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Active travel to school: Understanding the Ghanaian context of the underlying driving factors and the implications for transport planning

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ABSTRACT

Introduction: Even though active travel to/from school is a major form of physical activity, and indispensable in improving the health and well-being of children, research on children's active travel to/from school is underdeveloped in Sub-Sahara Africa. This study reports findings of the factors influencing active travel to/from school in Ghana, which has not been examined in previous studies. The novelty of this study is that it highlights and discusses key differences in the findings between children and teenagers in association with environmental factors, children and characteristics of their parents.

Methods: Primary data for this study were drawn from a cross-sectional survey consisting of 1236 respondents from 97 schools in Tamale, Ghana. A univariate logistic regression model was first fitted to preliminarily identify and select the factors statistically correlated with active travel to/from school followed by a combined logistic model to provide deeper understanding of the key underlying factors and their correlation effects on walking and cycling.

Results: The results show that children's age, home ownership and the employment status of mothers are negatively associated with active travel to/from primary school but not to secondary school. Conversely, frequency of walking and cycling on the part of the parents, distance to school and living in inner core areas are positively correlated with active travel to/from both primary and secondary schools. Differences in gender only exist in the secondary school trips, suggesting that female teenagers are less likely to actively travel to school.

Conclusion: Urban planners and policy makers should take the findings of this study into consideration in developing educational programmes and in planning for a more active travel supporting environment to encourage more walking and cycling to/from school.

1. Introduction

Active transport encompasses a number of different active travel modes, including but not limited to, walking, cycling, jogging and running, which all employ the physical propulsion of the human being in the movement. Globally, the commonest forms of active travel are walking and cycling. Active travel to school refers to the journeys to/from school that rely primarily on walking or cycling on typical school days. The routine nature of the journey to/from school does not only make it suitable for children to harness the benefits of walking and cycling, it also provides the opportunity for children to increase their daily physical activity (Tudor-Locke et al., 2002;

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Cooper et al., 2003; Hallal et al., 2012). Active travel to/from school is essential in combating childhood obesity and other non-communicable diseases (NCDs), promoting children's wellbeing and independent mobility while making them gain adequate familiarity with their environment (Salmon et al., 2018). Lowered traffic volume and decreased greenhouse gas emissions, which partly can be achieved by resorting to active travel, can reduce some of the environmentally mediated disease, such as asthma (Friedman et al., 2001).

Moreover, gaining adequate knowledge and experience about the environment is prerequisite for the cognitive development of children (Müller et al., 2008). By considering a range of commuting modes, Tajalli and Hajbabaie (2017) examined how travel choices for commuting impact on health. Their results showed that walking is associated with lower risk of obesity, hypertension, diabetes and mental disorders compared with public transport. Being obese, especially for children, in particular, may lead to psychological problems, which may negatively affect their quality of life (Black et al., 2014; Wille et al., 2010; Laverty et al., 2013). Other unstudied or undiscovered benefits of active travel to school may exist. Yet, the rate of walking and cycling to/from school has been declining globally. Buliung et al. (2009) present the case of active travel to/from school in Toronto, arguing that active school transportation including walking and cycling declined since the 1980s and the amount of decline varied by several factors including age and time of day.

A couple of reasons have been recounted in the literature (Section 2) about why people, especially school children, do not prefer to actively travel to school in most cases. To understand these reasons and to be able to proffer measures on how to overcome them, different conceptual opinions on active travel to/from school have been put forward in a number of studies, highlighting the factors influencing children's active travel behaviour, but also the importance of active travel to/from school for children. However, these empirical studies offer a wide array of findings, which more often cannot be generalised. Such issues result, primarily from differences in data structure, particularly in relation to differences in variable specifications (Mitra and Buliung, 2015; McDonald et al., 2014). For example, distance has been the key determinant of active travel to/from school. Yet, there are differences in opinions in the specification of what should be considered as an acceptable distance to encourage active travel to/from school. Moreover, physical and environmental variables are often captured differently, and obviously, resulting in contrasting findings (see, for example: Carlson et al., 2014; Chillón et al., 2014 against Babey et al., 2009).

A recent study by Loo and Siiba (2019) showed that, African countries are increasingly developing active transport policies. The overarching goal of the policies is to increase active travel mode share by first seeking to make walking and cycling accessible, safe and affordable for all.

