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Article

Factors Influencing Cycling among Secondary School Adolescents in an Ethnically Diverse City: The Perspective of Birmingham Transport Stakeholders

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Abstract: Despite strategies and schemes to increase cycling among adolescents in England, the levels of cycling among secondary school adolescents in various cities is low. This study aims to understand the factors influencing cycling among Birmingham secondary school adolescents from the perspectives of local transport stakeholders promoting cycling among secondary school adolescents. In 2019, 14 local transport stakeholders promoting cycling among secondary school adolescents in Birmingham participated in a semi-structured interview. The discussions focused on barriers and facilitators to increasing cycling among secondary school adolescents for school and non-school travel. Thematic content analysis was performed using NVIVO 12. The five-level socio-ecological model provided the framework for the analysis, resulting in five main themes. The study found the majority of the schemes and programs organised to increase cycling among secondary school adolescents focused on promoting school travel, with less focus on non-school travel. It was noted that cycling for leisure was more appealing to adolescents than utility cycling. Future interventions should include cycling promotion for non-school travel. In addition, increased support for leisure cycling may increase the overall appeal and enthusiasm of cycling among adolescents.

Keywords: cycling; adolescents; transport stakeholder

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1. Introduction

The UK government aims to reduce motorised transport by promoting the use of active travel for short journeys and part of long journeys in a bid to reduce the negative impact of motorised transport on the environment [1,2]. Active travel such as walking and cycling not only reduces congestion, noise and air pollution, it also provides the opportunity to include physical activities in everyday mobility [2–4]. Studies have shown the importance of physical activities, including preventing and reducing the risk of obesity and several non-communicable diseases such as diabetes and cardiovascular diseases [5–8]. Despite the well-known importance of physical activity, there is a growing trend of physical inactivity among adolescents [8]. The World Health Organization [8] reports that more than 80% of adolescents worldwide are physically inactive. Specifically, in England, only 22% of children and adolescents are sufficiently active [9]. In order to increase the level of physical activity, the World Health Organization has recommended for adolescents to engage in a minimum of sixty minutes of moderate-to-vigorous physical activity (MVPA) every day [8]. Although walking provides some level of physical activity, cycling is a more intense physical activity, thus providing adolescents with a greater opportunity to meet daily recommendations.

Cycling to school and non-school destinations is a feasible means to increase adolescents' physical activities while also reducing the environmental impact of motorised transport. Understanding the factors influencing cycling among specific age groups is imperative to increasing bicycle mode share. Several studies on cycling have focused on

primary school children and adult cycling [10–14]. This has resulted in a gap in understanding the factors influencing cycling for secondary school adolescents. Considering that secondary school adolescents, being a transitioning age group (childhood to adulthood), are at a crucial phase for the development of a healthy lifestyle, norms, and beliefs [15], it is important to inculcate active transport (walking and cycling) as a transferable healthy behaviour from childhood to adulthood [16]. This will help transition them from their current car-centric culture to adopt sustainable transport modes like cycling in adulthood. Stark et al. [17] stressed the importance of this approach by stating that people start forming perceptions of different forms of transport at a young age.

Despite efforts by local and national governmental authorities to reduce carbon emissions by increasing cycling, the level of cycling in various cities in the UK remains low, with a few exceptions of certain localities like Cambridge and Oxford [18]. Nonetheless, the repetitive school trips, high bicycle ownership, and school proximity, especially since "*three quarters of children live within a 15 min cycle ride of a secondary school*" [1,19], presents a unique opportunity for adolescents to improve the level of physical activity through cycling. Currently, only 3% of secondary school adolescents in England cycle to school, while approximately 60% use motorised transport to school (including 27% car/van travel; 12% private bus; 19% local bus; 2% surface rail) and 34% walk to school [19]. Hence, the need for research on cycling to provide an evidence-based approach to understand the factors that influence adolescents' cycling [20]. The factors influencing adolescent travel are not well understood [21]; therefore, a proper understanding of these factors can help increase cycling rates among adolescents in various localities [22]. This research aims to fill this gap by enquiring into factors influencing cycling from the perspectives of stakeholders promoting cycling among secondary school adolescents.

2. Materials and Methods

2.1. Study Area

This study was conducted in Birmingham city, located in the West Midlands region of England. The city is currently the second largest city in the United Kingdom, with an estimated population of 1,141,816 in 2019 [23]. Figure 1 shows the location of Birmingham, situated in West Midlands.

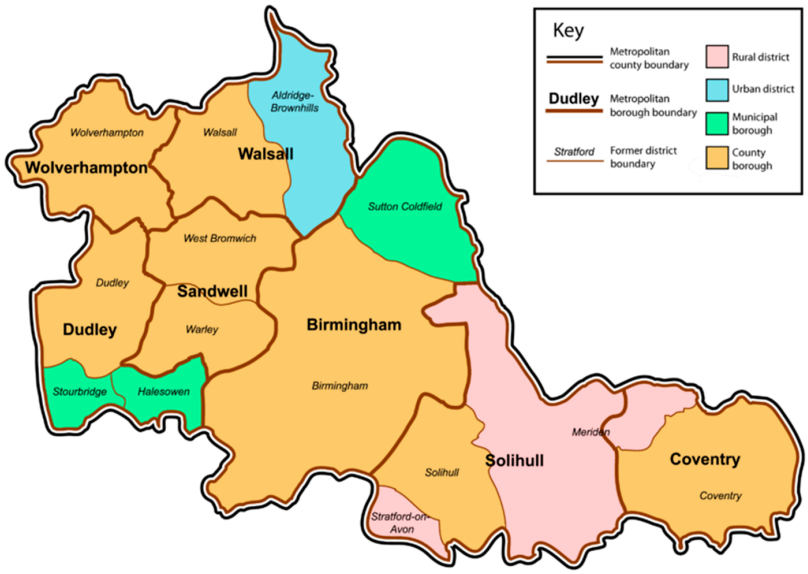

Figure 1. Map of West Midlands showing Birmingham.

