., 2004)	+	frequency of walking
C-Survey Accessibility to destination	(Timperio et al., 2004) child believe of no parks access to parks (F/M)	–	walking and cycling in 10-12 years old (M)
	(Page et al., 2010) easy access to range pf destination	+	taking part in structured exercise/sport every day
	(Page et al., 2010) greater perceived accessibility	+	Active commuting to school
Neighbourhood– Measured safety			
Measured safety from crime (high level of actual crime)	(Stephanie H. Kneeshaw-Price et al., 2015)	–	MVPA
	(Vonderwalde, Cox, Williams, Borghese, & Janssen, 2019)	+	active transportation in High crime areas
	(Zhu & Lee, 2008)	–	walkability
	(Suminski et al., 2018)	+	BMI z-score
Road safety	(Nguyen et al., 2018) children from the highest traffic volume	+	outdoor active play
	(Carver et al., 2014) the proportion of main roads	–	odd of walking and cycling (F) walking and cycling to school independently
	*(Oliver et al., 2015) ratio of high-speed roads around schools (weekdays)	–	%MVPA
	street connectivity	+	the proportion of trips made in active mode (on weekend and weekdays)
	(Helbich et al., 2016) exposures to major roads/highway	–	AST
	Availability of cyclist path	+	AST
	(Carver et al., 2008)* measured road environment	0	Likelihood of making at least 7 walking and cycling active trips per week

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Perceived and measured road safety	(Nguyen et al., 2018) perceived road safety	x	measured road safety
Perceived and measured personal safety	(Stephanie H. Kneeshaw-Price et al., 2015) Measured crime	0	with parents' perception
Parents to children perceived safety	(Timperio et al., 2004)		parent of 10 – 12 perception was more negative than their own children

Note: Association identified between safety and active mobility behaviour: (+) positive association, (-) negative association, (0) Non-Associated/Not Significant difference, x = association not to active behaviour. Abbreviation: P_Survey = studies examined the perception of safety among parents; C_Survey = studies examined the perception of safety among children. M = male (boys), F = female (girls), IM = independent mobility, MBI – body mass index, SES = socioeconomic status, HD = high depreciation, MD = Medium Deprived, CRI = Crime Risk Index, BMI Body Mass Index, SES = Socioeconomic level, * = behaviour show significant correlate on Weekdays, ** = Behaviour show on weekend, MVPA = Moderate to vigorous physical activity. [1] "Avoidance behaviour is where no further engagement in habits and activities due to perceived risk, e.g. parents driving children to school instead of walking or cycling., [2] Defensive behaviour is where habits are altered in an attempt to reduce perceived risk, e.g. parental accompaniment to children while walking to school", Ferraro, 1995.