Mad or Magnificent? Mothers Who Cycle With Their Children in The UK

Rahman, Dawn

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Mothers Who Cycle With Their Children in The UK

Dawn Rahman

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Declaration of Authorship

I, Dawn Rahman, hereby declare that this thesis and the work presented herein is entirely my own and it has not been submitted for any other degree or professional qualification. Where I have consulted the work of others, this is always clearly stated.

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Acknowledgements

This thesis is dedicated to all the **magnificent** mothers who are cycling with young children in the UK.

I am indebted to all the women and mothers who shared their time, thoughts, passion and on occasion their frustrations of their experiences cycling in the UK with their young children. And of course, my own son who inspired this research in the first place.

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Prologue

At the age of 17, I took what was generally considered a rite of passage for most teenagers and signed up for driving lessons. Upon passing my test soon after, however, I was not in a financial position to own a car. Instead, I continued to either travel by foot, bicycle or public transport. Fast forward thirty years and I still don't drive. I have been lucky enough to work and reside in places where I can rely on getting around predominantly by bicycle but also by foot and public transport, with the odd lift from car driving friends and family when necessary.

Having moved to Warwickshire in 2011, I found out I was pregnant. My husband and I immediately started looking at suitable ways in which I could transport our child around by bicycle. After much research we opted for a front carrying tricycle cargo style bike and we made our first outing when my son was 7 weeks old. I cycled extremely slowly, avoiding any noticeable bumps on the roads and cycle paths. I was so cautious, that it probably would have been quicker to walk. However, within a few weeks my speed and confidence had increased in abundance. The freedom my cargo bike provided me with as a non-driving mother was an absolute joy.

Nonetheless, I had to choose routes carefully. Whilst the area in which I live has a relatively good network of protected cycle paths, many of them feature guard rail barriers at regular intervals along these routes. This meant that although they were often the safest routes to cycle on, I had to continually get on and off to manoeuvre my bicycle around them. In some cases, I couldn't get through them at all. In these instances, I had to ride on the road instead to reach my end destination. Although I am a confident cyclist there was always a slight reticence to take my child onto busy roads for fear of being involved in a collision or being judged or criticised for putting my child in danger.

It occurred to me that when my son was a baby, I rarely saw other mothers cycling with young children in the area. From discussions with friends and uninvited comments from strangers (everyone has an opinion on a woman cycling with a young child it seems), my mode of transport was deemed slightly odd and in some cases was criticised as being dangerous. **"Are you mad?"** someone once shouted at me as I cycled past them. Whilst unwelcomed it was not completely unexpected. As someone who has always cycled as their main mode of

transport, it wasn't a surprise to find negativity associated with cycling. Furthermore, it is fair to say I also had many positive comments.

In the last few years, I have noticed more mothers cycling with their children in the area, but it is still quite uncommon. My personal experience leads me to surmise that cycling with a young child is hard, albeit rewarding work. It's not just something you do; it takes effort, money, and careful planning. If it's something that you want to do regularly, then it feels like you must be really committed to the cause. You need the right type of equipment and somewhere to store it at home. You can't always take the most direct route from A to B and you need to have the skills and perhaps more importantly, the confidence to cycle with a child.

As children reach various milestones you must adapt how you ride with them. The benefits of a child carrying cycle such as a cargo bike or trailer means you are in charge and can ride on most infrastructure, although you may have to think carefully about the routes you choose to avoid various physical barriers. However, once a child progresses to riding their own cycle, this brings a whole new set of challenges, primarily, keeping them safe. Routes often have to be handpicked; in that you need to feel confident that you and your child can navigate them without unnecessary danger.

Despite the efforts needed to cycle with a young child, the benefits are numerous. It's great exercise for them, you are able to chat freely with them (most of the time) and cycling through different seasons are great teachable moments about how nature changes throughout the year. On the downside, you are frequently required to negotiate issues which are outside of your control. These include careless driving from others, sub-par road surfaces and physical barriers, all whilst supervising a small person that can easily get distracted by their environment. At times cycling with a young child can feel like a gargantuan undertaking, and that's without dealing with what the British weather has to throw at you!

As such my experiences both positive and negative since I've been cycling with my son have left me intrigued to find out how other mothers are traversing the challenge of cycling with young children. Are my experiences typical of others riding in the UK? Do other mothers have to plan where and when they can ride with their children? Do they feel judged? Inspired by

my own experiences of cycling with my son, the following research seeks to better understand the practice of mothers cycling with children in the UK with children aged 11 and under.

Abstract

Whilst much research has been carried out looking at the relationship between women and cycling, less is known about the experiences of mothers cycling in the UK with their children (aged 11 and under) for utility journeys. This study uses social practice theory as its framework, in particular, the Shove et al. (2012) three element model is employed to show the different materials, meanings and competences used in the practice of mothers cycling with their children in the UK.

A mixed method approach was pursued including 3 focus groups with 10 women who work in the cycling industry. The findings from the focus groups helped shape a survey which was distributed via social media and completed by 1,351 mothers. In addition, 30 semi-structured interviews were conducted with respondents of the survey, carefully chosen to represent mothers using different cycle configurations, varying number of children and living in different geographical areas of the UK.

Cycling practices were constantly adapted by mothers to deal with different infrastructure types, weather conditions and as their children grew. Many mothers purchased additional equipment to make their practice feel more comfortable and safer for themselves and their children. This included materials to keep themselves and children dry and warm, such as waterproofs, rain covers and items to make themselves more visible such as flags, high visibility clothing and stickers attached to their cycles.

Mothers expressed a preference for infrastructure which was separated from motorised forms of transport, such as shared use paths and protected cycle paths but also quiet roads. However, many mothers had to navigate barriers such as guard railing or other obstructions on shared use routes, which often caused issues for those using non-standard cycles such as cargo cycles, trailers and child seats.

The mothers taking part in this study were very committed to cycling and expressed the joy of cycling with their children. Nevertheless, negative incidents when cycling, such as verbal abuse, careless and dangerous driving and sub-par infrastructure were common. These incidents frequently left mothers questioning their choice to cycle with their children due to concerns about safety. However, because the majority of mothers were highly motivated to

cycle, in most circumstances they were able to rationalise the negative experiences and continue with their practice.

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Chapter 1: Introduction

A UK Cycling Revolution?

"Since last year, cycling in England has risen by 46 per cent – the greatest increase in postwar history. Cycling has increased by more in this one single year than it did over the whole of the previous 20 years…Hundreds of new schemes have created safe space for people to cycle and walk, supported pubs and restaurants that might otherwise have closed, and allowed us to get the exercise we need. For decades we mourned that children no longer played in the street. Now once again, in some places, they do"

Boris Johnson, Prime Minister (Gear Change: One Year on) 2021 (Department for Transport, 2021a)

Boris Johnson, often known champion of the bicycle paints an optimistic picture on the state of cycling in England in 2021. He makes these claims in the foreword of the government's latest update on the 2020 published 'Gear Change' policy for walking and cycling. This document, backed up with funding to ensure "Actions, not just words" (Department for Transport, 2020b,8) aims to create a step-change in cycling (and walking) in England.

Similar sentiments to encourage more cycling can be found in policies developed by the other nations of the UK. The Northern Ireland Assembly published their 25-year active travel strategy "Changing Gear" in 2015, alongside funding to enable more cycling in the region (Department for Regional Development, 2015). Scotland's Active Travel Framework (2019) aims to bring together previous policy approaches to cycling (and walking) in Scotland and sets out strong targets relating to cycling to be achieved by 2030 (Transport Scotland, 2020). Furthermore, the Welsh Assembly's Active Travel Act, published back in 2013, was recently refreshed with new guidance published in July 2021 to provide clearer information on design standards for cycling and increased funding for active travel in Wales (Llywodraeth Cymru, Welsh Government, 2021a).

The documents noted above appear to show that all the nations appear to be in consensus regarding active travel, but will Boris Johnson's claims that cycling has seen a substantial rise, combined with these ambitious policy documents cement cycling's role as a viable mode of transport in the UK, finally be realised? There certainly appears to be a groundswell of political support for cycling, prompted by concerns over climate change and more recently the Covid-

19 pandemic highlighting the importance of a healthy nation (Buehler and Pucher, 2021; Morley, 2021). Cycling is regularly promoted as a means to tackle issues around both physical and mental health, various social inequalities, air quality, congestion and to help boost the economy (Department for Transport, 2021a,8). A plethora of schemes including cycling parking, cycling infrastructure, electric bicycle hire schemes and campaigns to encourage more cycling can be found across the UK implemented by a mixture of local authorities and grassroot organisations. In several cities, high profile Active Travel Commissioners and Bicycle Mayors have been appointed to better represent the needs of cyclists.

A growth in the implementation of Low Traffic Neighbourhoods (LTNS) or Active Travel Neighbourhoods and School Streets across the UK, also appear to be helping facilitate a growth in active travel modes, including more cycling (Chivers, Wong and Preston, 2019; Aldred and Goodman, 2020; Department for Transport, 2021a). The Cycle Superhighways in London, with design standards that mirror those of the infrastructure found in countries with high cycling levels, has undoubtedly helped the recent growth in cycling across many inner London boroughs (Haojie et al., 2018; Transport for London, 2020). Some areas such as Cambridge, Oxford, Edinburgh and many of the inner London boroughs routinely have a modal share of between 10-40% for cycling as a form of transport (Cycling UK's Cycling Statistics | Cycling UK, nd).

It is also hoped that the introduction in 2020 of Local Transport Note (LTN) 1/20 which sets out guidance for local authorities to design high quality and safe cycle infrastructure might ensure some consistency of cycle infrastructure being implemented. Indeed, in relation to the implementation of cycling infrastructure, which has in the past been of varying standards, the current government has inferred that funding will not be forthcoming for (English) local authorities unless schemes are ambitious and result in noticeable modal shift (Reid, 2020).

Alongside the political support, the public appetite for cycling is also widespread. In 2019, national cycling organisation Sustrans surveyed just under 17,000 residents living in twelve of their Bike Life Cities, which include cities from all four nations of the UK (Sustrans, 2019,3). The Bike Life reports set out to assess cycling by looking at measures such as infrastructure and travel behaviour and the impact of various cycling schemes. They found that 77% of those surveyed, favoured the implementation of physically separated cycle tracks to aid more cycling, with support dropping only slightly to 68% if it meant road space had to be taken

away from other traffic/vehicles (ibid,5). Also of interest, more people wanted increased investment into cycling, with 58% in favour compared to 42% wanting more money invested into measures that aid driving (ibid).

A government opinion poll taken by Ipsos Mori in June 2021 also shows 75% support for "encouraging people to walk or cycle instead of driving a car" (Marshall, De Lucia and Day, 2021,6). Nonetheless, there is a large proportion of the population that remain unconvinced by cycling as a viable mode. The 2019 Walking and Cycling Statistics for England put together by the Department for Transport found that 28% of those surveyed had no interest in cycling at all and 51% did not think there were any measures that would encourage them to cycle more (Department for Transport, 2020a).

A UK Cycling Stalemate?

During the past five decades, successive governments have pledged to increase the numbers of cycling in the UK via different schemes and measures. However, cycling policy has repeatedly faltered since an acknowledgement that it was needed in the 1970s, when a realisation that growing car use and a corresponding drop in cycling rates came to be seen as a policy problem (Golbuff and Aldred, 2011,3). This has led to the national average for utility cycling journeys in the UK remaining at just 1-3% of all trips for the last fifty years (Spotswood et al., 2015; Department for Transport, 2020a, 2021d).

It is evident that whilst in some areas cycling is thriving, this does not apply equally across the UK. In some cases, those areas with higher numbers of cyclists are by design. That is, there has been a concerted effort to enable cycling with the implementation of high-quality safe cycling infrastructure by local authorities. In other areas it may be more to do with a cycling culture that has allowed cycling to flourish, even in the absence of specific infrastructure (Aldred and Jungnickel, 2014; Lam, 2018). And in other places, it is a mixture of both.

Boris Johnson's recent rally cries of success may also need to be re-considered. In 2020, the number of miles cycled on the roads in England did increase by 46%, the highest number since the 1960s (Department for Transport, 2021, 14). Whilst there are no figures available for Northern Ireland (Robson, 2021), in Scotland, a 47% increase in cycling occurred between March 2020-2021 from the previous year (Cycling Scotland, 2020) and Wales also saw a 68.4%

increase in cycling during the same period (Llywodraeth Cymru, Welsh Government, 2021b). However, this can largely be attributed to the strict lockdown in the UK due to Covid-19, with stay-at-home orders for all, except key workers and where cycling was one of very few permitted activities allowed each day between March and July 2020. That all other forms of transport saw substantial decreases in trips and miles during 2020 reinforces why there was such an increase in cycling rates (Department for Transport, 2021d; Llywodraeth Cymru, Welsh Government, 2021b). Accordingly, hopes of a 'bike boom' may have been premature.

After the initial lockdown in March 2020, traffic levels quickly returned to pre-pandemic levels and by Autumn 2020, cycling rates had done the same (Vickerman, 2021, 97). In some cases, they were even lower, presumably due to a drop off in commuting with high numbers of employees either working from home or being on furlough (ibid). Perhaps even more worryingly, a government commissioned report predicts a possible 51% increase in road traffic volumes (by non-active travel modes) between 2015 and 2050 (Department for Transport, 2018,6).

Moreover, whilst support for cycling may be high, as a mode of transport it is still viewed negatively by many in society. Mainstream media regularly encourage the narrative of pitting car drivers against cyclists (Sustrans' Research & Monitoring Unit, 2019). Similarly, social media accounts describe anecdotal images of the roads being a battleground and a hostile and vitriolic environment between car drivers and cyclists. Cyclists are often painted as reckless, annoying, disorderly citizens that run red lights and don't pay road tax (ibid). Likewise, in some communities, cycling is seen as something that only children or those who can't afford a car do (Aldred, 2015a; Motherwell, 2018). In addition, those who cycle, ride at speed on pavements endangering pedestrians, or conversely cycle slowly, holding up other traffic (Aldred, 2015a; Sustrans' Research & Monitoring Unit, 2019).

This negativity also extends to cycling being viewed as dangerous which in turn is reinforced by those who are cycling. For example, video evidence from cyclists running cameras on their cycles of dangerous overtaking, or aggressive behaviour towards them is commonplace on forums such as X, Facebook and YouTube. Whilst both social and mainstream media can be accused of (at times) overhyping issues, it is evident that cyclist do regularly deal with close passes and aggression from other road users (Aldred and Crosweller, 2015; British Cycling, 2019). Indeed, in the past few years many police forces across the UK have begun actively

encouraging road users to submit camera evidence of careless and dangerous driving, “Data accessed by consumer car magazine WhatCar? via Freedom of Information requests to every UK police force revealed more than 52,000 pieces of footage have been submitted since 2017” (Fossdyke, 2020), validating cyclists claims of dangerous driving around them.

Fatalities and serious injuries of cyclists also increased by 21% between 2008-2018, although it is important to note there was a change in reporting systems which occurred during this period. That is, where previously each police force independently operated its own data collections system, the Department for Transport and Home Office established a standardised tool for reporting, called CRASH- Collision Recording and Sharing) which seeks to ensure police forces collect data in the same way (Department for Transport, 2020a). Consequently, changes to this new system may have initially skewed results from the previous systems. Similarly, an increase in miles cycled per person may also have affected these results (ibid). Nevertheless, whilst more people may be cycling, the conditions in which they do so are not necessarily ideal.

Cycling Diversity

Based on so much conflicting information, it is sometimes hard to judge whether cycling is increasing or static. The evidence put forward often appears ambiguous. Whilst there are some promising signals that cycling is growing in the UK, it is clear that there is still much to be improved upon. As highlighted previously, annual travel surveys for all four nations continue to show utility cycling remains at 1-3% of modal share, with cycling as a mode not having increased above these levels for the past five decades (Department for Transport, 2015, 2018b, 2020a). It is also clear that there are issues relating to the diversity of those riding bicycles. That is, cycling is not evenly distributed between socio-demographic groups. Lower numbers of females, children, older people, disabled, lower income and those from ethnic minority backgrounds participate in cycling compared to young white males (Steinbach et al., 2011; Aldred, Woodcock and Goodman, 2016a).

For instance, evidence is available relating to the socio-economic backgrounds of those who cycle in the UK. A report by Tortosa et. al (2021) using 2017 data from the National Travel Survey found that in England, people in the lowest quintile (1st), cycled less for utility journeys and commuting than people in higher income households (Tortosa et al., 2021). Similar

findings have been shown for Scotland, Wales and Northern Ireland (Parkin, Wardman and Page, 2007; Sustrans, 2022; Transport Scotland, 2022) where those in lower income groups cycle less than those in higher income quintiles.

Similarly, existing literature suggests that cycling rates amongst ethnic minority groups are extremely low in the UK, particularly amongst women (Department for Transport, 2018b). Steinbach et. al (2011) have collated data from Transport for London sources illustrating the difference between male and female and ethnic background cycling levels in London (see Table 1) below. This not only demonstrates the low numbers of those cycling from ethnic minority groups, but also the differences between genders, with far fewer women cycling compared to men in London.

Table 1
Percentage of adults who are cyclists by ethnicity.

Ethnicity[a]	Men		Women	
	2001	2005–2007	2001	2005–2007
White	3.4%	3.6%	1.3%	1.6%
Black	1.9%	1.4%	0.1%	0.2%
Asian	0.9%	0.8%	0.1%	0.0%
Other/Chinese	2.1%	2.3%	0.7%	0.5%
Total	2.9%	3.0%	1.0%	1.2%

Source: Transport for London, LATS 2001, LTDS 2005–2007.
[a] Aggregated from self-identified UK census categories.

Table 1 Percentage of adults cyclists by ethnicity Steinbach et al., 2011, p1124

Encouragingly, data from Transport for London has recently shown a definite narrowing of the gap between white and ethnic minority Londoners using bicycles, demonstrating, "Black, Asian and ethnic minority people are not significantly less likely to have cycled in the last 12 months" compared to those from a white background (Transport for London, 2021, 6). For instance, in comparison to 28% of white Londoners having used a bicycle in the past 12 months, the figures for those from ethnic minorities are not much lower- 24% for Black Londoners, 25% for Asian and 31% for Mixed/Multiple backgrounds (ibid). It is thought that the rise of those from ethnic minority groups cycling in London can be attributed to a combination of factors. These include the increase in protected cycle routes in the capital but also due to changing travel patterns as a result of the Covid-19 pandemic (Transport for London, 2021).

Nevertheless, the disparity between the number of women and men who cycle for utility purposes in the UK remains an issues, both in London (as demonstrated in Table 1 above) but also nationally. In the most recent annual travel survey (2021), the gap between male and female cycling highlighted that men undertake four times as many cycle trips as women and cover 4 times as many miles (Department for Transport, 2022b). The reasons for such low numbers of women cycling will be addressed briefly below, and then further in the Literature Review .

However, of particular interest for this research, is the numbers of mothers cycling with their children in the UK. Although there is no specific category in the National Travel Survey assessing the number of mothers riding with their cycling, the low level of both women and children cycling for all utility style journeys means it is possible to extrapolate that mothers riding with their children in the UK, for everyday journeys is particularly uncommon (Department for Transport, 2022b).

The important topic of ethnic minority, lower income and disabled people's cycling are covered to some extent in the Literature Review and are worthy of further research, particularly in relation to issues such as the barriers preventing them from cycling and what is needed to increase cycling levels within these groups. However, they are not specifically covered in this research.

Motherhood and Cycling With Children

When looking at the issues facing mothers cycling with their children, it can be assumed that there will be many parallels to those experienced by women. Much research has already been undertaken on gender and mobility, especially looking at the relationship between women and cycling. The Literature Review covers a more detailed analysis of the explanation given for fewer numbers of women (than men) cycling in countries such as the UK, Australia, Canada and the United States (often termed 'low cycling countries' due to the low number of utility cycling journeys made). These include, women's fear of cycling with other forms of motorised traffic, fear of harassment in public spaces and time management issues due to women having to work in paid employment, alongside shouldering a disproportionate share of care duties such as childcare, household errands and escort trips (Hanson, 2010; McCarthy et al., 2017; Prati, 2018).

However, whilst gender and cycling has been well researched, there is currently limited literature on motherhood and mobility, despite acknowledgment that the presence of children affects how mothers travel (Boyer and Spinney, 2016; McCarthy et al., 2017; Gilow, 2020). Even less is known about mothers who cycle with their young children for utility journeys, highlighting a substantial gap in literature on the experiences and barriers mothers face, particularly in the UK.

Journeys Carried Out by Mothers

The Office for National Statistics (ONS) estimate that approximately 7 million households in the UK, in 2019, have at least one child under the age of 14. Included in this amount, 2.9 million of these are lone parent families, with lone parent mothers accounting for 86% of that category. The number of mothers in the UK with young children is not an insignificant figure and how these women undertake journeys with their children should therefore be of importance.

The most common types of trips mothers carry out with their children tends to vary depending on the age of the child. For pre-school children (under the age of four), regular trips undertaken might include visiting baby clinics, medical appointments, baby groups, and formal childcare such as nurseries and pre-schools (Primerano et al., 2008; Barker, 2011). They might also comprise of trips to parks, shops and visiting friends and family. Some of these trips would be made daily and others on a more ad hoc basis.

For primary school aged children (between the ages of 4-11), the weekday journey to and from school would constitute a regular fixed trip. Other trips might include travelling to after-school activities such as sports and music clubs. Likewise, as with pre-school travel, journeys could also include trips to parks, shops and visiting friends and family outside of school hours (Primerano et al., 2008; Barker, 2011; Mackett, 2013). Whilst the types of trips mentioned above will not be carried out exclusively by mothers, research shows that in general mothers carry out much higher numbers of escort journeys than fathers or other caregivers such as grandparents and childminders (Mackett, 2013; Department for Transport, 2014; McCarthy et al., 2017; Criado Perez, 2019).

The Challenges of Travelling With Young Children

Often the focus in transport planning is "that mobility is purely instrumental, a derived activity undertaken for the sake of getting from A to B" (te Brömmelstroet et al., 2017,2). However, this fails to acknowledge the various complications facing mothers when travelling (Boyer and Spinney, 2016; Thomas, 2016). For instance, not only do mothers have to contend with navigating transport system primarily designed for male patterns of travel (see Literature Review), but they must also do so with additional complexities- children. Indeed, the National Childbirth Trust (NCT) even dedicates a section on its website providing 'top tips' and advice on how to travel with children across all travel modes to help avoid stressful situations (National Childbirth Trust, nd).

Many feminist writers saw women's mobility as powerful, empowering and even joyful (Hanson, 2010; Howat, 2017; McCarthy et al., 2017). And in many cases, it can be. A number of studies have been carried out looking at the use of cars to escort children and highlighted how time spent driving with children was a source of enjoyment (Dowling, 2000; Barker, 2011; Waitt and Harada, 2016), "I love driving them... it's a good catch-up with the kids...it's the only time you can actually pin them down and they can't escape" (Waitt and Harada, 2016, 1093).

Similarly, mothers cycling with their children, has also been shown to be an enjoyable activity (Eyer and Ferreira, 2015; McIlvenny, 2015; Thomas, 2016; Ravensbergen, Buliung and Laliberté, 2019a), "Oh, they love it! I wish I could capture the glee. They like it because the bucket is in front … they really like being in the front and having the wind in their face, and I think they also love the assist because Mommy can go kind of fast in a way that I didn't before when I was hauling all that weight [behind my conventional bike]. So, they get a kick out of that" (Thomas, 2022, 642).

However, it is also important to note that travelling with young children can alter the dynamics of mobility (Boyer and Spinney, 2016; Thomas, 2016; Gilow, 2020). Boyer and Spinney's (2016) research with young mothers found, "…we were struck by the extent to which the journeys we encountered were marked instead by slowness, discomfort, premeditation, and feelings of exhaustion (if not dread)" (Boyer and Spinney, 2016, 1114). It is widely acknowledged that travelling with children can be stressful, regardless of mode and

requires organisation and the ability to carry a lot of things. Journeys with pre-school children often entail a selection of "baby-detritus (pacifier, nappies, wipes, change-mat, sun hat, rain gear, change of clothes, bottle, possibly small toys, snacks)" (Boyer and Spinney, 2016, 1120). Whilst the need for 'baby-detritus' (ibid) may wane for primary school aged children, they too commonly require a range of accoutrements such as books, folders, sports kit, and musical instruments (Dowling, 2000; Jain, Line and Lyons, 2011).

The physicality of travelling with children, especially for mothers with more than one child can also influence how they travel. Babies and very young children's own lack of physical mobility or inability to travel independently often requires a need to be carried by sling, pushchair, car seat or bike seat/trailer (Boyer and Spinney, 2016,). As children grow older, whilst most are physically able to move independently over longer distances, in many cases they will still be accompanied on trips by an adult (Mackett, 2013).