Thus, the availability of enhanced understanding of the factors influencing active travel will positively impact the development of the transport policies in Africa. However, whereas there is a reasonable number of studies examining children's active travel to/from school from the global north, a systematic review of active transportation research in the global south, especially in Africa, reveals limited evidence of active travel research, suggesting that active travel research in the African continent is at its infancy (Larouche et al., 2018). This study argues that there is some need to develop further understanding of the factors influencing active travel from different geographical perspectives to augment what we already know from the north. The primary contribution of this paper is that it reports findings from a geographical region, Ghana that has not been examined in previous active travel to/from school studies. The novelty of the study is that it discusses the correlates of active travel to/from school, highlighting the differences between primary school children and teenagers in association with environmental factors, school children and characteristics of their parents.

The remainder of this discussion is organised as follows: section 2 presents the conceptual framework, in which the factors influencing active travel to/from school in the existing literature are highlighted. Section 3 is the methodology section, in which the survey design and the results are presented, highlighting the factors influencing active travel to/from school in Ghana. The results are discussed in section 4 and the conclusion is presented in section 5.

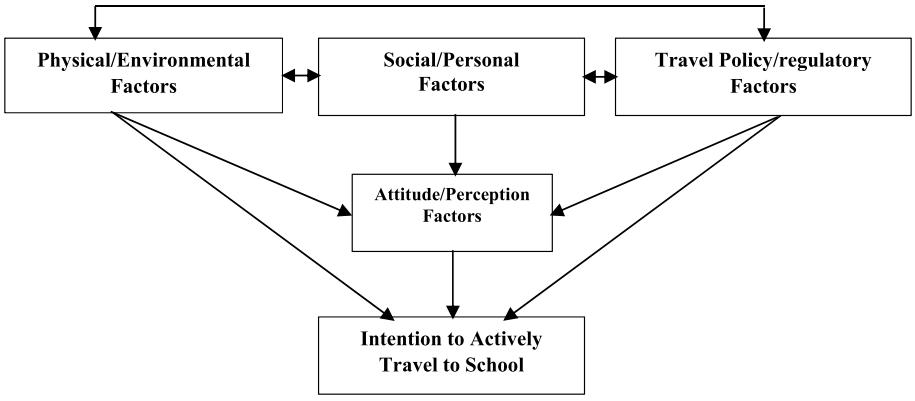

Fig. 1. Conceptual framework of the factors influencing active travel to/from school.

2. Understanding the factors influencing active travel to/from school, a conceptual framework

The subtleties of active travel are associated with multitude of factors, mainly embedded within the physical/environmental, policy/regulatory structures and the social/personal characteristics of the school children and their parents. These factors are interrelated and consist of both subjective and objective elements (Davison et al., 2008; Stewart, 2011; Chillón et al., 2014; Timperio et al., 2006). Based on the framework in Fig. 1, this section discusses the factors influencing walking and cycling to/from school, focusing on the physical/environmental and social/personal factors of the school children in association with their parents.

One of the paramount environmental factors influencing active travel to/from school is school distance, which is marked in a number of studies, suggesting that long travel distance to school is a barrier to children's active travel to/from school. In essence, long school distance promotes the use of motorised modes of transport other than active transport (Sener et al., 2019; Zhang et al., 2017; Ahern et al., 2017; Fyhri et al., 2011). For instance, after controlling for gender and density variables, Nelson et al. (2008) in their Ireland study, reported that, a unit increase in distance (miles) reduced the odds of active commuting to school by about 71%. Ahern et al. (2017) also examined primary school travel choices from parent's perspective and identified that distance and time for parents to accompany children to/from school were key barriers to active transport. Although, school distance does not always necessarily result in more or less frequent active travel to school, respectively (Bringolf-Isler et al., 2008; McDonald, 2007), it is hypothesised in this study that, longer school distance will have negative effect on active travel to/from school.

Safely, a perceived assessment of how secure children can be while walking or cycling to/from school is another widely discussed variable influencing children's active travel to/from school. Mandic et al. (2017) explored adolescents' perception of cycling versus walking to/from school in New Zealand and found that cycling was perceived as less safe, as people were less likely to cycle relative to walking. Safety concerns make parents unwilling to suggest independent walking and cycling to/from school for their children (Sener et al., 2019). Several issues affect safety, including the fear of abduction, bullying by strangers or the risk of children being knocked down by moving vehicles while walking or cycling to/from school (Rothman et al., 2017; Mehdizadeh et al., 2017; Pucher and Buehler, 2008).