Birmingham city adapted the West Midlands cycling charter, which presents a vision to increase the level of cycling in the West Midlands from a base line of 1% of all travel to

5% in 2023 and 10% in 2033 of the modal shares [24]. Currently, only 1% of school children (5–16 years) in West Midlands cycle to school [25].

2.2. Sampling

A combination of purposive and snowballing sampling was carried out based on the inclusion criteria: participants must be familiar with promoting cycling among secondary school students and must be currently working or have previously worked on promoting cycling among secondary school adolescents in Birmingham. Organisations promoting cycling in Birmingham were identified through an internet search. Information sheets containing the purpose of the study were emailed to the organisations. Interested organisations responded by suggesting individuals within the job role of promoting cycling to secondary school adolescents. Interview time and location was agreed with participants who agreed to participate.

2.3. Data Collection and Analysis

A total of 14 local transport stakeholders (policy and regulation stakeholders (n = 3), cycle instructors (n = 5), and non-governmental organisation stakeholders (n = 6)) agreed to participate. Interviews were conducted between January and September 2019. The interviews lasted between 20–40 min and were audio recorded after their verbal and written consent was collected. The study was approved by the University of Birmingham Ethics Committee.

The recorded data was transcribed verbatim. Transcripts were transferred into NVIVO 12 (a qualitative software) for analysing the data based on thematic content analysis [26,27]. The five levels of the socioecological framework, consisting of individual, interpersonal, organisation, physical and environment, and governmental factors provided a framework for the data analysis [28,29]. The socioecological framework has been widely adapted in various studies to understand factors influencing human behaviour, especially in health-related studies [30,31]. The socioecological framework shows that individual behaviours are influenced by multilevel factors such as intrapersonal, interpersonal, organizational, physical environment, and policies. Figure 2 shows the socioecological model adapted for this study [29,32].

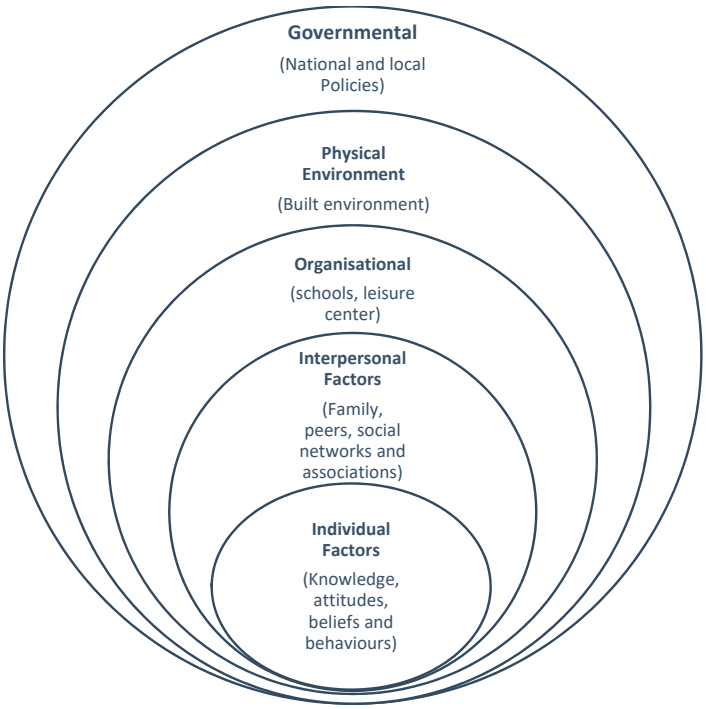

Figure 2. The Social Ecological Model based on Bronfenbrenner [28] adapted from the [33].

3. Results and Discussion

3.1. Individual Factors

3.1.1. Adolescents' Herd Mentality

One of the personal factors that affect adolescents' use of cycling for utility relates to the mentality of adolescents. While it can be argued that such mentality can be identified in both adult and adolescent cycling behaviour, participants in this study highlighted that adolescents have "*herd mentality*", which is a *moral tendency [among adolescents] . . . than among adults to do, and to be seen to be fitting in with crowds*. Within the body of literature, herd mentality has been described as a tendency to be influenced by 'group norms' rather than individual 'perception' [34–36]. This 'conformity behaviour' stems from a desire for a 'sense of security' and 'less criticism' [34]. Therefore, the prevalence of herd mentality among adolescents can either impede or facilitate cycling among adolescents, as they might choose to use the bicycle for "*hanging around with their friends*" (Participant 9) or decide not to participate in cycling activities because their friends are not participating. As a means of addressing the challenge that herd mentality poses, [34] recommends that the positive impact of adolescents' herd mentality should be harnessed, while the negative impact can be reduced by fostering 'independent thinking' among adolescents. Harnessing the positive impact of herd mentality among adolescents can be achieved by promoting cycling among friends and adolescents within similar social groups. This implies that adolescents who are inclined towards cycling should be encouraged to form social groups that support cycling, as this will help encourage other adolescents to engage in cycling, and such social groups can help sustain their budding cycling behaviour.