Existing Research on Mothers And Cycling

Whilst some research exists on mothers who cycle with their young children for utility journeys in countries with high cycling levels such as the Netherlands, Germany, Denmark and Sweden (Pucher and Buehler, 2008a; Wardlaw, 2014; Eyer and Ferreira, 2015; Boterman, 2020). There appears a substantial gap in literature on the same topic in those countries with low levels of cycling, with the exception of some recent research carried out on mothers cycling with their children in the US and Canada (Riggs and Schwartz, 2018; Ravensbergen, Buliung and Sersli, 2020; Sersli et al., 2020).

Whilst there is limited data on the numbers of mothers cycling with their children in the UK. There are however a growing number of social media pages dedicated to providing help and information for family cycling. Two of the most well established include the 'Family Cycling' Facebook page (with over 18,000 members) set up by cycling campaigner, doctor and mother of three, Ruth-Anna Macqueen, plus the Cycle Sprog website which was set up in 2012 by parents Karen and Chris Gee and has since grown to become a full time occupation for Karen, and now has a number of employees to help run the busy and popular website (Cycle Sprog, 2021). Incidentally both Ruth-Anna Macqueen and Karen Gee have featured in Cycling UK's '100 Women in Cycling 2019', for their campaign work for cycling with children (Cycling UK, 2019b, 2019a).

As previously mentioned, although data on mothers cycling with their children in the UK is sparse, patterns of bicycle sales can also help point to subtle changes in family cycling demographics. This includes the growth in sales of cargo bicycles for family use, with approximately 2,000 new bikes sold in 2020 (Bolton, 2021). A survey of electric bicycle users in the UK undertaken in 2019, highlighted a very small number of women switching to such bicycles to help assist with the additional effort needed to carry small children (Melia and Bartle, 2021). However, the same study also showed that most electric bicycle users in the UK are primarily existing bicycle riders who have switched to electric from conventional bicycles, so at present time are not attracting previous non-cyclists to take up cycling as a mode (ibid). Nevertheless, in 2020, electric bicycles made up to one fifth of all new bicycle sales across all retailers in that year (Mintel, 2021), showing a substantial growth in the e-bike market and an area of growth that should continue to be monitored, particularly in relation to the usefulness of electric bicycles for carrying children.

Additionally, a demand for all types of bicycles in the UK occurred in 2020 due to the popularity of cycling during the initial Covid-19 lockdown period. Retailers such as Halfords saw a 50% growth in sales on bicycles in 2020 (Mintel, 2021). However, due to supply issues caused by a mixture of problems related to both Covid-19 and Brexit, demand for bicycles outstripped supply, resulting in a thriving second-hand market as well (ibid). Initial research during the pandemic showed a spike in cycling, particularly during the stricter lockdown measures in the UK between March and July 2020. Some believe that higher numbers of women started cycling during lockdown as a result of the quieter roads, however currently there is no data on the numbers of mothers cycling with their children during the pandemic (Buehler and Pucher, 2021; Morley, 2021).

The Research

Andrea O'Reilly posits, "the category of mother is distinct from the category of woman, and that many of the problems mothers face—socially, economically, politically, culturally, psychologically and so forth—are specific to women's role and identity as mothers." (O'Reilly, 2019,13). Pedersen (2016) also believes mothers experience inordinate levels of scrutiny by society for actions they undertake whilst parenting (more so than male parents) (Pedersen, 2016). These factors combined with evidence that mothers continue to carry out higher

numbers of escort trips than fathers or other family members (Hanson, 2010; Sanchez de Madariaga, 2013; Prati, 2018) highlights that mothers often have distinctive experiences of parenting.

Whilst acknowledging that many fathers or other people with childcare responsibilities may be cycling with young children in the UK for utility style journeys and potentially experience similar barriers and issues that mothers face, this research will focus solely on the practices of mothers cycling with primary school aged children aged 11 and under. Children of primary school age has been chosen, on the basis that most children under 11 will be accompanied by an adult for most journey purposes in the UK (Shaw et al., 2015,5), albeit some exceptions may occur.

A particular gap in existing research includes an understanding of the differences between bicycle configurations and the various issues mothers face when using either; 1) 'child carrying bicycles' such as cargo cycles, child bike seats or trailers added to an adult bicycle and 2) 'independent cycling', that is where mothers and children cycle together but each person rides their own bicycle. There are also gaps in research relating to the issue of cycling with multiple children of different ages and abilities. Moreover, whether geographical location may impact the ability to cycle with children, looking at the differences between cities, suburban and rural areas. For instance, it is possible, because of the contrasts in infrastructure, variability in speed limits and the ubiquity (or otherwise) of other cyclists in certain areas, that mothers will face different issues and experiences based on where they live in the UK.

As mentioned above, previous research on the links between cycling and gender in the UK have sought to understand why lower numbers of women cycle than men. Accordingly, over the past few decades, the issues preventing higher cycling rates amongst women have been extensively researched. Interestingly, the barriers cited have changed little over time. These will be looked at in more detail in the Literature Review. Research on mothers cycling with their children in the UK, however, is not commonplace and subsequently there is a gap in current literature on this topic.

Therefore, the aim of this research, is to explore the practices of mothers cycling for utility journeys with their children in the UK, to help understand the practice better in terms. In

particular this study will explore if mothers use or need specific types of materials to cycle with their children. Additionally, what meanings they attach to their practice-both positive and negative. Furthermore, if they require particular competences such as skills or know-how to be able to cycle with their children and how these might differ to those required when cycling on their own. It will also examine what factors might cause mothers to stop cycling with their children either temporarily or permanently and finally, given that so few mothers currently cycle with their children, what needs to happen for more mothers to take up the practice of cycling in the UK.

Research Questions

Given the current lack of information on the practice of mothers cycling with their children in the UK, this research will be guided by the following questions:

1) What are the materials, meanings and competences in the practice of mothers cycling with their children in the UK?
2) What are the main ways in which links between the three elements are at risk of becoming broken, with regards to the practice of mothers cycling with their children in the UK?
3) How would materials, meanings and competences need to change for more mothers to take up the practice of cycling with their children in the UK?

Chapter 2: Literature Review

Introduction

This chapter is split into two main sections. The first section **'Gender and Mobility'** addresses definitions of mobility and gender and why women's patterns of travel in Western European countries are different to those carried out by men. It does this by looking at the gendered nature of trips and how the design of transport systems does not always suit the needs of women. It also looks at the issue of harassment. Whilst harassment in public spaces takes many forms based on characteristics such as disability, sexual orientation or ethnicity and can be directed at both men and women, for the purposes of this section, the focus will be on how women's experiences of harassment when travelling in the public sphere can affect how they move from one place to another. This section completes by focusing specifically upon the relationship between gender and cycling, addressing issues as to why so few women cycle in certain countries such as the UK, compared to countries with high cycling levels where women cycle in equal (and in some cases higher numbers) than men.

The second section **'Mothers and Mobility'** focuses specifically on mothers and their unique experiences of mobility. This will consider different parenting styles and notions of 'good parenting' and how these relate to mobility, including judgement of mothers by wider society for their transport choices. It will address how mothers' patterns of travel have changed over the years and highlight some of the difficulties of travelling with young children, particularly when trying to juggle work and caring commitments and the need to carry out multi-stop trips. It will also look at existing literature pertaining to mothers and cycling, in particular focusing on infrastructure preferences when cycling with children and issues that arise in terms of safety and visibility. The skills needed by mothers using child carrying cycles as opposed to independent cycling will also be addressed. Finally, it considers if care duties and trip chaining are compatible with cycling.

Gender And Mobility

In Chapter 1 of the book Gendered Mobilities, which addresses issues around gender, mobility and social justice, the complexities around definitions of gender and mobility are highlighted,

"The concept of gender does not operate in a 'binary' form. It is never given but constructed through performative reiteration. The resultant interpretations of gender are also historically, geographically, culturally and politically different, enabling a certain slippage between the different realms in terms of how genders are 'read'. This point is central to an analysis of how mobilities enables/disables/modifies gendered practices. We can use mobility both as an *archive* and *present indictor* (their emphasis) of discourses, practices, identities, questions, conflicts and contestations to understand its gendered nuances." (Uteng and Cresswell, 2016, 1).

In relation to definitions of gender, feminist scholars have long debated what is meant by this term and how the use of it in correlation with mobility should be understood. Some see gender as determined biologically and therefore undeviating. This results in gender being viewed as "an innate source of fixed and universal male/female difference" (Hanson, 2010, 8). The belief that women and men are inherently different because of their biological variations has been discussed at length by academics (Scott, 1986; Pryzgoda and Chrisler, 2000; Uteng and Cresswell, 2016; Lehmann, 2020) That is, distinctions between male and female bodies such as body shape, bone density, hormones, sexual organs can influence behaviour (ibid). However, the argument that the biological sex assigned to one at birth creates fixed gendered behaviour is somewhat problematic. For example, claims that women are more maternal, supportive and passive as a result of their biology and men are strong, masculine and aggressive are often-cited behaviours. Rather, many academics would debate that such an argument is too rudimentary in understanding the very complex nature of gender in society (Scott, 1986; Hanson, 2010; Uteng and Cresswell, 2016).

Meanwhile, others view gender as a more fluid concept, one that is constructed but can change. This is similar to the definition provided at the beginning above by Uteng and Cresswell (2016). Differences between men and women result therefore, not in relation to their biology but instead from the unequal power relations in society. Moreover, the extent to which these power relations play out vary greatly depending on factors such as age, class,

ethnicity, religion and geography (Scott, 1986). Therefore, for the purposes of this research, the definition of gender will be defined as being a fluid concept and one that is constructed by society. Hence it follows that it is this which results in unequal power relations that affects the way women behave, as opposed to biological markers. Nevertheless, whilst acknowledging that gender is a fluid concept and that other gender identities exists alongside male and female. For the purposes of this research the terms male/female and men/women will be used throughout this thesis.

There are also a number of different definitions when discussing mobility in various academic literature. For instance, mobility can include the movement of people between social classes, migration and even the range of movement of muscles within the human body (Law, 1999; Hanson, 2010; Uteng and Cresswell, 2016; Lehmann, 2020) . Hanson's (2010) definition of mobility as the "movement of people from one place to another in the course of everyday life" (Hanson, 2010, 7) appears simplistic but adequately summarises mobility for the purposes of this research.

For instance, discussions in this literature review pertain to the types of utility style journeys, distance and number of trips and modes used by women as they navigate their day to day lives. Similarly, the main focus of this research looks at the practice of mothers cycling with their children and seeks to better understand their movements (in this case using cycles) from one place to another with their children. Accordingly, future references to mobility in this thesis will be in line with the definition provided by Hanson above (Hanson, 2010,7).

Before addressing the significance of gendered patterns of movement, it is also important to consider that 'women' are not a homogenous group. Therefore, viewing mobility entirely through a gendered lens may have some limitations. Rather, gender intersects in a complex manner with other factors such as ethnicity, socio-economic status and disability. Indeed, the concept of intersectionality is raised in Penttinen and Kynsilehto's (2017) book 'Gender and Mobility', suggesting intersectionality is a more useful way of understanding how gender is tied to socio-demographic traits as mentioned above. For instance, they use the example of understanding issues that black women might face in society. Whilst feminism could address issues of sexism in a patriarchal society, some scholars would suggest that feminism is not necessarily equipped to understand issues of racism that may affect certain groups of women.

Conversely, when issues of racism are looked at, this may not always be viewed in relation to the experiences of women. Intersectionality would ensure both issues are adequately dealt with, allowing additional insights to be understood (Penttinen and Kynsilehto, 2017,9).

Using gender to understand patterns of travel also highlights other limitations in viewing women as 'one group'. It is apparent that not all travel modes are equally available to all groups of women. Of course, this argument also applies to men with certain socio-demographic characteristics or for those with disabilities. However, female specific examples are provided in this study because the main focus of this research relates to women and mothers. For instance, for some women, the only travel modes available to them may not be the most efficient or comfortable to use. Research has shown that many women from lower socio-economic backgrounds are heavily reliant on travelling by foot as their main mode of transport, due to financial constraints limiting other options. Although walking is promoted as a form of active travel and lauded for its many physical and mental health benefits, "for some segments of the population, walking is compulsory and a source of both physical fatigue and psycho-social stress" (Bostock, 2001, 11).

Similarly, the use of public transport can be an issue for women with certain disabilities, due to physical barriers such as lack of ramps and access points to aid boarding and disembarking public transport (Velho et al., 2016; Bezyak, Sabella and Gattis, 2017). Or, for those using cycles as a mobility aid, it has been found that many shared used cycle routes frequently have physical guard rail barriers or steps that are difficult to negotiate with non-standard bicycles (Gaffga and Hagemeister, 2015). Additionally, "attitudinal accessibility" (Das Neves, Unsworth and Browning, 2023, 428), where negative attitudes, behaviour, and communication, or lack of communication from public transport personnel and other members of the public can result in disabled passengers being made to feel unwelcome.

It is apparent therefore, that caution must be taken to avoid generalised statements about 'women' given the lack of homogeneity, as outlined above. Whilst my research will include, where this arises, experiences related to intersections of gender and other characteristics such as disability, this is not the main focus.

Patterns of Travel for Women

Why is mobility important to and for women? The importance of women being able to travel can be traced back to when women were previously restricted from traveling in the public sphere, unless accompanied by a husband, male relative or other suitable chaperone (Strange, 2002; Ebert, 2010; Roberts, 2015). Accordingly, the ability to travel independently can improve women's access to places which in turn can contribute to their upward social mobility through access to better employment and various services (Law, 1999; Hanson, 2010; Noack, 2011; Sanchez de Madariaga, 2013). Conversely when women have limited access to mobility this can have impacts on their rights and freedoms and exacerbate inequalities in society. As Hanson (2010) states: "…women are quite literally kept in their place by being denied access to certain locations at certain times" (Hanson, 2010,10). That is, if women can't travel, or access certain modes of transport, they risk being prevented from accessing employment or services for health or social welfare, which in turn can affect their quality of life (ibid).

There is much literature suggesting that transport systems in the UK and western societies are designed to primarily facilitate male patters of travel and as such, are in many cases, unsuitable for most women's daily travel needs (Monk and Hanson, 1982; Law, 1999; Noack, 2011; Sanchez de Madariaga, 2013; Greed, 2016; Criado Perez, 2019). To understand why transport system are gendered, it is first important to understand the types of journeys that women are carrying out.

Much research has been carried out looking at how increasing number of women have entered employment (over the past five decades) and the impact this has had on women's patterns of travel (Law, 1999; Hanson, 2010; Prati, 2018). For example, the percentage of women working in either full or part-time employment in the UK at the end of 2019, reached an all-time high of 72.4% (Office for National Statistics, 2020). This is a significant rise in the past few decades, with previous employment rates for women at 56% in 1971 (Connolly and Gregory, 2007,3). Similar figures for countries such as the US and western European countries show similar upward trends for women entering the workforce (Olde Kalter, Harms and Jorritsma, 2005; Rosenbloom, 2006).

However, whilst journey to work travel is of importance, it does not show the full picture of women's travel patterns. For instance, it fails to consider mothers and children, women on maternity leave, older women in retirement, or those who are not in employment but who still travel for various reasons (Law, 1999, 569). It also ignores key patterns of travel often distinctive to women. That is, in addition to working full or part-time, women undertake a disproportionate level of household errands, childcare and escort trips throughout the day which often necessitate the need to travel (Law, 1999; Hanson, 2010; Sanchez de Madariaga, 2013; Prati, 2018; Criado Perez, 2019).

A House of Commons briefing paper (2020) entitled 'Women and the Economy' shows that women in the UK are more likely to work part-time and in low paid occupations, such as administrative and secretarial roles, caring, leisure and other service industries (Francis-Devine, Foley and Ward, 2020,10). This is attributed to women being more likely to have to choose part time jobs or occupations that they can make 'work' around their other commitments. Research carried out in the Netherlands concluded similar, "Women work closer to home because they need to balance work and household responsibilities and promptly respond to family emergencies" (Olde Kalter, Harms and Jorritsma, 2005, 183).

Because women frequently juggle both employment and fulfilling these caring responsibilities, to do so necessitates travelling between places of employment, shops, nurseries and schools whilst carrying out various other tasks. These multiple roles often result in shorter but more frequent trips, multi-stop journeys and travelling outside traditional 'peak hours' (Monk and Hanson, 1982; Jain, Line and Lyons, 2011; Sanchez de Madariaga, 2013; Lehmann, 2020). A study in the Netherlands estimated that women can undertake up to six trips a day due to carrying out the types of journeys mentioned above (Olde Kalter, Harms and Jorritsma, 2005, 184). Similarly in London, UK "…women are three times more likely than men to take a child to school and 35% more likely to trip chain; this figure rises to 39% if there is a child older than nine in the household" (Criado Perez, 2019, 30).

In her book entitled 'Invisible Women', Criado Perez (2019) brings together previous research carried out on gender imbalances in society, including findings demonstrating a disparity in trip-chaining between men and women across Europe. In particular, how the burden disproportionately falls upon women to carry out multi-trip journeys to ensure care duties were achieved (Criado Perez, 2019,30). This became even more relevant for those with

children. The relevance of multi trips and duty of care responsibilities and their relationship to motherhood and cycling will be discussed in more detail in the following section Care Duties and Trip Chaining by Bicycle.

Given that high numbers of women are travelling for employment but also carrying out care duties, which frequently have an element of travelling due to carrying out escort trips (Sanchez de Madariaga, 2013; Criado Perez, 2019; Gilow, 2020), it is put forward that these types of trips are not facilitated by transport systems which favour male patterns of travel. The following section below will look at public transport systems, walking trips and the availability of cars for women when travelling. The relationship between women and cycling as a mode, will be dealt with in a later section.

Transport Systems And Gender

In the UK, the number of women driving has risen in the last few decades, with an increase in licences held, from 29% in 1975/6 to 71% in 2019 (Department for Transport, 2019b). Similar upward trends in Western European Countries, and the US have seen rising numbers of women holding driving licences over the past few decades (Olde Kalter, Harms and Jorritsma, 2005; Blumenberg et al., 2018). In the US, women now hold a higher proportion of licences than men, although research shows that they still drive fewer miles than men (Sivak, 2013).

However, more men hold driving licences than women and generally women have less access to cars than men, particularly in one car households. In England, just over 22% of households have no access to a vehicle at all (Department for Transport, 2022a), and single parent families in the UK, 90% of which are headed by women display "…significantly higher levels of non-car ownership than households with more than one adult" (Lucas et al., 2019). A number of studies have also been carried out regarding who gets priority for use in one car households. For instance, Blumenberg et al. (2018) in a US study, found that priority would go to the partner who was the higher income earner rather than by gender (Blumenberg et al., 2018). In the majority of cases, however, women earn lower salaries than men, so by default this would mean that men would gain access to the car in such cases (Olde Kalter, Harms and Jorritsma, 2005; Rosenbloom, 2006; Gil Solá, 2016; Costa Dias, Joyce and Parodi, 2018). Likewise, in a Swedish study, it was found that in one car families, the male partner had twice as much access to the car than the female partner. This was again attributed to male partners

generally having higher paid employment and a longer commute than their female partners (Gil Solá, 2016).

Therefore, despite an increase in women holding driving licences and carrying out trips by car, women generally have less access to cars than men, as their main mode of transport and half of low-income households do not have access to a car at all (Jain, Line and Lyons, 2011, 1609). In the absence of access to a private vehicle, many women are reliant on public transport systems. However, the design of public transport systems can also prove problematic. The Campaign for Better Transport, a national charity that campaigns to make transport improvements across England and Wales, highlight that since deregulation of bus services (outside of London), local authorities have continually reduced funding of bus services, resulting in years of cuts to local services (Campaign for Better Transport, 2019, 2023).

In addition, research carried out by Gates et al. (2019) on behalf of the Department for Transport, found these cuts disproportionately affect women as they carry out more bus journeys than men and as outlined previously, they also have less access to private vehicles than men (Gates et al., 2019, 23). Alongside service cuts affecting (some) women, Greed (2016), also discusses how the design of bus services do not always suit the travel needs of those women reliant on public transport, "Women's journeys are poorly met by public transport systems that have been designed on a radial basis funnelling workers into the centre during rush hours, and provide limited off-peak services for women, part-time workers, and a lack of transverse, inter-district bus routes" (Greed, 2016, 245).

Similar issues are found with rail travel. The design of train services is often incompatible with the types of journeys carried out by some women. This is because train networks in most western countries are unevenly distributed and gendered due to designs which favour radial, long-distance journeys as opposed to orbital, short distance ones (Sanchez de Madariaga, 2013; Criado Perez, 2019). Many train services are based on "a 'hub and spoke model' aimed at people who wish to travel into the centre of towns or cities for work in the morning and back to residential areas in the evening" (Gates et al., 2019). Hence, for those women who need to carry out multi-stop trips by train, direct routes are often limited, meaning for those women using them, they are often required to make transfers and connections. With this comes added costs. In Chicago (US), ticketing for public transport connections is contributed

with pricing those on lower incomes (particularly women) out of using them, due to having to pay each time a transfer occurs (Criado Perez, 2019, 36).

For some women, carrying out journeys by private vehicle or public transport is not an option. This may be due to financial constraints or lack of access to a vehicle or public transport service for all or some of their journeys. Therefore, in such cases, women may be reliant on travelling by foot or by cycle (women's use of cycles will be discussed shortly in more detail in the following section 'Women and Cycling'). In relation to walking, research shows that women are more likely to travel by foot than men, and more often do this with children and the paraphernalia needed to transport children such as prams and buggies (Boyer and Spinney, 2016, 1120). However, Madariaga de Sanchez (2013) points out, the types of trips carried out by foot are frequently ignored or fail to be considered as 'trips' in transport planning,

"…care trips are not sufficiently accounted for in transportation datasets. These care trips appear scattered under other headings, are uncounted, and are unnamed as such. Care trips can be hidden under other headings such as leisure, strolling, visits or other trips. Those trips made on foot and short distance trips of less than a kilometre, which are intentionally not included in many surveys, are not even counted" (Sanchez de Madariaga, 2013, 58).

Indeed, in the UK before 2016, the government annual travel surveys did not collect data on walking trips between 50 yards and one mile (Greed, 2016; Tight, 2018). Whilst a change was made to ensure that walking was seen as "both a mode in its own right and a critical part of transport by other modes – the walk to the bus stop, the walk from the car park to the office..." (Tight, 2018, 4) before 2016, the frequency of short walking trips made by women throughout the day to accomplish their various care duties was most likely underestimated.

Harassment of Women in Public Spaces

A further issues which can affect the movements of women when travelling, relates to the harassment of women in public spaces. Due to the focus of this thesis, the next section will exclusively address women's experiences of harassment when using different types of transport, notwithstanding an acknowledgment that men can also be subjected to harassment in similar circumstances.

A recent growth of campaigns on social media calling for women to share their experiences of harassment and sexual violence in public spaces appears to indicate just how prolific and universal the issue is (Kearl, 2010; Fileborn and Vera-Gray, 2017). It also suggests that women from all socio-demographics were susceptible. Although, harassment of women from ethnic minorities, transgender women, lesbians and disabled women often had an added element of racism, homophobia or ableism making their harassment experiences more complex (Fileborn and Vera-Gray, 2017, 206; Lubitow, 2017, 18-23)

Kearl (2010), in her book drawing together academic studies, news articles and interviews with female activists, discusses the apparent regularity of which women assert they have experienced verbal and sexual harassment, and in the most extreme cases- sexual assault in public spaces (Kearl, 2010). In particular, Kearl (2010), highlights that despite many women stating they have suffered from various forms of harassment, they often do not feel confident or comfortable reporting such incidents. Gekoski et al. (2015) concur, providing examples in their research on harassment on the British rail network. They emphasise how many women are unaware what constitutes harassment, due in part to the normalisation around certain behaviours. As a result, the underreporting of such crimes clouds the true extent of the level of harassment carried out. Reasons for not reporting incidents include, thinking the incident was not serious enough for the authorities to act, or not knowing who to report it to. Similarly, some women may suffer embarrassment or simply not want to make a fuss (Gekoski et al., 2015, 14).

The impact of harassment and sexual violence on women using transport systems is thought to influence a range of behaviours and strategies by women to circumvent incidents. These include avoidance, removing themselves from danger, or self-protective behaviours which aim to minimise any risks (Riger and Gordon, 1981, 83). Vera-Gray and Kelly (2020) highlight that women and girls become accustomed to modifying behaviour and giving up their freedom of movement to ensure their safety. They provide examples of women continually making decisions to avoid harassment such as, “changing routes home to choosing seats on public transport, physically reducing themselves in public, to using headphones and sunglasses as a way of feeling invisible” (Vera-Gray and Kelly, 2020, 266).

