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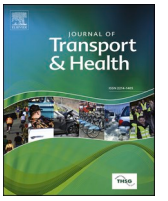

Children's happiness and the school route: Linking perceptions of the built environment to wellbeing

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ABSTRACT

Background: The urban built environment can impact children's wellbeing through exposure to health hazards or conditions that hinder or promote street activities (e.g. active travel, leisure). Children's travel to school is an important way children interact with their environment. However, little is known about the relationship between children's perceptions of the built environment on the route to school, travel mode and the impact this has on their subjective wellbeing.
Methods: Using a bespoke questionnaire, we gathered children's perceptions of the built environment on their school journey (including home street, trip and road outside the school characteristics), frequent active travel to school (3+ days/week) and three wellbeing outcomes: liking the journey, feeling happy and relaxed during the journey, and feeling happy. Multivariate logistic regression was used to explore the association of wellbeing with perceptions of the built environment.
Results: 740 children, aged 8–11 years, in seven schools in Bradford, UK. Three built environment perceptions were consistently associated with all measures of wellbeing, feeling: safe from traffic on their trip, that sidewalks were in good condition on their trip, and that there were things to see and do near school. Frequent active travel to school and good air quality were associated with children liking their trip to school but not with feeling happy and relaxed on the journey or generally happy.
Conclusion: Our results suggest that children's perceptions of certain built environment characteristics are important predictors of wellbeing on the school journey. Policy and decision-makers are encouraged to improve the quality of these built environment features (e.g. traffic safety, sidewalks, crossings, and having pleasant things to see and do) to foster children's wellbeing.

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1. Introduction

The World Health Organisation (WHO) estimates that 14 % of children and adolescents globally aged 10–19 years experience mental health conditions (World Health Organization, 2024). The human potential lost to national economies arising from mental health conditions in those aged 0–19 years has been estimated at US$387.2 billion a year (UNICEF, 2021). The causes of poor mental health are multi-factorial and with more children growing up in cities worldwide, urban built environments have a role to play in influencing child health (Bole et al., 2024; Alderton et al., 2019; Ferguson et al., 2013; McGowan et al., 2021; Hunter et al., 2019; Audrey and Batista-Ferrer, 2015; Ortegon-Sanchez et al., 2021; McEachan et al., 2018).

The built environment can negatively affect children's health through characteristics like the presence of main roads, the number of roads to cross and high traffic levels which hinder physical activity and active travel (Davison and Lawson, 2006). Proximity to busy roads increases exposure to health hazards such as noise and air pollution, which can cause asthma (Khreis et al., 2019) and affect cognitive development (Bettiol et al., 2021; Sunyer et al., 2015; Binter et al., 2022). In contrast, other built environment characteristics can positively influence health by enabling social and cognitive development and fostering wellbeing in young children (Bell et al., 2020; Binter et al., 2022). These health promoting qualities of the built environment include low traffic levels, the presence of traffic safety features, cul-de-sac roads, good quality walking infrastructure, aesthetically pleasant qualities, and accessibility to green and open spaces. These attributes also facilitate increases in physical activity, including play and active travel, which can positively influence wellbeing (Nordbø et al., 2020; Ortegon-Sanchez et al., 2021; Gemmell et al., 2023). However, these positive and negative exposures are not distributed equally, and in more deprived communities there tends to be reduced access to high-quality greenspace (Dadvand et al., 2014; McEachan et al., 2016), increased exposure to traffic and pollution (Mueller et al., 2018), and a greater risk of traffic-related injuries (O'Toole and Christie, 2018). Reduced access to green space, particularly high-quality green space, and over-development near schools are associated with lower levels of wellbeing (McEachan et al., 2016) and lung function (Agier et al., 2019) in children. Neighbourhood disorder (characterised by poorly maintained buildings, graffiti, litter, dirt, and noise), often found in areas of deprivation, that disrupt the safety, calmness and upkeep of an area has been found to undermine mental health and reduce physical activity, as early as the preschool period (Francesconi et al., 2022).

Children's journeys to school are an important part of how children interact with and experience the built environment and can have important implications for their mental health (Binter et al., 2022; McEachan et al., 2018). Active travel to and from school can contribute substantially to increasing physical activity levels (Galán et al., 2024; Ikeda et al., 2019) and potentially also wellbeing (Rodriguez-Ayllon et al., 2019).

Targeting children's journeys to school provides an opportunity to promote both physical and mental health through encouraging children to travel actively and engage with their built environment. The effects of active travel on physical health are well-documented, but a better understanding of the relationship between active travel, perceptions of the built environment and wellbeing on the journey to school is needed. Some studies focus on travel mode and children's life and school travel satisfaction (Friman et al., 2019) or the link between travel mode to school and psychological wellbeing (Stark et al., 2018). However, a recent systematic review of studies of active travel to school and wellbeing of children found that, in general, very few studies consider wellbeing outcomes such as life satisfaction, happiness or perceived health (Fernández et al., 2023). Similarly, a metanarrative review of studies of the built environment and child health (Ortegon-Sanchez et al., 2021) identified that subjective wellbeing was seldom considered.

Given the important role that the built environment can play in addressing the child mental health crisis and to address the identified research gaps, this study aimed to investigate how children's perceptions of the built environment on the route to school, considering travel mode, influence their subjective wellbeing. To this aim we have characterised children's subjective wellbeing in terms of satisfaction with the trip to school, feelings of happiness whilst travelling to school, and generally in their life.

2. Materials and methods

2.1. Study context

Bradford District in West Yorkshire, England is the 5th largest local authority in the UK with a population of over 560,200 residents. Bradford is one of the youngest districts in the UK with a quarter of residents less than 20 years old (City of Bradford Metropolitan District Council, 2024). Bradford has one of the most ethnically diverse populations in England and has some of the highest levels of poverty and ill-health (in 2022/23 26 % of children were obese at age 10–11) (Office for Health Improvement and Disparities, 2024). This study reports baseline cross-sectional data collected as part of the evaluation of School Streets interventions (Dowling et al., 2025) developed in the context of ActEarly, a city Collaboratory for the early promotion of good health and wellbeing (Wright et al., 2019). All data was collected before implementation of a School Streets intervention (Sustrans, 2022).

2.2. Study participants

Participants were primary school children in Years 4–6 (age 8–11 years) recruited through the schools in Bradford. Pupils from seven schools completed the survey in May–July 2023. Parents and guardians received an information sheet outlining the project and data collected, with an opt-out consent process. The project was explained to the children on the day, and children's assent was confirmed before data collection. Ethical approval was granted by the University College London Research Ethics Committee (4129/008). The surveys were completed online during class time, and two researchers attended each school to facilitate the survey delivery; one school declined this offer.

2.3. Survey measures

We developed the **C**hild – **H**ealth and **P**lace **I**ntervention **E**valuation (C-HaPIE) tool, a survey based on Healthy Streets indicators (Transport for London, 2024) and a recent metanarrative review of studies of the built environment and child health (Ortegon-Sanchez et al., 2021). The Healthy Streets indicators define ten evidence-based indicators that describe people's experience of being on the streets. The indicators assess, among other characteristics, the quality of the street environment for crossing, noise levels, conduciveness to walking and cycling, things to see and do, air pollution, safety from traffic and crime and if the street makes people feel relaxed.

The C-HaPIE survey asked children to assess various healthy street indicators to capture their perceptions of the built environment spanning the entire route to school including home street, journey and the road outside the school. The tool also asked children questions about travel mode to school, and their wellbeing and health adapted from (Pickett et al., 2022). For the journey to school, the C-HaPIE survey focused on experienced wellbeing measures associated with the journey on the day because asking about instantaneous self-reports of specific emotions is an approach intended to overcome global satisfaction evaluations drawbacks, including neglect of the experience duration and imperfect recalling (Kahneman et al., 2004). The C-HaPIE survey measured subjective wellbeing in terms of affective evaluations of the trip to school concerning positive emotions (e.g., liking the trip or feeling happy) and positive deactivation (e.g., feeling relaxed). As recommended in the literature when seeking to investigate the travel experiences of young children, we used very simple wording plus mood icons (emoticons) (Stark et al., 2018; Friman et al., 2019). The complete C-HaPIE survey is presented in Appendix A.

2.3.1. Outcome variables - subjective wellbeing

Subjective wellbeing was assessed with three questions, each using a three-point Likert scale. We measured experienced wellbeing during the trip to school by asking: (i) 'Overall, how much do you like your trip to school?' (very much, a little, not at all) and (ii) 'Did you feel happy and relaxed on your trip to school today?' (very happy and relaxed, happy and relaxed, not very happy and relaxed at all). We measured general wellbeing by asking (iii) 'How often do you feel happy?' (all of the time, some of the time, not at all, prefer not to say). These variables were dichotomised as outlined in Section 2.3.5.

2.3.2. Explanatory variables – perceptions of the built environment

2.3.2.1. The trip to school variables. Using a Likert scale, participants were asked to rate (i) how safe from traffic (very safe, safe, not very safe at all) and (ii) crime (very safe, safe, not very safe at all) did you feel on your trip to school today and (iii) are the sidewalks on your trip to school in good condition (very good, good, not very good at all).

2.3.2.2. The road outside the school and the home street variables. Using a Likert scale, children were asked to rate road crossing safety, traffic noise, and plants and greenery for both the road outside their school and their home street by answering: 'How safe do you feel crossing the street' (very safe, safe, not very safe at all); 'How noisy is the traffic' (not very noisy at all, noisy, very noisy); and 'Are there trees and plants' (many, some, not many). Children also answered the question 'How clean is the air on the road outside your school' (very clean, clean, not very clean at all). Finally, participants provided their perception of activities in the school and home area by answering two questions: 'Are there enough places to play near your school' (enough, some, not enough) and 'Are there nice things to see and do on the road where you live/around your school' (many, some, not many).