Although it is posited that poor walking/cycling environment influences the use of the car in school travels (Zhang et al., 2017), findings on what parents perceived as unsafe or poor walking/cycling environment are contrasting. For instance, Davidson et al. (2008) and Panter et al. (2008) found no association between parent's and children's concerns about safety and rates of active transport to/from school. Nonetheless, the strongest opinion regarding concerns about safety is that, children who live in areas where there is a higher negative perception of safety among both parents and school children are less likely to walk or cycle to/from school relative to the reverse (Ahern et al., 2017); Veitch et al., (2017); Carlson et al., (2014).

Car ownership, an element of the socioeconomic/personal factors of a household also affects intention to walk or cycle to/from school. Studies have shown that, children living in households with motorised modes of transport, such as car, are less likely to actively travel to school as they are more likely to be driven to/from school by their parents (Easton and Ferrari, 2015; Li and Zhao, 2015). The influence of the car on active travel to/from school, however, depends on several factors such as the availability of, for example, caregivers, employment constraints of parents (He and Giuliano, 2017; Ahern et al., 2017), the level of traffic safety in the neighbourhood or the influence of one's significant others (Acheampong, 2016, 2017; Acheampong and Siiba, 2018).

Findings on active travel to/from school rates by age as an individual attribute is inclusive. Many studies have reported that active commuting to/from school is more common among younger children aged between 8 and 11 years with percentages varying from one study to the other. However, one Swiss study found that children aged 6 and 11 years commuted more actively to school than those between 12 and 18 years old in China (Tudor-Locke et al., 2003). Yet, Sirard and Slater (2008) did not find any association between children's age group and active transport to school. In terms of gender, Yelavich et al. (2008) found that boys are more likely than girls are to commute actively to/from school, but there was no such association in many studies as indicated in the literature review of Sirard and Slater (2008) about walking and cycling to school.

Characteristics of the built environment in relation to the influence of physical infrastructure constitute other set of factors that influence active travel to/from school (Pucher and Buehler, 2008). Active travel policy or regulatory framework that provides supportive infrastructure for waking and cycling (e.g. adequate and accessible side-walk or bike lanes), or traffic control facilities (e.g. speed humps or zebra crossing) near school environment, can positively influence children's intention to walk or cycle to/from school (Veitch et al., 2017). On the influence of providing dedicated active transport infrastructure, Standen et al. (2017) surveyed users of a new cycle infrastructure in Sydney, Australia to ascertain whether their travel mode was changed due to the presence of the infrastructure. Their findings showed that people were prepared to use longer routes to benefit from better experiences of cycling. The road environment in particular influences active travel in different ways. For instance, availability of footpaths was particularly associated with increased walking and cycling in many studies (e.g. Fulton et al., 2005). However, Panter et al. (2008) reported mixed results for the presence of footpaths and children's use of active transport, with some (e.g. Forsyth et al., 2012) positing that the provision of supportive active transport infrastructure may not necessarily change peoples' perceptions of the environment regarding increasing their frequency of walking or cycling.

The wide ranging literature, as reviewed above, has given us great insights into the factors influencing active travel to/from school. Yet, the review showed that some more work on this important topic is still required, especially in the context of developing countries in Africa to further broaden our understanding of the multiplicities of issues affecting active school travel behaviour. This paper is a contribution towards narrowing this research gap using Ghana as the study setting.

3. Methodology

3.1. Study setting

This study was conducted in Tamale, the regional capital of the northern region of Ghana. Tamale has an estimated population of 371351 people with average household size of 6.3 members (Ghana Statistical Service, 2012), and increases in population by about 4000 people per year. This population increase is largely driven by the strategic location of Tamale, making it the hub for land based transportation within the northern parts of Ghana. The unique location of the city also makes it a more attractive destination for business and commercial activities for people within its sphere of influence and beyond. As the regional capital of one of the largest administrative regions in Ghana, the density, the diversity and the order of services in the area increase by day, brining unique implications for sustainable transport planning. In terms of active transport, Tamale is marked by a generally flat landscape with few isolated hills, presenting optimal conditions for walking and cycling as major means of transportation.