Women And Cycling

Women and cycling have had an uneasy relationship since the invention of the first safety bicycle in the 1880s. The first female users of bicycles in the late 1880s were viewed as pioneers and radicals and invoked a deep-seated fear among some sections of society that female cyclists were rejecting well established gender roles (Thorpe, 2017). The Suffragettes' use of bicycles for campaigning for women's rights further cemented the scandalous image of the types of women in society who cycled (ibid). However, the safety bicycle is also attributed to transforming the lives of women by granting them freedom to travel unaccompanied and facilitating them to 'cycle out of the domestic and into the public world' (Lister, 2017 np). Furthermore, in 1895 Suffragette leader Elizabeth Cady Stanton predicted the power of the bicycle in transforming the lives of women, realising the independence women were gaining because of this invention (Howat, 2017)

Indeed, at one point in time, women using bicycles in the UK for transport was a common practice. Pooley and Turnbull's research (2000), reviews modal choice for work trips between 1890-1989, demonstrating that women's use of the bicycle ranged between 5% up to a high of 11.7% in the period 1940-1959 (Pooley and Turnbull, 2000). Between the 1930s and 1970s it was an established practice for female factory workers to use bicycles to travel to and from work and the use of bicycles by women became popular in certain professions such as district nursing and midwifery care (ibid). However, the numbers of women cycling for utility purposes began to decline, quite dramatically post 1970s (Davis, Valsecchi and Fergusson, 2007; Golbuff and Aldred, 2011).

The next chapter discusses in more detail how a fragmented approach to cycling policy between the 1970s and current times (in the UK) has resulted in much lower numbers of cycling in the UK generally, including far fewer women cycling than men. However, the next two sections address some of the issues that are attributed to the current low levels of women cycling.

Safety When Cycling

The preceding sections of this chapter have highlighted various issues pertaining to other modes of transport such as public transport and walking. Therefore, it could be questioned why cycling, a relatively low cost, time guaranteed, and healthy travel option is not more

popular amongst women, particularly when it used to be practiced in much higher numbers. One of the most common reasons put forward for fewer females cycling in low cycling countries than males, relates to concerns about safety when cycling. For females these safety concerns can be split into two distinct categories: fear of injury from mixing with heavy traffic and fears for personal safety as discussed in the section above detailing women's harassment in public spaces (Xie and Spinney, 2018; Ravensbergen, Buliung and Sersli, 2020; Lam, 2022).

In relation to fear of injury, existing literature points towards women having a preference to ride on protected cycle infrastructure. Thereby, preventing the need to mix with motorised forms of traffic (Garrard, Rose and Lo, 2008; Heesch, Sahlqvist and Garrard, 2012; Prati, 2018; British Cycling, 2019). Whilst research shows that both men and women prefer traffic-free routes, this is more prevalent for women, "Both men and women tend to prefer separation for motor traffic; however, studies suggest that women's preferences are, on average, stronger" (Aldred, Woodcock and Goodman, 2016,33).

Other studies frequently point to the much higher numbers of women cycling in high cycling countries such as the Netherlands, Denmark and Germany. In these countries, high quality networks of protected cycle routes are common, which allow cycling to be undertaken without having to mix with motorised forms of traffic. For example, "45% of all bike trips in Denmark, 49% in Germany and 55% in the Netherlands" (Pucher and Buehler, 2008b), are carried out by women. Moreover, trips for shopping, leisure and the school run are commonly carried out by women using bicycles (Aldred, Woodcock and Goodman, 2016, 29). Accordingly, safe cycling infrastructure is often given as a reason for much higher numbers of female cyclists in high cycling countries, and an absence of protected routes to the lower numbers of women cycling in low cycling countries.

In relation to personal safety fears, there is evidence documenting harassment of female cyclists (Roberts, 2015; Lubitow, 2017; Jelly, 2019). One study carried out on women that use cargo bikes in the US, found that several women had experienced "aggression from drivers on multiple occasions (even with children on-board) and made a distinction that this experience was much different than the experience of their male partners" (Riggs and Schwartz, 2018, 105). As mentioned in a previous section on harassment of women in public spaces, where women modify their behaviour in an attempt to avoid harassment, female cyclists also make adaptations to avoid danger. This is achieved by avoiding certain areas

whilst cycling, or not cycling in certain areas after dark or on isolated cycle routes in the daytime (Roberts, 2015; Lubitow, 2017; Lam, 2018; Xie and Spinney, 2018).

Nonetheless, the types of infrastructure women prefer to cycle on, such as protected routes and low traffic routes (Prati, 2018; Sustrans, 2018b; Xie and Spinney, 2018; British Cycling, 2019) are often problematic for female cyclists. This is because when cycle routes are planned, traffic safety tends to be prioritised. However, this can unintentionally create routes that lead to personal safety concerns. For example, "priority is given to traffic-free routes even if they are isolated and may be perceived as unsafe from a social safety perspective" (Xie and Spinney, 2018, 200). Lam (2018), in her research on Quietways in London, highlights similar issues. Whilst Quietways have been hailed as ideal for women, for providing infrastructure that supports safe, leisurely paced riding. Conversely, they fail to consider that "the poor street lighting may aggravate women's perceptions of danger from crime or harassment" (Lam, 2018,15).

Nevertheless, some women have claimed they feel more protected from harassment when cycling, in comparison to other modes (Lubitow, 2017; Sersli et al., 2021). That is, they can avoid and quickly move away from unwelcome advances when cycling. Sersli et al. (2021) carried out research following the experiences of 32 women who had participated in a bicycle safety course in Vancouver, Canada. The women were interviewed in the year following their course and were asked questions regarding their views on traffic safety, navigating routes around the city and any experiences of harassment whilst cycling. Over a third of the women taking part in the study, used their bicycles at night. Whilst some of the women, were cautious about the types of routes they used at night, one participant believed, "it's actually safer for me to be biking home . . . I've had people stop me or make me uncomfortable when I was on foot. But on the bike, I just felt safer . . . because then I wouldn't have to talk to anyone. I could just go home quicker and faster" (Sersli et al., 2021,15).

A number of studies have suggested that women's reluctance to cycle, due to safety issues (both from injury and personal safety) can be attributed to women being more risk averse than men (Garrard, Rose and Lo, 2008; Heesch, Sahlqvist and Garrard, 2012; Teschke et al., 2015). However, a number of academics have questioned implications that women's lack of cycling is purely to do with risk aversion (Ravensbergen, Buliung and Laliberté, 2019a;

Graystone, Mitra and Hess, 2022). For instance, a recent study by Graystone et al. (2022) looking at gendered perceptions of cycling safety found,

"…our findings begin to dismantle the problematic stereotypical portrayal of women cyclists being naturally more risk-averse or fearful than men cyclists, and offer insights into the types of safety-related risks where gendered differences are more versus less profound. We conclude that women cyclists are likely more concerned about dangers to their personal safety, compared to men. This should not be seen as a higher level of risk aversion, as women are in fact subject to more social violence in public space (Graystone, Mitra and Hess, 2022, 11).

The assertions by Graystone et al. (2022) link back then to the notion of wider societal issues of women's experience of harassment in the public realm and how this shapes their behaviour accordingly.

Research also shows that women cite a fear of traffic, or fear of being killed or seriously injured in the absence of safe cycling infrastructure (Emond, Tang and Handy, 2009; Aldred and Dales, 2017; Xie and Spinney, 2018).In England, the Department for Transport figures show 82% of males compared to 18% of females were killed or seriously injured whilst cycling in 2013. Of course, acknowledgement must be given when using these figures that males make three times as many cycle trips as females (Department for Transport, 2015,4). Martinez Ruiz et al. (2015), also carried out research indicating higher numbers of collisions and fatalities for male cyclists (per km) in Spain, compared with female riders. Again, this was partly explained by males having more exposure as a result of carrying out more cycling journeys compared with female cyclists (Martínez-Ruiz et al., 2015, 156). Likewise, several other studies show that male cyclists in both low and high cycling countries have higher numbers of injury and fatalities than women (Teschke et al., 2015; Fotios and Castleton, 2017; Prati, Fraboni, De Angelis, et al., 2019).

However, most injury/fatality data fail to capture 'near misses' that cyclists often contend with on a daily basis. These include incidents such as close passes, being driven at, car doors opened on them, tailgating and vehicles pulling out or in front of them (Aldred, Woodcock and Goodman, 2016,72). That is, whilst cycling is not the most dangerous mode based on statistics detailing fatalities and injuries whilst riding, the regular near misses and aggression

faced by cyclists on a continual basis "contribute to perceived cycling risk as understood by current cyclists, and potentially through more indirect processes whereby others hear about or see such incidents" (Aldred, Woodcock and Goodman, 2016, 70).

Previous research conducted by Walker (2007), highlighted that drivers appeared to give female cyclists more space when passing in motorised vehicles. Walker's study saw a male experimenter wear a long feminine wig, to appear female from behind and found as a result that drivers left more space when passing (Walker, 2007,421). Reasons provided for the wider passing of female cyclists included, "motorists in general feel female bicyclists are less predictable than male riders and thus leave more space when passing" (Walker, 2007, 424). Other suggestions put forward in the report point towards female cyclists being considered frail, and out of politeness, drivers would give them more space (ibid).

However, the findings of Walker's (2015) research were at odds with a study carried out by Aldred and Crosweller (2015), investigating near misses and related issues among UK cyclists. In contrast they found, "women report 50% higher rates than men per mile cycled (with no difference per hour, or per cycle trip)" (Aldred and Crosweller, 2015, 387). The reasons given for female cyclists reporting more close passes in their research, however, was more to do with the types of trips they carried out, as opposed to their gender, "Gender was not significant, suggesting that underlying women's higher incident rates is a broader association between shorter, slower trips and higher incident rates" (Aldred and Crosweller, 2015, 384).

Although collision and fatality rates appear to be much lower for female cyclists in both low and high cycling countries (Department for Transport, 2015; Martínez-Ruiz et al., 2015; Teschke et al., 2015; Fotios and Castleton, 2017; Prati, Fraboni, Angelis, et al., 2019), it is worth considering that given women have stronger preferences for infrastructure protected from motorised forms of vehicles that this might impact on their perceptions of what is acceptable behaviour from other road users (Garrard, Rose and Lo, 2008; Heesch, Sahlqvist and Garrard, 2012; Prati, Fraboni, De Angelis, et al., 2019; Russell et al., 2021). Accordingly, further research could be conducted on whether women have less tolerance to close passes and near misses compared with male cyclists or assign higher importance to feeling 'comfortable' when cycling.

Research carried out by some academics, suggests that improved infrastructure to enable safe cycling is considered necessary to combat the fears of danger associated with cycling (Yang et al., 2010; Black and Street, 2014; Riggs and Schwartz, 2018; Shaw et al., 2020; Russell et al., 2021). Others, however, flag that that improvements to infrastructure alone, would be insufficient to see a substantial rise in cycling journeys. Rather, for cycling to flourish, there needs to be both safe infrastructure but also a culture that normalises utility cycling in low cycling countries (Daley and Rissel, 2011; Aldred and Jungnickel, 2014; Haustein, Kroesen and Mulalic, 2020; Fraboni et al., 2021). This is discussed below.

Cycling Culture

In many low cycling countries, the low numbers of women cycling, can in part be related to the image of cycling as a mode. For example, in the UK, cycling is very much considered a fringe activity and is populated with cyclists wearing specialist clothing such as helmets and lycra (Spotswood et al., 2015; Aldred and Dales, 2017; Parsons and Vigar, 2018). This specialist clothing implies it is an activity that it is dangerous and/or requires a particular level of fitness and athleticism to do it, "Hence, the perceived need to cycle fast may be disproportionately off-putting to women…"(Aldred and Dales, 2017, 349). Furthermore, research carried out on media representation of active travel modes, including cycling, found that many articles portrayed cycling negatively. Although cycling as an activity was promoted as having various benefits to health and the environment, in contrast, the portrayal of cyclists, both as individuals and as a collective, was much less positive (Aldred and Jungnickel, 2014; Spotswood et al., 2015; Sustrans' Research & Monitoring Unit, 2019).

Articles about cyclists were frequently themed around criminal acts, safety, road incidents and collisions (Macmillan et al., 2016; Sustrans' Research & Monitoring Unit, 2019). Spotswood et al. (2015) also carried out research, delving into attitudes about cycling. Both men and women were interviewed and highlighted significant differences between views on cycling for leisure compared with cycling for utility journeys. With the latter type of trips showing cyclists being the source of annoyance for other road users and negative connotations of cyclists as rule breakers, dangerous and arrogant (Spotswood et al., 2015, 27).

Does the negative portrayal of cycling and cyclists matter in relation to gender? Sustrans (2019) found an overrepresentation of articles focusing on "…the idea of the cyclist as an aggressive male character, the 'lycra lout'…" (Sustrans' Research & Monitoring Unit, 2019a, 44). In addition, when discussing cycling related safety and criminal acts in UK National and Scottish papers, "the percent of images that show only men are 64% and 62%, respectively" (Sustrans' Research & Monitoring Unit, 2019a,10). That male cyclists are often linked to criminal acts in the media, alongside utility cycling being frequently portrayed as dangerous, is thought to discourage more women from taking up cycling, particularly for utility purposes (Macmillan et al., 2016; Aldred and Dales, 2017). Although, a small number of studies have looked at the specific links between negative media depictions of cycling and the influence this might have on women's uptake of cycling, this appears to be a topic which could benefit from more detailed research in the future.

The Sustrans study (2019) also found that the media largely ignored female representation in cycling, "or portrays them through an overtly male gaze, often using highly sexualised or sexist imagery" (Sustrans' Research & Monitoring Unit, 2019a,10). However, even campaigns to normalise utility cycling for women, have in some cases presented themselves as reinforcing the need for women to conform to a certain standard. For example, the 'cycle chic' movement saw campaigns directed at women, advising them on how to look feminine whilst cycling. This included advice on cycling in heels, skirts and how to avoid the dreaded 'helmet hair' to look bike chic and fashionable. Whilst these campaigns were intended to show a positive image of cycling, it appears that this may unwittingly add more pressure on women that they must look a certain way to cycle (Steinbach et al., 2011; Aldred and Jungnickel, 2014).

Whilst not everyone in high cycling countries regularly cycles, or indeed views the mode in favourable terms (Boterman, 2020; Haustein, Kroesen and Mulalic, 2020) it is evident, however, that such countries do foster a positive cycling culture. That is, cycling as a mode is normalised, an everyday activity and generally seen as an acceptable way to travel (Kuipers, 2013,25). Nevertheless, whilst a cycling culture appears to be embedded in the Dutch psyche, and in other countries such as Denmark and Germany, whereby women cycle at similar levels to men, and that all age groups are represented from children up to the elderly (Pucher and Buehler, 2008), exceptions do remain. For instance, much lower numbers of people (particular females) from ethnic minorities cycle in Holland and Denmark (Haustein, Kroesen

and Mulalic, 2020). In general, however, cycling is accepted as a feasible and suitable mode of which to travel, particularly for women and children. Indeed, in high cycling countries such as the Netherlands, Denmark and Germany "Children and adolescents have the highest rates of cycling in almost every country" (Pucher and Buehler, 2008b, 504).

Mothers And Mobility

Various branches of feminism and other fields of study have looked at the issues of gender and mobility. However, these have largely been addressed in relation to women as opposed to looking specifically at mothers (Law, 1999; Hanson, 2010; Ravensbergen, Buliung and Laliberté, 2019b). There is much literature discussing definitions of motherhood, regarding issues such as whether men can 'mother' or whether a woman has to birth a child to be considered a mother (Ruddick, 1982; Dail, 1986; McDonald, 2008; Greed, 2016; Murray, 2016; Doucet, 2018). Unfortunately, in depth discussions of this nature are outside the scope of this research. Rather, for the purposes of this study references to mothers will refer to any women carrying out childcare duties.

As mentioned previously, Andrea O'Reilly believes "the category of mother is distinct from the category of woman, and that many of the problems mothers face—socially, economically, politically, culturally, psychologically and so forth—are specific to women's role and identity as mothers." (O'Reilly, 2019,13). O'Reilly coined the term 'matricentric feminism' in 2011 to fill, what she considered a gap in how mothers are viewed and treated in society. She puts forward that although men also undertake caregiving and parenting roles, it is the fact that women and mothers are ultimately oppressed by patriarchal systems that makes their experiences different to men/fathers. That is, "matricentric feminism understands motherhood to be socially and historically constructed, and positions mothering more as a practice than an identity" (O'Reilly, 2019, 16). Hence, matricentric feminism focuses on how this oppression affects mothers in their day to day lives.

For instance, an example of this relates to how mothers often experience inordinate levels of scrutiny by society for actions they undertake whilst parenting (more so than male parents). "Throughout history, blame is a term that has been associated with mothers. For many years, mothers have been blamed for various issues related to families and children" (Zimmerman et al., 2008,204). Similarly, mothers are frequently pitted against one another for decisions

made in their roles as mothers (Hays, 1996; Sutherland, 2010; Pedersen, 2016; O'Reilly, 2019). In the last few decades, a popular media narrative has been to pit working mothers against stay at home mothers, even though "mothers are not clearly divided into two camps; many mothers move in and out of the workplace in both full- and part-time capacities" (Zimmerman et al., 2008,207). It also assumes that mothers have a choice about whether they go to work or stay at home with their children, when for many there is no choice. Rather, financial circumstances will dictate whether a mother must take paid employment or not in most cases.

As such, matricentric feminism firmly puts motherhood at the centre of its theory, to better understand how the identify of being a mother affects the day to day lives of mothers. It should follow therefore, that applying the theory of matricentric feminism to mobility could potentially offer a further layer of understanding around the issues interlinking the role of motherhood on modal choice. Unfortunately, and somewhat surprisingly, there is currently an absence in writings under this theory on the impacts of transport systems and how travel choices are undoubtedly influenced or affected by motherhood. This highlights a gap for potential research to be carried out, but which is currently outside the scope of this research.

Nevertheless, despite the omission of transport in matricentric feminism, elsewhere a growing body of literature on mobility and motherhood exists which provides an acknowledgment that mothers face different circumstances due to their identity as a mother. That is, whilst they may not subscribe specifically to the theory of matricentric feminism, they too recognise that mothers, whilst sharing commonalities with women and other caregivers such as fathers, will also have experiences unique to their status of motherhood in relation to mobility (McDonald, 2008; Barker, 2011; Jain, Line and Lyons, 2011; Greed, 2016; Murray, 2016).

This includes research looking at pram mobilities which examine the experiences of mothers journeying with prams and navigating places on foot with young children (Bostock, 2001; Boyer and Spinney, 2016; Clement and Waitt, 2017, 2018). Other literature focusses on the links between ideologies of good parenting and mobility, with the majority of the latter research centring around car use (Dowling, 2000; McLaren, 2016, 2018). The omission of, or limited recognition of cycling in relation to motherhood and mobility, notwithstanding a few exceptions (Ravensbergen, Buliung and Laliberté, 2019b; Ravensbergen, Buliung and Sersli,

2020; Sersli et al., 2020, 2021), further highlights the gaps in current research on mothers cycling with their children, particularly in relation to its practice in the UK.

However, whilst a growing body of literature looking at motherhood and mobility is important. As mentioned previously, gender intersects with other socially constructed categories such as ethnicity, socio-economic class and disability. And just as the experience of 'women' may differ because of these, mothers are also a diverse group with fluid identities influenced by the same constructs (McDowell et al., 2005; Miller and Brown, 2005; Gillies, 2006). Recognising the differences that exist between mothers is useful and a growing body of literature on the role of motherhood across ethnicity, sexuality and social class recognises these differences (Duncan et al., 2004; Raith, Jones and Porter, 2015; O'Reilly, 2021). In particular, when discussing what constitutes a good mother, a bias towards literature on white, heterosexual middle-class mothers (usually married) exists (Sutherland, 2010; McLaren, 2018; O'Reilly, 2021).

Mothering Styles

Motherhood is a socially constructed concept that becomes defined within social, economic and historical contexts (Apple and Golden, 1997; O'Reilly, 2021). These concepts are fluid depending on several factors previously mentioned such as ethnicity, socio-economic status, and disability (Murray, 2016,48). Accordingly, mothering cultures are influenced by a number of factors. For example, informal exchanging of information on mothering practices between friends, neighbours and intergenerational female family members has been a long-established custom (Pedersen, 2016). Similarly, dominant ideologies of the time are also influenced by the government, experts, social and mainstream media (Murray, 2016,)

Indeed, such a volume of information from all the different types of sources highlighted, arguably leaves mothers under pressure to perform in a certain way, but also confused as to which advice to follow.

"Mothers are presented by the media with a variety of different stereotypes to choose from, ranging from the earth mother who devotes her every waking hour to her children, to the supermom who holds down a fulltime career while 'juggling' childcare and domestic tasks. Competing and contradictory ideologies of motherhood offer different definitions of the good mother, making it difficult for a woman to judge her own mothering, but also

offering the possibility of picking and choosing from the criteria for good motherhood" (Pedersen, 2016,2).

Those that fail to conform to certain societal standards may be judged, even though there are so many conflicting ideologies available. Does the notion of mobility and mode choice also play a role in what constitutes good mothering? Mothers are often placed in a no-win situation with regard to meeting the various and often changeable standards of being a 'good mother'. How they travel with their children appears similarly problematic. This arises from opposing views on what is deemed 'good' mothering in relation to mobility. For instance, in some cultures driving children to school is deemed positively, due to beliefs that driving is the safest way to transport children in view of road safety and stranger danger fears (Dowling, 2000; Murray, 2016). This is because a lack of quality walking and cycling infrastructure or accessible (both physically and affordable) public transport essentially forces reliance on the car, which in turn, because the other options are so poor reinforces the "social norms that strengthen the association between good parenting and auto-ownership" (McCarthy et al., 2017,774).

However, for others, driving children to school has negative connotations due to issues such as increasing levels of obesity amongst children. Therefore, not walking or cycling children to school is seen as 'bad' mothering due to limiting their physical activities (Murray, 2009, 2016; Bonham and Wilson, 2012). With such conflicting views on what is deemed 'good' or 'bad' it would seem that mothers are again put in an impossible situation to be a 'good' mother, as is required of them by society and their close circle of contacts. Many academics have written about the different parenting ideologies in existence and how they have changed over time (Hays, 1996; Dowling, 2000; Pedersen, 2016; O'Reilly, 2019, 2021). Of particular interest to this research is to what extent these mothering ideologies impact on mode choice (if at all)?

The two main ideologies that will be addressed here are 'sacrificial mothering' which was prevalent in the UK between the 1940s to late 1980s, and then the period between the 1990s to current time, characterised as 'intensive mothering'. It is clear that mothers' patterns of travel with their young children were markedly different during these two periods. However, it is important to note that ideologies are often deeply bound to wider events happening in society. That is, parenting styles often become closely interwoven and influenced by other events happening in parallel. Therefore, it is necessary to look at some of the wider events in

the UK, that may have influenced different patterns of travel by mothers and their children, alongside these dominant mothering ideologies.

In addition, it is, of course, important to note that not every mother will subscribe to the dominant ideologies of the time. Nevertheless, it is useful (notwithstanding the above points made) to look at these two dominant mothering ideologies, in the context of patterns of travel for mothers and children.

Sacrificial Mothering (1940-1980s)

Sacrificial mothering developed post Second World War. Prior to this, whilst large numbers of men were conscripted and in active service during the war, women were required to fill the gaps of occupations left empty (Trey, 1972; Kossoudji and Dresser, 1992). However, when the war ended, previously employed women were encouraged to relinquish their jobs back to the returning men. A new 'happy homemaker' discourse was set in motion by the government encouraging mothers to stay at home and an "ideological redesign of what constitutes good motherhood" was initiated, placing women firmly back in the private sphere (O'Reilly, 2021,82).

Sacrificial mothering portrayed women who were full time homemakers, looking after their husbands needs and being close to their children twenty-four-seven as 'good' mothers. In line with this happy homemaker discourse, men became full time economic providers for their families. There were strong views, that pre-school children fared better when raised (in their formative years) by their mothers, reinforcing the sacrificial model of a male breadwinner and mothers staying at home (Lewis, 2003; Stirrup, Duncombe and Sandford, 2015). Whilst it is impossible to group all mothers into one homogenous group, many mothers did stay at home with their children, particularly during their younger years.

However, whilst mothers were physically present with their children it was often the case that babies would be left outside in prams during which mothers would tend to housework, and older children would play out in the street with other children for long hours (O'Reilly, 2021,84).Although most literature places sacrificial mothering as being between the 1940s-1980s, it is clear that within this time period, certain mothering practices that would be considered common in the 1940s-1960s were considerably different to those in the latter part of this parenting ideology i.e 1970s-1980s. For instance, during the 1940s – to early 1970s,

many children were generally afforded a high level of independence and allowed to explore the local vicinity without adult supervision, as well as travelling to school unaccompanied by an adult (Mackett, 2002; Shaw et al., 2015; Cowman, 2017). From the mid-1970s to the late 1980s, however childhood mobility independence was beginning to decrease. This will be discussed in more detail below.