2.3.3. Control variables

The first part of the questionnaire asked children about their gender (boy, girl, prefer not to say), ethnicity, school name and school year (as a proxy for age). Children were asked to describe their ethnicity (white, black African, black Caribbean, Indian Asian, Pakistani, Bangladeshi, Chinese, mixed, other); due to low numbers in some groups this variable was simplified to white (white), Asian (Indian Asian, Pakistani, Bangladeshi, Chinese) and all other ethnicities (black African, black Caribbean, mixed, other). Children were asked to report their active travel frequency ('Do you walk or cycle to school 3 or more days a week?' (Yes/No), which we defined as frequent active travel.

2.3.4. Other variables

Children were also asked to report their travel mode to school ('How did you come to school today?') and travel companionship ('Who came with you on your trip to school this morning?' (Multiple choice: alone, parent/other relative, other adult, brother/sister, friends). Due to low numbers in some groups, companionship was re-categorised: parent/other relative and other adult were combined as 'Adult', brother/sister and friends were combined as 'Sibling/friends' and alone was unchanged. Subsequently, four mutually exclusive categories were created: adult, alone, sibling/friends, and adult/sibling/friends.

2.3.5. Variable dichotomisation

The full list of the variables and all response options are presented in the Results section (Table 1, Table 2). Variables for which low numbers in the lowest or negative Likert category (defined as $n \leq 21$) were identified, were dichotomised by merging the lowest and the medium Likert categories; prefer not to say, an option for both gender and 'How often do you feel happy', was excluded. Following this rationale, the three subjective wellbeing outcome variables and four explanatory variables (all trip variables and crossing the road

outside the school) were dichotomised. Explanatory variables that were not dichotomised were scored using numeric values representing the number of categories (i.e., one, two, three), with the highest value representing the most positive perceptions.

2.4. Analysis

The analysis consisted of three parts. First, a χ^2 test was used to compare travel characteristics and a Kruskal-Wallis test was used to compare perceptions of girls and boys, and across year groups and schools. Second, logistic regression was used to examine the independent associations between each variable relating to the child's perception of the built environment and each of the three subjective wellbeing outcome variables. Independent associations were adjusted for gender, school year, ethnicity, and school. Third, multivariate logistic regression models were defined to account for the effects of children's perceptions of other components of the built environment experienced throughout their journey. For each of the three outcome variables three models were built following an incremental approach: Model 1 – trip to school variables, Model 2 – Model 1 plus road outside the school variables and, Model 3 – Model 2 plus home street variables. Models were compared using a log likelihood ratio test. All models were adjusted for gender, school year, ethnicity, school, and frequent active travel. Analysis was completed using Stata (v16.1). A p-value <0.05 was considered statistically significant.

3. Results

3.1. Characteristics

In total, 997 children aged 8–11 years took part. There were 740 children with complete data who were included in this analysis. Comparison of excluded and included participants found no differences across gender, ethnicity or year group. However, there was a difference across schools with noncompletion rates ranging from 6 to 29 % across all schools ($p < 0.001$).

There was an even split of girls and boys (n = 740, 52 % and 48 %, respectively), and across year groups (Year 4–33 %, Year 5–32 %, Year 6–35 %) (Table 1). The majority of children walked or cycled to school (59 %); there was no difference in travel mode across gender or school year. Most children travelled to school with an adult (81.9 %); however, there were associations between travel companion and gender or school year with more boys (13 %) and older children (11 years old, 14 %) tending to walk alone compared with girls (6 %) and younger children (9 years old, 2 %), respectively. Reported school journey time was similar for boys and girls. The majority of walking/bike (73 %) and car (65 %) journeys were less than 10 min. Only 3 % of children travelled by public transport, the majority (51 %) of these journeys were less than 15 min.

3.2. Perceptions of the built environment

Table 2 describes children's perceptions of the built environment on their journeys to school. Most children felt very safe (47 %) or safe (49 %) from traffic on their journey to school; differences in perceptions were observed by school year ($p = 0.036$). Sidewalk condition was rated as not very good at all by 10 % of children, whereas the remainder felt it was good (57 %) or very good (33 %); there were no differences by gender or year group. For the road outside their schools, children reported poor air quality (21 %), not many trees and plants (19 %), not enough play places (17 %) and not many things to see and do (19 %). Near home, children observed that there were not many trees and plants (34 %) and not many things to see and do (35 %) and 10 % reported feeling not very safe at crossings on their home street, with differences in perceptions by gender ($p = 0.003$) and school year ($p = 0.033$).

There was no association between frequent active travel (walking or cycling to school three or more days a week) and gender, year group, or ethnicity. However, there was an association between frequent active travel and the school that children attended ($p < 0.001$). Perceptions of the built environment were similar between those who frequently travelled actively to school and those who did not; however, there was an association between perception of trees and plants at home and active travel ($p = 0.014$) with those who travelled actively reporting not many trees and plants (37 %) compared to those who do not travel actively (28 %).

3.3. Independent associations of travel mode and perceptions of built environment with wellbeing

Independent associations between children's travel mode and their perceptions of the built environment on their journey to school are shown in Appendix B. Children who walked or cycled to school on average three or more days per week (B 0.404, 95 % CI 0.093, 0.715; $p = 0.011$) liked their trip more than those who did not. Active travel was not associated with feeling happy and relaxed on the trip or feeling happy generally.

All variables relating to the trip to school (feeling safe from traffic, good sidewalk conditions, feeling safe from crime) were associated with all three measures of wellbeing. Amongst variables relating to the home environment, only feeling safe crossing the road, and feeling that there were many things to see and do were associated with all three measures of wellbeing. Similarly, amongst variables relating to the road outside the school, feeling safe crossing the road, a perception of having many things to see and do, enough play places and clean air quality were positively associated with all three measures of wellbeing. Children's perceptions of trees and plants or noise on their home street or the road outside the school were not associated with all three measures of wellbeing (Appendix B).

Table 1
Characteristics of participants, by gender and school year.

	All		Gender					School Year						
			Female (girl)		Male (boy)			Year 4		Year 5		Year 6		
	n	(%)	n	(%)	n	(%)	p	n	(%)	n	(%)	n	(%)	p
Gender														
Female (girl)	382	(51.62)	–	–	–	–	N/A	122	(49.80)	119	(50.42)	141	(54.44)	0.526
Male (boy)	358	(48.38)	–	–	–	–		123	(50.20)	117	(49.58)	118	(45.56)	
Ethnicity														
Asian	340	(45.95)	177	(46.34)	163	(45.53)	0.843	117	(47.76)	105	(44.49)	118	(45.56)	0.572
White	175	(23.65)	87	(22.77)	88	(24.58)		62	(25.31)	51	(21.61)	62	(23.94)	
Other	225	(30.41)	118	(30.89)	107	(29.89)		66	(26.94)	80	(33.9)	79	(30.5)	
School Year														
Year 4	245	(33.11)	122	(31.94)	123	(34.36)	0.526	–	–	–	–	–	–	N/A
Year 5	236	(31.89)	119	(31.15)	117	(32.68)		–	–	–	–	–	–	
Year 6	259	(35)	141	(36.91)	118	(32.96)		–	–	–	–	–	–	
Travel Mode														
Walk/bike	432	(59.26)	219	(58.09)	213	(60.51)	0.692	136	(56.43)	137	(58.8)	159	(62.35)	0.595
Car	272	(37.31)	146	(38.73)	126	(35.8)		98	(40.66)	86	(36.91)	88	(34.51)	
Public Transport	25	(3.43)	12	(3.18)	13	(3.69)		7	(2.9)	10	(4.29)	8	(3.14)	
Frequent active travel														
No	304	(41.08)	158	(41.36)	146	(40.78)	0.873	109	(44.49)	99	(41.95)	96	(37.07)	0.226
Yes	436	(58.92)	224	(58.64)	212	(59.22)		136	(55.51)	137	(58.05)	163	(62.93)	
Travel Companion														
Alone	71	(9.59)	24	(6.28)	47	(13.13)	**0.005**	6	(2.45)	28	(11.86)	37	(14.29)	**0.000**
Adult	476	(64.32)	251	(65.71)	225	(62.85)		174	(71.02)	143	(60.59)	159	(61.39)	
Adult & friend/sibling	130	(17.57)	77	(20.16)	53	(14.8)		43	(17.55)	47	(19.92)	40	(15.44)	
Friend	63	(8.51)	30	(7.85)	33	(9.22)		22	(8.98)	18	(7.63)	23	(8.88)	
Trip Duration														
Up to 5 min	298	(40.82)	135	(36.19)	163	(45.66)	0.213	101	(42.26)	96	(41.2)	101	(39.15)	**0.023**
5–10 min	211	(28.9)	118	(31.64)	93	(26.05)		67	(28.03)	59	(25.32)	85	(32.95)	
11–15 min	82	(11.23)	45	(12.06)	37	(10.36)		31	(12.97)	19	(8.15)	32	(12.4)	
16–20 min	25	(3.42)	12	(3.22)	13	(3.64)		8	(3.35)	7	(3)	10	(3.88)	
21–30 min	17	(2.33)	10	(2.68)	7	(1.96)		4	(1.67)	8	(3.43)	5	(1.94)	
More than 30 min	12	(1.64)	5	(1.34)	7	(1.96)		0	(0)	9	(3.86)	3	(1.16)	
Don't know/not sure	85	(11.64)	48	(12.87)	37	(10.36)		28	(11.72)	35	(15.02)	22	(8.53)	

Frequent active travel was defined as active travel to school three or more days per week.

Table 2
Perception of the built environment and subjective wellbeing, by gender and school year.