3.2. Survey design

Primary data for this study were drawn from a cross-sectional survey. The study area was grouped into 15 administrative units called circuits by the Ghana Education Services, Tamale. Based on data obtained from the Ghana Education Service, Tamale, the 15 clusters consisted of 244 schools disaggregated into 171 and 73 Primary and Junior High Schools, respectively. It was observed that most of the schools with higher number of student enrolment were located within 10 km radius from the central business district (CBD), constituting the historical-core area of the Tamale Township, Conversely, areas beyond 10 km buffer constituted the outlying suburban locations, where the absolute number of schools and student enrolment were relatively lower. Guided by this observation, this study considered clusters within 10 km from the CBD as a matter of criterion for selecting the schools.

Based on this selection approach, 10 of the 15 clusters were selected for the survey (see Table 1). The selected clusters consisted of 46,955 school children in 167 schools constituting the sampling frame for this study. However, the total number of schools that were interviewed was 97. The main reason was that 70 of the primary schools were feeder schools, located at the same premises with their Junior High Schools. Thus, only the main schools under such circumstances were considered (n = 97). This approach was strategically adopted to ensure that subjects from approximately closed areas were not overly represented in the final sample. In other words, considering that sample size calculation for logistic regression analysis is a complex problem, the researcher carefully ensured that representative responses were collected from the respondents. The number of school children finally contacted (n = 1,488) was estimated based on the formulation in equation (1) (Gorard, 2003, p. 64).

$$n = \frac{\frac{z^2 * p(1-p)}{e^2}}{1 + \frac{z^2 * p(1-p)}{e^2 N}} \quad \text{Eqn.1}$$

Where: n = sample size; z = z-score; p = population proportion; and e = margin of error.

A confidence level of 95%, z-score of 1.96 and a population proportion of 0.80 were assumed for the estimation of the sample size. Each of the 10 clusters was allocated a share of the total sample size as a proportion of its respective number of school children (Table 1). The simple random technique was ultimately employed to select the schools and the respondents in each cluster.

A structured questionnaire was designed in line with the conceptual framework (Fig. 1). For the primary school children, the questionnaires were completed by the parents, while the secondary school teenagers completed the questionnaires themselves. The questionnaire instrument was carefully designed and administered bearing in mind the respondents, as the same questionnaire was used for both the younger children and the teenagers, and the fact that the reading and understanding levels of the two groups of

Table 1
Sampling frame and sample size distribution at the cluster level.

Cluster/ Neighbourhood	Sampling Frame			Sample Distribution		
	Schools	Population		Sample Population	% of Sample (n = 1,488)	Selected Schools
		Number of Children	Percent of Total (N = 46,955)			
Aboabo	12	3124	7	99	7	9
Bamvim	17	3284	7	104	7	11
Dabokpa	22	6226	13	197	13	12
Kaladan	18	6401	14	203	14	8
Kumasi road	19	4903	10	155	10	14
Lamashegu	20	5508	12	175	12	13
Nyohini	12	4369	9	138	9	6
Sakasaka	19	6911	15	219	15	5
Yendi Road	13	2738	6	87	6	11
Zogbeli	15	3491	7	111	7	8
Total	**167**	**46,955**	**100**	**1,488**	**100**	**97**

Source: Ghana Education Service, Tamale (2018)

children are different. Response items were presented in two main themes to the survey respondents.

The first theme covered the social/personal factors and the household characteristics, including the travel characteristics of the respondents. The second theme comprised indicator items that assessed issues of the physical environment and how those influence the intention of the respondents to actively travel to/from school. A total of 838 questionnaires were issued to the parents of the primary school children. However, only 689 (82.1%) of questionnaires were returned, satisfactorily completed and considered for the analysis. Similarly, 650 questionnaires were administered to the teenagers but only 547 (84.2%) of them provided complete and satisfactory answers for consideration in the analysis. Thus all the statistical results and discussions in this study are based on a total of 1236 responses.