The Changing Travel Patterns of Mothers And Children in The UK During The Sacrificial Mothering Period (1940s-1980s)

During the period when 'sacrificial mothering' was a dominant ideology, car use was beginning to increase quite substantially, with Department for Transports statistics reporting 12.6 billion vehicle miles (cars and taxis) driven in 1949, rising to 133.6 billion vehicle miles in 1980 (Department for Transport, 2021c). This growth in car use began to impact on how children travelled. Mackett (2002), looks at how children's use of cars increased substantially during the period between 1964 -1999. For example, in 1964 only 37% of children (aged between 3-15) travelled by car in the UK with this increasing to 64% (for children aged between 5-15) in 1985/86 and then 70% by 1997/99 (Mackett, 2002, 30).

In addition, as car use was increasing, a corresponding reduction in active travel modes such as walking and cycling by children was also happening. Mackett (2002), also charts the trends in children's use of active travel modes, highlighting a reduction in bicycle use between 1975 and 1986 for children aged five to ten. In 1975/1976, average bicycle miles for boys stood at 32 miles per year. However, by 1985/86 this had dropped down to 16 miles per year. Average bicycle miles for girls dropped from 18 miles per year to 14 miles per year over the same dates (Mackett, 2002, 29). Whilst this data refers to children's independent use of bicycles, it appears that there is no data on escort trips carried out by mothers/parents on bicycles with their children either from Mackett's research or other sources such as the National Travel Survey during that period. It is unclear as to whether such data exists in the first place. This could be because children tended to cycle independently to places in close proximity and as such escort journeys by bicycle rarely occurred. Or, that such journeys did happen but were simply not captured or analysed by the available data collection services at the time.

As car use began to grow, concerns about road safety issues contributed towards lower numbers of children travelling to places unaccompanied and playing out in the streets

(Hillman, Adams and Whitelegg, 1990; Mackett, 2002; Cowman, 2017; McCarthy et al., 2017). In addition, other fears also played a role. The 'Stranger Danger' campaign which launched in the UK in 1988 was a home office run campaign designed to warn children of the dangers of mixing with people they didn't know (Hillman, Adams and Whitelegg, 1990,91). According to Hillman et al. (1990), this campaign had a knock on effect, that meant parents stopped allowing their children to play out or travel independently due to fears of child abduction, which as a result also contributed to a decrease in children walking and cycling (ibid).

As mentioned previously, more mothers were also working in either full or part-time employment. This factor, combined with a reluctance to allow children to travel unaccompanied meant that the journey to school started to become more complicated, "Parental strategies to cope with this dual challenge often most conveniently involve driving children to school en route to work" (Easton and Ferrari, 2015, 10). This was further compounded by changes to the 1980 Education Act allowing greater parental choice for both primary and secondary school, allowing parents to choose schools out of traditional catchment areas, meaning in many cases the distances to schools travelled were much further and became more likely to be undertaken by car (Mackett, 2002; Easton and Ferrari, 2015).

Intensive Mothering (1990s onwards)

Accordingly, by the 1990s the changes in society mentioned above were beginning to result in major changes in how mothers travelled with their children. This shift also coincided with the emergence of a new dominant mothering ideology which Hays (1996) coined 'intensive mothering'. This involved a shift from mothers needing to be physically present with their offspring, to ensuring the psychological, emotional, or cognitive needs of the child were met (Hays, 1996). Therefore, as the intensive expert driven parenting ideology began to emerge, the key to being a good mother relied upon ensuring your child had the best start in life. Outsourcing these needs to experts became common, backed up with "a significant amount of evidence that enrolling under-fives in enrichment activities is now a central aspect of 'good parenting' among certain social groups" (Stirrup, Duncombe and Sandford, 2015).

A plethora of baby classes began emerging to ensure that young children were nurtured adequately. This could range from music or art based classes, forest schools or various physical activities such as baby yoga or other movement based classes. As children grew older,

these would take the form of other activities such as various sports, drama clubs, languages, musical instruments, and even extra tutoring to ensure they are excelling in academic subjects (Hays, 1996; Mackett, 2002; Stirrup, Duncombe and Sandford, 2015; Lamar and Forbes, 2020)

A particular consequence of these types of classes, meant a need for mothers to 'travel' with their children, adding additional trips to their already busy schedules. Unsurprisingly, the pressure of intensive mothering often resulted in many mothers experiencing feelings of guilt. That is, for mothers who were often juggling paid employment, unpaid care duties and the need to ensure their children's psychological, emotional and cognitive needs were met, many mothers were left to question if they were successfully meeting the criteria of being a 'good mother' (Stirrup, Duncombe and Sandford, 2015,92).

The Changing Travel Patterns of Mothers And Children in The UK During The Intensive Mothering Period (1990s onwards)

For the increasing numbers of mothers working both full and part-time, childcare was a prominent issue, both in terms of access to it, but also in how it affected travel patterns for working mothers with both employment and escort trips to education/childcare to navigate on an almost daily basis. In 1998, the then Labour government produced a Green Paper on the National Childcare Strategy with the aim to support working families. It also had a particular emphasis on lone working mothers, due to research identifying the higher rates of poverty faced by lone-mother families (Lewis, 2003; Stirrup, Duncombe and Sandford, 2015). Also, of note in this Green Paper was a departure from previous government thinking that being cared for by a mother during pre-school years provided the most beneficial start to a child's life. Instead, in similar vein to the intensive mothering ideology, in the 1998 paper, policy thinking had changed to, "Supporting families in regard to childcare policies meant giving children a better start in terms of "early learning", which signalled the government's concern to promote education rather than day care…" (Lewis, 2003,221).

By the 1990s, against the backdrop of increased car use, stranger danger fears and more mothers working, it became uncommon for children to play out outside for long periods of time or travel independently without adult supervision, except in very few circumstances. As a result, the time previously spent by children travelling between school and home in the

afternoon, and then playing outside with friends and neighbours needed to be replaced with other forms of activities,

“A related trend has been the shift from free play where children simply go out of the home to play in the street, park or countryside to organised activities where children participate in activities such as football lessons or dance classes. These latter activities take place at specific locations, often not very close to the home, so the only convenient way to reach many of them is by car. These factors have made family life more complex, often revolving around the use of cars to escort children to their various activities, to the extent that many children’s lifestyles are dependent on the car” (Mackett, 2013, 66). It could be argued that factors such as the government’s policies around early learning and increasing number of organised activities for children, aligns itself to the intensive mothering ideals of nurturing children to give them the best start in life.

On the other hand, the research carried out by Shaw et al (2015), showed that parents were restricting their children’s independent mobility due to other concerns already noted, such as high volumes of traffic, stranger danger and being judged by their neighbours if they let their children play unsupervised outdoors (Shaw et al., 2015, 50). A study carried out in 2017 in Australia of 1,800 parents of children aged 9-15 also reinforced that disapproval from family and friends were one of the top factors in letting their child travel independently, “Social norms and community norms are shaping parent’s decisions about letting their children be independently mobile” (Perkins, 2017,np). Regardless of motivations, it was clear that by the 1990s, patterns of travel had changed substantially.

In the study carried out on childhood independent mobility by Shaw et al. 2015 (mentioned above), looking at the differences between how children travelled between 1971 and 1990. The changes over the 20 year period were substantial. For instance, the report showed that in 1971 (in London), 80% of children aged seven and eight travelled to school unaccompanied by an adult, and 55% of children under ten were also allowed to travel alone to places within walking distance (Shaw et al., 2015,5). However, by 2010, “almost no children under ten years old are allowed to travel alone to places (other than school) within walking distance” (ibid). The National Travel Survey carried out by the Department for Transport also showed that in 2010 the number of children walking or cycling to school had dropped substantially from

previous years, with 40% now being driven to school, compared with 15% of children being driven to school in 1975/76 (Department for Transport, 2014).

Mothers And Cars

The reduction in children's independent mobility and increased motorised traffic on the roads, as highlighted earlier, has resulted in increasing numbers of mothers now using the car to travel with their children. Whilst escorting children on the journey to school and education settings are not exclusive to mothers, research shows that they do carry out these types of trips in much higher numbers than fathers and other care givers, meaning a high percentage of children being driven to school are done so by their mothers (Department for Transport, 2019b). Existing research also shows, that in addition to the school run journey, other utility trips such as visiting friends and relatives, after school clubs and shopping are also being increasingly made by mothers using cars (Dowling, 2000; Barker, 2011; Jain, Line and Lyons, 2011; Mackett, 2013)

In the late 1880s, just as the bicycle was seen as empowering for women in facilitating travel, some see the car as empowering for women and mothers alike in current times. That is, the use of cars can be seen as providing women with greater freedom and choice to access employment and social activities. It also allows the avoidance of some forms of harassment often experienced using other types of transport (Dowling, 2000; Dobbs, 2005; Greed, 2016; Gilow, 2020). The practicalities of mothers having to trip chain with another journey such as continuing to work or to carry out errands, ranks highly as a reason for car use over other modes (Jain, Line and Lyons, 2011; Carver, Timperio and Crawford, 2013; Mackett, 2013; Boyer and Spinney, 2016).

Some researchers highlight that there is pressure on parents to drive because it is linked to constructs of the 'good parent' (Carver, Timperio and Crawford, 2013; Mackett, 2013; Boyer and Spinney, 2016; Westman, Friman and Olsson, 2017). Barker (2011) talks about 'carescapes', looking at different spaces that are commonly used to look after children. Whilst traditionally the home would be the key site of care-based activities, the increasing need to escort dependent children has led to the car becoming a pivotal place in which to undertake care (Barker, 2011,413). Mothers who drive their children, therefore, are not only protecting them from road and personal safety concerns but using a car allows them to create

meaningful relationships with their children whilst driving (Dowling, 2000; Barker, 2011; Westman, Friman and Olsson, 2017).

The use of cars by mothers, however, is sometimes judged negatively by wider society. For instance, whilst many mothers drive their children to school and then continue their journey onwards to their workplace. Greed (2016), in her chapter featured in the Gendered Mobilities book (Uteng and Cresswell, 2016), entitled "Are we there yet? Women and Transport Revisited, notes, "The school run is portrayed in the media as being undertaken by rich lazy housewives in their '4 by 4' Range Rovers, although many families only own a cheap car and have to make major economies to keep it running" (Greed, 2016,248).

Jain et al's (2011) research on the logistics of the school run for working mothers also highlighted the pressures of driving between home, schools and employment sites. This included the stress of finding a parking space, getting stuck in traffic and the possibility of being late (Jain, Line and Lyons, 2011). Moreover, the often strict time constraints many mothers find themselves under, frequently results in mothers constantly rushing around from place to place. Furthermore, similar to the comments made by Gilow (2020), previously mentioned in the Introduction, the often relentless need to plan journeys to precision to ensure children are picked up on time and ensure other obligations are met, all add to the stressful nature of driving.

Mothers Using Cycles

Whilst the previous section discussing Mothers and Cars highlights literature on 'good' or 'bad' mothering in relation to car use, there is currently limited research on this subject with regard to cycling. In the absence of cycling being a normal everyday activity in the UK, cyclists are often viewed as brave, committed or adventurous (Spotswood et al., 2015,28). What so for mothers who cycle with their children?

Some studies have highlighted that mothers who cycle with their children, believe that they are conducting 'good' mothering due to the many beneficial aspects of cycling. That is, by teaching their children an essential life skill by showing them how to ride a bicycle, but also from the health and environmental benefits of cycling with their children, allowing them to get exercise and travel by a non-polluting mode (Bonham and Wilson, 2012; Ravensbergen, Buliung and Laliberté, 2019b).

Conversely, a study carried out in Canada by Sersli et al. (2020), found that cycling with children on busy roads can be viewed negatively and call into question the mothering skills of those that do, "Women described a tension between bicycling and keeping children safe from traffic danger, pertaining to meanings in what others have described as the 'good parenting ideal'" (Sersli et al., 2020, 4). Similarly, if the widely held view of cyclists in the UK is negative, as shown in an earlier section, then an assumption could be made that cyclists are seen as going against social norms by many. Consequently, given the high standard that mothers are generally held to in society, it could be assumed that mothers who cycle with their child are also viewed negatively by some.

Whilst, as highlighted above, a small number of studies have looked at the issue of 'good' or 'bad' parenting in relation to cycling, these studies have taken place in Australia and Canada (Bonham and Wilson, 2012; Ravensbergen, Buliung and Laliberté, 2019b; Sersli et al., 2020). One exception to this is the UK based research entitled "A troublesome transport challenge? Working round the school run" (Jain, Line and Lyons, 2011;), however this focuses on all modes of transport used to get children to school, with cycling mentioned only briefly and not forming a major part of the study.

The next section will show that research has been carried out in relation to infrastructure preferences for cycling with children, including UK studies. However, it appears that there is a gap in literature about mother's use of cycles, particularly in relation to issues of the good or bad parenting ideal. This gap suggests that this is an area which could benefit from more research. Nevertheless, whilst academic studies are lacking on this topic, there are numerous examples of parents being criticised for cycling with their children in social and print media.

Image 1 below shows a snapshot of some articles criticising parents whilst cycling with their children. In the examples provided, however, it is not just mothers that appear to be judged. Rather both mothers and fathers are equally berated for their actions. It also appears that both cycling on the pavement with children and cycling on the roads (with no cycle infrastructure) is criticised.

A three-wheeled idiot

I ENCOUNTERED a remarkably stupid man this week. Not to talk to. I only saw him through my car windscreen as I negotiated a particularly busy junction, a crossroads infamous for skids, crunches and collisions.

He was on a tricycle. Mounted above the front wheel was a basket – a big one. Big enough to carry his two small children. The only thing protecting them from the risks of the road was the basket's wicker frame. Not much use if their earnestly pedalling dad was in a front-end shunt with a car, van, truck or bus. But the kiddies and their pathetic basket might absorb some of the impact of the collision and so protect daddy a bit, so hey, all not quite lost, eh?

I presume this idiot congratulates himself on leaving a low carbon footprint, cleaner city air, blah blah. That he does so at the expense of the safety of his kids is clearly beyond his wit or comprehension. God knows what their mother thinks.

I was tempted to flag him down and ask what he was playing at. If he were driving a car (heaven forfend) would he dispense with child seats and seat belts? Probably, if he thought in some obscure way it would help save the planet.

Richard Madeley, Daily Express 4.8.2018

Couple face trouble for letting kids cycle to school

Irresponsible parents or nanny state nonsense?

by MARTIN THOMAS MON, JUL 05, 2010 12:04

A London couple who let their children cycle to school by themselves have been warned they could be reported to social services unless they supervise the journey.

An article in today's Daily Mail highlights the case of Oliver and Gillian Schonrock, who let their five year-old son and eight year-old daughter cycle the one-mile trip to school unaccompanied. They say it helps to teach the kids independence, self-confidence and responsibility.

But other parents and teachers at Alleyn's Junior School in Dulwich are said to think the practice is irresponsible and dangerous. Head teacher Mark O'Donnell has told the Schonrocks that the school is obliged to consider the children's safety and has a legal responsibility to refer the case to Southwark Council's Children's Services department if they fear the kids are being put at risk.

Mr Schonrock, 40, the managing director of an e-commerce company, said: "Like everybody else our age we spent a lot more time with our friends playing in the streets or parks without parental supervision and without our parents becoming unduly worried. These days children live such regimented lives. They can do nothing unless it's planned. We are trying to let them enjoy their lives and teach them a little bit about the risks of life."

London cargo bike mum who was victim of social media pile-on for cycling on pavement explains why she does it

by ROADCC STAFF FRI, JUN 11, 2021 15:01

riders - picture courtesy Sophie Gauthereau

"Harassment of me and my family is not about cycling on pavements or danger to pedestrians; it is about revenge" says Sylvia Gauthereau

A London cargo bike user and cycling campaigner who was this week subjected to a social media pile-on after pictures of her riding on the pavement, with her daughter in the cargo box, were shared to a local Facebook group and other platforms, has given a detailed explanation of why she avoids riding on the road at the location in question.

Viral video debated on Jeremy Vine show (screenshot Twitter video/ @azb2019)

"Should not be on the public highway riding a bike": Conservative politician weighs in on viral clip of driver refusing to stop for child

The video, which has been viewed 2.3 million times, was debated on Jeremy Vine's Channel 5 show...

by DAN ALEXANDER WED, NOV 09, 2022 15:38

A second Conservative politician has spoken out about the viral video which has been doing the rounds on Twitter and shows a motorist driving past a five-year-old cyclist within touching distance.

Image 1 Example of social and print media criticism of parents cycling with children

Infrastructure Preferences for Cycling With Children

Whilst this thesis is concerned with the experiences of mothers cycling with their children, some of the following literature looking at infrastructure preferences does so in relation to parental views of cycling with their children. That is, there is no specific distinction between the opinions of mothers and fathers. Where relevant, this section will highlight whether the relevant literature pertains solely to the views of mothers, or the wider category of parents.

Although there is limited literature on 'good' or 'bad' parenting in relation to cycling with children. The research outlined earlier by Ravensbergen et al. (2019) and Sersli et al. (2020) and the media reports shown in Image 1 on the previous page, highlight how the type of infrastructure a mother or parent cycles on with her child, can elicit negative opinions from other road users. Additionally, mothers riding with their children on some forms of infrastructure can generate feelings of guilt or stress on the mothers part, due to road safety concerns when cycling with their children, "Bicycling with children on streets was a source of tension…Women said that routes fine for themselves were not suitable for children…" (Sersli et al., 2020, 5). In particular, the avoidance of busy roads by parents was common when riding with their children. Likewise, routes that entail a longer distance would often be chosen if they felt safer to use than the most direct route available (Hatfield et al., 2019, 38).

Research by Aldred (2015) asked adults (both male and female) to look at different infrastructure scenarios in urban settings to ascertain if they would be confident to cycle on them. These included examples such as kerb or car parking segregation, modal filtering, 20mph limits, carriageway cycle lanes without segregation and shared bus lanes. Respondents were then asked if their opinions would change under the following conditions, "(a) while carrying a child and (b) if riding with an eight-year-old. The fourth and fifth questions asked whether the respondent believes the situation would be suitable (a) for a sensible twelve-year-old on his/her own and (b) for most people" (Aldred, 2015b, 92).

Perhaps unsurprisingly the most popular scenarios concerning cycling with children, were for infrastructure which was protected either by kerb or car parking, shared park routes and filtered streets where traffic volumes would be very low (Aldred, 2015b, 104). This research reinforces previous findings that both women and men prefer facilities which are physically

separated from motorised vehicles when riding with children (Emond, Tang and Handy, 2009; Sustrans, 2018a; Xie and Spinney, 2018; British Cycling, 2019).

Infrastructure Preferences for Child Carrying Cycles And Independent Cycling

This following section looks more closely at literature relating to cycling with children when using different types of cycle configurations, and how this influences the type of infrastructure used. There are two main options available for cycling with children. The first involves child carrying cycles, that is, children being carried or towed either in bicycle seats, tagalong or trailers attached to an adult bicycle. Also available in this category are cargo cycles, tandems or triplets which are specifically designed child carrying cycles equipped to carry one or more children at a time. The second option is where a mother rides her own bicycle, and her children ride alongside her independently on their own cycles.

The use of child carrying bicycles are seen as having many positive benefits. In research conducted in Vancouver, Canada, women were contacted to take part in a study group to see how their cycling habits may have changed as a result of participating in a cycling course. The course sought to equip them with the skills to ride in various urban environments, improve bicycle handling skills and provide them with road safety knowledge (Sersli et al., 2020,2). Seventeen of the study group were mothers of young children and whilst some of the mothers felt comfortable cycling on roads without specific cycling infrastructure, many had concerns about mixing with heavy traffic, particularly if they had children riding their own bicycles alongside them.

However, “Access to child seats, trailers, cargo bicycles, or other devices to carry children seemed to broaden the types of routes where women could bicycle with children” (Sersli et al., 2020,5). That is, when using child carrying cycles, because the mother is in complete charge of the journey they did not need to worry about “wobbliness and unpredictable movements” (ibid) that can often occur when young children ride their own bicycles. Nonetheless, in the same study, some concerns were raised pertaining to being physically able to carry multiple children on a bicycle due to the added weight, “Women described bicycling with children to require additional competences. Several women referred to

techniques for managing extra weight and momentum when carrying children on bicycles" (Sersli et al., 2020,4).

Certainly, for bicycles which carry children as passengers, there are a number of issues that can affect the safety and comfort of the rider. In Hatfield et al's (2016) study on child carrying bicycles in Australia (surveying parents, not just mothers). It was found that "Many respondents identified that the additional weight of the child(ren) and carrier(s) resulted in reduced acceleration, reduced travel speed, reduced manoeuvrability, and longer braking distance" (Hatfield et al., 2019,37). Other studies also found that it was noted that front or back fitted bicycle seats can affect the balance of the bicycle, especially if child passengers move around or shift their weight from side to side suddenly (Oxley et al., 2016; Raftery et al., 2016; Hatfield et al., 2019). Similarly, in front mounted cycling child seats, issues can also arise if children try to interfere with the steering by moving the handlebars or grabbing the brakes (Hatfield et al., 2019,37).

In relation to cycling casualties whilst riding with child seats, a specific issue arises when mounting and dismounting children from the bicycles. Two studies (both Australian) (Oxley et al., 2016; Raftery et al., 2016), showed that most child passenger injuries did not occur when moving but rather "…were sustained in non-crash incidents, the majority of which involved the bicycle or carrier tipping over. The majority of these incidents occurred while loading or unloading a passenger…" (Raftery et al., 2016,32).

An issue unique to tagalongs (where a child's bike is attached to the rear of an adult bicycle) also related to the handling and balance of them. In a similar vein to child seats, problems can arise if the child shifts their bodyweight around suddenly or inadvertently pulls on their own brakes whilst in motion. However, whereas children using child seats are usually strapped in with safety harnesses/seat belts, children using tagalongs are not. This means that it is imperative that they remain holding on to their own handlebars at all times to stay safely seated. Again, the Hatfield et al. (2019) research found that due to the quality of road surfaces being used, it was sometimes impossible to avoid routes that might inadvertently jolt their children around, as well as falls arising from children moving around whilst seated on their own bicycle and not holding on properly (Hatfield et al., 2019,37).

Navigating a variety of obstacles was also highlighted as a particular issue for non-standard configurations such as trailers, tagalongs and cargo bicycles due to their width and length. A study conducted in Germany, by Gaffga and Hagemeister (2015), found that users of bicycles with trailers attached, often found problems navigating bollards, chicane barriers and the narrow cycle lanes. In addition, temporary obstacles such as rubbish bins, parked cars and advertising signs could also cause problems (Gaffga and Hagemeister, 2015,3). Although the Gaffga and Hagemeister (2015) study was not confined to trailers carrying children, Hatfield et al.'s Australian study (2019) specifically on child carrying cycles, largely reinforced these findings with regard to trailers attached to an adult bicycle. "Length may also reduce manoeuvrability, including through narrow openings. Some respondents made specific mention of the positioning of bollards preventing trailer access to paths, so that they must use roads, which are perceived as less safe" (Hatfield et al., 2019,37).

Other non-standard bicycles such as cargo bicycles, or those with added child seats, tagalong and trailers were also frequently impeded by the prevalence of physical barriers often on the very infrastructure preferred by those riding with young children. For instance, physical barriers such as guard railing can frequently be found at entrances to 'cycle friendly' routes such as parks or national cycle networks. Clayton et al. (2017), in their research on cycling and disability note some of the barriers on cycle routes include narrow gates, steps, uneven surfaces and narrow spaces that are unsuitable for adaptive bicycles that tend to be wider and heavier (Clayton, Parkin and Billington, 2017,454). These issues equally affect child carrying bicycles, as often require the user to physically lift the bicycle to navigate around them, which is impossible for many disabled cyclists but also for some parents.

For children riding their own bicycles, competent bicycle handing skills and their ability to listen and follow instructions is key. As previously mentioned, in the Vancouver study carried out by Sersli et al. (2020), for those mothers with children riding their own bicycles, they were often conscious of children's "wobbliness and unpredictable movements" (Sersli et al., 2020,5). This meant that due to road safety concerns, mothers would often limit cycling with their children to traffic free areas like parks or segregated cycle paths or cycling on the pavement. In another Canadian study by Ravensbergen et al. (2020), a further issue was highlighted, where in some cases, mothers had to walk or run alongside their children riding their bicycles. This was because children who were learning how to cycle lacked the necessary

skills to cycle safely. This in turn also limited the types of routes they could take as it was not always practicable to run long distances or in certain environments (Ravensbergen, Buliung and Sersli, 2020, 342). Consequently, in both studies, it was highlighted that unless a direct traffic free route exists, many utility journeys were not undertaken by mothers with their children, by bicycle, due to the absence of safe infrastructure (ibid).

Another factor for both children riding their own bicycles independently, but also those carried in trailers and on tagalongs relates to the visibility of the child to other road users, due to their low stature (Aldred, 2015b; Hatfield et al., 2019). In Aldred's (2015) research on adults attitudes to child cycling, some parents raised concerns about their children's visibility on certain types of infrastructure, "…a combination of through motor traffic and parked cars restricting visibility and manoeuvring may prove hostile for children, in residential streets" (Aldred, 2015, 104).