	All		Gender					School Year						
	All		Female (girl)		Male (boy)			Year 4		Year 5		Year 6		
	n	(%)	n	(%)	n	(%)	p	n	(%)	n	(%)	n	(%)	p
Trip Variables														
Safe from Traffic														
Very safe	344	(46.49)	163	(42.67)	181	(50.56)	0.108	132	(53.88)	107	(45.34)	105	(40.54)	**0.036**
Safe	361	(48.78)	206	(53.93)	155	(43.3)		98	(40)	120	(50.85)	143	(55.21)	
Not very safe at all	35	(4.73)	13	(3.4)	22	(6.15)		15	(6.12)	9	(3.81)	11	(4.25)	
Sidewalk Quality														
Very good	247	(33.38)	125	(32.72)	122	(34.08)	0.976	94	(38.37)	81	(34.32)	72	(27.8)	0.143
Good	420	(56.76)	223	(58.38)	197	(55.03)		124	(50.61)	134	(56.78)	162	(62.55)	
Not very good at all	73	(9.86)	34	(8.9)	39	(10.89)		27	(11.02)	21	(8.9)	25	(9.65)	
Safe from Crime														
Very safe	413	(55.81)	201	(52.62)	212	(59.22	0.129	135	(55.1)	140	(59.32)	138	(53.28)	0.339
Safe	298	(40.27)	169	(44.24)	129	(36.03		94	(38.37)	90	(38.14)	114	(44.02)	
Not very safe at all	29	(3.92)	12	(3.14)	17	(4.75)		16	(6.53)	6	(2.54)	7	(2.7)	
School Variables														
Feel safe crossing road														
Very safe	315	(42.57)	152	(39.79)	163	(45.53)	0.071	118	(48.16)	98	(41.53)	99	(38.22)	0.123
Safe	358	(48.38)	190	(49.74)	168	(46.93)		106	(43.27)	115	(48.73)	137	(52.9)	
Not very safe at all	67	(9.05)	40	(10.47)	27	(7.54)		21	(8.57)	23	(9.75)	23	(8.88)	
Play Places														
Enough	287	(37.78)	132	(34.55)	155	(43.30)	**0.044**	93	(37.96)	85	(36.02)	109	(42.08)	0.137
Some	327	(44.19)	183	(47.91)	144	(40.22)		95	(38.78)	117	(49.58)	115	(44.40)	
Not enough	126	(17.03)	67	(17.54)	59	(16.48)		57	(23.27)	34	(14.41)	35	(13.51)	
Air Quality														
Very clean	119	(16.08)	56	(14.66)	63	(17.6)	0.694	41	(16.73)	40	(16.95)	38	(14.67)	0.408
Clean	468	(63.24)	249	(65.18)	219	(61.17)		145	(59.18)	155	(65.68)	168	(64.86)	
Not very clean at all	153	(20.68)	77	(20.16)	76	(21.23)		59	(24.08)	41	(17.37)	53	(20.46)	
Trees and Plants														
Many	251	(33.92)	152	(39.79)	99	(27.65)	**<0.001**	96	(39.18)	82	(34.75)	73	(28.19)	0.227
Some	346	(46.76)	176	(46.07)	170	(47.49)		101	(41.22)	107	(45.34)	138	(53.28)	
Not many	143	(19.32)	54	(14.14)	89	(24.86)		48	(19.59)	47	(19.92)	48	(18.53)	
Things to see/do														
Many	240	(32.48)	115	(30.1)	125	(34.92)	0.352	91	(37.14)	71	(30.08)	78	(30.12)	0.479
Some	361	(48.78)	196	(51.31)	165	(46.09)		106	(43.27)	124	(52.54)	131	(50.58)	
Not many	139	(18.78)	71	(18.59)	68	(18.99)		48	(19.59)	41	(17.37)	50	(19.31)	
Noisy														
Very noisy	133	(17.97)	71	(18.59)	62	(17.32)	0.300	53	(21.63)	42	(17.8)	38	(14.67)	0.552
Noisy	298	(40.27)	159	(41.62)	139	(38.83)		92	(37.55)	94	(39.83)	112	(43.24)	
Not very noisy at all	309	(41.76)	152	(39.79)	157	(43.85)		100	(40.82)	100	(42.37)	109	(42.08)	
Home Variables														
Feel safe crossing road														
Very safe	339	(45.81)	154	(40.31)	185	(51.68)	**0.003**	127	(51.84)	113	(47.88)	99	(38.22)	**0.033**
Safe	325	(48.81)	185	(48.43)	140	(39.11)		93	(37.96)	97	(41.1)	135	(52.12)	
Not very safe	76	(10.27)	43	(11.26)	33	(9.22)		25	(10.2)	26	(11.02)	25	(9.65)	
Trees and Plants														
Many	179	(24.19)	99	(25.92)	80	(22.35)	**<0.001**	64	(26.12)	56	(23.73)	59	(22.78)	0.981
Some	313	(42.3)	184	(48.17)	129	(36.03)		93	(37.96)	103	(43.64)	117	(45.17)	

(*continued on next page*)

Table 2 (*continued*)

	All		Gender				School Year						
	All		Female (girl)		Male (boy)			Year 4		Year 5		Year 6	
	n	(%)	n	(%)	n	(%)	p	n	(%)	n	(%)	n	(%)	p
Not many	248	(33.51)	99	(25.92)	149	(41.62)		88	(35.92)	77	(32.63)	83	(32.05)	
Things to see/do														
Many	156	(21.08)	83	(21.73)	73	(20.39)	0.609	61	(24.9)	58	(24.58)	37	(14.29)	**0.024**
Some	325	(43.92)	168	(43.98)	157	(43.85)		114	(46.53)	94	(39.83)	117	(45.17)	
Not many	259	(35)	131	(34.29)	128	(35.75)		70	(28.57)	84	(35.59)	105	(40.54)	
Noisy														
Very noisy	99	(13.38)	53	(13.87)	46	(12.85)	0.781	28	(11.43)	30	(12.71)	41	(15.83)	0.839
Noisy	189	(25.54)	97	(25.39)	92	(25.70)		69	(28.16)	59	(25.0)	61	(23.55)	
Not very noisy	452	(61.08)	232	(60.73)	220	(61.45)		148	(60.41)	147	(62.29)	157	(60.62)	
Wellbeing Variables														
Like trip														
Very much	324	(43.78)	168	(43.98)	156	(43.58)	0.313	109	(44.49)	106	(44.92)	109	(42.08)	0.884
A little	363	(49.05)	198	(51.83)	165	(46.09)		111	(45.31)	114	(48.31)	138	(53.28)	
Not at all	53	(7.16)	16	(4.19)	37	(10.34)		25	(10.20)	16	(6.78)	12	(4.63)	
Happy and relaxed														
Very happy and relaxed	221	(29.86)	106	(27.75)	115	(32.12)	0.571	93	(37.96)	66	(27.97)	62	(23.94)	**0.034**
Happy and relaxed	427	(57.70)	233	(60.99)	194	(54.19)		121	(49.39)	134	(56.78)	172	(66.41)	
Not very happy & relaxed	92	(12.43)	43	(11.26)	49	(13.69)		31	(12.65)	36	(15.25)	25	(9.65)	
Happy														
All of the time	182	(24.59)	105	(27.49)	77	(21.51)	0.128	62	(25.31)	57	(24.15)	63	(24.32)	0.824
Some of the time	477	(64.46)	236	(61.78)	241	(67.32)		158	(64.49)	150	(63.56)	169	(65.25)	
Never	18	(2.43)	6	(1.57)	12	(3.35)		9	(3.67)	6	(2.54)	3	(1.16)	
Prefer not to say	63	(8.51)	35	(9.16)	28	(7.82)		16	(6.53)	23	(9.75)	24	(9.27)	

3.4. Multivariate regression models

For each of the three outcome variables three models were built following an incremental approach: Model 1 – trip to school variables, Model 2 – Model 1 plus road outside the school variables and, Model 3 – Model 2 plus home street variables. All models were adjusted for school year, school, gender, ethnicity, and frequent active travel. The full details of these models are shown in Appendix C. The models deemed the best fit using the log likelihood ratio test are presented in Table 3.

3.4.1. Outcome 1: liking the journey to school

Frequent active travel was positively associated with children liking their journey to school (B 0.410, 95 % CI 0.062, 0.758; p = 0.021) (Table 3). On the trip to school, perceptions of feeling less safe (safe/not very safe compared with very safe) from traffic and worse sidewalk condition (good/not very good compared with very good) were negatively associated with liking the journey. At the road outside the school, perceptions of having some play places (compared to enough), lower air quality, and less things to see and do were negatively associated with liking the journey. The addition of the home variables in model 3 did not improve the fit of the model (p = 0.43), and none were statistically significant indicating their limited value in explaining the outcome (Appendix B).

3.4.2. Outcome 2: feeling happy and relaxed on the journey to school

Active travel was not associated with children feeling happy and relaxed on their journey to school (Table 3). On the trip to school, perceptions of feeling less safe (safe/not very safe compared with very safe) from traffic and worse sidewalk condition (good/not very good compared with very good) were negatively associated with feeling happy and relaxed. On the road outside the school, perceptions of having fewer things to see or do and the streets not being very noisy were negatively associated with feeling happy and relaxed. At the home street, a perception of fewer things to see and do was negatively associated with feeling happy and relaxed in the fully adjusted model (Model 3).

3.4.3. Outcome 3: feeling happy

Being male was associated with being less happy than female (B −0.528, 95 % CI -0.926, −0.130; p = 0.009) (Table 3). Active travel was not associated with children feeling happy on the trip to school, perceptions of feeling less safe (safe/not very safe compared with very safe) from traffic and worse sidewalk condition (good/not very good compared with very good) were negatively associated with feeling happy. On the road outside the school, feeling less safe when crossing the road (safe/not very safe compared to very safe), the air being not very clean (compared with very clean), having some things to see and do (compared to many), and the streets being noisy (compared with very noisy) were associated with reduced happiness. At the home street, a perception of not many things to see and do was negatively associated with feeling happy (B −0.623, 95 % CI -1.193, −0.054; p = 0.032; Appendix C); however, Model 3 was not a better fit than Model 2 (p = 0.267).

3.4.4. Commonalities across measures of wellbeing

The variables which related most consistently to all measures of wellbeing were the quality of sidewalks, feeling safe from traffic on the trip to school, and feeling that there were enough things to see and do near the school gate. In the fully adjusted models (Model 3), variables relating to the built environment at home did not improve the model fit for liking the school journey or feeling happy.