A strict sample selection protocol was observed to enable the researcher overcome a potential bias regarding the selection of the schools since it was apparent that the entire population of schools could not be included. From this, it was learned that the matter of sampling for social research is largely inevitable. Hence, social researchers need to be conscious of this inevitability and take appropriate steps to ensure that samples, which are not weighted to the entire research population, are representative. The researcher also took appropriate step to ensure maximum reliability of the responses from the survey considering his positionality within the research setting. In other words, having lived within the study setting for a while, the researcher was nearly trapped within the insider position. This trap, and perhaps, a potential source of bias, was avoided by explaining the purpose of the research to the participants, the position of the researcher within the research, and how the data collected were going to be used. The respondents were also advised to provide only answers that reflect their circumstance as much as possible.

3.3. Measurement and statistical analyses

In line with the conceptual framework (Fig. 1), the factors considered in this study were classified into three: (1) household

Table 2
Descriptive statistics of the respondents.

Attribute	Primary School Children (N = 689) (5–12 yeas) (%)	Secondary School Teenagers (N = 547) (13–16 yeas) (%)
Child Characteristics		
Gender:		
Males	48.6	49.1
Females	51.4	50.9
Age:		
5–6	37.9	
7–8	34.5	
9–10	37.5	
11–12	43.2	
13–14		52.7
15–16		47.3
Travel mode to/from school		
Cycle/walk	53.6	62.8
Bus	5.4	3.7
Car	30.6	27.2
Combined modes	10.4	6.3
Active/inactive Travel mode to/from school		
Active	53.6	62.8
Inactive	36.0	30.9
Combined modes	10.4	6.3
Parent/household Characteristics		
In fulltime job	47.4	46.2
Highest educational qualification		
Tertiary	28.2	34.9
Pre-tertiary	52.6	48.6
None	19.2	16.5
Frequency of cycling		
Every day	10.3	7.6
Several times a week	6.6	3.4
1-2 times a week	18.8	4.2
None	64.3	84.8
Frequency of walking		
Every day	19.4	22.2
Several times a week	22.5	33.3
1-2 times a week	49.5	30.3
None	8.6	14.2
Residency status		
Owner-occupied	25.1	30.6
Family house	32.7	30.3
Rented home	42.2	39.1
Inner core area	65.7	53.9

characteristics; (2) environmental factors; and (3) controlling variables (age and gender). The moderating variable, gender of the school children was measured on a six band scale, four for the primary school children (5–6, 7–8, 9–10 and 11–12 years) and two for the teenagers (13–14 and 15–16 years).

The educational level of the parents was assessed on a five-point scale (i.e.: J.H.S/Middle, S.H.S, Vocational/Technical, Tertiary/Undergraduate/Diploma/Postgraduate levels). However, in the analysis, J.H.S/Middle, S.H.S, Vocational/Technical were classified as Pre-tertiary level while Tertiary/Undergraduate/Diploma/Postgraduate were put together and named Tertiary level. Distance to school, an environmental factor, was classified into: <0.5; 0.5–1; and >1 miles, and recorded based on the reported average school distances of each respondent. The number of children in the household, employment status of mothers, and parent's highest educational qualification were considered under the theme capturing the social, personal and household characteristics. The study area was grouped into inner and outer core areas based on the reported school distances. Information on income of the households was not captured. This was because, as argued in the study of Acheampong and Siiba (2018), income data obtained through surveys are usually not reliable due to, among other things, the tendency to underestimate earnings, especially among workers in the informal sector of Ghana. Thus, owning a house in this context, was used as a proxy measure of the socioeconomic status of parents. Lastly, the culture of parents towards active travel was captured by the reported frequency of walking and cycling in the week preceding the survey. After collating the survey data, the variables were coded and entered into the Statistical Package for the Social Sciences (SPSS v20) for further analysis.

3.4. Results

3.4.1. Descriptive statistics of the respondents

The descriptive statistics of the respondents are summarised in Table 2. The results show that majority of the sample lived in the inner core areas of Tamale with generally the highest proportions of them living in rented homes in both the primary and the secondary school samples. In terms of employment, the results also show that a substantial proportion (although less than half of the samples) of the parents of the school children were working fulltime and more than a third of them had acquired pre-tertiary level of educational qualification. In terms of the frequency of cycling among the parents, the results show that less than a half of the samples in the primary and secondary schools cycled, at least 1–2 times a week, but more of the parents in the primary school sample cycled than their counterparts in the secondary school sample. Conversely, more than 80% of the parents in both the primary and the secondary school samples stated that they had walked at least 1–2 times in the week that preceded the survey. More of the sample (10.4%) in the primary school used a combination of active and other modes to/from school relative to those in the secondary school sample (6.3%). Overall, 53.6% of the primary school children and 62.8% of the secondary school teenagers walked or cycled to/from school, respectively.