Care Duties And Trip Chaining by Bicycle

The logistics of trip-chaining by bicycle with the need to accommodate children and other items such as school equipment and shopping is often cited as a main barrier to cycling (Delmelle and Delmelle, 2012; Prati, 2018). Care duties combined with a car dominated society makes cycling difficult for women, and even more so for mothers. Davis et al (2007) claim, "as society became increasingly organised around the car: average distances to work, education, hospitals and shops have increased sharply" (Davis, Valsecchi and Fergusson, 2007, 24). This had implications for modes of travel such as cycling, both in terms of longer distances being unpalatable for mothers travelling with young children and road safety concerns due to high volumes of motorised vehicles.

A recurring theme when discussing the need for mothers to carry out care duties and trip chaining relates to the busy schedules that many mothers have. As has been demonstrated earlier, juggling paid employment with unpaid duties at home such as household errands and escort journeys, disproportionately falls upon mothers. When this is combined with the increasing number of activities that children now undertake (in line with the intensive parenting ideology) mothers frequently find themselves carrying out multiple journeys per day (Sanchez de Madariaga, 2013; Criado Perez, 2019; Gilow, 2020).

Research shows that for many mothers, they feel the only way to achieve these competing demands is to carry out such journeys by car (Mackett, 2002; Barker, 2011; Gilow, 2020). Indeed, even those women who cycle themselves and with their children for leisure purposes, struggled to trip chain using bicycles with younger children due to competing demands and fitting things in, "Mothers were often pressed for time, negotiating tight schedules between work and mobility of care. A few mothers suggested chronic time constraints curtailed opportunities for bicycling…" (Sersli et al., 2020, 6).

Cycling is also seen as problematic for mothers traveling with more than one child and if needing to carry various equipment. However, the use of cargo cycles, particularly electric assist, is seen as one possible way to fulfil trip chaining. That is, by using a cargo cycle, multiple children can be transported as passengers. The use of a cargo cycle also has the added benefit of not needing to worry about children's ability to cycle independently and the various road safety concerns that can arise from children lacking bicycle handling skills or adequately following instructions (Riggs and Schwartz, 2018; Ravensbergen, Buliung and Sersli, 2020; Sersli et al., 2020). Additionally, the design of cargo cycles means that it is usually possible to transport any accompanying gear often needed for journeys to school, sporting activities or music lessons etc.

In Riggs and Schwartz (2018), study of cargo bicycle owners in the US, their research showed how some mothers were able to accomplish a number of activities due to the use of their cargo bicycle,

"For example, the women interviewed underscored the imports of making trip-chaining, or linked trips with various purposes around town (particularly with children) – something that the bike empowered them to do. They felt that they were different than the men in their lives because as women they carried gear and kids and needed tools to do this. As one mother noted, 'Women . . . need a trunk. My bike is my trunk.' " (Riggs and Schwartz, 2018, 106).

However, a number of mothers interviewed as part of the Riggs and Schwartz (2018) study, still had reservations about using certain routes, "some of the challenges from the women interviewed who felt strongly deterred by an uncomfortable built environment. This includes the presence of fast-moving or congested traffic as well as ensuring the safety of their children

and themselves while riding a cargo bike" (Riggs and Schwartz, 2018, 6). In the Sersli et al. (2020) study in Vancouver, Canada, it was posited that the lack of safe infrastructure in Vancouver on routes to schools, libraries and shops, limited the opportunities for trip chaining, particularly on journeys where children needed to be escorted somewhere. That is, because mothers didn't feel it was a safe environment to cycle with their children for these types of trips (Sersli et al., 2020).

In comparison, a study undertaken by Eyer and Ferreri (2015) of women cyclists in Amsterdam, found that the availability of safe and connected infrastructure enabled mothers to carry out many care duties and trip chaining by bicycle,

"Many diarists described cycling as beneficial: practical, fast, healthy, and calming. Indeed, a sense of relaxation appeared to be involved in riding the bicycle. Even though it could easily be imagined that mothers would feel tense or anxious when cycling with their child, half of the mothers discarded this presumption completely and the other half claimed to feel 'rather safe'. Security was thus not an issue for mothers, which may explain why less than half of the participants had their children wear any protective gear on the bicycle" (Eyer and Ferreira, 2015, 703).

Also, of note in the Amsterdam research, is that whilst a small number of mothers used cargo cycles, the majority did not. That is, because safe infrastructure was provided on routes that they typically carried out journeys on, they were able to carry out escort trips using bicycles with either child seats fitted (for use with younger children), or in the majority of cases used standard adult bicycles, and their children would cycle their own bicycles independently (ibid).

Literature Review Summary

This chapter has looked at how women's and mother's mobility, particularly cycling is affected by a number of issues. For instance, previous research demonstrates that transport systems in many westernised countries were initially designed to favour male patterns of transport, primarily to facilitate men travelling from home to work. As a result, they are in many cases unsuitable for most mother's daily travel needs. This is because mothers tend to carry out more journeys each day albeit shorter in distance, compared to other women and men, (including fathers) because of the necessity to combine trips to accomplish the competing

demands of both travelling to work and the travel required to carry out extra 'care duties' such as escort trips, household errands (Hanson, 2010; Jain, Line and Lyons, 2011; Lehmann, 2020).

The literature review also highlighted reasons to explain the current low numbers of women and mothers cycling in countries such as the UK, US, Canada and Australia which are often termed low cycling countries due to the low number of cycling trips carried out. In particular, women's fear of cycling in heavy traffic was noted as a significant barrier to increasing the uptake of women riding bicycles. This, when combined with the types of journeys mothers are frequently carrying out, meant cycling was considered too complicated due to the pull of competing demands, and the logistics of cycling with children too difficult for mothers to overcome (Emond, Tang and Handy, 2009; Hanson, 2010; McCarthy et al., 2017; Prati, 2018).

Previous research also showed how mothering styles, particularly in relation to how children were allowed to travel, had evolved over the past few decades and were further influenced by wider events in society. For example, it was shown that pre-1980s, young children were generally afforded a high level of independence and allowed to explore their local areas without adult supervision, as well as travelling to school unaccompanied by an adult (Mackett, 2002; Shaw et al., 2015; Cowman, 2017). The reasons for this were linked to lower levels of traffic than the post-1980s, fewer mothers working in paid employment meaning mothers did not have to travel to work and fewer children attending paid after school activities, than in the post 1980s period (ibid).

In comparison, post 1980's against the backdrop of increasing volumes of traffic on the roads and higher numbers of women in paid employment, children's mobility was severely affected as a result. As the UK became car dominated and society was increasingly organised around car use the emergence of a new dominant mothering ideology which Hays (1996) coined 'intensive mothering', also led to a growing trend for 'paid' activities for children outside of schools hours. As a result, this necessitated journeys to and from these activities, usually by cars, adding to the vicious circle of more traffic on the roads (Davis, Valsecchi and Fergusson, 2007, 24). Consequently, this led to a reluctance of parents to let their children travel independently, in particular with cycling as a mode being unpalatable for mothers and their children due to road safety concerns as a result of high volumes of motorised vehicles.

The literature review also showed that mothers are often judged for their actions in society, and how they transport their children was no exception to this. For instance, cycling with children on busy roads can be viewed negatively and call into question the mothering skills of those that do (Sersli et al., 2020,4). Accordingly, fears of being judged for cycling in what many 'others' in society might view as a dangerous activity, also contributes to cycling being less favoured as mode of transport for mothers and children alike (ibid).

The chapter also looked at previous research carried out on infrastructure preferences for parents with children in relation to cycling. Overwhelmingly, parents were not comfortable with young children cycling on busy roads. Instead, the use of off road shared use paths, infrastructure which is protected either by kerb or car parking, or quiet roads where the traffic volumes would be very low were deemed preferable (Aldred, 2015b, 104). However, research also showed that these types of infrastructure were often problematic due to guard railing on shared use paths, or issues with traffic calming on quiet roads such as chicanes and speed humps impeding the non -standard size of child carrying cycles (Hatfield et al., 2019,37).

The final chapter assesses the topic of mothers cycling and trip chaining, particularly in the context of carrying out care duties. Research highlighted that due to the increasing volume of trips that mothers carry out on regular basis, alongside the need to carry various equipment, journeys by car were favoured (Mackett, 2002; Barker, 2011; Gilow, 2020). However, the use of child carrying cycles was deemed a potential way to assist more mothers to overcome some of the issues of time management and carrying child related accoutrements due to being able to carry multiple children as well as other equipment (Riggs and Schwartz, 2018; Ravensbergen, Buliung and Sersli, 2020; Sersli et al., 2020). Nevertheless, the issues of road safety concerns, as continually highlighted throughout this chapter were still seen as a major barrier for mothers switching from motorised vehicles to cycling as a mode.

Chapter 3: Theory

Introduction

A number of theories were considered to frame the findings of this research. Of particular importance was to select a theory which was able to capture an understanding of the complexities of the relationship between mothers and cycling in the UK. For instance, as shown in both the Introduction chapter and Literature Review, cycling as a mode of transport has remained at low levels for the past few decades despite efforts to encourage its use. In particular, the failure of integrating cycling into wider transport policy has resulted in a lack of safe cycling infrastructure and the absence of a culture which normalises cycling (Pucher and Buehler, 2008a; Wardlaw, 2014). Accordingly, finding a suitable theory which could adequately assess the historical, social and environmental considerations of the relationship between motherhood and cycling in the UK was key.

Feminism, with its focus on understanding the social problems and issues experienced by women as a result of gender bias in society was an initial choice. A demonstrated previously in the Literature Review, a number of feminist writings on the issues of mobility and in particular, women's relationship with cycling already existed (Law, 1999; Hanson, 2010; Ravensbergen, Buliung and Laliberté, 2019b), highlighting its potential suitability to frame this research. However, the Literature Review also addressed how feminism, whilst focusing on the positioning of women in society, often failed to look at the specific experiences of mothers.

As a result of this gap, matricentric feminism was established by Andrea O'Reilly and was also considered as a possible theory in which to frame this research, given that it places the subject of motherhood at its very core. That is, mothers should be viewed in a category separate from that of women as they face additional issues due to their status and identity as a mother that are not adequately addressed by feminism alone (O'Reilly, 2019,13). However, matricentric feminism (to date) has not considered the issue of mobility on motherhood and so it was discounted as a theoretical framework for this particular research.

Nevertheless, feminism and matricentric feminism both centre on the experiences of women and mothers respectively, which given the topic of this research was undoubtedly important. However, the use of Social Practice Theory, and in particular the use of Shove et. al's (2013) three element approach (see below) was chosen as a theoretical lens to explore this topic due

to its suitability of providing a means to understand how mothers are carrying out the act of cycling with their children in the UK. In particular, by being able to capture the motivations and meanings that they assign to cycling, the types of materials they need to carry out cycling and the necessary skills required. Indeed, a number of studies have recently been published looking at the subject of women and cycling using social practice theory to frame their research, highlighting the use of such a theory being popular in assessing complex topics such as cycling (Spotswood et al., 2015; Ravensbergen, Buliung and Sersli, 2020; Sersli et al., 2020, 2021).

Of course, as with other theories, social practice does not assume to present a perfect model in which to view and understand social phenomena, and as such, more detail including the pros and cons of using this theory will be discussed below.

Social Practice Theory

Although authors use different definitions of social practice theory, the commonality of those advocating the model share a departure from focusing on the key determinant in behavioural change being based on an individual's ability to be influenced by economic incentives, values and attitudes alone. Instead, those supporting practice theories believe the fixation on the individual ignores the complexities of society and other factors that influence how people behave. Thus, while the role of the individual remains a part of practice theories, they cease to be the prime focus and are relegated to a much smaller role (Reckwitz, 2002; Shove, Mika and Matt, 2012; King et al., 2013; Parsons, 2019). Instead, and perhaps unsurprisingly, at the heart of social practice theory is the notion of 'practices' and how they coalesce.

Although there are different viewpoints on how practices exist and fit together, most practice theorists believe that they consist of interlinked patterns of behaviour consisting of various elements. For instance, Schatzki (2002), believes that practices are "a temporally evolving, open-ended set of doings and sayings linked by practical understandings, rules, teleoaffective structure, and general understandings" (Schatzki, 2002, 87). Reckwitz (2002), further outlined how elements are routinised behaviours which are interconnected to one another and that the elements consist of forms of both bodily and mental activities, 'things' and how they are used. This includes the importance of knowledge in the form of understanding i.e. having the know-how of how to carry out certain practices, alongside emotional and motivational

knowledge (Reckwitz, 2002,249). Interestingly, emotional and motivational knowledge and know-how are not seen as personal attributes of an individual, rather, "individuals feature as the *carriers* or hosts of a practice" (Shove, Mika and Matt, 2012,7). The role of the individual as a carrier will be discussed in more detail in a later section.

Materials, Meanings And Competences

Building on the work of other theorists, Shove et al. (2012) streamlined the process down to a three element model consisting of materials, meanings and competences (see Figure 1).

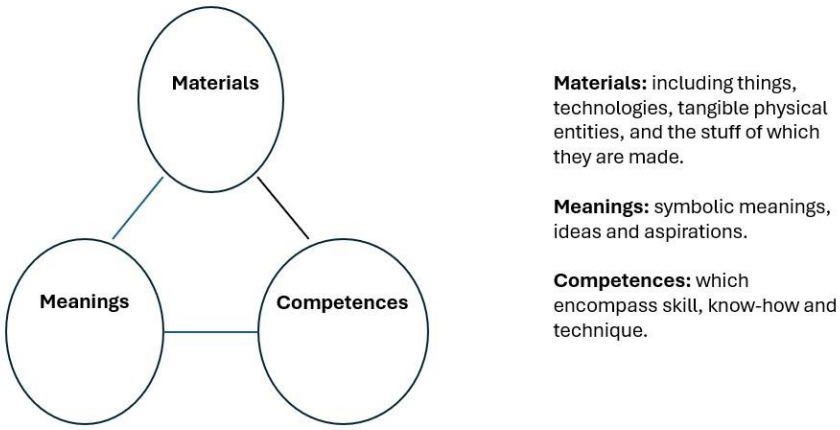


Figure 1 Three Element Model (Shove et al. 2012 p14)

This model put forward by Shove et al. has become a popular way to describe practices and how they help to explain various phenomena in society. Indeed, a number of academics refer to this model in their own writings to explain various cycling phenomena (Aldred and Jungnickel, 2014; Spotswood et al., 2015; Ravensbergen, Buliung and Laliberté, 2019a; Ravensbergen, Buliung and Sersli, 2020; Sersli et al., 2020; Buck and Nurse, 2021; Sersli et al., 2021). Therefore, whilst acknowledging other scholars work on the definition of social practice theory such as Reckwitz and Schatzki, for the purposes of this research the Shove et al. (2012) three element model will be used to help better understand the practice of mothers cycling with their children in the UK.

Materials

Within the three element model, materials are described as defined elements that are utilised within a practice. Materials can include what is owned by the practitioner, therefore in the case of mothers cycling with their children, this could be a bicycle, child seat or trailer. Materials can also be something that are used by the practitioner such as infrastructure like cycle parking, cycle lanes or shared use paths. Similarly, the body which propels the bicycle is also considered a material in this model. Indeed, there is no distinction between inanimate or living objects in their definition (Shove, Mika and Matt, 2012). This is because they are all part of the 'things' or 'materials' included in practices. However, it is important to note that whilst materials are a key part of a practice, they are insignificant on their own, "…products alone have no value. They do so only when integrated into practice and allied to the requisite forms of competence and meaning" (Shove and Pantzar, 2005, 57). For a practice to exist, a material must interact and link with meanings and competences.

Meanings

Meanings, therefore, are usually shared concepts that give sense to and explain why people might participate (or not) within a practice. As outlined in the three element model above (see Figure 2), these can be symbolic meanings, ideas and aspirations (Shove, Mika and Matt, 2012,14). Meanings are closely related to social norms, in that when practices are routinely performed by large numbers of people, then these practices signal that the behaviour or practice being carried out is an acceptable one (Shove, Mika and Matt, 2012; Aldred and Jungnickel, 2014; Spotswood et al., 2015). Conversely if practices are not commonly acted out, this would signal that they are not in keeping with societal norms. For cycling this is important, particularly in the UK where the image of cycling and the meanings attached to it are frequently viewed negatively by many in society (Parsons and Vigar, 2018; Sustrans' Research & Monitoring Unit, 2019) and can explain (in part) current low cycling rates.

Competences

Finally, competences require the know-how and skills of how to carry out a practice. Furthermore, these two factors need to combine to be successful. For instance, it isn't enough to just know about something, one must also have the skill to carry out that knowledge

(Shove, Mika and Matt, 2012, 23). These learned skills can be both mental and physical. For instance, the know-how of balancing and riding a bicycle requires the physical skills to do so. Similarly, the know-how of the rules of the road requires both mental knowledge plus physical skills to safely navigate a bicycle in and around other road users.

Variability Within The elements

It is also important to consider, when looking at the practice of cycling, that it takes many different forms within the UK. That is, cycling can be performed in different ways such as utility cycling, leisure cycling, BMX, mountain biking and track cycling. The materials, meanings and competences required for these different types of cycling will therefore differ depending on the specific type of cycling being practiced. For instance, the materials needed for utility cycling will be very different to that required for track cycling due to the different types of bicycles and infrastructure used.

Similarly, the meanings attached to a 'sporty' type of cycling such as downhill mountain biking will also necessarily differ to that of utility cycling. In that, downhill mountain biking may be associated with high risk due to equipment often worn during the practice of it, such as full face helmets and body armour. Equally, utility cycling in the UK, could also have meanings of high risk and safety issues but for different reasons, such as mixing with motor vehicles and the possibility of collisions/danger from other road users. Finally, the competences required for the performance of different types of cycling will also vary. With specific skills and know-how differing depending on the type of cycling being practiced.

Connection of Practices

According to Shove et al. (2012), the three elements; materials, meanings and competences, must simultaneously be present for a practice to exist. However, these elements must also continually connect with one another to stabilise a practice, notwithstanding fluidity and nuances within a practice each time it is performed. This is what allows routinisation of a practice to occur (Reckwitz, 2002, 249). Understanding the fluidity of practices is particularly pertinent in relation to the complexities of cycling in the UK.

Nettleton and Green (2014), in their research on changing mobility practice through a social practice approach, provide the example of two women who undertook a cycle training course

and shared many commonalities. That is, both women gained similar skills from the course, had friends who cycled, and shared similar health and environmental motivations to take up cycling. However, only one of them continued to cycle after the course. The female participant who entered into a regular practice of cycling, was able to do so because,

"a social, material and environmental network has coalesced to enable cycling to happen: her physical ability; time and energy; a working bicycle; supportive husband, family and friends with time to encourage her fledgling skills; local places (park, quiet roads) where not only is cycling theoretically possible, but culturally appropriate for a female, middle-aged and less than fluidly competent practitioner to do it" (Nettleton and Green, 2014, 245).

Conversely, the other participant on the cycle training course was unable to mobilise all the various elements successfully. That is, despite purchasing a bicycle, sourcing somewhere to store it, having friends who were happy to accompany her on rides,

"…in the context of a busy job, low energy at the end of the day, the visible dangers of inner-city roads and the less than welcoming environment of her local park, these are not possible to bring together in the process of embedding newly acquired embodied skills: that is learning to ride on the road" (ibid 245).

Accordingly, in the former case the necessary links coalesced to allow the practice of cycling to occur. However, in the latter example, because connections between the various elements were not sufficient, the practice of cycling did not happen.

Practice-as-Entity and Practice-as-Performance

There are two ways of conceptualising practice: practice-as-entity and practice-as-performance. The former (entity), refers to something that is easily recognisable as a practice or 'thing' such as cycling, gardening or photography. That is, practice-as-entity presents the different characteristics of a practice. Therefore, in cycling it would view the practice by considering what elements are needed to undertake the practice, such as having a bicycle, somewhere to ride it and the skills to cycle. It would also consider how any elements are interconnected. For instance, does infrastructure (or lack of) affect where and when people cycle. The connection of practices to other practices or bundles of practices is also of importance (Heidenstrøm, 2022), for example in relation to cycling, how this interacts with

the practice of driving will be discussed shortly. Similarly, looking at practice-as-entity over a period of time can highlight the evolution of how practices have changed, and further reinforces the dynamic nature of practices.

However, practice-as-entities need to be performed in order to exist. For cycling, the practice -of-performances can be undertaken in a variety of ways as highlighted previously. For instance, cycling for leisure, sport or transport. Even within these three different categories there are many ways in which they can be performed. That is, different types of bicycles can be used– road, BMX, hybrid, mountain, fixed wheel. Different clothing may be worn, distances cycled will vary and even the type of surface cycled on can differ. Accordingly, "the practice of cycling as entity provides the framing, resources and pattern for a diversity of performances of cycling" (Shove, Mika and Matt, 2012, 490).

That a practice can be performed in so many different ways, further demonstrates the dynamic nature of practices which are constantly changing and being acted out in various forms. It also provides numerous contact points for which new practitioners could be recruited to a practice. Furthermore, each time a set of actions occur it becomes recognisable to others and potentially allows them to follow suit by providing a rough blueprint, "Eventually, physical tools and artefacts along with human skills, experience, meanings and social significance coalesce around the practice, anchoring it and embedding it within a complex web of other practices" (Moreham, 2021, 35). Therefore, whilst practice-as-entity and practice-as-performance are two quite different concepts, they are necessarily connected, whereby changes in entity can affect performance and vice versa.

Carriers of The Practice

Despite a departure from the individual being at the centre of behaviour, the role of the individual is still pertinent in practice theory. This is because, for a practice to happen, they have to be performed by people, or a 'carrier'. Similarly for a practice to exist and continue over time, they will require new recruits to ensure the practice persists. Indeed "the careers of individual practitioners determine the fate and future of the practice itself" (Shove and Pantzar, 2007,3). Therefore, as more people participate in a practice, their experiences may differ from others. That is, they may use different materials, assign different meanings and utilise different competences within the practice and thus the practice continually evolves

and changes. This in turn may affect future recruitment and retention (ibid). Indeed Shove et al. (2012) posit, "Our central proposition is that the contours of *any one* practice – where it is reproduced, how consistently, for how long, and on what scale -depend on changing populations of more and less faithful carriers or practitioners" (Shove, Mika and Matt, 2012, 63).

It is widely agreed in social practice, for a person to participate in practice, they must have both the know-how (Reckwitz, 2002,249), alongside the practical skills of 'doing' (Schatzki, 2012a). Thus, a number of conditions need to be met for carriers to be recruited. This includes being exposed to a practice in the first place. They may also need to acquire particular competences to take part, "potential practitioners have to master a new technique; materials and skills have to gel" (Shove and Pantzar, 2005,58). It is also suggested that for carriers of a practice to continue taking part and reproduce the practice, they would need to gain something positive from the experience (ibid).

However, Shove et al. (2012) posit that for some practices, they become so widespread and embedded into everyday life that the recruitment of carriers is more likely to happen than say, other less mainstream practices. An example they provide, includes the practice of daily showering in Western societies. This practice does not need to actively seek out new recruits because the design of bathrooms, the plethora of personal cleansing products on sale and an expectation to be clean by society means the practice is something "…where participation is simply expected, recruitment follows as a matter of course" (Shove, Mika and Matt, 2012, 68-69). In addition, some practices (like showering) are relatively easy to participate in, due to the ease of which materials, meanings and competences (mentioned above) link.

However, in comparison to showering/cleaning, it could be argued that recruiting carriers to the practice of cycling (in the UK) is more complicated. As will be discussed in more detail in a later section, utility cycling is not currently a mainstream practice in the UK, due to a number of factors preventing the sufficient links between the materials, meanings and competences to allow cycling to flourish as a practice. Accordingly, for cycling as a practice to recruit more practitioners it would require a change in all three elements. Interestingly, however, this could initially be initiated by a change in just one of the elements. That is, the implementation of more protected cycle lanes (materials) in the UK could then act as a catalyst for change in the meanings associated with the practice of cycling, because the separation from other road

users makes cycling as a practice safer and less associated with high speed and high risk. In turn, this change in meanings, also influences the competences needed to cycle, as practitioners would no longer need to have the skills or know-how to cycle on busy roads with other fast moving vehicles. Consequently, as the practice becomes more popular, meanings and competences adjust allowing even more carriers to be recruited to the practice,

"If a practice becomes widespread, we might also expect meanings to shift: like competences, they might become less closely tied to the individual. Hence, when everyone cycles, no one is 'a cyclist'; it is not who you are but simply what you do. Conversely, where cycling is marginalised (and cycling may require higher levels of competence, or less easily available materials), characteristics associated with the practice may be more likely to coalesce into an identity (i.e., an expression of a perceived group affiliation)" (Aldred and Jungnickel, 2014,80).

One could assume therefore, that due to the high levels of mothers cycling with their children in countries such as the Netherlands, Denmark and Sweden, the practice of cycling has met the conditions of it being a mainstream practice and as such cycling is just something that happens (Oosterhuis, 2016).