4. Discussion

This study investigated how children's perceptions of the built environment on their journey to school relate to their subjective wellbeing. To have a complete understanding of children's subjective wellbeing and to cover the identified gaps in the literature, we used three measures of wellbeing: two associated with the travel to school experience, liking the trip to school and feeling happy and relaxed on the way to school, and one measure of general wellbeing, feeling happy. We found significant associations between children's perceptions of the built environment on their journeys to school and their subjective wellbeing. After adjusting for other journey characteristics, the three perceptions of built environment features consistently linked to all measures of wellbeing were children feeling safe from traffic, perceiving the sidewalks as being in good condition, and finding things to see and do around the school.

4.1. Perceptions of the street environment and experienced subjective wellbeing

Children who felt not very safe/safe from traffic (compared with very safe) and considered the condition of sidewalks to be not very good/good (compared with very good) on their trip to school and perceived that there were some or not many things to see and do around the school (compared with many) reported liking the journey to school less and feeling less happy and relaxed on the way to school. Poor air quality (not very clean/clean compared to very clean) and having some as opposed to enough places to play around the school were associated with not liking the journey to school but not with feeling happy and relaxed. These findings are in line with the few child-centred, albeit qualitative, studies on children's experiences on the way to school that have explored children's perceptions of the environment and positive and negative (like, dislikes) affective responses (Wilson et al., 2019; Michail et al., 2021). In these studies streets that lacked sidewalks or had high traffic volume or speed elicited negative emotions and were seen as barriers to active travel to school; the presence of shops or 'seeing' and 'going through' parks were described as positive features. Others have found that children can perceive poor quality sidewalks (including cracks and lumps) as unappealing and unsafe due to falling hazards (Mitchell et al., 2007). Traffic volume, traffic safety, sidewalk conditions and availability of child-relevant amenities and services are built

Table 3
Summary of multivariate regression for (1) do you like your trip to school, (2) do you feel happy and relaxed on your trip to school, and (3) do you feel happy.

	Like Trip to School			Feel Happy and Relaxed			Feel Happy		
Gender	Beta	95 % CI	p	Beta	95 % CI	p	Beta	95 % CI	p
Female (girl)	Ref			Ref			Ref		
Male (boy)	−0.236	[-0.574,0.101]	0.169	0.069	[-0.310,0.448]	0.721	−0.528	[-0.926,-0.130]	**0.009**
Ethnicity									
Asian	Ref			Ref			Ref		
White	0.573	[-0.067,1.213]	0.079	0.398	[-0.313,1.109]	0.273	0.024	[-0.766,0.815]	0.952
Other	0.387	[-0.023,0.796]	0.064	0.055	[-0.397,0.506]	0.812	−0.189	[-0.657,0.280]	0.430
School									
School 1	Ref			Ref			Ref		
School 2	−1.140	[-1.927,-0.353]	**0.005**	−0.140	[-1.053,0.773]	0.764	−0.966	[-1.919,-0.014	**0.047**
School 3	−0.695	[-1.340,-0.050]	**0.035**	0.708	[-0.004,1.420]	0.051	−0.837	[-1.554,-0.120	**0.022**
School 4	−0.337	[-1.104,0.431]	0.390	−0.038	[-0.886,0.810]	0.930	−0.981	[-1.885,-0.076	**0.034**
School 5	−0.527	[-1.175,0.121]	0.111	−0.127	[-0.860,0.606]	0.734	−0.703	[-1.408,0.002]	0.051
School 6	−1.146	[-1.981,-0.311]	**0.007**	0.108	[-0.816,1.032]	0.819	−1.117	[-2.100,-0.134	**0.026**
School 7	−0.770	[-1.435,-0.105]	**0.023**	−0.251	[-1.017,0.516]	0.521	−0.403	[-1.100,0.294]	0.257
School Year									
Year 4	Ref			Ref			Ref		
Year 5	0.116	[-0.295,0.528]	0.580	−0.299	[-0.745,0.147]	0.189	0.187	[-0.294,0.668]	0.445
Year 6	0.021	[-0.391,0.433]	0.921	−0.312	[-0.769,0.144]	0.180	0.302	[-0.180,0.783]	0.220
Active Travel									
No	Ref			Ref			Ref		
Yes	0.410	[0.062,0.758]	**0.021**	−0.268	[-0.652,0.115]	0.171	0.205	[-0.201,0.611]	0.323
Travel Companion									
Adult	Ref			Ref			Ref		
Alone	0.527	[-0.060,1.113]	0.078	0.419	[-0.230,1.068]	0.206	−0.425	[-1.157,0.307]	0.255
Adult, friend/sibling	0.083	[-0.361,0.527]	0.714	−0.170	[-0.657,0.318]	0.495	−0.477	[-1.010,0.056]	0.080
Friend/sibling	−0.130	[-0.737,0.476]	0.674	−0.109	[-0.799,0.581]	0.757	−0.880	[-1.754,-0.006]	**0.049**
Trip Variables									
Safe from Traffic									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.491	[-0.855,-0.127]	**0.008**	−0.987	[-1.402,-0.573]	**0.000**	−0.557	[-0.989,-0.125]	**0.011**
Sidewalk Quality									
Very Good	Ref			Ref			Ref		
Good/not very good	−0.690	[-1.051,-0.330]	**0.000**	−0.450	[-0.839,-0.061]	**0.023**	−0.495	[-0.903,-0.086]	**0.018**
Safe from Crime									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.284	[-0.644,0.077]	0.123	−0.222	[-0.634,0.190]	0.291	−0.265	[-0.700,0.171]	0.234
School Variables									
Crossing safety									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.231	[-0.592,0.130]	0.210	−0.371	[-0.781,0.038]	0.076	−0.645	[-1.073,-0.218]	**0.003**
Play Places									
Enough	Ref			Ref			Ref		
Some	−0.588	[-0.966,-0.211]	**0.002**	−0.167	[-0.582,0.248]	0.431	−0.342	[-0.779,0.095]	0.125
Not enough	−0.423	[-0.922,0.076]	0.097	0.173	[-0.385,0.732]	0.543	−0.222	[-0.819,0.375]	0.467
Air Quality									
Very clean	Ref			Ref			Ref		
Clean	−0.588	[-1.071,-0.106]	**0.017**	−0.437	[-0.937,0.064]	0.087	−0.292	[-0.808,0.224]	0.267
Not very	−0.791	[-1.375,-0.206]	**0.008**	−0.444	[-1.069,0.182]	0.165	−0.681	[-1.351,-0.012]	**0.046**
Trees and Plants									
Many	Ref			Ref			Ref		
Some	0.119	[-0.275,0.512]	0.554	−0.123	[-0.558,0.312]	0.580	−0.353	[-0.811,0.105]	0.131
Not many	0.108	[-0.381,0.598]	0.665	0.048	[-0.494,0.589]	0.863	0.079	[-0.475,0.632]	0.781
Things to see/do									
Many	Ref			Ref			Ref		
Some	−0.766	[-1.150,-0.382]	**0.000**	−0.438	[-0.855,-0.021]	**0.039**	−0.470	[-0.914,-0.026]	**0.038**
Not many	−0.628	[-1.127,-0.130]	**0.013**	−0.652	[-1.219,-0.086]	**0.024**	−0.535	[-1.140,0.069]	0.083
Noisy									
Very noisy	Ref			Ref			Ref		
Noisy	−0.346	[-0.812,0.121]	0.147	−0.327	[-0.853,0.198]	0.222	−0.690	[-1.241,-0.139]	**0.014**
Not very noisy	−0.326	[-0.797,0.146]	0.176	−0.638	[-1.189,-0.086]	**0.023**	−0.474	[-1.017,0.068]	0.087
Home Variables									
Crossing safety									
Very safe				Ref					
Safe				−0.256	[-0.683,0.171]	0.240			
Not very safe				0.633	[-0.045,1.310]	0.067			
Trees and Plants									

(*continued on next page*)

Table 3 (*continued*)

	Like Trip to School			Feel Happy and Relaxed			Feel Happy		
Many				Ref					
Some				−0.001	[-0.467,0.464]	0.996			
Not many				−0.132	[-0.630,0.366]	0.604			
Things to see/do									
Many				Ref					
Some				−0.673	[-1.132,-0.214]	**0.004**			
Not many				−0.925	[-1.444,-0.406]	**0.000**			
Noisy									
Very noisy				Ref					
Noisy				−0.001	[-0.641,0.638]	0.997			
Not very noisy				0.178	[-0.436,0.792]	0.570			
Constant	2.484	[1.560,3.409]	0.000	2.019	[0.935,3.103]	0.000	2.273	[1.270,3.275]	0.000
Pseudo-R^2	0.144			0.179			0.157		

Participants who preferred not to answer the question for Outcome 3 (Feel Happy) were excluded from the analysis (n = 63). Due to low numbers in the lowest/negative Likert category, the following variables were dichotomised as shown in the table: (a) Safe from Traffic, (b) Sidewalk Quality, (c) Safe from Crime, (d) Crossing Safety.

environment features which have also been shown to be associated with positive health outcomes (reductions in obesity) or health promoting behaviours (physical activity or active travel) (Nordbø et al., 2020; Ortegon-Sanchez et al., 2021; Ahern et al., 2017).

4.2. Perceptions of the street environment and general subjective wellbeing

We found that children who felt 'very safe' from traffic, reported 'very good' sidewalk conditions, perceived that there were 'many' things to see and do around the school and felt 'very safe' when crossing the road outside the school reported feeling happier in general. This is a novel contribution from our study since, to the best of our knowledge, perceptions of street environment features have yet to be studied in relation to this measure of affective wellbeing in children. To hypothesise about the mechanisms behind these associations, we drew upon findings from studies in adults that have looked at the links between street environment characteristics and wellbeing. In line with our findings regarding the association between traffic safety and happiness, Anciaes et al. (2016) found that perceptions of high traffic volumes and speeds were associated with lower wellbeing when people considered these as barriers to walking. Perceptions of high traffic levels have also been identified as a key contributor to community severance which can impact health due to restrictions to social contact, physical activity and access to goods, services, and opportunities (Anciaes et al., 2016). Regarding sidewalk conditions, other authors identified that urban spaces with qualities that were positively evaluated, such as pedestrian infrastructure, attractive and aesthetic spaces and lower air pollution, had stronger effects on people's positive mental health (Hematian and Ranjbar, 2022).