3.4.2. Factors influencing active travel to/from school in Tamale

A univariate logistic regression model was fitted to preliminarily identify and select the factors statistically correlated with active travel to/from school. Performance of the model was validated using the cross-validation approach, following from which a combined logistic model was also estimated to provide deeper understanding of the key underlying factors and their correlation effects on walking and cycling to/from school. Results of the model, as adjusted for age and gender, are shown in Table 3. In terms of the household characteristics, the results show that both the primary school children and the secondary school teenagers who had siblings (i.e. other school age children in the household) were more likely to walk or cycle to/from school, but a reduced tendency to actively travel to/from school among children whose mothers were in fulltime job.

Table 3
Logistic regression results of factors associated with active travel (adjusted for age and gender).

	Primary School Children (N = 689) Coeff. (C.I.)	Secondary School Teenagers (N = 547) Coeff. (C.I)
Physical/environmental factors		
Outer core areas (outer Tamale)	−0.798 (−1.003, −0.628)**	−1.218 (−1.504,−1.021)**
Distance to school		
<0.5 mile	3.561 (3.332, 3.939)**	4.263 (3.936, 4.769)**
0.5–1 mile	2.263 (1.999, 2.621)**	2.923 (2.678, 3.292)**
>1 mile	Reference	Reference
Parents/household characteristics		
Frequency of active travel		
At least 1–2 times a week (**cycling**)	0.550 (0.269, 0.855)**	0.426 (0.039, 0.831)**
At least 1–2 times a week (**walking**)	0.887 (0.722, 1.089)**	0.661 (0.444, 0.905)**
Number of children in the household	0.174 (0.088, 0.268)**	0.110 (0.018, 0.208)**
Employed in full time job (**Mother**)	−0.512 (−0.681, −0.365)**	0.097 (−0.101, 0.299)
Housing tenure		
Owner-occupied home	−0.616 (−0.837, −0.421)**	−0.228 (−0.535, 0.070)
Rented home	Reference	Reference
Family house	0.444 (0.210, 0.696) **	0.267 (−0.071, 0.616)
Highest educational qualification		
Tertiary level qualification	−0.428 (−0.608, −0.267)**	−0.215 (−0.435,−0.004)**

**p < .05; * .05 < p < .10.

An interesting finding from Table 3 is that, children and teenagers were more likely to actively travel to/from school if their parents walked or cycled at least 1–2 times a week. Housing tenure was only significantly associated with active travel to/from primary school, but not for travel to/from secondary school. In particular, primary school children living with their parents in owner occupied homes were less likely to walk or cycle to school than those living in family houses. On the other hand, the likelihood of walking or cycling to/from primary school increased where children lived in a family house. In terms of the environmental factors, the results show that shorter distance to both primary and secondary schools is positively associated with active travel to/from school. In other words, children and teenagers who lived under 0.5 mile and between 0.5 and 1 miles were more likely to actively travel to/from school than those living beyond 1 mile. Similar to the distance parameter, Table 3 also shows that both primary school children and the secondary school teenagers who lived in the outer core areas of Tamale were less likely to walk or cycle to/from school.

The strength of the findings from Table 3 were reassessed in a combined logistic regression model (Table 4). In the combined model, age was significantly correlated with active travel to/from school across all age groupings in the primary school sample. However, children within the younger age groupings (i.e.5–6 and 7–8 years) were less likely to walk or cycle to/from school relative to their counterparts in the primary school sample. Conversely, no significant association across age groupings were detected in the secondary school sample. Moreover, children living in owner-occupied homes were less likely to walk or cycle to/from school than those in family houses and rented homes. There were no longer significant differences between housing tenures and teenagers' active travel to/from secondary school in the combined model.