3.1.2. Enthusiasm of Adolescents towards Cycling

Another factor identified is the appeal of cycling to adolescents. Most participants alluded to the stance that cycling is not necessarily the coolest thing for secondary school adolescents; therefore, they have little or no interest in cycling. This was highlighted by Participant 4 who stated that "*[although] cycling is not the most uncool thing in the world [it is] not necessarily the coolest*". Another participant mentioned that "*youngsters at [this] age [don't] want to [cycle] anymore; they just want to do other social things*", which means that "*many teenagers will not [choose cycling as] a transport choice . . . [but would rather] cycle [as a way] of hanging around with their friends*" (Participant 9). Further stressing this point was another, who submitted that "*a lot of [children at that age] are into social BMX biking*". As a result, selling the idea of cycling to adolescents is quite difficult. Participant 1 noted that "*it is quite a difficult sell [because] . . . it's a time in [their lives when they are] becoming more independent and it's quite difficult to capture secondary school adolescents' attention with something that is perhaps not that exciting*". Participant 5 also supported this stance by stating that " *. . . at [a] younger age, [adolescents] will do whatever you tell them [but] at the secondary school age, they'll say 'I don't want to do that'*".

As such, addressing barriers to cycling requires strategies to improve adolescents' interest in cycling. According to Participant 2, cycling initiatives should include "*fun stuff [that will] attract adolescents to actually take part [in cycling, e.g.,] some kind of competition*". Another strategy that can be aimed at increasing adolescents' interest in cycling is the use of incentives that have the potential to motivate secondary school adolescents to cycle. For instance, "*[schools can have] cycle clubs [and/or give] stickers for riding to schools and prizes*", opined Participant 7. In addition, adolescents can be given reward points at school if they cycled to school, and then those points could be used in the tuckshops, suggested Participant 6. Because the reward is tangible, this initiative might motivate adolescents to cycle. Supporting this idea were Participant 8 and Participant 2, who stated that "*[adolescents want] a treat, an extended break time, free bike locks [or] some kind of incentive scheme*"; therefore, it is important that initiatives provide some form of tangible benefit or reward to adolescents to be effective.

3.1.3. Lack of Cycle Training

The interviews provided further insight into the low level of cycle skills among adolescents, which creates a need for cycle training as an intervention for increasing the uptake of cycling for utility among adolescents. Sadly, it was noted that there is a lack of cycle training, which contributes largely to the low level of cycling among adolescents. This lack of cycling is impacted by two other factors: lack of adolescents' interest in cycling classes and a limited number of bicycles. Participants associated the lack of adolescents' interest in cycling classes with the fact that "*some secondary children find [cycle training] quite tedious [because it is a continuous] drill on the road*" (Participant 1). The lack of interest in cycle training makes facilitating cycle training '*hard work*' for the cycle instructors as a result of resistance from adolescents. To ensure cycle training is appealing to adolescents, participants suggested that cycle training should not be compulsory for adolescents, and the cycling training session should be used to increase the appeal of cycling to adolescents by incorporating fun into the training program such as "*[marrying cycle training with] a bit of BMXing, to appeal to the fun and the excitement of secondary school children*" (Participant 1). Therefore, one way of increasing adolescents' uptake of cycle training is to first increase their interest in cycling, as this will, in turn, increase their interest in cycle training.

3.1.4. Access and Condition of Adolescents' Bicycles

Access to bicycles and the conditions of adolescents' bicycles were additional factors identified by participants as having an impact on adolescents' use of bicycles for utility cycling. Some participants mentioned that some adolescents do not have bicycles, and certain groups of the population "*might not have access to bicycles*" (Participant 3). While some adolescents do not have bicycles for reasons other than inability to afford a bicycle, others from deprived areas might have difficulty getting access to bicycles due to constraints associated with their economic situation. Participant 4 stated "*bicycles aren't cheap*", and the associated cost of safety equipment is "*almost never ending*". Participants suggested that adolescents will be more inclined to want to be associated with expensive bicycles, as they won't want to be seen on a "*shopping bike*" or a bike that doesn't "*fit the image*" they want to portray. To address the concerns of adolescents' access to bicycles, participants cited and suggested various schemes already initiated within the city to make bicycles available to children. Some of these schemes included the '*bank bicycles*', '*bike libraries*' and '*bike sharing*', developed to support adolescents who cannot afford a bike. Furthermore, schemes such as bike sharing systems have proven to be efficient in reducing road congestion and air pollution [37,38]. In addition, bike sharing systems increase the likelihood of bicycle adoption by reducing the need for individuals to purchase bikes [39].

3.1.5. Sweat and Uniforms

Another barrier noted by participants is the concern around adolescents arriving at their destination covered in sweat. Participant 8 highlighted that adolescents were concerned about arriving at school "*all sweaty*", which might demand the need for changing into fresh clothes. Apart from the fact that some secondary schools do not currently have facilities that support adolescent "*clean up or [change] fresh uniform to change into*", adolescents were less willing to take extra clothes for changing into to school because "*[they] don't have time to get changed when [they] get to school, [and it increases the] hassle of [carrying] all the stuff [they] already have to carry*" (Participant 8).

Further to sweating as a barrier to cycling, participants also noted that [cycling] "*in a school uniform is difficult for some kids, [and this] depends on the school uniform. Some school uniforms are more flexible than others, some [uniforms] are very smart with the tie*". In addition, "*[some adolescents] have to wear a skirt as part of [the] school uniform*", which might create a barrier to cycling (Participant 1). Further to this, in situations where it is not possible to modify the nature of the uniforms, a case has been made for schools to provide facilities that allow adolescents to change into their uniforms after getting to school.