4.3. Active travel and wellbeing

We found that consistent with other literature assessing children's satisfaction with travel (Friman et al., 2019), frequent active travel (walking or cycling to school three or more days a week) was associated with children liking their trip to school more, with this effect being moderated by the perceptions of the built environment. However, frequent active travel was not associated with feeling happy and relaxed on the journey or generally happy. We also found that perceptions of the built environment on the journey to school or on the road outside school were not different between children who travelled actively and those who did not. This suggests that the physical activity (walking or cycling) associated with active travel does not mediate between the built environment and these two measures of happiness. This finding contradicts evidence from the literature that links physical activity and positive emotions in children and adolescents (van Woudenberg et al., 2020; Li et al., 2022). However, these studies primarily considered leisure physical activity or total physical activity in a day, not specifically physical activity associated with school travel. Based on our results, we hypothesised that children do not associate active travel with being happy and relaxed because the characteristics of the street environment are perceived as unsafe, unpleasant or overdemanding due to the level and type of stimuli that can cause sensory overload (Bornioli et al., 2018; Sadeghpoor et al., 2024).

5. Strengths and limitations

This study is a large, multi-ethnic sample of children aged 8–11 years. Children's voices are often under-represented, which is an important contribution of this study to the literature. We explored in detail how features of the built environment and mode of travel to school relate to wellbeing using subjective wellbeing measures that have not been considered before in studies of the associations of the built environment and child health. We developed a bespoke survey based on the Healthy Streets indicators and a previous meta-narrative review which includes an evidence-based, concise, and comprehensive list of questions on aspects of the built environment relevant to the health and wellbeing of children. There are limitations to this study. This is not a representative sample of children in Bradford and caution should be applied to the extrapolation of our findings. Moreover, whilst completing surveys during school time resulted in a high response rate and immediate researcher clarification of children's questions, this environment may have resulted in

peers influencing each other's answers. Additional research is needed to identify and assess unmeasured subjective or objective factors relating to the built environment (such as spatial and geographical analysis) which may help to explain children's wellbeing while travelling to school. Moreover, further testing may be required to determine whether children's interpretation of some questions reflects that of the researchers. For example, anecdotal evidence from researchers identified that children were often unsure how to interpret 'crime'. Finally, parents are the gatekeepers to children's travel; their perceptions of the built environment on their journeys to school also require further exploration and consideration as improving their perceptions may facilitate more opportunities for children to travel actively to school.

6. Conclusions

Our results suggest that perceptions of street level characteristics, or the quality of the environment, are important predictors of children's subjective wellbeing and, potentially, more important than active travel. This may be because active travel to school is a necessary activity that takes place regardless of the quality of the built environment. Recent evidence suggests that poor quality environmental conditions discourage physical activity (Ortegon-Sanchez et al., 2021). Similarly, the quality of greenspace has been found to be more important for wellbeing than quantity alone (Nordbø et al., 2020; McEachan et al., 2018). Since children must complete trips to school, poor-quality street environments may create a stressful experience for children, impacting their wellbeing or discouraging active travel to school altogether. Therefore, street environment characteristics —such as traffic safety, sidewalks, crossings and other pedestrian infrastructure, and having pleasant things to see and do, especially around school catchment areas — are key features to improve in support of children's subjective wellbeing. Permanent street design interventions such as traffic calming measures or Low Traffic Neighbourhoods and temporary traffic restrictions such as School Streets are relevant to contribute to this aim.

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CRediT authorship contribution statement

Adriana Ortegon-Sanchez: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Conceptualization. **Lisa Dowling:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Sophia Arthurs-Hartnett:** Writing – review & editing, Investigation. **Nicola Christie:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Rosemary R.C. McEachan:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Child – Health and Place Intervention Evaluation (C-HaPIE) tool

YOUNG PEOPLES TRAVEL & ACTIVITY

YOUR CONSENT

By completing this survey you are agreeing to take part in this study and for your data to be stored on the University College London (UCL) secure server.

We will ask you to fill in this questionnaire again later in the year to see whether how you feel about the streets round your school, or how you travel to school changes. To answer these questions, we need to link your questionnaires using some details (e.g. school, school year, initials) but we will not use these details to identify who you are.

This questionnaire should take less than 15 minutes to complete. We will use your answers to see if changes to the streets are related to children's health and wellbeing. We will also write reports but you will not be identified in any report. You do not have to complete the questionnaire if you do not want to.

Do you wish to continue to the survey?

Yes ☐

No ☐

Please tick the box ☑ next to your answer

Please try to answer all the questions. There are no right or wrong answers. We want to know what you think. Your answers will not be shown to anyone that you know (including mums and dads).
If you do not want to answer a question you can miss it out.
If you need any help, you can ask your teacher or the person who gave you this.

Thank you!

ABOUT YOU

1. What are the first two letters of your FIRST NAME?
   e.g., if your name is John, write Jo

   WRITE HERE: _____

2. What are the first two letters of your LAST NAME?
   e.g., if your name is Khan, write Kh

   WRITE HERE: _____

3. Which school year are you in? (***Please tick ONE box***)

   Year 4 ☐

   Year 5 ☐

   Year 6 ☐

   What is the name of your class? (e.g. apple, red, 6a)
   If your class does not have a name, write NA

   WRITE HERE: _____

4. What month were you born in?

   WRITE HERE: _____

5. What is the name of your School?

St Philip's CoE	☐	Atlas Community	☐
All Saints CoE	☐	Green Lane	☐
Farfield	☐	Cavendish	☐
Newby	☐	Westbourne	☐
Oxenhope CoE	☐	Beckfoot Priestthorpe	☐
Our Lady of Victories	☐	Other	☐

5a. If you selected 'Other' for question 5, please write in the name of the Other School you attend _____

6. Are you **(*Please tick ONE box*)**

Female (girl)	☐
Male (boy)	☐
Other / do not want to answer	☐

7. How would you describe yourself: **(*Please tick ONE box*)**

Bangladeshi	☐	Black Caribbean	☐
Pakistani	☐	Chinese	☐
White	☐	Mixed	☐

Indian Asian ☐ Other ☐

Black African ☐ Prefer not to say ☐

WHERE YOU LIVE

8. What is the name of the street you live in?

WRITE HERE: _____

9. Would you say you are happy in the area where you live?
(***Please tick ONE box***)

Very happy ☐ 

Happy ☐ 

Not very happy ☐ 

10. How long have you been living in this area?
(***Please tick ONE box***)

Less than a year ☐

1-3 years ☐

More than 3 years ☐

11. How safe do you feel crossing the road where you live?
(***Please tick ONE box***)

Very safe ☐

Safe ☐

Not very safe ☐

12. How noisy is the traffic on the road where you live?
(***Please tick ONE box***)

Very noisy ☐

Noisy ☐

Not very noisy ☐

13. Are there trees and plants on the road where you live? **(Please tick ONE box)**

Many ☐

Some ☐

Not many ☐

14. Are there nice things to see and do on the road where you live? **(Please tick ONE box)**

Many ☐

Some ☐

Not many ☐

15. Does your home have a garden where you can play?

Yes ☐

No ☐

16. Does your family have a car?

Yes ☐

No ☐

17. Do you have access to a bicycle in your house?

Yes ☐

No ☐

ABOUT YOUR SCHOOL JOURNEYS

Your trip **TO school this morning**

18. How did you come to school today? ***(Please tick ONE box for the main way you travelled)***

Car  ☐

Walk  ☐

Bike  ☐

Bus  ☐

Taxi  ☐

Other, please write in _____

19. How many roads did you have to WALK across on your way to school? (e.g. 0, 1, 2.)
Please WRITE IN number _____

20. How long did it take you to get to school today?
(Please tick ONE box)

Up to 5 minutes ☐

5-10 minutes ☐

11-15 minutes ☐

16-20 minutes ☐

21-30 minutes ☐

More than 30 minutes ☐

21. Who came with you on your trip to school this morning? **(Please tick a box for everyone who came with you)**

- Alone ☐
- Parent/other relative ☐
- Other adult ☐
- Brother or sister ☐
- Friends ☐

22. Did you feel happy and relaxed on your trip to school today? ***(Please tick ONE box)***

- Very happy and relaxed ☐ 
- Happy and relaxed ☐ 
- Not very happy and relaxed at all ☐ 

23. How safe from **traffic** did you feel on your trip to school today? ***(Please tick ONE box)***

- Very safe ☐
- Safe ☐
- Not very safe at all ☐

24. How safe from **crime** did you feel on your trip to school today? ***(Please tick ONE box)***

Very safe ☐

Safe ☐

Not very safe at all ☐

25. Are the **pavements** on your trip to school in good condition? ***(Please tick ONE box)***

Very good ☐

Good ☐

Not very safe at all ☐

26. Overall, how much do you like your journey to school? ***(Please tick ONE box)***

Very much ☐

A little ☐

Not at all ☐

27. How will you travel back home from school today? **(*Please tick ONE box for the main way you will travel)***

Car  ☐

Walk  ☐

Bike  ☐

Bus  ☐

Taxi  ☐

Other, please write in _____

HOW DO YOU USUALLY TRAVEL TO AND FROM SCHOOL

28. Do you walk or cycle to school 3 or more days a week

Yes ☐

No ☐

29. In an average school week, on how many days do you **WALK** to get **TO** school (e.g.,0, 1,2,3,4,5)

Please WRITE in your answer _____ 

30. In an average school week, on how many days do you **CYCLE** to get **TO** school (e.g.,0, 1,2,3,4,5)

Please WRITE in your answer _____ 

31. In an average school week, on how many days do you **WALK** to get **FROM** school (e.g.,0, 1,2,3,4,5)

Please WRITE in your answer _____

32. In an average school week, on how many days do you **CYCLE** to get **FROM** school (e.g.,0, 1,2,3,4,5)

Please WRITE in your answer_____

33. If currently you do not walk or cycle 3 or more days to school, would you like to?
(Please tick ONE box)

Yes ☐
No ☐
Maybe ☐

34. What would make it easier for you to walk or cycle to school?
Please WRITE in your answer

HOW DO YOU FEEL ABOUT THE AREA AROUND YOUR SCHOOL?