4. Discussions

This paper examined potential factors of active travel to primary and secondary schools in association with environmental factors, child/teenager and parent characteristics in Ghana, using Tamale as a case study. The key finding was that parent's frequency of walking and cycling was positively associated with active travel behaviours of primary school children and secondary school teenagers. As observed in the analyses, for instance, if parents walked at least 1–2 times a week, the likelihood of active travel to/from school among both the primary and secondary school children increased. This particular finding may be supported by studies that argued that children who live in areas or countries where active travel is highly patronised (e.g. Netherlands, Denmark, Germany, Davis (California) etc.) are more likely to commute actively in their adult lives than those living in other areas where active travel is less predominant. This is because, for children, learning to walk or cycle to school, largely, depends on observation and motivation from others who do so frequently (Pucher and Buehler, 2008), the role model effect.

This study offers some evidence on how far children and teenagers are prepared to walk or cycle to/from school in Ghana. In particular, perceived distances shorter than 1 mile between home and school were significantly associated with active travel to school among primary school children and secondary school teenagers. Primary school children living within 0.5 mile and between 0.51 miles were 3.5 and 2.2 times more likely to walk or cycle relative to living beyond 1 mile. Similarly, secondary school teenagers who lived

Table 4
Results of combined logistic regression model of the factors influencing active travel.

	Primary School Children Coeff. (C.I)	Secondary School Teenagers Coeff. (C.I)
Intercept	−2.925 (−3.503, −2.471)**	−2.621 (−3.365, −1.988)**
Physical/environmental factors		
Outer core area (outer Tamale)	−0.387 (−0.637, −0.152)**	−0.919 (−1.259, −0.617)**
Distance to School		
<0.5 mile	3.525 (3.287, 3.911)**	4.285 (3.947, 4.805)**
0.5–1 miles	2.204 (1.936, 2.566)**	2.864 (2.605, 3.243)**
>1 mile	Reference	Reference
Child characteristics		
Gender (Female)	−0.064 (−0.270, 0.140)	−0.392 (−0.684, −0.116)**
Age		
5–6	−0.557 (−0.842, −0.296)**	
7–8	−0.296 (−0.566, −0.040)**	
9–10	Reference	
11–12		−0.084 (−0.585, 0.414])
13–14		0.099 (−0.61, 0.536)
15–16		Reference
Parent Characteristics		
Frequency of active travel		
At least 1–2 times a week (**cycling**)	0.700 (0.281, 1.183)**	0.728 (0.211, 1.274)**
At least 1–2 times a week (**walking**)	0.495 (0.261, 0.699)**	0.565 (0.234, 0.921)**
Number of children in the household	0.158 (0.043, 0.279)**	0.143 (0.002, 0.289)**
Employed in full time job (**Mother**)	−0.310 (−0.522, −0.110**	0.051 (−0.235, 0.340)
Housing Tenure		
Owner-occupied home	−0.554 (−0.835, −0.295)**	−0.199 (−0614, 0.209)
Rented home	Reference	Reference
Family house	0.258 (−0.061, 0.589) **	0.188 (−0.299, 0.684)

**p < .05; * .05 < p < .10.

within 0.5 mile and between 0.5-1 miles were 4.2 and 2.8 times more likely to actively travel to school, respectively, than living beyond 1 mile away from their schools. The finding on the influence of distance on active school travel corroborates the studies of Zhang et al. (2017), Mitra and Buliung (2015), Waygood and Susilo (2015) and Yang and Diez-Roux (2013), who highlighted similar effects of distance on the active travel mode choice behaviour of school children in the respective countries of their studies. In this study, the finding on the effect of active travel to/from school generally suggests that, for the distance tolerance, primarily for walking, Ghanaian children and teenagers are closer to children and teenagers in other parts of the world such as America, but differ from other countries' such as the Netherlands, due to, perhaps, its (Netherlands) well established active transport infrastructure and cycling and walking cultures (Wardlaw, 2014; Bere et al., 2008) relative to the situation in Ghana (Acheampong and Siiba, 2018; Acheampong, 2016).