Ex-Practices And Proto-Practices

For a practice to flourish the links between the three elements must be continually connecting with one another, albeit with some degree of fluidity and nuance each time a practice is performed. However sometimes links between the elements can become broken. When this happens a practice can become an ex-practice, see Figure 3 below. There are two different types of ex-practices. The first relates to when links disintegrate to the point that a practice can cease to exist in society completely, possibly as a result of changes in social trends, legislation or improvements in technology. For instance, very few people carry out the practice of using outside toilets in the UK, due to advances in indoor plumbing and changes in housing standards.

Secondly a practice can continue to exist, but an individual carrier may defect from the practice and thus it becomes an ex-practice for that specific individual. "Individuals are

constantly taking up and dropping out of different practices as their lives unfold" (Shove, Mika and Matt, 2012, 67).

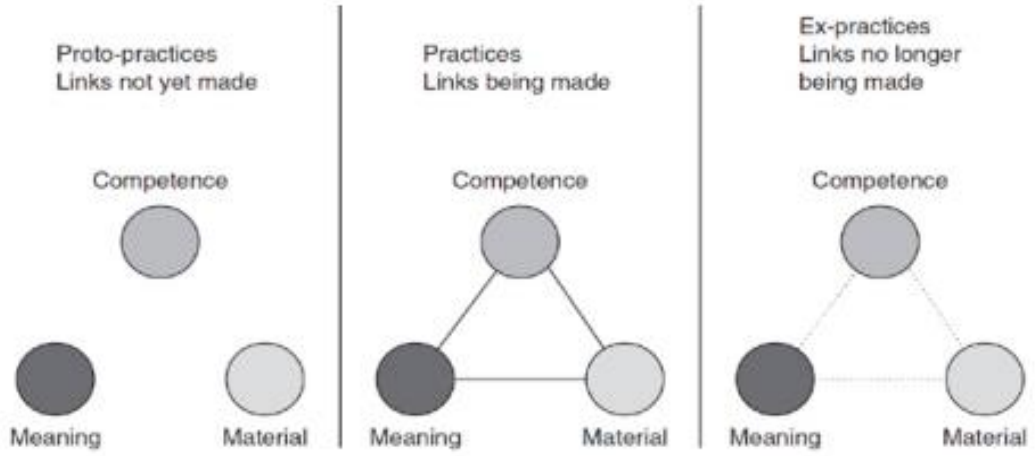


Figure 2 Proto-practice, practices and ex -practices (Shove et al. 2012 p25).

Proto-practices on the other hand, also shown in Figure 2, are when links have not yet been made or stabilised between the elements for it be considered a practice. These will be discussed shortly.

Broken Links: When Practices Cease to Exist in Society

It is important to note that the making or breaking of links can result in quite different outcomes despite similar circumstances. This will be demonstrated below using the example of the growth of car use and decline of cycling in the 1970s which occurred both in the UK and The Netherlands. However, as will be shown, differences in approach to the growth of the practice of driving and the various negative externalities that followed, were dealt with very differently by the two countries. As such, for the practice of utility cycling, the linking of materials, meanings and competences in the UK was very different to that of The Netherlands.

Despite an awareness of the negative externalities of growing car use, car centric policies continued to dominate the landscape of UK transport strategy from the 1970s onwards. The UK government's reluctance to specify national guidance or commit sufficient funding to local authorities to implement cycling schemes, also resulted in slow progress and varying

standards of cycle infrastructure across the UK (Davis, Valsecchi and Fergusson, 2007; Golbuff and Aldred, 2011). Whilst cycling in the UK had once been a popular mode (ibid), levels had fallen to between 1-3% of mode share during the past five decades and with it far fewer numbers of women cycling than men for utility journeys (Department for Transport, 2022b).

Meanwhile, in the Netherlands, during the 1970s, cycling levels were also in decline, due to a growth in the practice of driving. However, in stark contrast to the UK, the Netherlands tackled the problem head on, by integrating cycling into wider transport policy (Pucher and Buehler, 2008a; Wardlaw, 2014). Cycle networks were implemented, linking housing developments to schools, shops and workplaces (ibid) making cycling to such places convenient and in many cases the most direct route to take. As a result of these policies, cycling in the Netherlands increased and was once again seen as an everyday practice with around 27% modal share of all journeys (Pucher and Buehler, 2008a; Haustein, Kroesen and Mulalic, 2020).

Using social practice theory and the Shove et al. (2012) three element model to examine the decline of cycling in the UK, these changes occurred in part, due to broken links between materials, meaning and competences in the practice of cycling, but also because the links between the elements of driving became bound together more strongly which in turn also affected the practice of utility cycling in the UK. That is, materials facilitating the practice of driving became more readily available through the provision of infrastructure such as roads, motorways and parking. In addition, vehicles became more affordable to the general population (Shove, Mika and Matt, 2012, 30). At the same time, meanings associated with cycling in society also began to change as more people took up the practice of driving. As driving became the social norm, and cycling became less popular, those people who continued to practice cycling were often deemed “deviant, irrational and problematic” (Parsons and Vigar, 2018, 168). Therefore, as mentioned above in a previous quote by Aldred and Jungnickel (2014), cycling became a marginalised practice and those who took part it in became an exception rather than the norm hence (Aldred and Jungnickel, 2014,80).

These policy decisions also meant that the competences required to carry out the practice of utility cycling in the UK changed. Those riding bicycles now required skills and the relevant know-how to cycle on busy roads. Furthermore, as the competences needed to practice utility cycling changed, this again fed back into the meanings of utility cycling, which became

associated with not only unusual behaviour as mentioned previously but also with high risk and danger (Golbuff and Aldred, 2011; Aldred and Jungnickel, 2014; Parsons and Vigar, 2018).

On the other hand, in the Netherlands, due to specific materials in the form of cycle routes and networks separated from motor vehicles, links were forming between the three elements which helped facilitate cycling. In particular, the provision of safe cycling infrastructure changed the competences needed to cycle, because there was no need to master skills to deal with heavily trafficked roads. This also meant the meanings associated with cycling in the Netherlands became viewed as a safe, normalised, everyday activity and generally seen as a positive thing to do. Indeed, in stark contrast to the UK, cycling began to be performed by both men and women equally, and mothers using cargo bikes, trailers, or child bike seats to transport their children around, or ride alongside their children on their own bikes was a common practice (Emond, Tang and Handy, 2009; Eyer and Ferreira, 2015; Ravensbergen, Buliung and Sersli, 2020).

When Individuals Defect From a Practice

Shove et al. (2012) also refer to individual carriers defecting from practices if links become broken between the three elements. An ex-practice, in relation to cycling might be that someone has their bicycle (*material)* stolen, and if they lack the financial resources to purchase another bicycle, this could result in a permanent break to the practice. Another example could be where someone changes jobs and their new commute is too long to cycle, or they deem their new route too dangerous (*material, meanings and competen*ces). Therefore, for that particular individual, cycling becomes an ex-practice.

The breaking of links, however, doesn't always result in an individual defecting from a practice permanently. In some cases, breaks between links can result in a temporary pause, This will be shown in a later section with findings from this research demonstrates how mothers sometimes had to take a short break for various reasons, but then elements realigned to allow the practice of cycling to commence again.

Proto- Practices

Shove et al. (2012) also discuss proto-practices to show the complicated nature of practices and how simple changes in one or more of the elements can result in practices ceasing to

exist or getting started in the first place. For example, and as demonstrated in Figure 3 previously, a proto-practice is where the elements of a practice exist, but they have not yet linked in such a way as to earn practice status. Julsrud and Farstad (2020), in their research on car sharing in Norway note that when a practice is not yet carried out in high numbers then it would be classed as a proto-practice,

"Following the triadic conceptual framework offered by Shove and her colleagues, it [car sharing] largely represents a proto-practice – an emerging social practice where the links between the elements of meaning, materiality and competence have not yet been made stable, or are lacking altogether" (Julsrud and Farstad, 2020, 3).

Therefore, using the above definition, whilst the practice of mothers cycling with their children exists in the UK, the numbers of those participating in this practice are low allowing it, in its current form to be considered a proto-practice.

Limitations of Social Practice Theory

Despite the increasing popularity of the use of social practice theory by academic writers to explain various social phenomena, a number of criticisms and limitations are also put forward. For instance, a number of questions have been raised concerning which methodologies are compatible with practice theory when trying to provide empirical evidence of practices. As with many tenets of practice theory, there are a number of competing views on this topic. These are discussed below.

Ongoing Methodological Debates

As discussed, whilst there is no consensus on the exact way practices fit and exist together, it is generally accepted that social practice theory allows phenomena in the form of 'practices' to be framed and understood. It also provides consideration as to why some practices are mainstream whilst others exist on the periphery of society. It does this by looking at how practices develop, perpetuate and in some cases abate (Reckwitz, 2002; Shove, Mika and Matt, 2012; King et al., 2013; Parsons, 2019). However, whilst the employment of social practice theory is acknowledged to be a useful mechanism for providing in-depth descriptions of practices that occur, it is less clear how empirical methods should be applied when framing research within social practice theory.

For instance, understanding practices can be complicated, this is because some practices (or parts of them) are not necessarily intentional or even conscious 'doings' (Schatzki, 1996). That is, whilst people will be aware they are carrying out a practice, they may not have made a connection as to how their practices are routinized, linked to cultural norms or how wider societal factors influences them. For instance, Trowler (2014) believes,

"For the people performing complex practices it is difficult to express these in words, partly because those practices are usually normalized, invisible to them, partly because they are embodied, involving emotions and assumptions as well as behaviour, and partly because they feature characteristics that are inexpressible" (Trowler, 2014, 20-21).

If this is the case, which methods are best suited to capture complicated nuances that practices have, particularly in cases when the person carrying out the practice may not even be aware of them themselves?

There have been attempts by some to provide guidance on methodologies for social practice theory. Nicolini, in his various writings, puts forward a 'theory method package' or 'toolkit' for research (Nicolini, 2009, 2013, 2017). This approach encourages the zooming in and out of practices. First by zooming in on a particular practice in a "specific place to make sense of the local accomplishment of the practice and the other more or less distant activities" (Nicolini, 2013, 220). This is then followed by a zooming out process that allows observation of any connections between practices including those which are spatial and historical. Subsequent zooming in and out continues until the practice is better understood. Although it is assumed a practice may never truly be fully understood due to its constant state of flux (ibid).

However, Nicolini's toolkit does not provide prescribed methods as to how to undertake this 'zooming in and out', as the complexity of practices means that it is unlikely that one single method could capture the various nuances involved adequately (Nicolini, 2009, 196). Nicolini's rejection of standalone methods such as surveys and interviews, which he declares are "a second best choice" (Nicolini, 2017, 32) however, suggest an ethnographic approach is implied as the preferred method, "Whenever possible, we should position ourselves in the midst of the scene of the action" (Nicolini, 2017, 29).

Bueger (2014) with his paper on praxiography (the practice of doing research) posits that there is no specific blueprint for social practice theory methodologies, and like Nicolini (2009), for research to be successful it must avoid the pursuit of a singular strategy. Rather, "It has to be tailored to the problems and practices at hand. It requires mixing and blending different strategies into each other or inventing new ones in response to the material studied" (Bueger, 2014, 385-386). In many ways, both Nicolini and Bueger's response to methodologies are somewhat open ended, perhaps allowing them to be interpreted in such a way that arguably raises more questions than answers. Similarly, Shove's (2017) response to methodologies is also left relatively ambiguous. She advocates an approach where methods should be chosen based on what is being studied, "Using practice theory is not directly tied to certain methods, but the choice of methods is- as always -dependent upon your specific research question" (Shove, 2017,np).

Qualitative – Interviews And Focus Groups

For some social practice theory advocates, qualitative methods such as interviews are frowned upon. That is, due to beliefs that practitioners may not necessarily be aware of certain 'unconscious' aspects of their practice and therefore are unable to communicate them adequately (Trowler, 2014, 20-21). Hitchings (2012) refutes the arguments that people are unable to necessarily understand the nuances of their practice and as such incapable to talk about it with any authority,

"Interviews offer such an efficient means of understanding how it is to embody certain practices when it may be exactly such understandings that could prove crucial in initiating positive change. Encouraging people to talk about their practices may not always be easy, but that does not mean it is not worth trying" (Hitchings, 2012,69).

Nicolini (2009), although an advocate of ethnography also believes that individuals can understand and talk about their actions within a practice. However, in discussing interviews, he references quite a specific type of interview known as the Interview to the Double (or ITTD). This is a particular form of interview which sees the practitioner of a practice provide a detailed narrative on the key elements of what they are doing. The ITTD allows the practitioner to step out of their practice and describe what they do word for word so that

their instructions could be used by someone else to carry out the practice action by action if needed (Nicolini, 2009).

It is unclear if the Interview to the Double (ITTD) method would work with practices such as cycling with children. That is, the practice of riding with a child during an average week could cover a multitude of different journey routes, lengths, different weather, interactions with different road users and unpredictable moods and behaviour of children, making each journey unique. Of course, Nicolini's preference for methods such as the interview technique described above would also be intended to be used in conjunction with some participant observations as well, so the use of it as standalone method may indeed be moot. Nonetheless, an interpretation of the Interview to the Double (ITTD) method has been employed in this research as part of the interview process and will be discussed later.

It is also important to consider the role of the researcher or those carrying out interviews. For instance, with regard to how this may influence the process in terms of how willing participants are to share their views and thoughts. As Berger (2015) points out in her article on reflexivity, the information shared by participants can differ quite markedly depending on how comfortable they feel sharing sensitive information with the researcher (Berger, 2015,231). As an example, Berger's research, which entailed interviewing immigrant women in the US, found that her own status as an immigrant allowed her to build a rapport with participants. She found they felt comfortable sharing quite detailed information with her, which they may not have been so willing to do with other interviewers (ibid). In this research, as a mother who cycles with their child, this could potentially help foster a comfortable relationship between interviewer and interviewee, notwithstanding that those with different socio-demographic backgrounds to my own may have different opinions and/or feel less comfortable.

Focus groups are another form of qualitative research and are perceived to be able to play a role in a social practice theory methodology if applied befittingly. The main issues surrounding methods such as focus groups are similar to those used against interviews. For instance, that those taking part in practices are not necessarily able to vocalise them (or certain parts of them) and that participants of a practice may not have made conscious links to parts of their practice because they have become so routinized and normalised (Trowler, 2014). Therefore, any oral accounts via a focus group may miss key information that would be evident when

observing them in the midst of their practice. However, this of course relies on a researcher being capable of interpreting and understanding all aspects of a social practice when they witness it. Additionally, observation alone is also problematic as fails to take into account any historical or cultural elements that are not necessarily 'acted out' in a practice (Schatzki, 1996; Reckwitz, 2002; Shove, 2010; Shove, Mika and Matt, 2012).

For example, a particular claim of social practice theory is that practices are influenced by cultural and social norms (Reckwitz, 2002; Shove, 2010; Parsons, 2019). Indeed, the Literature Review covers the issues of why less women cycle than men in the UK. Many of these reasons are historical, such as how transport systems have been designed over the last few decades. Or how cycling is often viewed negatively in society, which can make cycling as a mode of transport less attractive to women. Other research also points out how women from ethnic minority backgrounds undertake less cycling than those from white backgrounds (Steinbach et al., 2011; Aldred, Woodcock and Goodman, 2016b). Observation or ethnographic studies (alone) would not necessarily unravel why those from certain backgrounds are not taking part in the practice of cycling. However, interviews or focus groups with women from ethnic minorities could pick up important clues and information as to why cycling is not more widespread within certain demographic groups.

Quantitative Methods - Surveys

The use of quantitative measures such as surveys are perhaps viewed as least compatible with social practice theory, because they are unable to capture the "intangible and ephemeral; the sensory, emotional, kinaesthetic and symbolic aspects" (Spinney, 2011,164) of a practice. A similar sentiment appears to be shared by Browne (2016), in her article on the use of mixed methods in social practice theory. She posits that the use of surveys are deemed unsuitable because they are unable to "reflect deep dynamics of practices , how they change over time, and interpersonal dynamics…" (Browne, 2016, np).

Nonetheless, Browne attempts to look at both the pros and cons of qualitative and quantitative methods and in doing so, she then concedes, that it could equally be argued that a strong focus on qualitative methods such as ethnography, focus groups or interviews means research findings can be quite limited. That is, it is possible that conclusions are made about practices based on very small sample sizes and this in itself could be deemed problematic

(ibid). Browne (2016) continues with the positives of quantitative methods and that the use of methods such as surveys can provide useful information on the patterns of practices by sampling much larger populations and identifying how widespread a particular practice is (ibid).

This view concurs with Schatzki's (2012) points, where he concludes surveys can play a useful role in the study of large scale phenomena (Schatzki, 2012, 26). The other benefit of using methods such as surveys, is that the inclusion of quantitative research has the opportunity to "… provide greater explanatory power and generalizability to complement existing qualitative research" (Kennedy, Krahn and Krogman, 2013,255).

For instance, my own experience of cycling with my son, is that when cycling with him as a passenger in my cargo cycle, I frequently experienced problems with physical barriers on certain shared use cycle paths. Accordingly, I might hypothesise that other mothers using similar cycles would also find this a problem. Using quantitative methods such as surveys can help to provide evidence, providing a larger sample than qualitative methods such as focus groups or interviews can. Likewise, if found to be a common obstacle for other mothers this could be followed up using qualitative methods to gain greater detail on such issues.

It is clear that the topic of methodologies in social practice theory remains relatively unresolved. So much so, that a Practice Theory Methodologies blog was set up to allow practitioners/academics to debate and discuss pertinent issues surrounding the use of various methods when using this framework. Interestingly, the blog includes the quote mentioned previously from Shove, in her article, with the somewhat provocative title, "Practice theory methodologies do not exist" (Shove, 2017, np). It is evident from reading articles from the blog that there remain many differences in opinion on this topic. Indeed, the introduction section of the blog posits how

"…important questions remain as to both whether the methodological 'status quo' in social scientific disciplines suffices for those engaging with practice theory, and how methodological innovation or experimentation might inspire further theoretical and empirical contributions" (Hui and Schafer, 2015).

Therefore, as with the absence of an exact definition on what social practice theory is, it follows that many practitioners have different views on what methods should be used when carrying out research.

Social Practice Theory and Change

A further criticism of social practice theory relates to how it copes with change. That is, whilst using this theory helps garner interesting and in-depth descriptions of practices (Shove and Pantzar, 2005; Shove, 2010; Shove, Mika and Matt, 2012) they offer no real solutions for change in the real world, and are unable to necessarily predict or explain future change (Moreham, 2021, 39). In part, this is attributed to the dynamic nature of practices, constantly "unfolding" (Schatzki, 1996) and existing in relationships with other dynamic practices. These other practices sometimes work in competition to them or can 'bundle' (Heidenstrøm, 2022) together harmoniously with them. As a result, this means change is not straightforward,

"A number of authors have grappled with the question of how to intentionally intervene in such a dynamic and interrelated domain, where single, causative levers of change remain scarce and instead, indeterminacy and even uncertainty around the direction of causation abound. Practice theory eliminates the sanctuary of a safe, external vantage point for advocates and policymakers, and very different forms of intervention are required". (Moreham, 2021,22).

Proponents of practice theory however would counter these claims, positing that if a practice is studied, it allows understanding of how …"certain practices are done, produced, re-produced and why others are prevented" (Parsons, 2019, 38). The issue that practices are constantly changing is not necessarily a problem, because change is always occurring in society. Rather, the study of a practice would in most cases provide enough information to understand what necessary changes (via policy), are required to a practice or certain elements of it, to facilitate positive change. Rather, the limitations in using social practice theory are practical issues and not theoretical ones.

For instance, Hampton and Adams (2018) discuss some of the limitations in social practice theory in a practical setting. Their research looks at government social researchers (GSRs) tasked with influencing energy and environmental policy in the UK. Many of the GSRs interviewed readily acknowledged the disadvantages in using behavioural economics, choice

architecture or 'nudge' theories commonly favoured by government policy (House of Lords: Science and Technology Select Committee, 2011; Hampton and Adams, 2018). That is, because focusing on changing individuals' behaviour via targeted campaigns was often limited in scope and not able to bring about widespread changes (Hampton and Adams, 2018, 215).

However, whilst these researchers were aware of social practice theory and its capacity to recognise the usefulness of the role of historical, cultural and societal considerations, there was a concern that because practice theory was radically different to models commonly used (Hampton and Adams, 2018, 219), that it was unlikely to become a mainstream theory in government policy at the current time,

"If we could have some evidence on its application as well as theory.... We would be the ones who would be promoting it.' 'Social practice theory needs to be crystallised in concepts which people can understand. You need micro-applications of it. Little trials of social practice theory.' 'That's what you need - an intentional social practices approach, to give it ammunition" (Hampton and Adams, 2018, 220)

Accordingly, the theoretical underpinnings of practice theory were both recognised and accepted as a useful way in which to understand certain behaviours and practices better. Rather the practical application of it, or rather the lack of useful examples of its application in real life situations was the limiting factor in it being used in policy circles.

Chapter 4: Methodology

Introduction

This chapter sets out the methodology used to conduct this research. It starts by revisiting the three research questions initially presented in the Introduction chapter. It also assesses the pros and cons of different types of research methods, their suitability for understanding the practice of cycling with children and then concluding with the methods chosen to proceed with. Next, the following sections outline the detailed design of the three phases of research used within this study. It does this by addressing how data was collected and the methods for analysis of each phase in more detail. The final two sections, acknowledge the methodological limitations and a discussion of my position in this research and how this has affected choices made throughout.

Research Questions:

As outlined in the Introduction Chapter, this research seeks to better understand the practice of mothers cycling with children in the UK and is guided by the following questions:

1) What are the materials, meanings and competences in the practice of mothers cycling with their children in the UK.
2) What are the main ways in which links between the three elements are at risk of becoming broken, with regards to the practice of mothers cycling with their children in the UK?
3) How would materials, meanings and competences need to change for more mothers to take up the practice of cycling with their children in the UK?

Whilst some mothers in the UK are cycling with their children, little is known about the various elements of their practice and the intricacies of how they perform cycling with their children. Previous research also cites barriers that cycling is unachievable due to concerns over road safety issues and its incompatibility with carrying out paid employment and other care duties The research questions chosen for this study, therefore, are well positioned to help fill some of the existing gaps in knowledge around this topic.

Choice of Research Methods for This Study

As has been shown in the Literature Review, there are pros and cons to using any type of methods when carrying out research. Trying to design a methodology when framing research within social practice theory appears even more complex given the various opinions on the suitability of available methods. For instance, the previous chapter outlines some of the issues when choosing various research methods in combination with social practice theory. Accordingly, to choose a suitable methodology for this research, it was important to revisit the initial Research Questions to ascertain the best methods to proceed with this research.

Even though limited information is available regarding the current practice of mothers cycling with their children in the UK, the research questions were designed to gain an insight into the intricacies and detailed nature of the various ways in which mothers carry out the practice of cycling with their children. It does this, by looking at the types of materials used, meanings associated to their practice and competences needed to carry it out. It also considers how links may become broken within the three elements and how changes to them are needed to recruit more mothers to the practice.

Mixed Methods

Methods were required that could capture both quantitative information as well as rich qualitative data. That is, quantitative information was needed to ascertain issues such as socio-demographic traits of mothers who currently cycle in the UK with their children and potentially highlight if there were any commonalities of the 'carriers' of this practice. Quantitative methods would also help understand patterns in the (materials) utilised in the practice of cycling with children, such as the types of cycles used, costs of cycles and types of infrastructure used by mothers. However, qualitative methods were also essential to allow mothers the opportunity to express the types of meanings they associated with their practice, and to allow a deeper understanding of various issues surrounding the competences needed to perform the practice of cycling with their children.

In view of this, it became clear that a mixed methods approach would be the ideal solution to allow a combination of both quantitative and qualitative methods to capture the types of information listed above. Put simply "mixed methods is a procedure for collecting, analyzing,

and “mixing” or integrating both quantitative and qualitative data at some stage of the research process within a single study for the purpose of gaining a better understanding of the research problem” (Ivankova, Creswell and Stick, 2006, 3). The use of mixed methods in the field of social sciences is accepted as a suitable way to look at complex subjects which require both a quantitative and qualitative approach to better understand issues (Miller and Brewer, 2003; Shorten and Smith, 2017; Timans, Wouters and Heilbron, 2019).

The rationale for using mixed methods is seen as a means of overcoming the shortfalls that can materialise when using either/or quantitative and qualitative methods. That is, by using a mixture of both, “…the combination of qualitative and quantitative methods together could mean that the weaknesses of one approach are cancelled out by the strengths of the other” (Miller and Brewer, 2003, 327). Nonetheless, criticisms have been raised concerning the combining of quantitative and qualitative methods due to the different theoretical underpinnings of both methods, which by their very definition are frequently assumed incompatible.