35. How safe do you feel crossing the road outside your school? ***(Please tick ONE box)***

Very safe ☐

Safe ☐

Not very safe at all ☐

36. How noisy is the traffic on the road outside your school? ***(Please tick ONE box)***

Very noisy ☐

Noisy ☐

Not very noisy at all ☐

37. Are there enough places to play near your school? ***(Please tick ONE box)***

Enough ☐

Some ☐

Not enough ☐

38. Are there trees and plants on the road outside your school? ***(Please tick ONE box)***

Many ☐

Some ☐

Not many ☐

39. Are there nice things to see and do around your school? ***(Please tick ONE box)***

Many ☐

Some ☐

Not many ☐

40. What sort of things would make the area around your school nicer to be in? ***Please WRITE in your answer***

---

41. How clean do you think the air is on the road outside your school? ***(Please tick ONE box)***

Very clean ☐

Clean ☐

Not very clean at all ☐

42. Overall, how much do you like the road outside your school? ***(Please tick ONE box)***

Very much ☐

A little ☐

Not at all ☐

Last week, did you play or hangout in a park near you?

Yes ☐

No ☐

Last week, did you play or hangout in the streets near you?

Yes ☐

No ☐

HOW YOU FEEL

Please try to answer all of these questions. Remember there are no right or wrong answers. We want to know what you think. Your answers will not be shown to anyone that you know (including mums and dads).

If you do not want to answer a question you can miss it out.

43. How often do you feel happy? ***(Please tick ONE box)***

All of the time ☐

Some of the time ☐

Never ☐

Prefer not to say ☐

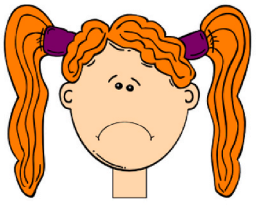
44. How often do you feel sad? ***(Please tick ONE box)***

All of the time ☐

Some of the time ☐

Never ☐

Prefer not to say ☐



45. How often are you ill or unwell? ***(Please tick ONE box)***

All of the time ☐

Some of the time ☐

Never ☐

Prefer not to say ☐

46. How often do you feel healthy? ***(Please tick ONE box)***

All of the time ☐

Some of the time ☐

Never ☐

Prefer not to say ☐

FRIENDS

47. How many friends do you have? ***(Please tick ONE box)***

Lots ☐

Some ☐

Not many ☐

Prefer not to say ☐

That's the end of the questions thank you for your help!

If any of the answers to any questions have upset you or you want to speak about something worrying, please speak to a member of the research team or the teacher that is doing the survey with you.

Appendix B. Independent regression models

All individual models are adjusted for school, school year, gender, and ethnicity. Due to low numbers in the lowest/negative Likert category, the following variables were dichotomised as shown in the table: (a) Safe from Traffic, (b) Sidewalk Quality, (c) Safe from Crime, (d) Crossing Safety. Participants who preferred not to answer the question for Outcome 3 (Feel Happy) were excluded from the analysis (n = 63) (see Table B1).

Table B1
Independent associations between wellbeing variables, travel characteristics and perceptions of the built environment.

	Outcome 1: Like Trip			Outcome 2: Happy and Relaxed on Trip			Outcome 3: Feel Happy		
Travel Mode	Beta	95 % CI	p	Beta	95 % CI	p	Beta	95 % CI	p
Car	Ref			Ref			Ref		
Walk/bike	0.332	[0.007, 0.658]	**0.045**	−0.115	[-0.467, 0.236]	0.521	0.185	[-0.203, 0.574]	0.349
Public Transport	0.349	[-0.490, 1.189]	0.415	0.655	[-0.203, 1.514]	0.135	0.484	[-0.479, 1.447]	0.325
Travel Companion									
Alone	Ref			Ref			Ref		
Adult	−0.521	[-1.048, 0.006]	0.053	−0.164	[-0.735, 0.406]	0.573	0.281	[-0.381, 0.942]	0.406
Adult + friend/sibling	−0.495	[-1.098, 0.107]	0.107	−0.187	[-0.838, 0.465]	0.575	−0.093	[-0.854, 0.668]	0.811
Friend/sibling	−0.753	[-1.469, −0.038]	**0.039**	−0.493	[-1.282, 0.296]	−0.220	−0.712	[-1.726, 0.301]	0.168
Active Travel (3 days)									
No	Ref			Ref			Ref		
Yes	0.404	[0.093, 0.715]	**0.011**	−0.144	[-0.478, 0.189]	0.397	0.199	[-0.167, 0.565]	0.286
Trip Variables									
Safe from Traffic									
Very Safe	Ref								
Safe/not very safe	−0.935	[-1.242, −0.628]	**<0.001**	−1.339	[-1.687, −0.991]	**<0.001**	−1.044	[-1.413, −0.676]	**<0.001**
Sidewalk Quality									
Very Good	Ref			Ref			Ref		
Good/not very good	−1.051	[-1.374, −0.729]	**<0.001**	−0.961	[-1.298, −0.623]	**<0.001**	−0.958	[-1.321, −0.595]	**<0.001**
Safe from Crime									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.667	[-0.972, −0.361]	**<0.001**	−0.712	[-1.052, −0.372]	**<0.001**	−0.744	[-1.115, −0.373]	**<0.001**
School Variables									
Crossing Safety									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.842	[-1.147, −0.537]	**<0.001**	−0.979	[-1.311, −0.647]	**<0.001**	−1.14	[-1.504, −0.776]	**<0.001**
Play Places									
Enough	Ref			Ref			Ref		
Some	−0.902	[-1.238, −0.566]	**<0.001**	−0.595	[-0.956, −0.235]	**0.001**	−0.73	[-1.118, −0.342]	**<0.001**
Not enough	−0.829	[-1.271, −0.388]	**<0.001**	−0.413	[-0.877, 0.052]	0.082	−0.715	[-1.245, −0.184]	**0.008**
Air Quality									
Very clean	Ref			Ref			Ref		
Clean	−0.993	[-1.420, −0.566]	**<0.001**	−1.024	[-1.455, −0.593]	**<0.001**	−0.882	[-1.332, −0.431]	**<0.001**
Not very clean at all	−1.272	[-1.784, −0.759]	**<0.001**	−1.017	[-1.542, −0.492]	**<0.001**	−1.271	[-1.860, −0.682]	**<0.001**
Trees and Plants									
Many	Ref			Ref			Ref		
Some	−0.128	[-0.473, 0.217]	0.468	−0.314	[-0.687, 0.059]	0.099	−0.471	[-0.877, −0.064]	**0.023**
Not many	−0.184	[-0.618, 0.250]	0.406	−0.234	[-0.704, 0.235]	0.328	−0.214	[-0.713, 0.284]	0.399
Things to see/do									
Many	Ref			Ref			Ref		
Some	−1.085	[-1.430, −0.740]	**<0.001**	−0.787	[-1.148, −0.425]	**<0.001**	−0.872	[-1.262, −0.482]	**<0.001**
Not many	−0.939	[-1.377, −0.501]	**<0.001**	−0.886	[-1.366, −0.405]	**<0.001**	−0.934	[-1.468, −0.400]	**0.001**
Noisy									
Very noisy	Ref			Ref			Ref		
Noisy	−0.224	[-0.643, 0.194]	0.294	−0.375	[-0.816, 0.067]	0.096	−0.487	[-0.982, 0.008]	0.054
Not very noisy at all	−0.089	[-0.507, 0.330]	0.678	−0.376	[-0.819, 0.066]	0.096	−0.132	[-0.613, 0.349]	0.590
Home Variables									
Crossing safety									
Very safe	Ref			Ref			Ref		
Safe	−0.719	[-1.043, −0.396]	**<0.001**	−0.898	[-1.259, −0.537]	**0.000**	−0.61	[-0.991, −0.230]	**0.002**
Not very safe	−0.58	[-1.106, −0.054]	**0.031**	−0.299	[-0.850, 0.252]	0.287	−0.423	[-1.054, 0.207]	0.188
Trees and Plants									
Many	Ref			Ref			Ref		
Some	−0.126	[-0.502, 0.250]	0.510	−0.397	[-0.798, 0.005]	0.053	−0.601	[-1.034, −0.169]	**0.006**
Not many	−0.329	[-0.729, 0.071]	0.107	−0.530	[-0.960, −0.100]	**0.016**	−0.397	[-0.854, 0.060]	0.089
Things to see/do									
Many	Ref			Ref			Ref		
Some	−0.556	[-0.949, −0.163]	**0.006**	−0.95	[-1.360, −0.540]	**<0.001**	−0.754	[-1.188, −0.320]	**0.001**
Not many	−0.824	[-1.241, −0.407]	**<0.001**	−1.293	[-1.743, −0.843]	**<0.001**	−1.096	[-1.580, −0.613]	**<0.001**
Noisy									
Very noisy	Ref			Ref			Ref		
Noisy	−0.217	[-0.718, 0.285]	0.397	−0.188	[-0.734, 0.357]	0.499	−0.01	[-0.587, 0.567]	0.973
Not very noisy	0.097	[-0.348, 0.543]	0.668	−0.034	[-0.518, 0.450]	0.891	−0.026	[-0.539, 0.487]	0.921

Appendix C. All multivariate regression models

Due to low numbers in the lowest/negative Likert category, the following variables were dichotomised as shown in the table: (a) Safe from Traffic, (b) Sidewalk Quality, (c) Safe from Crime, (d) Crossing Safety. Model 1 includes all trip related variables - safe from traffic, sidewalk quality and safe from crime. Model 2 includes the variables in model 1 and road outside the school variables - feeling safe at crossings, perception of quantity of play places, air quality, perception of quantity of trees and plants, things to see and do, and noise. Model 3 includes all the variables in Model 2 and home variables - feeling safe at crossings, perception of quantity of trees and plants, things to see and do, and noise. All models are adjusted for gender, ethnicity, school, school year, active travel (3+ days), and travel companion (see Table C1).