3.1.6. Gender Imbalance

The issue of *gender imbalance* in cycling among adolescents was highlighted by participants. For instance, Participant 8 mentioned that the "*majority of the children cycling are boys*" and Participant 1 also stated that "*[there is] a drop off generally in physical activity [among teenage girls, which is] the same for cycling*". This imbalance in gender representation for cycling was associated with several factors, which were identified by the respondents. One of such factors relates to girls' concern about their image and appearance. Participant 5 highlighted that girls might be discouraged from cycling because it "*messes their hair*". Another factor relates to the type of uniform some girls have to wear to school, as some uniforms might not be ideal for cycling. This was highlighted by Participant 1 who noted that girls might "*[be] self-conscious*" if they had to cycle in skirts. Participant 9 also echoed "*the concern of fashion, [as] skirts may be [a] barrier for girls*". A study conducted in New Zealand also identified 'uniform requirements' as a barrier to cycling, especially among female adolescents [40]. They further highlighted the constraints the school uniforms—especially for females wearing skirts—impose on their perception of cycling, and associated cycling with a masculine activity [40]. Similarly, in a 2010 focus group study conducted in some public schools in Australia to gain a deeper understanding of the reasons adolescent girls give for withdrawing from physical activity, Slater and Tiggemann (2010) also found that females perceived physical activities as "masculine". Girls' concerns about cycling may stem from the fact that females are more concerned about their 'appearance and image' and being 'teased' while engaging in physical activities, including cycling [41,42].

Furthermore, some participants highlighted the social implication that cycling to school might have for girls. Participant 8 touched on this by submitting that "*[girls] cycling would mean that they [aren't] socializing on their way to school [because if] all their friends are walking and they're cycling, they're not going to be chatting to their friends*". A study in New Zealand also found that "cycling to school provided less opportunity for socializing with friends" [43]. This underscores the role interpersonal factors play in the adoption of cycling by female adolescents. The same point was highlighted as one of the factors that influenced cycling by females in a study conducted by [42], where it was stated that female adolescents were influenced to cycle by their friends and parental norms. From these studies, it is clear that, for female adolescents, socialising on the way to school is important; therefore, devising a means whereby they can be encouraged to collectively cycle in groups would serve to stimulate the adoption of cycling as a social activity that can be enjoyed with friends.

Moreover, gender inequality among adolescents in physical activities including cycling has been identified in several studies (Frater and Kingham, 2018). The results are consistent in several developed countries, with findings highlighting a drop-off in female adolescents' participation. It is quite interesting to note that this drop-off is a similar trend among female adults, with [19] reporting fewer female adults using bicycles for trips. Grudgings et al. [44] noted that females were less likely to cycle in low cycling countries because they often require an additional favourable environment to cycle than males. The factors influencing gender inequality in cycling are often multifaceted [45]. Some of the factors identified in the literature include geographical, socioeconomic, demographic, and infrastructural factors [46]. For instance, Carroll et al. [46] found females were more concerned about cycling distance. Pontes et al. [47] found that gender difference in physical activities was more noticeable in the U.S. among ethnic minority female adolescents in comparison to white female adolescents. This is in accordance with findings from Steinbach et al. [48], who found that gender and ethnicity play a key role in influencing the uptake of cycling. In addition, some studies found that cycling infrastructure preference varied with gender; for example, a study in Australia found that while men preferred cycling on roads, women were more likely to prefer off-road cycling [49]. Grudgings et al. [44] suggested female cyclists' needs should be considered when planning and designing cities. Thus, policies that foster gender equality when promoting cycling adoption are paramount.

3.1.7. Image

Participants highlighted adolescents' concerns about their appearance, noting in particular that wearing a *Hi-Vis (High Visibility Vest)* and *helmet* while cycling was a barrier to the uptake of cycling (Participant 10 and 11). Although helmets are instrumental in reducing the risk of brain injury in the event of accidents [50], and their use has been mandated in countries such as Canada and the United States [51], the use of helmets has been cited as a barrier to adolescents' cycling [52,53]. As Molina-García et al., [52] noted, "one in five adolescents perceived helmet use to be a barrier to cycling to school". This might result from adolescents' negative perception of their appearance when using a helmet as recounted by Participants 10 and 11: "*I'm not gonna look good in it*"; "*I am going to look like an idiot*"; "*it doesn't look cool*". By focusing on how they look in helmets, adolescents ignore the importance of helmets for their safety. Incidentally, [54] found that adolescents are less likely to be aware of the amount of protection helmets provide to them. Therefore, stakeholders seeking to encourage cycling among adolescents need to emphasize the importance of wearing appropriate cycling gear. While some studies have suggested that 'enforcement' of helmet wearing should be accompanied with 'education and awareness' [55], research has also found that bicycle helmet laws can reduce the adoption of cycling by adolescents [56]. Therefore, the emphasis should be on education and awareness to reduce the potential or perceived negative impact of helmet laws on the uptake of cycling. This is also important as it can help curb the negative influence peers' lack of use of helmets has on adolescents [57].

Given that adolescents are at a crucial stage in their development, where image and appearance are considered crucial factors [41], it is important to have role models who can show that you can still be cool while wearing helmets. For instance, Participant 10 pointed out that adolescents' concern about their image may have resulted from the role of "*social media [in promoting how] young teenagers should look*", as "*young people are still sort of searching . . . and discovering their own identity*" (Participant 2). Therefore, changing the narrative on social media can be leveraged in creating an appetite for cycling in the correct gear among adolescents. This can be achieved through various strategies, such as having a social media cycling challenge that focuses on awareness and education or getting celebrities and social media influencers to model appropriate cycling gear, as this can help take the un-coolness out of wearing safety gear like helmets. In addition, the role of parents as role models cannot be over-emphasised, as research has found that "the strongest predictor of child helmet use is adult helmet use" [58]. Therefore, "modelling of helmet use by parents is an effective strategy to promote children's helmet use", as children are almost 40% more likely to always wear their helmets if adults always wear theirs [58].