For example, a key principle of qualitative research is that it is often based on a constructivist approach focusing on the subjective, ‘the why’ and the individual experiences of those being studied, which allows in depth findings of phenomena (Barnham, 2015; Hafsa, 2019). Whereas quantitative research on the other hand follows a positivist and much more objective approach focusing on the ‘what’ via measurable, large-scale data which can be traced and analysed to show patterns (ibid). Nevertheless, for many, the different theoretical underpinnings of mixed method research are not an issue. That is, both pragmatism and critical realism allow a philosophical stance that is fully compatible with mixed method research and thus allows the different theories to be reconciled (Bergman, 2008; Barnham, 2015; Regnault, Willgoss and Barbic, 2018; Mukumbang, 2021).

However, whilst the theoretical issues appear to be accommodated, some practical questions remain when designing a methodology that uses both quantitative and qualitative methods. For instance, the order in which data collection is carried out, if one method is prioritised over the other and how data is analysed and whether the different types of data sets are integrated (Ivankova, Creswell and Stick, 2006; Hughes, 2016). These issues can make the implementation of mixed methods complicated and were carefully considered throughout this research. Nevertheless, Ivankova et al. (2006) believes these are not insurmountable

problems and provides procedural guidance to designing a methodology using mixed methods which can overcome issues such as those raised above concerning the sequence of data collection, the weight given to the different methods and data analysis (Ivankova, Creswell and Stick, 2006, 3).

Furthermore, with regards to mixed methods being used in social practice theory-based research, as previously mentioned, Browne (2016), debates the pros and cons of standalone quantitative methods and standalone qualitative methods showing various limitations for both. Instead, she posits that using a mixture of quantitative and qualitative overcomes shortfalls from using just one method, "This is why I am a strong advocate that mixed methodologies are always more illuminating. Each reveal different levels and layers and dynamics of practices at different scales…" (Browne, 2016).

The Study Design

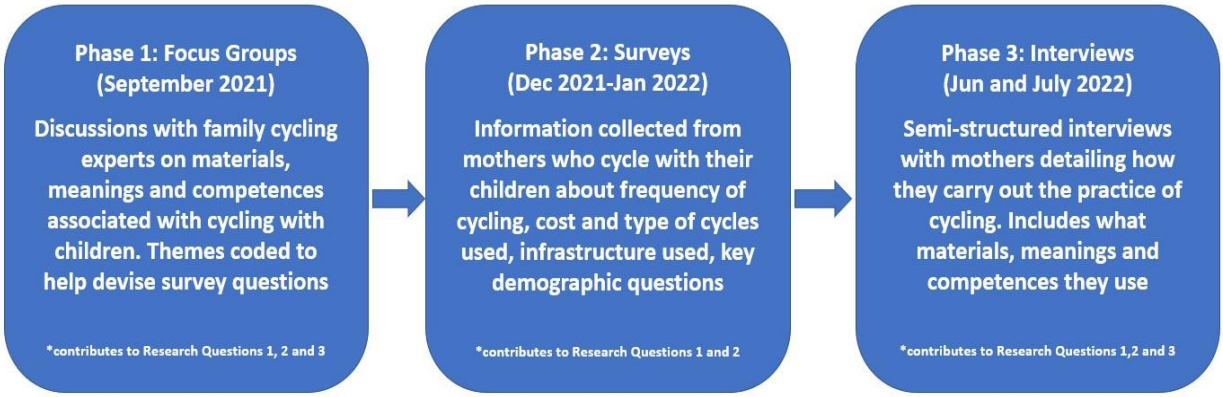
Once the decision had been made to use a mixed methods approach the research was divided into three phases. Figure 5 below shows the three phases of research, which included:

Phase 1: Focus Groups

Phase 2: Surveys

Phase 3: Semi Structured Interviews.

Ethics approval was sought for each phase of the research and will be discussed in a later section.



Research Questions:

1) **What are the materials, meanings and competences in the practice of mothers cycling with their children (aged 11 and under) in the UK**
2) **What are the main ways in which links between the three elements are at risk of becoming broken, with regards to the practice of mothers cycling with their children (aged 11 and under) in the UK?**
3) **How would materials, meanings and competences need to change for more mothers to take up the practice of cycling with their children (aged 11 and under) in the UK?**

Figure 3 Design of the Three Phases of Research

Phase 1 – Focus Groups

This phase of the research was intended to contribute towards all three Research Questions The focus groups took part during the month of September 2021 and were split into three separate groups. Funding was secured to provide vouchers to allow participants to be recompensed for their time. Twelve participants were initially recruited, but two had to drop out due to various reasons just before the focus groups commenced. Due to ongoing issues with the pandemic and the fact that participants were located across the UK (covering all four nations), it was decided to conduct them online via Skype for a duration of approximately 1.5 hours.

The initial aim was to recruit women who are influential in the field of female/family cycling. A list of key women from around the UK who either work, volunteer or have a high social media presence on family cycling issues was compiled. Having previously worked in several organisations in the cycling field, I initially touched based with a number of contacts I had, asking for suggestions for people to take part in the focus groups. A key requirement being that participants must cover a wide range of cycling organisations and come from different geographical areas of the UK. This resulted in a long list of names of possible participants

being put forward. The final list of participants was selected based on their willingness and availability to take part in a focus group during the month of September 2021.

The participants of the focus groups represented a variety of cycling organisations and professions. These included Sustrans and Cycling UK, Joyriders, Bikeability instructors, cycling coaches, Breeze champions, business owners (family cycling related), community cycling officers, cycling advocates and campaigners. Geographically, participants were located across England, Scotland, Northern Ireland and Wales. Two participants represented ethnic minority cycling groups/individuals. Several participants also had children who were autistic or had learning difficulties but unfortunately it was not possible to find any participants to represent disability cycling groups (particularly those with physical disabilities). This should be highlighted as a possible limitation and a gap to be followed up in any future research.

As a mother who cycles with their child, I am aware of my own bias in relation to the issues that I believe are problematic when cycling with a child (see later section on my research position). Therefore, the focus groups were carried out to ensure a more independent view based on the wide variety of participants engaging in the discussions, to highlight what they felt were pertinent issues involving the practice of mothers cycling with children. A list of questions (see Appendix 1) was compiled to guide the focus group conversations. However, these acted mainly as a steer to allow conversations to flow and if necessary, move onto other issues not scripted.

In keeping with the theme of the Shove et al. (2012) three element model, questions were loosely grouped to ensure elements which would fit under materials, meanings and competences were covered in discussions. For example, questions included the types of cycle infrastructure in the UK which they felt was conducive to cycling with children, and those which are not (materials). The cost of child carrying bicycles and cycling equipment was also discussed. Discussions of cultural barriers (meanings) and the skills/confidence needed to cycle as a woman and mother were also raised (competences), which then linked to suggestions on the types of interventions that could be employed to help more mothers take up the practice of cycling with their child.

When moderating the online focus group, it was imperative that everyone was given the opportunity to speak their views. A particular downside of online forums is that not being in

the same room as someone, can make it difficult to read body language cues. Similarly, it is hard to judge when someone has finished speaking, resulting in an overlap of conversations taking place, "when compared to face-to-face focus groups, participants found that the discussion in online focus groups did not flow as well" (Stewart and Shamdasani, 2017,50). However, in general the discussions went smoothly, and everyone was given ample time to get their points across through careful moderation of the group.

Analysis

The focus groups were recorded on Skype and recordings were encrypted, transcribed and stored in line with the university's GDRP requirements. Thematic analysis was used to create a set of initial codes from each of the transcripts. These were inputted into qualitative data analysis software Nvivo. It was evident that repetition of the same topics arose during the three separate focus groups. The transcripts were read thoroughly another 3-4 times with additional codes being added where relevant, and eventually a number of themes were established. The majority of these themes were able to succinctly fit within the Shove et al. (2012) three element model of materials, meanings and competences. Finally, after coding and studying all the findings from the three focus groups, the thematic analysis of the results helped to design Phase 2 of the research.

Phase 2 – Surveys With Mothers Who Cycle With Their Children

The design of the surveys was intended to capture information from mothers in the UK who cycle with their children aged 11 or under and to help answer Research Questions 1 and 2. It was put together using Qualtrics software. The benefit of using this particular software allows surveys to be designed that can permit branching, skip logic and randomisation. This makes analysis straightforward but also user friendly for those filling out the survey. Other benefits for data analysis are that Qualtrics allows the export of data to a number of interfaces such as SPSS and office-based programmes like excel, word and powerpoint, thereby providing lots of different means to analyse the data collected.

Moreover, for the user it does not require any installation of software or the need to register an account and is both desktop and mobile phone compatible. The downside is that it is an entirely web-based programme. Therefore it does exclude those without access to the internet and a computer/smart mobile phone (Nayak and K A, 2019). However, latest research

shows that over 97% of all UK households do have access to the internet, which demonstrates that hopefully only a small percentage would have been prevented from accessing the survey (Statista, 2022).

To ensure that the survey could accurately capture the practice of mothers cycling with their children, participants had to meet the following criteria:

-Is a mother to child/children aged 11 or under

-Currently cycles at least twice a month with a child aged 11 or under

-Lives in the UK

Those who failed to meet any of the above criteria were unable to continue with the survey. Appendix 2 contains a copy of the survey. Most questions consisted of multiple-choice options which would allow quantitative data to be collected. These questions covered issues such as the types and cost of cycles owned, preferred infrastructure, cycle storage questions and basic demographic information about participants. A number of socio-demographic questions were included, asking information on age, ethnic background, level of education, household income and their location in the UK. The inclusion of socio-demographic questions were also included to assess if cycling with children was more prominent in certain groups than others. Not all questions forced an answer, and some were multiple choice, meaning that the sample size for each question differed. Where tables or figures are provided in Chapter 5, the sample size is included.

Several questions also had open ended options to allow participants to elaborate more details on their own personal circumstances and allowed for any issues that couldn't be captured by the closed multiple-choice questions. The inclusion of such questions was hoped to provide more rich qualitative data that could be sorted where feasible using thematic analysis. These themes could then be cross referenced to see what level of correlation, if any, occurred with those that arose from the earlier focus group discussions. Participants filling out the surveys were also asked if they would be willing to take part in more in-depth interviews at a later date. See later section on Interviews detailing how they were contacted.

The first part of respondent's postcodes was also requested. This was included for two reasons. Firstly, to demonstrate the locations of those mothers (who responded to the

survey) across the UK carrying out the practice of cycling with their children. The second reason was to ensure that when it came to the third phase of the research -interviews, a range of mothers from different geographical areas could be approached.

Survey Distribution

The survey was distributed online via social media channels such as Facebook, LinkedIn and Twitter (now X). It was live for a four week period, between the following dates 20.12.21 – 14.1.22. Many respondents were recruited via specific family or female cycling Facebook groups. Because Facebook has no limit on characters used, I was able to give a brief introduction of the research I was carrying out, in addition to including some background information on my own journey of cycling with my child.

Image 2 ***Facebook post advertising the survey***

Using Twitter (now X) was slightly more complicated due to limited characters allowed, which prevented a more personal approach as used on Facebook. However, with the application of the #cycling and #phd hashtag and a request for it to be retweeted, it was still a valuable resource. With my tweet (including a link to my survey), being shared over 750 times. The tweet was re-published at various points during the four week period the survey was open, to allow continual promotion of the research.

Image 3 Twitter post advertising the survey

Several cycling advocacy groups that I have links to, and local authority transport professionals also helped share the survey amongst their networks. Attempts were made to ensure that participants in the survey covered a wide geographical spread of the UK. This was achieved by working with cycling organisations in the four nations of the UK who were able to share the survey within their regional networks. Figure 6 below shows the percentage split of respondents from each of the different four nations who filled out the survey.

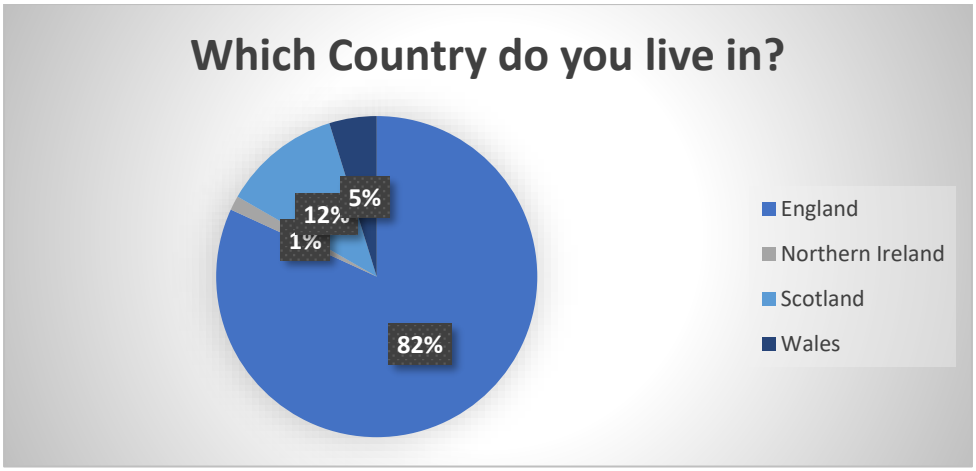


Figure 4 Survey Respondents Country of Residence

Image 4 below also shows a map of plotted postcodes of respondents from the survey. Unfortunately, it was not possible to ascertain if participants resided in a city, suburban or rural area from the postcode data provided. Nevertheless, the map shows that a good coverage of mothers from across the UK filled out the survey. During the interviews, mothers were asked if they lived in a city, suburban or rural area, allowing insights and information about the practice of cycling in the different settlement types.

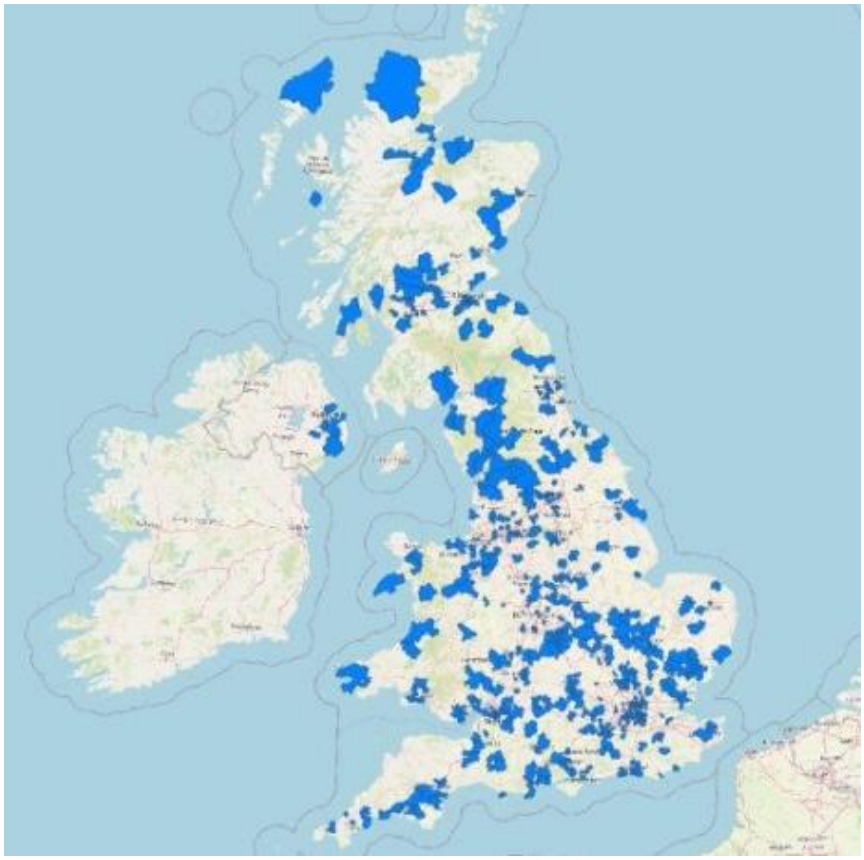


Image 4 Plotted postcode date from the survey results. Map produced by Rachel Aldred (2023)

Analysis

Upon closing the survey, 1,442 responses had been received. Initial actions included viewing the results on Qualtrics and removing any incomplete/invalid surveys. Approximately 91 of these had to be discounted, because they hadn't completed all of the questions or respondents didn't meet the criteria set out above and therefore were unable to progress further. This left 1,351 complete responses. The results were inputted into SPSS software, to allow for in-depth analysis. For those questions which allowed open ended answers these were copied into tables and then inputted into Nvivo and cross referenced against existing themes to see if there was replication in any of the answers provided with the focus group responses.

Phase 3 – Semi Structured Interviews

The interviews sought to contribute to all three Research Questions. Over 600 respondents had expressed a willingness to take part in further research. Filters were used in Qualtrics to identify those mothers who had agreed to be contacted and met the various criteria listed below:

a) a mix of those using child carrying bicycles and riding their bicycles independently,

b) different parts of the UK,

c) participants with different numbers of children to see how this might affect their practice of cycling.

A list was compiled of potential recruits, and emails were sent out until all 30 interviews had been arranged and completed. See Table 2 on the next two pages, for the list of interviewees incorporating the three characteristics listed, plus additional ones including parenting status, age of child, country, region, topography of area, income and ethnicity.

Interviewee	Parenting Status	No. Children	Age of child	Cycle Configuration	Country	Region	Settlement Type	Topography	Income	Ethnicity
Jess	Parent	1	6	Adult cycle with front seat and tagalong. Child rides own cycle	England	South West	City	Flat	20-30k	Asian
Anna	Parent	2	4, 6	Adult cycle and child rides own cycle	Northern Ireland	Down	Suburban	Mixture	80k +	White
Beth	Parent	1	4	Adult cycle with front seat when answering survey. Child has since move to riding their own cycle	Northern Ireland	Antrim	Suburban	Mixture	60-70k	White
Edith	Parent	1	3	Adult cycle with front seat and child using balance bike plus starting to learn to ride a pedal cycle	Scotland	Edinburgh and Lothians	City	Flat	80k +	White
Sarah	Parent	2	5, 8	Adult cycle with tagalong and children ride own cycles	England	West Midlands	Rural	Hilly	60-70k	White
Jess	Parent	2	5, 8	Cargo cycle (electric) and Adult cycle. 8-year-old child rides own cycle	England	South East	City	Hilly	prefer not to say	White
Carrie	Parent	2	5,5 (twins)	Cargo cycle (electric) and Adult cycle with tagalong. Children ride own cycles	Scotland	Edinburgh and Lothians	City	Hilly	60-70k	Mixed
Diana	Parent	2	2, 3	Adult cycle with rear seat and tagalong. 3-year-old rides own cycle	England	North West	Suburban	Flat	70-80k	Mixed
Ellie	Single Parent	1	6	Adult cycle with tagalong and child rides own cycle	England	South West	Suburban	Hilly	40-50k	White
Izzy	Parent	3	3,6, 8	Adult cycle with trailer and front cycle seat, cargo cycle (electric) and all children ride own cycles	England	East Midlands	Suburban	Mixture	40-50k	White
Julia	Parent	2	6,6 (twins)	Adult cycle (electric) with trailer and children ride their own cycles	England	West Midlands	Suburban	Flat	60-70k	White
Harriet	Parent	2	6, 8	Adult cycle (electric) with rear seat, trailer and tagalong and children ride own cycles	England	North East	Suburban	Flat	80k +	White
Libby	Parent	2	4, 8	Adult cycle with rear child seat and 8 year old child rides own cycle	England	London	City	Mostly Flat	80k +	White

Isla	Parent	2	5, 9	Adult cycle (electric) with rear child seat and children ride own cycles	England	North West	Suburban	Flat	50-60k	White
Suzy	Parent	3	3,7, 10	Adult cycle with rear child seat and children ride own cycles (3 year old rides balance bike)	England	East England	Suburban	Mixture	80k +	White
Amber	Parent	2	4, 8	Adult cycle with rear seat and tagalong for 4 year old and 8 year old rides own cycles	Wales	South West Wales	City	Hilly	20-30k	White
Alison	Parent	2	1,4	Adult cycle (electric) with front seat for 1 year old and rear seat for 4 year old, and 4 year old child rides own cycle with stabilisers	Scotland	Tayside, Central and Fife	Suburban	Hilly	50-60k	White
Jenny	Parent	1	10	Adult cycle and child rides own cycle	Scotland	Glasgow and Strathclyde	Suburban	Mixture	20-30k	White
Helen	Parent	2	2, 5	Adult cycle with front seat and 5 year old rides own cycle	England	South West	City	Hilly	50-60k	White
Kath	Single Parent	1	9	Adult cycle and child rides own cycle	England	Yorkshire/ Humberside	Rural	Hilly	10-20k	White
Niki	Parent	1	4	Adult cycle (electric)with rear child seat and follow me and child rides own cycle	England	Yorkshire	Suburban	Hilly	60-70k	White
Fiona	Co-Parent	1	5	Adult cycle with rear child seat and child rides own cycle	Wales	North Wales	Rural	Hilly	40-50K	White
Ava	Co-Parent	1	2	Adult cycle with rear child seat and cargo cycle (non- electric)	Scotland	Highlands and Islands	City	Hilly	below 10k	White
Alisha	Parent	3	4,4 (twins) 9	Cargo cycle (electric) and 9 year old rides own cycle	England	London	City	Flat	80+	White
Neena	Parent	1	11	Adult cycle and child rides own cycle	England	East of England	Suburban	Mixture	30-40k	Asian
Sonia	Parent	2	6, 8	Tandem/triplet (electric) and children ride own cycles	England	East England	Suburban	Hilly	prefer not to say	Asian
Jan	Parent	4	7,10, 10 (twins) , 11	Cargo cycle (electric) and children ride own cycles	Wales	South East Wales	Rural	Hilly	50-60k	White

Olivia	Parent	1	5	Adult cycle with front child seat and tagalong and child rides own cycle	England	East England	Rural	Mixture	30-40k	Mixed
Emma	Parent	2	2, 4	Adult cycle with rear seat. Cargo cycle (electric) and 4-year-old child rides own cycle	Wales	South East Wales	Suburban	Hilly	70-80k	White
Laura	Parent	2	3, 7	Adult cycle with rear and front seat and 7-year-old child rides own cycle	England	North East	Suburban	Mixture	50-60k	White

Table 2 List of Interviewees with various characteristics

Thematic analysis of the results from the previous survey and focus groups, helped to shape the questions to be used for the interviews. However, due to the different characteristics of participants mentioned above, some questions differed depending on factors such as their bicycle type and the number of children they had. Whilst a number of interview questions had been developed, the aim was to allow the interviews to be relatively open and organic, depending on what the interviewee had to say. As such the interviews were semi -structured with a number of questions acting as a guide (see Appendix 3).

The first part of respondents' postcodes was already available from the surveys and had informed the sampling for the interviews. Whilst full postcodes were not requested during the interview process, clarification of geographical settlement types were provided orally, with each interviewee being asked if they lived in an area which was classed as rural, suburban or a city. Traditionally, geographical areas within the UK have been classified as urban or rural. However, the government have recently introduced new classifications (see Table 3) to understand variations between settlements of different sizes (Baker, 2018).

	Number	Population Size
Core Cities	12	+175,000
Other Cities	24	+ 175,000
Large Towns	119	60,000-174,999
Medium Towns	270	25,000 – 59,999
Small Towns	674	7,500-24,999
Villages and small communities	6,116	-7,500

Table 3 Settlement Classifications (Baker, 2018)

These new categories potentially have implications for the assessment of transport patterns and will allow greater "differences, trends and inequalities across Great Britain- such as how large cities differ from small towns" (Baker, 2018, para 1). However, I was confident that for the purposes of this research, that is to make general observations about the practice of cycling in the area they reside, that mothers were well placed to make assumptions on the type of settlement they lived in. Accordingly, these were discussed in terms of settlements being cities, suburban or rural. Future research might want to delve much deeper into the practice of cycling in specific geographical sub-types making detailed comparisons on the availability of specific infrastructure and traffic conditions in different areas. However, this was outside of the scope of this research.

Interviews took place during June and July 2022. Participants were given the option to choose a time suitable to them, which would fit around childcare and any other responsibilities. Accordingly, they were conducted at a variety of times during the day including evenings, weekdays and weekends. Interviews took place over the phone and conversations were recorded using a dictaphone allowing an MP3 recording of the call to be produced.

Analysis

Once the interviews had taken place, the relevant MP3 files were encrypted and stored securely in line with University of Westminster policies. They were then uploaded to Trint, a transcription software which generates written transcripts. Once transcripts had been produced these were uploaded into Nvivo software and were coded and put into existing themes/nodes generated by the focus groups and surveys.

Ethics Approval

In order to carry out the three phases of research for this thesis, it was essential to ensure that the University of Westminster's ethics procedures were correctly followed. This meant that for each individual phase of the research, ethics approval was sought and issues pertaining to storing data and information were adequately followed. Details are outlined below:

Phase 1 – Focus Groups: Information sheets detailing the nature of the research and how their contributions would be used were provided to each participant of the focus group. This was followed up with a consent form, which each participant was required to sign and date before being able to take part. The focus groups were recorded on Skype and recordings were encrypted, transcribed and stored in line with the university's GDRP requirements.