Due to low numbers in the lowest/negative Likert category, the following variables were dichotomised as shown in the table: (a) Safe from Traffic, (b) Sidewalk Quality, (c) Safe from Crime, (d) Crossing Safety. Model 1 includes all trip related variables - safe from traffic, sidewalk quality and safe from crime. Model 2 includes the variables in model 1 and school variables - feeling safe at crossings, perception of quantity of play places, air quality, perception of quantity of trees and plants, things to see and do, and noise. Model 3 includes all the variables in Model 2 and home variables - feeling safe at crossings, perception of quantity of trees and plants, things to see and do, and noise. All models are adjusted for gender, ethnicity, school, school year, active travel (3+ days), and travel companion (see Table C2).

Due to low numbers in the lowest/negative Likert category, the following variables were dichotomised as shown in the table: (a) Safe from Traffic, (b) Sidewalk Quality, (c) Safe from Crime, (d) Crossing Safety. Model 1 includes all trip related variables - safe from traffic, sidewalk quality and safe from crime. Model 2 includes the variables in model 1 and school variables - feeling safe at crossings, perception of quantity of play places, air quality, perception of quantity of trees and plants, things to see and do, and noise. Model 3 includes all the variables in Model 2 and home variables - feeling safe at crossings, perception of quantity of trees and plants, things to see and do, and noise. All models are adjusted for gender, ethnicity, school, school year, active travel (3+ days), and travel companion. Participants who preferred not to answer this question were excluded from the analysis (n = 63) (see Table C3).

Table C1
Multivariate regression – do you like your trip to school.

	Model 1 - Trip			Model 2 - Trip, School			Model 3 - Trip, School, Home		
Gender									
Female (girl)	Ref			Ref			Ref		
Male (boy)	−0.127	[-0.444,0.190]	0.433	−0.236	[-0.574,0.101]	0.169	−0.201	[-0.547,0.144]	0.254
Ethnicity									
Asian	Ref			Ref			Ref		
White	0.413	[-0.201,1.027]	0.188	0.573	[-0.067,1.213]	0.079	0.607	[-0.038,1.252]	0.065
Other	0.334	[-0.056,0.723]	0.093	0.387	[-0.023,0.796]	0.064	0.379	[-0.036,0.794]	0.073
School									
School 1	Ref			Ref			Ref		
School 2	−1.017	[-1.773,-0.262]	**0.008**	−1.140	[-1.927,-0.353]	**0.005**	−1.183	[-1.984,-0.382]	**0.004**
School 3	−0.668	[-1.278,-0.057]	**0.032**	−0.695	[-1.340,-0.050]	0.035	−0.734	[-1.391,-0.077]	**0.028**
School 4	−0.380	[-1.112,0.352]	0.309	−0.337	[-1.104,0.431]	0.390	−0.406	[-1.195,0.384]	0.314
School 5	−0.462	[-1.070,0.145]	0.136	−0.527	[-1.175,0.121]	0.111	−0.545	[-1.205,0.115]	0.106
School 6	−0.885	[-1.679,-0.091]	**0.029**	−1.146	[-1.981,-0.311]	**0.007**	−1.216	[-2.067,-0.365]	**0.005**
School 7	−0.777	[-1.412,-0.143]	**0.016**	−0.770	[-1.435,-0.105]	**0.023**	−0.832	[-1.511,-0.154]	**0.016**
School Year									
Year 4	Ref			Ref			Ref		
Year 5	0.044	[-0.349,0.437]	0.826	0.116	[-0.295,0.528]	0.580	0.106	[-0.310,0.522]	0.618
Year 6	0.000	[-0.390,0.391]	0.998	0.021	[-0.391,0.433]	0.921	0.057	[-0.361,0.475]	0.788
Active Travel									
No	Ref			Ref			Ref		
Yes	0.448	[0.113,0.783]	**0.009**	0.410	[0.062,0.758]	**0.021**	0.427	[0.074,0.780]	**0.018**
Travel Companion									
Adult	Ref			Ref			Ref		
Alone	0.499	[-0.064,1.061]	0.082	0.527	[-0.060,1.113]	0.078	0.589	[-0.007,1.185]	0.053
Adult, friend/sibling	0.031	[-0.396,0.458]	0.887	0.083	[-0.361,0.527]	0.714	0.067	[-0.382,0.516]	0.770
Friend/sibling	−0.222	[-0.810,0.365]	0.459	−0.130	[-0.737,0.476]	0.674	−0.057	[-0.670,0.557]	0.857
Trip Variables									
Safe from Traffic									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.715	[-1.051,-0.380]	**0.000**	−0.491	[-0.855,-0.127]	**0.008**	−0.475	[-0.847,-0.102]	**0.012**
Sidewalk Quality									
Very Good	Ref			Ref			Ref		
Good/not very good	−0.897	[-1.236,-0.559]	**0.000**	−0.690	[-1.051,-0.330]	**0.000**	−0.663	[-1.026,-0.299]	**0.000**
Safe from Crime									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.316	[-0.653,0.020]	0.066	−0.284	[-0.644,0.077]	0.123	−0.257	[-0.624,0.109]	0.169
School Variables									

(*continued on next page*)

Table C1 (*continued*)

	Model 1 - Trip			Model 2 - Trip, School			Model 3 - Trip, School, Home		
Crossing safety									
Very Safe				Ref			Ref		
Safe/not very safe				−0.231	[-0.592,0.130]	0.210	−0.194	[-0.568,0.180]	0.309
Play Places									
Enough				Ref			Ref		
Some				−0.588	[-0.966,-0.211]	**0.002**	−0.548	[-0.929,-0.167]	**0.005**
Not enough				−0.423	[-0.922,0.076]	0.097	−0.366	[-0.877,0.145]	0.160
Air Quality									
Very clean				Ref			Ref		
Clean				−0.588	[-1.071,-0.106]	**0.017**	−0.557	[-1.049,-0.065]	**0.026**
Not very clean				−0.791	[-1.375,-0.206]	**0.008**	−0.810	[-1.402,-0.218]	**0.007**
Trees and Plants									
Many				Ref			Ref		
Some				0.119	[-0.275,0.512]	0.554	0.078	[-0.323,0.479]	0.703
Not many				0.108	[-0.381,0.598]	0.665	0.100	[-0.399,0.600]	0.694
Things to see/do									
Many				Ref			Ref		
Some				−0.766	[-1.150,-0.382]	**0.000**	−0.773	[-1.160,-0.385]	**0.000**
Not many				−0.628	[-1.127,-0.130]	**0.013**	−0.587	[-1.093,-0.081]	**0.023**
Noisy									
Very noisy				Ref			Ref		
Noisy				−0.346	[-0.812,0.121]	0.147	−0.304	[-0.788,0.180]	0.219
Not very noisy				−0.326	[-0.797,0.146]	0.176	−0.352	[-0.857,0.154]	0.173
Home Variables									
Crossing safety									
Very safe							Ref		
Safe							−0.239	[-0.625,0.147]	0.225
Not very safe							0.179	[-0.438,0.796]	0.570
Trees and Plants									
Many							Ref		
Some							0.123	[-0.308,0.554]	0.575
Not many							−0.135	[-0.597,0.326]	0.565
Things to see/do									
Many							Ref		
Some							−0.226	[-0.676,0.224]	0.325
Not many							−0.326	[-0.813,0.162]	0.190
Noisy									
Very noisy							Ref		
Noisy							−0.147	[-0.714,0.420]	0.612
Not very noisy							0.098	[-0.440,0.636]	0.721
Constant	1.029	[0.371,1.687]	0.002	2.484	[1.560,3.409]	0.000	2.652	[1.612,3.692]	0.000
Pseudo-R^2	0.096			0.144			0.152		
Likelihood ratio test			N/A			0.000			0.431

Table C2
Multivariate regression – do you feel happy and relaxed on your trip to school.

Table	Model 1 - Trip			Model 2 - Trip, School			Model 3 - Trip, School, Home		
Gender									
Female (girl)	Ref			Ref			Ref		
Male (boy)	0.066	[-0.281,0.412]	0.710	0.027	[-0.339,0.392]	0.885	0.069	[-0.310,0.448]	0.721
Ethnicity									
Asian	Ref			Ref			Ref		
White	0.282	[-0.391,0.955]	0.412	0.362	[-0.331,1.055]	0.305	0.398	[-0.313,1.109]	0.273
Other	0.053	[-0.372,0.478]	0.808	0.056	[-0.384,0.497]	0.802	0.055	[-0.397,0.506]	0.812
School									
School 1	Ref			Ref			Ref		
School 2	−0.054	[-0.912,0.805]	0.903	−0.116	[-1.002,0.770]	0.797	−0.140	[-1.053,0.773]	0.764
School 3	0.743	[0.079,1.407]	0.028	0.682	[-0.012,1.376]	0.054	0.708	[-0.004,1.420]	0.051
School 4	0.105	[-0.692,0.902]	0.796	0.079	[-0.740,0.898]	0.851	−0.038	[-0.886,0.810]	0.930
School 5	−0.002	[-0.681,0.677]	0.996	−0.130	[-0.841,0.581]	0.720	−0.127	[-0.860,0.606]	0.734
School 6	0.309	[-0.558,1.176]	0.484	0.114	[-0.787,1.015]	0.804	0.108	[-0.816,1.032]	0.819
School 7	−0.160	[-0.878,0.558]	0.662	−0.172	[-0.915,0.571]	0.650	−0.251	[-1.017,0.516]	0.521
School Year									
Year 4	Ref			Ref			Ref		
Year 5	−0.350	[-0.770,0.071]	0.103	−0.275	[-0.710,0.160]	0.215	−0.299	[-0.745,0.147]	0.189
Year 6	−0.472	[-0.897,-0.048]	**0.029**	−0.385	[-0.828,0.059]	0.089	−0.312	[-0.769,0.144]	0.180
Active Travel									
No	Ref			Ref			Ref		

(*continued on next page*)

Table C2 (*continued*)