3.2. Interpersonal Factors

Family Influence

In line with previous works by [59], participants underlined the influence of the "*family culture*" on adolescents' cycling. In particular, respondents from the focus group highlighted that "*[adolescents] will be willing to ride [their bicycles] if their parents are really interested in riding*". Corroborating this stance were Participants 9 and 1, who submitted that "*[adolescents] are influenced [to cycle] by [their] parents*", and "*what [they] are told or what they see at home*". The overriding submission was that family history and a tradition of non-cycling were to blame for the adolescents' lack of interest in cycling. Arguing that when children journey from early childhood through adolescence and have never witnessed their parents ride a bicycle or encourage them to, then it becomes easy to "emulate" what is evident, as the legacy of cycling has not been passed down.

The influence of family culture, especially parental support for cycling, has been identified in the literature. For instance, [59] argued the importance of understanding parental perception of barriers to cycling to school as they influence adolescents' transport choices. Furthermore, participants highlighted parental reluctance to support their children cycling as a result of apprehension stemming from safety concerns. Concerns include

the level of traffic on the roads, the perception of cycling as dangerous, and inadequate infrastructure to support cycling. For example, one of the participants noted that "*if the parents don't perceive cycling to be safe . . . letting their kids go out on their bike on their own to get to school [and] if there's a big road in the middle, they will be scared of that and so might want to discourage [their] kids from cycling. So, parents' concerns are definitely an obstacle*". Participants argued that because the roads around most of the schools are characterised by being a bit small, busy with lots of traffic, and lacking the necessary cycling infrastructure, parents would rather not want to go through the anxiety of imagining what accidents could result from their children cycling in such road conditions and therefore discourage them. "*Parents might feel it's so dangerous, because the perception is, you know, it's dangerous, something might happen to them, not just whether they get knocked over by a car, just because of crime, perhaps that might actually, may make parents feel more wary about letting their teenagers [out]*", they argued. Parents concern for safety has been highlighted as a major barrier to adolescents' cycling; although this age group participate in transport decisions, their parents still have a great influence in their decision to cycle [60].

Curiously, the study highlighted that even when parents do not cycle, they still run with the belief that cycling is unsafe. This disposition will eventually play out in the amount of support they give to their children. Sometimes, these concerns continue even after their children have been taught to cycle. Participants argued that children might not cycle anymore after they have "*done extremely well at [the] bike training, resulting in their confidence [dropping] further until they eventually end up being either non-cyclists again or someone who is scared to go on the roads*". At other times, parents are alleged to outrightly withhold their support for their children to be adequately trained to cycle by refusing to grant consent. Among many possible reasons that could be responsible for this is the impression that the children could be "*taken advantage of*" by their instructors. This lack of trust in the instructors was thought to be a barrier influencing parents' lack of support for their children's cycle training.

Another factor emerging from the interview was the influence of the parent's social class on cycling. Participants alluded to the fact that certain societal classes might be more willing for their children to cycle. Saying, for instance, that "*we find that in sort of middle-class areas it's probably a lot of fear from the parents that their children, something's going to happen to them if they go out by themselves on the bike, so they just drive them [in cars] everywhere. [On the other hand], we find in more working-class areas, a lot more kids around on bicycles just in the local roads and so on*".

It is noteworthy that participants also highlighted measures they thought could help address the issue of negative parental influence. It was opined that creating avenues to educate parents on the safety and benefits of cycling would help improve their perception of cycling being a dangerous act. Participant 6 suggested that, "*[educating] parents, [showing] the parents it's actually good for their children [to cycle and] it's not that dangerous and [to also] get parents to join in as well*" would help in this regard. Furthermore, "*going in [to] speak to children and parents at parents' evenings and transition events, [to] talk face to face with people inside . . . is the way to go with behaviour change for this age group, and if you try and do it any other way, i.e., put stuff online, etc., you're only scratching the surface*". This face-to-face education and engagement of parents will avail them the opportunity of knowing about available infrastructure like cycle paths and welfare facilities like showers, among others. Other ways parents' perception could be improved is to engage both parents and children in promotional programmes and events, such as family cycle rides where both are encouraged to ride together. As mentioned by a participant, "*in getting children to ride to school, you need to get the parents riding to work so they can ride to school with the kids, then ride off to work*". This point would be mostly valid only when the children are junior school-aged-children, because it has previously been established that the older adolescents become, the more "uncool" cycling for school travel appears to them. This was a point mirrored by some participants, who opined that "*if you think of a family bike ride, you probably [should] think of parents with junior school-aged children but senior school, whether they'd still want to go on a bike*

ride with the parents . . . ". Other schemes, such as a cycling bus, were also suggested by the participants. Participants explained that this involved "*parents doing a rota system, where they pick up [their children] at a point, having cycled from school until that point of pick up*".

To improve cycling safety, participants suggested an improvement in cycle infrastructure, such as cycling routes and clear road safety signage. They suggested that there was a need for "*cycle lanes up to the schools, because some of our schools are on, like, off-road cycle networks or not far from it, unless you've gotten a link between the off-road cycle network and clear signage, clear places, where kids can cross safely across the road. So, [it is] probably better to have cycle routes that connect up to the school*".