In line with some authors (e.g. He and Giuliano, 2017; McDonald, 2008), who argued that mothers had primary responsibility on children's commute to/from school, suggesting that mothers who are routinely busy with their works, are less likely to accompany their children to school by walking/cycling, this study also found that children whose mothers were in fulltime jobs were less likely to actively commute to primary school. This finding also agreed with the study of McDonald (2008), who indicated that children whose mothers work fulltime and commute to work in the morning were less likely to walk or cycle to school than children whose mothers were not leaving for work in the morning. However, He and Giuliano (2017) study of the factors affecting children's active journeys to school in Southern California disagrees with this finding. On the contrary, He and Giuliano found that mothers in fulltime employment, working longer hours and living farther away from home were less likely to chauffeur their children to school, thereby substituting chauffeuring with other alternative modes of travel, including walking and cycling to school. On the other hand, there was no association between mothers' employment status and active travel to secondary school, suggesting that children in secondary school are more likely to commute independently to school.

Household characteristics, such as the number of other school children in the household and housing tenure were significantly associated with active travel to primary school. In other words, the more there were other school going children in the household, the more likely children and teenagers were to walk or cycle to/from school. This finding is, however, in contrast with the study of Wilson et al. (2018), who found that school children (aged nine-14 years) without siblings were more likely to actively travel to school in Ontario, Canada. Living in an owner occupied home was negatively associated with active travel to/from primary school. This finding suggests that children living in households that could afford their own house were less likely to walk or cycle to/from school. Residential density and peri-urbanisation, where new residences are located in the outer suburbs of Ghanaian cities somehow influenced this finding. Most of the respondents in this study (34.3% and 46.1% of the primary and secondary school samples, respectively) were residing in the outer suburbs (outer core areas and low density areas), giving them some motivation to travel by other modes than active transport, including chauffeuring their children to/from school.

5. Conclusion

This paper examined the factors associated with active travel to school in Ghana with findings segregated for primary school children and secondary school teenagers. The findings provide some empirical insights of the factors influencing active travel to/from school in previously unexplored context. The findings have some implications for active travel policy for Ghana and other developing countries. The influence of household characteristics, i.e., the number of other school children in the household and parents' active travel pattern, on active travel to/from school, points towards a possible behaviour change campaign towards making people, especially parents with school children, embrace active travel as a more sustainable travel alternative to motorised travel to/from school. If other school children in a household, particularly those using motorised modes to/from school can be encouraged to embrace walking and cycling to/from school, active travel frequencies are likely to increase for school journeys, as more of the school children were likely to walk/cycle to school if other school children in their households also walked or cycled to school.

In this regard, there is the need to promote the development of strategic programmes to increase the understanding and appreciation of parents, guardians and school children on the relevance of active travel to/from school. This can be spearheaded by the government through its representatives at the various levels of planning at the local authority levels (i.e. the Metropolitan, Municipal and District levels). Furthermore, policy consideration to ensure continuous education for school children to increase their understanding of the health and environmental relevance of walking and cycling, could be considered for inclusion in the educational curriculum.

The connectivity between encouraging people to embrace active travel and the availability of relevant physical infrastructure/thriving environment to sustain that attitude is critical. Accordingly, in addition to championing attitude changing campaign programmes, relevant policy strategies also need to be considered to build a more active travel supporting environment to encourage more active travel to/from school within the urban travelling space. This is based on the influence of environmental factors, i.e. school distance, on active travel to/from school. On the influence of school distance, for example, the results specifically showed that distance shorter than 1 mile was significantly associated with active travel to school among the primary school children and the secondary school teenagers. A more active travel supporting environment may include mitigating the effect of travelling long distance to school, increasing the provision of active travel infrastructure, and putting in place motorised traffic regulatory measures, including traffic calming regulations, especially around school environment, to ensure safer walking to school.

Undoubtedly, restructuring the urban environment to make it friendlier for walking and cycling is not, financially and politically, an easy suggestion to make, as there are always other competing interests to fulfil by local authorities. Nonetheless, such investment to improve the conditions of urban environment for walking and cycling will obviously go a long way to dispel the fears of households towards active travel in regard to safety of walking and cycling in a developing country like Ghana.

The major weakness of this study is that primary data were drawn from self-reported information in a cross-sectional survey, despite its potential bias in evaluating quantitative variables, such as school distance (e.g. underestimation or exaggeration of school distance). In regard to the measurement of school distance, although the researcher appreciated that objective measures of school distance, for instance, using GPS tracking system would have been better, the subjective method was informed by the sample size of the study, which somehow made it cumbersome to use GPS tracking system. Thus, future studies may consider employing alternative methods to address this weakness.

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