Table	Model 1 - Trip			Model 2 - Trip, School			Model 3 - Trip, School, Home		
Yes	−0.159	[-0.520,0.201]	0.387	−0.216	[-0.588,0.156]	0.255	−0.268	[-0.652,0.115]	0.171
Travel Companion									
Adult	Ref			Ref			Ref		
Alone	0.249	[-0.361,0.860]	0.423	0.237	[-0.398,0.871]	0.465	0.419	[-0.230,1.068]	0.206
Adult, friend/sibling	−0.132	[-0.596,0.331]	0.576	−0.126	[-0.603,0.350]	0.604	−0.170	[-0.657,0.318]	0.495
Friend/sibling	−0.238	[-0.904,0.428]	0.483	−0.208	[-0.886,0.470]	0.548	−0.109	[-0.799,0.581]	0.757
Trip Variables									
Safe from Traffic									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−1.149	[-1.520,-0.777]	**0.000**	−0.971	[-1.370,-0.572]	**0.000**	−0.987	[-1.402,-0.573]	**0.000**
Sidewalk Quality									
Very Good	Ref			Ref			Ref		
Good/not very good	−0.718	[-1.074,-0.362]	**0.000**	−0.508	[-0.888,-0.129]	**0.009**	−0.450	[-0.839,-0.061]	**0.023**
Safe from Crime									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.247	[-0.621,0.128]	0.197	−0.208	[-0.604,0.189]	0.305	−0.222	[-0.634,0.190]	0.291
School Variables									
Crossing safety									
Very Safe				Ref			Ref		
Safe/not very safe				−0.434	[-0.824,-0.044]	**0.029**	−0.371	[-0.781,0.038]	0.076
Play Places									
Enough				Ref			Ref		
Some				−0.237	[-0.643,0.169]	0.252	−0.167	[-0.582,0.248]	0.431
Not enough				0.086	[-0.452,0.625]	0.753	0.173	[-0.385,0.732]	0.543
Air Quality									
Very clean				Ref			Ref		
Clean				−0.511	[-0.998,-0.024]	**0.040**	−0.437	[-0.937,0.064]	0.087
Not very clean				−0.428	[-1.037,0.181]	0.168	−0.444	[-1.069,0.182]	0.165
Trees and Plants									
Many				Ref			Ref		
Some				−0.112	[-0.532,0.309]	0.603	−0.123	[-0.558,0.312]	0.580
Not many				0.039	[-0.486,0.565]	0.883	0.048	[-0.494,0.589]	0.863
Things to see/do									
Many				Ref			Ref		
Some				−0.436	[-0.846,-0.026]	**0.037**	−0.438	[-0.855,-0.021]	**0.039**
Not many				−0.732	[-1.284,-0.181]	**0.009**	−0.652	[-1.219,-0.086]	**0.024**
Noisy									
Very noisy				Ref			Ref		
Noisy				−0.391	[-0.886,0.104]	0.121	−0.327	[-0.853,0.198]	0.222
Not very noisy				−0.626	[-1.127,-0.126]	**0.014**	−0.638	[-1.189,-0.086]	**0.023**
Home Variables									
Crossing safety									
Very safe							Ref		
Safe							−0.256	[-0.683,0.171]	0.240
Not very safe							0.633	[-0.045,1.310]	0.067
Trees and Plants									
Many							Ref		
Some							−0.001	[-0.467,0.464]	0.996
Not many							−0.132	[-0.630,0.366]	0.604
Things to see/do									
Many							Ref		
Some							−0.673	[-1.132,-0.214]	**0.004**
Not many							−0.925	[-1.444,-0.406]	**0.000**
Noisy									
Very noisy							Ref		
Noisy							−0.001	[-0.641,0.638]	0.997
Not very noisy							0.178	[-0.436,0.792]	0.570
Constant	0.323	[-0.388,1.034]	0.373	1.653	[0.702,2.604]	0.001	2.019	[0.935,3.103]	0.000
Pseudo-R^2	0.119			0.152			0.179		
Likelihood ratio test			N/A			0.001			0.002

Table C3
Multivariate regression – do you feel happy.

	Model 1 - Trip			Model 2 - Trip, School			Model 3 - Trip, School, Home		
Gender									
Female (girl)	Ref			Ref			Ref		
Male (boy)	−0.459	[-0.833,-0.084]	**0.017**	−0.528	[-0.926,-0.130	**0.009**	−0.549	[-0.958,-0.140]	**0.008**
Ethnicity									
Asian	Ref			Ref			Ref		
White	−0.105	[-0.870,0.660]	0.788	0.024	[-0.766,0.815]	0.952	−0.012	[-0.817,0.794]	0.978
Other	−0.185	[-0.632,0.263]	0.419	−0.189	[-0.657,0.280]	0.430	−0.157	[-0.632,0.317]	0.516
School									
School 1	Ref			Ref			Ref		
School 2	−0.828	[-1.755,0.099]	0.080	−0.966	[-1.919,-0.014	**0.047**	−0.949	[-1.913,0.015]	0.054
School 3	−0.766	[-1.440,-0.092]	**0.026**	−0.837	[-1.554,-0.120	**0.022**	−0.832	[-1.561,-0.102]	**0.025**
School 4	−0.919	[-1.777,-0.062]	**0.036**	−0.981	[-1.885,-0.076	**0.034**	−1.058	[-1.982,-0.135]	**0.025**
School 5	−0.479	[-1.130,0.172]	0.149	−0.703	[-1.408,0.002]	0.051	−0.715	[-1.431,0.000]	0.050
School 6	−0.807	[-1.737,0.123]	0.089	−1.117	[-2.100,-0.134	**0.026**	−1.066	[-2.070,-0.062]	**0.037**
School 7	−0.361	[-1.021,0.300]	0.285	−0.403	[-1.100,0.294]	0.257	−0.458	[-1.165,0.248]	0.204
School Year									
Year 4	Ref			Ref			Ref		
Year 5	0.096	[-0.366,0.558]	0.684	0.187	[-0.294,0.668]	0.445	0.209	[-0.279,0.697]	0.401
Year 6	0.171	[-0.284,0.627]	0.461	0.302	[-0.180,0.783]	0.220	0.389	[-0.104,0.881]	0.122
Active Travel									
No	Ref			Ref			Ref		
Yes	0.240	[-0.148,0.627]	0.225	0.205	[-0.201,0.611]	0.323	0.215	[-0.198,0.628]	0.308
Travel Companion									
Adult	Ref			Ref			Ref		
Alone	−0.418	[-1.121,0.285]	0.244	−0.425	[-1.157,0.307]	0.255	−0.433	[-1.190,0.323]	0.261
Adult, friend/sibling	−0.489	[-1.004,0.026]	0.063	−0.477	[-1.010,0.056]	0.080	−0.552	[-1.096,-0.009]	**0.046**
Friend/sibling	−0.953	[-1.803,-0.103]	**0.028**	−0.880	[-1.754,-0.006]	**0.049**	−0.863	[-1.747,0.021]	0.056
Trip Variables									
Safe from Traffic									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.819	[-1.215,-0.423]	**0.000**	−0.557	[-0.989,-0.125]	**0.011**	−0.545	[-0.990,-0.101]	**0.016**
Sidewalk Quality									
Very Good	Ref			Ref			Ref		
Good/not very good	−0.784	[-1.168,-0.401]	**0.000**	−0.495	[-0.903,-0.086]	**0.018**	−0.456	[-0.872,-0.041]	**0.031**
Safe from Crime									
Very Safe	Ref			Ref			Ref		
Safe/not very safe	−0.360	[-0.765,0.045]	0.081	−0.265	[-0.700,0.171]	0.234	−0.302	[-0.749,0.144]	0.184
School Variables									
Crossing safety									
Very Safe				Ref			Ref		
Safe/not very safe				−0.645	[-1.073,-0.218]	**0.003**	−0.598	[-1.041,-0.155]	**0.008**
Play Places									
Enough				Ref			Ref		
Some				−0.342	[-0.779,0.095]	0.125	−0.338	[-0.782,0.107]	0.136
Not enough				−0.222	[-0.819,0.375]	0.467	−0.195	[-0.815,0.425]	0.537
Air Quality									
Very clean				Ref			Ref		
Clean				−0.292	[-0.808,0.224]	0.267	−0.244	[-0.772,0.285]	0.366
Not very clean				−0.681	[-1.351,-0.012]	**0.046**	−0.677	[-1.362,0.007]	0.052
Trees and Plants									
Many				Ref			Ref		
Some				−0.353	[-0.811,0.105]	0.131	−0.289	[-0.758,0.181]	0.228
Not many				0.079	[-0.475,0.632]	0.781	0.098	[-0.469,0.665]	0.735
Things to see/do									
Many				Ref			Ref		
Some				−0.470	[-0.914,-0.026]	**0.038**	−0.459	[-0.909,-0.009]	**0.045**
Not many				−0.535	[-1.140,0.069]	0.083	−0.469	[-1.088,0.150]	0.137
Noisy									
Very noisy				Ref			Ref		
Noisy				−0.690	[-1.241,-0.139]	**0.014**	−0.650	[-1.226,-0.073]	**0.027**
Not very noisy				−0.474	[-1.017,0.068]	0.087	−0.388	[-0.983,0.207]	0.201
Home Variables									
Crossing safety									
Very safe							Ref		
Safe							−0.005	[-0.470,0.460]	0.983
Not very safe							0.339	[-0.414,1.091]	0.378
Trees and Plants									
Many							Ref		

(*continued on next page*)

Table C3 (*continued*)

	Model 1 - Trip			Model 2 - Trip, School			Model 3 - Trip, School, Home		
Some							−0.382	[-0.872,0.108]	0.126
Not many							−0.099	[-0.626,0.428]	0.713
Things to see/do									
Many							Ref		
Some							−0.344	[-0.839,0.151]	0.173
Not many							−0.623	[-1.193,-0.054]	**0.032**
Noisy									
Very noisy							Ref		
Noisy							−0.021	[-0.676,0.633]	0.949
Not very noisy							−0.207	[-0.834,0.420]	0.517
Constant	0.812	[0.093,1.531]	0.027	2.273	[1.270,3.275]	0.000	2.718	[1.581,3.856]	0.000
Pseudo-R^2	0.101			0.157			0.170		
Likelihood ratio test			N/A			0.000			0.267

Data availability

The authors do not have permission to share data.

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