3.3. Organisational Factors

3.3.1. Limited Access to Schools

Schools have been identified as the main hub where adolescents can be reached by cycling stakeholders, but "*getting through the door*" is difficult. This difficulty faced by cycling promoters when attempting to gain access to secondary schools, according to respondents, was due to a number of reasons. One of which was the bureaucracy involved in getting communication and feedback from school administrators and managers. Other reasons alluded to were that schools focused more on curricular than extra-curricular activities; the academic workload allows little to no time for extra-curricular activities and fun. Furthermore, "cost" was also seen as a factor, because schools consider the financial implication of committing academic staff to participate in cycling promotional programmes at the expense of their primary assignment of teaching.

3.3.2. School Safety Concerns

Participants emphasised that concern for the adolescents' safety by head teachers and school administrators was another organisational factor inhibiting the adoption of cycling. A reluctance to support and promote cycling activities was borne out of the concern for the impact that an adolescent having a cycling accident would have on the school. Beyond the concern for the school's possible battered public image is the concern for the safety and health of the adolescents. It could be argued that such concerns and reservations are understandable considering the fact that when parents send their children to school, they have invariably entrusted the care of their adolescents to the school. In addition, because the adolescents have the tendency to have fun without applying caution, especially when outside the school premises, school managers (administrators and head teachers) are wary of complaints that might come from local residents around the school.

3.3.3. Influence of Teachers Motorised Transport Choice

Another factor that was identified to have an impact on the adoption of cycling by adolescents was the role teachers' preference for motor vehicles played. The subtle socio-cultural influence of using motorised transport to get to school was strong. Participants in the focus groups submitted that, should adolescents find "*40 bicycles parked in the school's parking lot*" day in day out, with the head teacher being one of the owners of the bicycles, it would have a compelling influence on the adoption of cycling by them. Studies have shown that children learn better through emulation rather than by instruction.

Conversely, however, having someone (or people) of influence within the schools to promote cycling would have a positive impact, leading to the adoption of cycling by the adolescents. This was reflected during the interviews. When asked about suggestions on the ways the highlighted challenges could be overcome, participants opined that to counteract the social influence of staff use of motorised transportation to school, on the adolescents, there is a need to have a cycling champion among the members of staff or school management. This is because management wields greater influence. This champion would advocate for cycling adoption, set up cycling projects, and serve to motivate adolescents to adopt the cycling culture. Furthermore, if the practical adoption of cycling was inculcated into the Physical Education (PE) curriculum, with PE teachers actively involved in cycling

promotion activities, adolescents would have the opportunity to learn how to cycle within the school environment, thereby increasing their interest and further strengthening their cycling ability as a consequence.

3.4. Physical and Environmental Factors

Three physical and environmental factors were identified. These factors include limited cycling infrastructure, concern about the concentration of traffic, and attitudes of motorists around school areas.

3.4.1. Concerns around Cycling Infrastructure and Attitude of Road Users in Birmingham

Concerns about the infrastructure in place to support cycling were a recurring factor in the participants' submissions. Participants maintained that because paths were not wide enough for pedestrians and cyclists, with parking issues everywhere, "*cyclists are not wanted on the pavements or on roads*". This inadequacy of available infrastructure posed a barrier to cycling. Many studies have identified the importance of providing adequate infrastructure that supports cycling [61,62]. This infrastructure includes but is not limited to cycle lanes, road markings and signs, and trip-end facilities (e.g., parking facilities), among others [63]. This infrastructure is usually required at the beginning of the trip, in the course of the trip, and at the end of the trip [63]. Emphasising the insufficiency of cycle lanes around Birmingham schools, a participant submitted that "*the environment to get to every secondary school isn't cycle friendly, you have to go against the tide to choose to cycle. [The roads are] small, busy [with] lots of traffic and no cycling infrastructure . . . segregated cycle infrastructure in Birmingham, and commuter routes are not designed to go to schools*" (Participant 9). The need for more and better infrastructure was emphasized, and particular mention was made of the need to design the infrastructure to be specific to the user's need. It was, however, stated that this intervention is *very difficult* due to the limited financial resources available and rights of land ownership. This is a challenge because facilitators do not own the land and they themselves do not have adequate money to improve infrastructure. Nonetheless, participants emphasized the need to "*[create] decent cycle paths [so adolescents] could [use] quiet roads [for] part of the journey, [and] use the cycle path to get to the busy parts*". It was suggested that the cycle paths should connect up to the schools, with clear signage, street lighting for adequate illumination of the road at nightfall, and clear places where kids can safely cross the roads.

Another concern highlighted by participants is the concentration of traffic outside the school gates. This factor has been discussed by Hopkins and Mandic [40], who highlighted the increased safety concerns around school areas as a result of the traffic concentrating around the school environs. A participant submitted that "*traffic [usually] concentrates outside the school, [especially during] drop-off and pick-up times [thus making the] school gates a very dangerous point for cyclists and pedestrians*". This is consistent with the assertion of Hopkins and Mandic [40] that pick-up and drop-off times intensify traffic on the road network as a consequence of parents/guardian commuting. Participant 8 recounted seeing "*children almost [get] hit by cars reversing in a very tight space without using the mirrors at rush hour [and drivers making] U-turns in a dangerous place [around school areas]*".

In a bid to alleviate these safety concerns, it was mentioned that some roads close to schools are painted with "*double yellow lines (a cautionary measure)*" to prevent parents from parking close to the schools; however, it was also highlighted that "*unless there is someone there vigorously enforcing compliance by ticketing people, people just ignore it*". This creates a case for educating drivers, especially parents, on the reason for having this measure and the risks of disregarding it in the environment around schools. To avoid any accidents, participants suggested that traffic wardens could be situated around school environments. Having traffic wardens only serves to encourage a temporary behaviour change, which only reverts to the status quo once the wardens leave; therefore, a more sustainable measure would be the deployment of targeted education for all parent-drivers.

3.4.2. Distance

Distance was also cited as a barrier that impedes adolescents' uptake of cycling for utility purposes. In this study, short distance and long distance were highlighted by participants to prevent adolescents from cycling. Participants opined that adolescents who lived close to schools found it to be too much of a hassle to get their bicycles ready to make the short trip to school. Participant 8 noted that "*the secondary school adolescents I've spoken to there, often don't cycle to school because they perceive that they lived too close to school to cycle, it's too much hassle for them to get their bike out of the garage, get on it to cycle to school and then lock it up at the other side, they think that's too much*".

Conversely, when the school is further away from the adolescents' accommodation, travelling a long distance on a bike to school can serve to discourage cycling. This long distance was identified as a barrier. Interestingly, a few were of the opinion that distance might not really be a barrier, suggesting that adolescents will be more likely to cycle if it was enjoyable. If "*[the journey] is an enjoyable, safe, and comfortable journey, then [cycling] six miles along a green track with no other traffic could be a pleasant experience and quite enjoyable, but if it's four miles through busy traffic and across a lot of hazardous roundabouts can feel a lot longer*", submitted Participant 2.

3.4.3. Weather

Concerns about weather were identified by participants; however, this was not extensively discussed. Several studies in the literature have reported bad weather as a barrier to physical activities [64,65], including cycling [66]. However, Tremblay et al. [67] noted that weather might not be a major barrier to active transport in adolescents. However, participants highlighted the difficulty of cycling with uniforms in the rain. Participant 4 described these concerns by highlighting the concerns about *books, [and] laptops* getting wet. Therefore, strategies to help adolescents adapt to bad weather are necessary to mitigate this barrier [64].

3.4.4. Safety Concerns

Although safety concerns are a major barrier to cycling [68,69], Participant 5 highlighted "*[secondary school] children are quite fearless and do not have fear or apprehension [for cycling]*". Participant 8 agreed by highlighting that adolescents are less concerned about their safety and might be "*a bit reckless when it comes to cycling . . . because a lot of the kids like doing stunts*". Participant 5 also expressed concerns regarding adolescents' unsafe behaviour during cycle training, stating "*one lad [while] doing his national standards bikeability . . . got his mobile phone in one hand and he's riding with the other and [he was] supposed to be looking at the traffic . . . he was good at riding, it's just he wanted to do it his way which wouldn't have been the safe way*". Participants further highlighted, however, that concern for adolescents' safety will depend "a bit" on their ages. The older they are, the more they become susceptible to peer pressure, and when their peers promote at-risk behaviours, indulging in them becomes easy.

3.5. Governmental Factors

In this segment, factors relating to policy and other government-related factors were identified. The absence of specific policy, irregularity of funding, and an insufficiency of cycle training instructors could negatively affect the adoption of cycling as a means of travel by adolescents. These factors identify the need for government to create an enabling environment that will make it easier to adopt cycling as a means of travel. An enabling framework that will help set a clear social objective for intervening as well as the necessary financial support will allow for the adoption of cycling as a means of transport for the sake of sustainability.

3.5.1. Nonexistence of Specific Government Policy

One of the identified factors tied to direct influence of government on the adoption of cycling by school adolescents is the inexistence of specific government policy. Although government policies that promote cycling generally do exist, there has yet to be any geared towards promoting cycling among secondary school adolescents directly. Participants submitted that the current policy is very generic and does not differentiate between age groups. A cursory look at the existing policy shows that the focus is more on developing sustainable public transportation rather than getting secondary school adolescents walking and cycling.

This issue can be addressed by understanding the possible reasons for the nonexistence of government policy targeted towards adolescents. Respondents opined that there was a need for government to "*start from scratch*" in order to better understand what the issues are and then develop a policy or policies that draw out relevant actions.

3.5.2. Irregularity of Funds

Closely linked with the nonexistence of a specific government policy was the irregularity and inadequacy of funds to promote cycling. Participants identified this as a major challenge hampering the promotion of cycling. Funding for cycling initiatives have been limited, and where there is some funding, it is usually inconsistent, with the flow described as "patchy". The presence or absence of adequate funding can serve as a motivating or demotivating factor for staff involved in promoting cycling. The morale of staff is usually affected when funding to sustain planned activities around the promotion of cycling is not forthcoming, as this affects the sustainability of planned activities and programmes. When morale is low, the quality of work performed by staff also takes a hit. The lack and irregularity of funds to support cycling have been reported in the literature. Ref. [70] opined that low investment in England in cycling infrastructure might result in the goal of doubling the cycling rate been being missed in 2025. In contrast to other European countries, the rate of investment in cycling in England is low [70]. Low investment could result from various factors, such as antagonism from the public [70].

There are a number of reasons for this irregularity of funding. One is the "intense" competition for limited government resources. Several cycling organisations within the country all bid to access the same funds, which other mechanised transport modes bid for as well. When these funds are disbursed, priority is given to other modes of transportation over cycling, especially when the various counsellors representing the districts place a greater value on other modes of transportation than on cycling within their regions. So, when counsellors who have a strong say in the allocation of scarce resources do not share the same sentiments towards cycling as cycling promoters, then cycling may not get adequate funding. While crucial work around the development and promotion of cycling has been done by volunteers, the impact of these volunteers could be enhanced by a greater involvement of government through targeted funding.

Interestingly, even though some participants argued that Birmingham was better off in terms of funding for cycling when compared with other local authorities, the consensus was that the funding was inadequate and irregular, especially for supporting cycling activities and the development of cycling networks in Birmingham. The development of new cycling infrastructure is a capital-intensive project, as noted by the participants; therefore, pending an upward review of funding, there is a need for a proper assessment, monitoring and evaluation, and maintenance of the current infrastructure.

3.5.3. Insufficiency of Cycle Training Instructors

In addition to the aforementioned governmental factors, participants also highlighted concerns about the inadequate number of cycling training instructors as a barrier to cycling among adolescents. This insufficiency was highlighted in reference to the number of instructors required to facilitate the teaching of Bikeability Level 3 to adolescents in secondary schools. This is because, unlike Bikeability Level 1 and 2, which can be taught with fewer

instructors, Bikeability Level 3 requires more instructors to maintain the expected levels of staff–adolescent ratio, because this training is usually conducted on busy roads and thus requires a higher number of instructors supervising the adolescents. One downside to this is that schools are only able to offer this training to a small group of adolescents at a time rather than a whole class as a result of an inadequate supply of instructors.

To address the challenge of the inadequate supply of cycling instructors, participants opined that PE teachers could be trained to become cycling instructors so that they are equipped to facilitate cycle training among adolescents. This eliminates the need to wait for the city council to supply the schools with Bikeability instructors. Another solution proffered to reduce the pressure caused as a result of the Bikeabilty instructor shortage is for schools to involve parents who are willing to volunteer to join the team of cycle training instructors after undertaking full training.

3.6. Participants' Perspective on Non-School Cycling

In the course of the interview, participants also spoke on factors influencing adolescents' adoption of cycling for non-school travel, albeit in lesser detail than they did for school travel. They opined that this was due to the focus being mostly on "*getting more children to cycle to and from school*". Although school travel is a repetitive travel, which adolescents make weekly and thus amounting to an enormous amount of travel, it can be noted also that adolescents have significant amounts of travel after school and during the weekend as well. These trips provide an enormous opportunity to increase adolescents' physical activities if converted to cycling [71]. Non-school travel reduces the concerns of traffic hassle that exist for school travel. Attempting to promote cycling in adolescents for non-school travel after school and during weekends would be the "hardest to sell", as submitted by some of the participants. Bearing this in mind, it should be noted that despite the added challenge of accessing adolescents in non-school locations to promote cycling by stakeholders, promoting non-school cycling fosters "socializing" among adolescents, without the clothing barrier of wearing of school uniforms, because they are at liberty to wear whatever they deem fit.

Promoting the opportunity for leisure (cycling adventures), which cycling provides, will help to increase its adoption in non-school travel, as one respondent submitted. Young people love to have fun; therefore, promoting cycling for leisure can increase adolescents' interest in cycling. However, the possibility of adolescents adopting cycling due to its recreational appeal is not well known, as there are no works in this area in the literature.

From the interviews, it can be deduced that cycling requires a tactical comprehensive approach to ensure the continuous adoption and sustainability of initiatives. This was substantiated by a participant, who remarked, "*setting up projects is easy; it's keeping them going [that is] the really difficult bit. [Promoting cycling] has to be a combined effort of everything together; if you did just one of these things it doesn't seem to add up continually*". Efforts both at national and local government levels have been made to ensure a continuous growth of cycling; however, these strategies and schemes tend to be 'patchy', with an inadequate 'methodological approach' to ensure the sustainability of the projects. To increase cycling trips among adolescents, continuous efforts and a combination of the aforementioned strategies are required.

4. Conclusions

This study presents findings from the interviews conducted with local transport stakeholders in Birmingham promoting cycling to secondary school adolescents. The factors highlighted by participants further reiterated the fact that the factors influencing adolescent's utility cycling are multifaceted and interrelated. The multifaceted nature of factors indicates a combination of multi-layered initiatives and strategies will be required to increase cycling trips.

The interviews also reveal that stakeholders promoting cycling among adolescents are familiar with the barriers and enablers for adolescent cycling, especially for school travel.

However, as aforementioned, the inadequacy of available resources (such as funds and expertise) limit the promotion of cycling. Furthermore, participants agreed on most of the barriers and enablers; however, there were slightly divergent views on the enthusiasm of adolescents towards cycling. It was also observed that the area of expertise of the stakeholder informed the barriers and enablers they focused on. For instance, participants in the bike training category and from NGOs were more familiar with barriers and enablers of cycling for secondary school adolescents and provided a more robust perspective on adolescents' utility cycling; however, participants in the policy and regulation category had less experience promoting cycling among adolescents and therefore focused mostly on limited resources (funds and expertise) and the needed policies. This might be as a result of these individuals having less direct contact with adolescents. Thus, to ensure the effectiveness of strategies and policies that foster utility cycling among adolescents, relevant stakeholders with in-depth experience in promoting cycling among stakeholders should be incorporated.

To encourage cycling among adolescents, it is imperative that local authorities and cycling organisations focus on ensuring adolescents' interest in cycling is increased, especially females. In addition, infrastructure that supports safe cycling, such as well-marked and segregated cycle lanes connecting residential areas to schools, is crucial to reducing parental safety concerns, which may further impede adolescents' adoption of cycling as a mode of transport. Moreover, consistent funds should be allocated to ensure the continuance of cycling promotional activities for adolescents.

The research was conducted in Birmingham, UK, which is a megacity with significant cultural diversity. Findings from this study may be adopted in cities in both developed and developing countries. Lastly, it is important to highlight that the data used were collected pre-COVID-19; therefore, the findings are a reflection of what was obtainable before the pandemic. With the present changes occasioned by the COVID-19 pandemic, it is possible that some of the identified factors may have been altered; activities geared towards promoting cycling among adolescents (secondary school) should be carried out within COVID regulations.

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