Phase 2 – Surveys: In line with the University's ethics requirements, participants were required to give consent to their responses being used as part of the research. This was completed via dialogue on the front page of the electronic survey, explaining in detail about how data and any personal information would be used. Participants had to click on the consent button in order to proceed with the survey.

Phase 2 – Interviews: Interviewees recruited from the survey phase were provided with an information sheet which detailed the nature of the research and how their contributions

would be used. Interviewees that agreed to take part were then asked to sign a consent form before the interview took place and provide a contact phone number that they were happy to conduct the interview on. At the time of the interview, participants were told that the call was being recorded using a dictaphone and that this would be used to help transcribe the interview. Participants were assured that all recordings were encrypted, transcribed and stored in line with the university's GDRP requirements.

Methodological Limitations

As discussed in an earlier section, for some social practice theory purists, the use of ethnography is seen as the most suitable method when framing research or using a social practice theory lens. Therefore, not using ethnography (in any form) may be seen, by some, as a limitation in this research. But what would ethnography mean for this particular research?

In many ways ethnography would lend itself well to this research. Indeed, the low numbers of mothers cycling with their children in the UK, position it as a practice on the periphery of society and participant observation of those who carry out the practice, could help make sense of how and why they do it. Nonetheless, attempting to research the "intangible and ephemeral" (Spinney, 2011,164) elements of a practice are not without issue. For instance, if seeking to conduct interviews whilst carrying out ride-alongs, depending on location it could be problematic trying to converse with someone who might ride at speed or live in an area of high traffic. Trying to hold a conversation around other road users and traffic noise could be both distracting and dangerous (ibid).

For this research, a ride along would necessitate observing and interacting with a mother and her children. For example, asking questions as to why they made certain manoeuvres, riding positions, or instructed their child in a certain way. However, my own experience of riding with a young child is that it can be quite stressful interacting with lots of different road users and ensuring your child doesn't get distracted and make mistakes that could cause them harm whilst on their bicycle. Therefore, whilst the ride-alongs could be revised to involve observations from afar, or video recordings, rather than specific interactions including informal interviews, I believed the results would not justify the possible risks.

Additionally, having started my research in September 2020, many social distancing and in person meeting restrictions were still in place during this time due to the Covid-19 pandemic. When putting together my research methods in January 2021, the UK had just started another 3-month lockdown period and uncertainty existed as to whether more would follow at this point. After much consideration, I decided not to follow an ethnographic approach for two main reasons. Firstly, given the previous comments above, pertaining to issues of accompanying mothers riding with their children. I decided that the use of ethnographic methods such as ride-alongs and videos were not suitable due to the possibility that my presence could distract and therefore compromise the safety of the mother and her children cycling. Secondly, due to the ongoing pandemic, following an ethnographic approach would potentially have jeopardised finishing the research in the timeframe given.

Accordingly, it was decided that to ensure the research could go ahead without any delays, methods would be chosen that would not be hindered by any future restrictions should they be put in place. Nevertheless, any future research on this topic, however, may want to revisit whether an ethnographic approach, given different conditions and timing, would be suitable.

My Position in This Research

Information from existing literature combined with my own position, that is, a mother who cycles with her child, means I already have some predetermined ideas of issues facing mothers when cycling with their children. This is of course not unusual. Any research objectives and questions devised by a researcher will, by their very nature necessitate various assumptions on "how the social world operates and how it can be known…"(Shove, Mika and Matt, 2012, 143). Therefore, it is impossible when investigating a topic to remove oneself completely from making some assumptions.

However, I was aware that my experiences of cycling with my child could differ to other mothers. For instance, I am white, live in a suburban area, have one child and would be described as having a relatively affluent household income. It was likely therefore that my experiences might be very different to many of the mothers taking part in this research and I would need to ensure that I continually questioned my own bias when asking questions and making judgments on any findings. The focus groups, were particularly useful in helping me gain an insight into what some of the issues might be for those mothers taking part in the

research with more than one child, on lower incomes or from a different ethnic minority background to mine. That is, the breadth of different backgrounds represented by those taking part in the focus groups, that is they worked across a number of areas in family cycling, provided an insight as to what some of the issues might be. This not only helped me prepare the questions that should be asked in the surveys and interviews but also highlighted that I would need to delve deeper into those areas and topics I had no experience of myself to ensure I fully understood them.

Accordingly, I am taking a reflexive approach, due to the nature of how my own experiences have shaped the initial design of this research. Berger, in her study of immigrants in the USA (2015) addresses three types of reflexivity; "(1) reflexivity when researcher shares the experience of study participants, (2) reflexivity when researcher moves from the position of an outsider to the position of an insider in the course of the study, and (3) reflexivity when researcher has no personal familiarity or experience with what is being studied" (Berger, 2015, 219). Clearly as a mother who cycles with her child, I fit firmly into the first category, notwithstanding that those taking part in the research may be from different socio-demographic groups to me.

However, from the outset, I have not hidden my position with those participating in my research. Indeed, many mothers have been happy to share their experiences with me. Perhaps this is because they feel that I understand the issues at hand, which is a positive. Nevertheless, a potential downside is the possibility that some mothers won't go into specific detail about certain issues because they assume I already know what they mean (Berger, 2015; Probst, 2015).

Similarly, just by declaring ones approach to be reflexive does not ensure that the research is now objective, "The intellectual conviction that self-awareness is important may not be sufficient to expose masks and blind spots to self-scrutiny" (Probst, 2015, 38). It is thereby essential that any methods employed, particularly qualitative ones allow participants to have "control over their narrative and what they want to say and how they want to say it" (Arsel, 2017, 940). It is also important that I seek to challenge and revise my pre-existing ideas continually throughout my research. In particular, through the choice of my methods, how I designed them and my interpretation of any findings.

Chapter 5: Mothers Who Cycle with Their Children

Introduction

"… I have two children to get ready and the two year old is running around in circles and not doing what he's supposed to do. So yes, shoes on, bags, all our helmets and like my reflective hi vis, they're all in the garage. Now over the winter I've been keeping the battery inside the house and that's an extra thing to remember…And then uh the keys are a bit of a faff, as key for the door, key for the garage, key for the bikes and keys, if I know I'm going to be locking the bike up at school and I need to make sure I've got the d-lock and the key for that as well" (Interviewee, Emma).

The above quote comes from Emma, mother to two children aged two and four-years-old, who lives in a hilly suburban area of Wales. Emma is describing what she does, most mornings, to get ready to undertake the school run with her children by bicycle. Many of the mothers taking part in this research also followed similar rituals and routines to allow them to carry out the practice of cycling with their children.

This chapter presents the main findings of the results from the research. As outlined in the Methodology Chapter three phases of research were undertaken in this study. These included: **Phase 1:** Focus groups with influential women who work in cycling, **Phase 2:** Surveys of mothers currently cycling with children (aged 11 and under) in the UK and **Phase 3:** In depth interviews with 30 mothers recruited from the surveys. The use of social practice theory provided a lens to view the various elements of a practice including routines such as Emma's above. From the analysis of the data, it was evident that commonalities in the form of a number of themes were highlighted across the focus groups, surveys and interviews alike. It was also clear that these themes could be usefully framed within the three element model of materials, meanings and competences designed by Shove et al. (2012).

Appropriately, this chapter is divided into three main sections: Meanings, Materials and Competences. The first section will consider topics such as the meanings associated with cycling in terms of the meanings mothers attach to their practice and how these are sometimes influenced by infrastructure but also the views of friends, family members and strangers. It will also reflect on views around meanings of convenience and/or the inconvenience of cycling alongside juggling employment and other care duties. The section

on materials looks at the different types of cycle configurations used by mothers in this research, including the cost of cycles and materials employed to help with cycle storage. It also addresses whether there is a relationship between the types of cycle configurations utilised by mothers and a preference for using particular infrastructure when cycling. The competence section will consider the skills and know-how mothers need to carry out the practice of cycling with their children. This includes looking at issues of confidence to cycle with children as well as how mothers communicate with children whilst riding. The techniques needed to cycle with children are discussed with a particular focus on how techniques might change for mothers with multiple children, and of different ages and abilities. Finally, this section also views the skills and adaptation of riding techniques as children grow and switch from child carrying cycles to riding independently.

Meanings

Motivations for Cycling With Children

Motivations to cycle can be seen as part of the culture of meanings associated with the practice of cycling. The survey asked mothers to choose their main reasons for cycling with their children and were given a list of motivations which allowed them to select multiple options, these are set out in Figure 7 below.

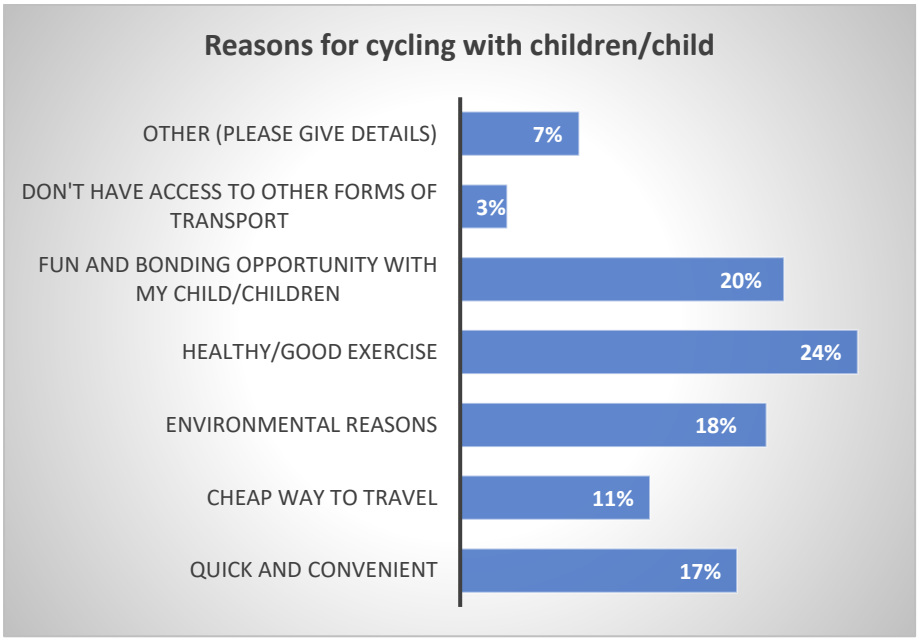


Figure 5 Survey Respondents Reasons for Cycling with Children (sample size 4683)

Only a small number, 3% chose cycling because they did not have any other transport options available to them. Similarly, only 11% chose cycling for financial reasons (cheap way to travel). Rather, cycling with children could be interpreted as a definite choice rather than as a financial necessity or from lack of other transport options. The option 'fun and bonding opportunity with my child' was another popular motivation for cycling. That this option was the second most selected motivation for cycling in the survey, indicates that for many mothers, in this research, the practice of cycling with their child was propitious to fostering bonding moments and emotional relationships.

Multiple comments in the surveys and interviews highlighted how many mothers found driving stressful. In comparison, cycling with their children was deemed more enjoyable and for the most part less stressful than being in a car. Furthermore, not only was it enjoyable but

mothers believed their practice was also beneficial because it helped them and their children be physically active, taught their children life skills, improved their mental health and was good for the environment by reducing congestion and air pollution. Therefore, they also attached wider meanings to their practice of cycling, primarily, that it was good for both them and their children, as well as for wider society.

Indeed, a number of mothers felt that they were performing 'good mothering' by cycling with their children due to the wide ranging benefits listed above. During the Covid pandemic some mothers taking part in this research also started to associate meanings of care and protection with the practice of cycling. For instance, for those mothers without access to a car, many started to cycle with their children rather than using public transport because they felt that cycling would be a safer way to travel.

"*I live in central London and stopped using the tube during the first wave of covid and now cycle everywhere"* (Survey Respondent).

During the interviews, Jess, mother to one child aged 6-years-old, who rides her own bicycle independently, previously used to take her daughter to school on the bus before carrying onto her workplace. However, during the pandemic, when schools had reopened, she started cycling her daughter to school due to concerns of catching covid on public transport. Whilst her initial reasons for cycling were to try and keep herself and her child safe from covid, she soon began to attach other meanings to her practice of cycling. That is, she discovered that by cycling to school and then onto her own workplace, her journey time reduced from an hour down to twenty minutes. Jess has since continued to cycle with her daughter due to the time savings, health benefits and the fact that they were both enjoying cycling more than using the bus.

Similar to Jess's experience, the convenience of cycling was also rated highly amongst many mothers and is discussed in more detail in a later section when looking at how mothers juggle employment and cycling with their children. However, as shown previously, for many mothers, those other benefits such as enjoyment, the physical and mental health improvements, teaching life skills and being good for the environment highlighted that cycling wasn't just about the convenience of getting from A-B in the quickest or most cost effective way. Rather, for many taking part in this research, it was much more than just a form of

transport to get around. It wasn't just something they did, they chose to do it because it was really important to them, it was a specific lifestyle choice and they wanted to be an example to others,

"…cycling normalises bikes as transport so that my child is more likely to choose this when she has an independent choice…I want to be a good example of a cycling mum to encourage other mums to make the same choice" (Survey respondent).

"*To showcase active travel to school as a viable option for other families i.e. add to the culture of cycling. To normalise cycling on roads for my children and for other road users"* (Survey respondent).

That cycling was associated with so many benefits and positive meanings, helps explain how so many mothers taking part in this research were able to continue cycling when in fact, for some mothers carrying out the practice, it was not always an easy task. For instance, whilst mothers openly shared their enjoyment of cycling with their children, it was apparent that the act of cycling often involved specific organisational skills. However, it was clear that quite specific competences were required by mothers to deal with the organisational skills needed to enable cycling to happen. These will be discussed in more detail in the competences section later.

Another less positive aspect of cycling, linked to mothers experiencing negative incidents from other road users and dealing with concerns from friends, family members and at times complete strangers. The section below will look more closely at the meanings mothers attached to the more negative side of cycling with their children.

Aren't You Brave? Opinions on Cycling With Children

Did the mothers in this research associate their practice of cycling as dangerous, or acknowledge that others around them thought this way? Most mothers did associate meanings of danger with their practice of cycling. However, they also believed that many of the potential risks of cycling could be managed by carefully planning safe routes, avoiding particularly busy roads, using certain equipment to make them more visible to other road users and generally being cautious when cycling with their children. The previous section on motivations demonstrated that the majority of mothers felt cycling was a good thing to do,

for them, their children and wider society. It was apparent however, that not everyone shared their beliefs and as such additional meanings of guilt and bad parenting sometimes became associated with their practice of cycling.

During the focus group discussions, the majority of those participating thought that the image of cycling in the UK played an integral role in why so few mothers currently cycle with their children. A number of comments were made in relation to the use of the word 'brave' frequently being used when describing mothers cycling.

"I used to get fed up with people telling me I was brave when I used to go to school and it's like "you're so brave you know"…it shouldn't be brave cycling my children to school but then it kind of makes you think am I being stupid, am I? There's always that underline that if something did happen then people will go well it's all your own fault, you know because you thought to cycle with them on the roads. And that's quite scary" (Focus group participant, Kate).

All the focus group participants agreed that utility cycling in the UK was viewed as an unsafe activity in general – for both male and female adults. Therefore, that mothers might choose to cycle with their young children was seen as especially contentious, particularly if mothers cycled with their children on roads mixing with motorised traffic. In addition, because cycling in the UK was not a normalised activity, the sight of mothers riding configurations such as cargo cycles, tandems or towing trailers with child passengers was (in some places) so unusual that they could elicit a number of reactions from onlookers. It was apparent from all three phases of the research, that whilst reactions to their practice would often be positive, concerns and in some cases outright anger about the safety of a child being carried as a passenger or riding independently alongside their mother were equally common.

From the interviews, it was also evident that many of the mothers knew that their practice of cycling was considered dangerous by others. Although most of the mothers stated that their close family and friends supported their choice to cycle with their children, they were also aware that concerns about their safety existed. Some friends and family members shared these fears directly. For instance, Amber, a mother to two children aged 4 and 8-years-old, cycles with her youngest in a rear child seat and/or a tagalong, whilst her eldest rides his own bicycle. She found,

"…my mum, especially, is very concerned and she's obsessed with this idea that I'll fall off …And my dad is really, really supportive but he worries a lot about the traffic, you know, because he obviously rode with us on his bike when we were small children, but he thinks the amount of traffic in that 30 years has really changed…Yeah and cars are bigger as well and so he says often that he doesn't know that he'd ride with small children on the bike now" (Interviewee, Amber).

Although Amber understood that her parent's fears were not necessarily intended to upset her, she explained that it did sometimes make her question her ability to cycle with her children. Furthermore, Amber was not the only mother to deal with this issue. A number of those interviewed explained how they were made to feel guilty and justify their choice to cycle with their children due to friends and family members worrying about them. Whilst they appreciated that, in most cases, their friends and family were not intentionally trying to upset or criticise them, many of those interviewed felt they had to placate various concerns by explaining the steps they took to make their journeys 'safe'. They also noted that they did not have to do this for any other transport mode they used. In addition, mothers worried about the reaction they would receive from friends and families if indeed an incident occurred whilst cycling with their children.

Again, the use of the word brave was highlighted. For instance, some of those interviewed suspected that their families and friends did have concerns about how safe it was to cycle with their children. However, for fear of upsetting them, they chose not to vocalise this directly, rather joking about how 'brave' they were to cycle. That is, friends and family members used brave as a passive aggressive way of expressing concerns about their child's safety.

It was also apparent that some mothers received other indirect or passive aggressive comments intimating that cycling with their children was dangerous,

"… parents of my kid's friends would say things like, "oh, I, I would never take my kid out cycling on the road. I would never put a seat on the back of my bike… I couldn't ride a bike because I would be too worried about them"" (Interviewee, Anna).

"Like some people at work would comment about me cycling with my child and say, "oh, you know the roads are busy?"" (Interviewee, Alison).

A number of those interviewed, found it irritating to receive comments about their choice to cycle with their children. For some mothers, they believed that they had carefully considered the pros and cons of cycling and to receive comments from others made them feel like they were being unfairly judged, and in some cases made them question themselves as to whether cycling with their children was too dangerous. However, most of the mothers interviewed said they shrugged these types of comments off, mainly because they were confident that cycling with their children was as safe a mode of transport as any other. In addition, because the comments came from people they knew, they understood they were not intentionally critical, rather from a place of concern.

Comments from strangers, on the other hand were more difficult to deal with. One of the mothers interviewed, Ava, had experienced a number of incidents where strangers had shouted out of passing vehicles that she was mad and committing child abuse and putting her child in danger by cycling on the road with her. In the survey, mothers were asked if they had ever experienced verbal abuse when cycling with their child. Approximately 37% of those surveyed had suffered from verbal abuse, and 2% had experienced sexual harassment/abuse.

46% of mothers who had experience verbal or sexual harassment/abuse noted that they continued cycling as normal and didn't let it affect their practice of cycling. However, an option was given to allow mothers to provide more information about their experiences. This resulted in many mothers describing in more detail how they felt as a result of the abuse. Unsurprisingly, experiencing verbal/sexual harassment or abuse whilst in the company of their children was upsetting,

"It wasn't serious abuse, but I have had complete strangers question my parenting because I cycle with my child" (Survey respondent).

"It saddened me and made me second guess my judgment of allowing my 4-year-old to cycle independently along the road" (Survey respondent).

Less than 0.5% stopped cycling completely, with responses stating that they had felt unsafe cycling and so decided not to continue. A small number of mothers, 6%, noted that they took a short break from cycling and 10% adapted their route as a result of their incident. A question was asked in the survey if any other issues contributed to them taking a break. The most common responses were that their incident occurred at nighttime and going into the darker

winter months, so for these mothers they took a break from cycling until spring/summertime as they felt safer riding in lighter conditions. However, 20% of mothers surveyed had no option but to continue cycling on the same route as they had no alternative way to reach their end destination. In such cases, many mothers stated that they had a few days off to contemplate their choices, but then continued with their practice as they felt cycling was still worth continuing with due to wider benefits they believed they gained from cycling with their children.

It was clear however, that being the recipient of verbal abuse, and particularly comments about cycling with their children in certain situations often left mothers frustrated and upset as they felt that they were being judged for their parenting skills, even though (in similar vein to above), they had carefully considered the various risks with cycling and taken every step possible to make it as safe as they could. Moreover, because many of these comments were shouted out of passing cars, there was no opportunity to communicate with the person making these allegations, meaning they had no opportunity to challenge or explain their position.

Mothers were also surveyed about other incidents whilst cycling, with a view to ascertain if such incidents affected the types of meanings they associated with their practice of cycling. These are listed below in Figure 8. Options were chosen based on the feedback from the focus groups as to some of the most common negative incidents that cyclists might face on a regular basis.

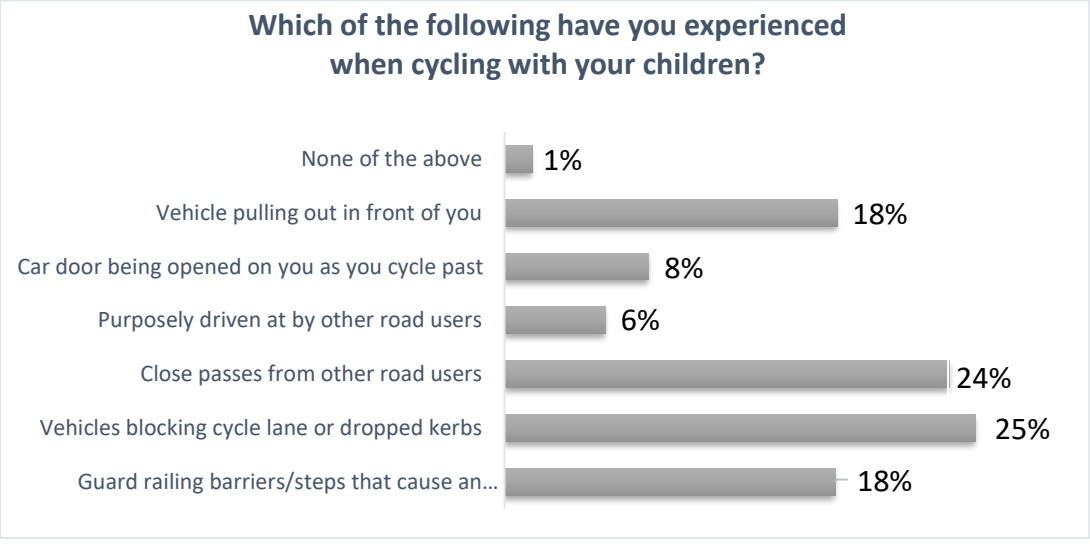


Figure 6 Potential incidents when cycling (sample size 4001)

The types of issues listed can be separated into two different categories. The first category containing 'guard railing barriers/steps that cause an obstruction to your journey' and 'vehicles blocking cycle lane or dropped kerbs' can be classed as issues that cause annoyance or prevent certain routes being used but are not usually dangerous. Although some exceptions could occur if a cyclist is forced to re-route onto a busier road. This category was selected by 43% and largely reflects comments in the focus groups about physical barriers/obstructions that frequently feature on cycle infrastructure. These issues were also repeatedly raised in the survey responses by participants and will be discussed in more detail in the materials section.

The second category includes 'vehicles pulling out in front of you', 'car door being opened on you as you cycle past', 'purposely driven at by other road users', and 'close passes from other road users'. This category involves hostile types of behaviour from other road users that could result in harm or even fatalities. As can be seen in Figure 8 above, 56% of mothers had experienced these types of issues. Further analysis showed that 63% of the 1% who had not experienced any of the above issues were mothers who 'only used their bicycle for leisure purposes', that is, they did not cycle for utility purposes. Comments in the survey from those mothers who only used their bicycle for leisure purposes noted they did not cycle on roads with their children. Therefore, conflict was much lower as they did not mix with motorised vehicles.

As a result of these types of incidents happening on a regular basis, combined with verbal abuse and even the more well intentioned comments from friends and families, this left many mothers feeling conflicted about cycling with their children.

"I have seriously considered stopping cycling with my child to school because we have so many near misses with either dangerous overtaking or cars pulling out in front of us" (Survey respondent).

"I constantly have to have a word with myself about the risks associated with traveling in this way. I don't want to stop but at the same time, some journeys leave me petrified for our safety" (Survey respondent).

It became apparent that for many mothers there was an interplay and tension between the positive meanings they attached to cycling (as demonstrated in the previous section on

motivations) and the negative meanings that arose when they were subject to other people questioning their parenting skills as well experiencing the dangers listed in Figure 8 above.

However, because most mothers did attach positive meanings to their practice, as a result of the benefits they felt cycling brought them and the wider society, the majority of mothers were able to continue cycling because they ultimately felt the benefits of cycling outweighed any potential negative incidents. Indeed, the majority of mothers only experienced positive feedback both from people known and unknown to them. In particular, many mothers using cargo cycles, trailers and child seats, noted how people would often wave and smile as they approached or passed by on their bikes. Carrie, mother to 4-year-old twins, described how her children had become well known in their local area for always being on their cargo cycle and were constantly given positive reactions,

"There's a couple of lollipop men who loves to wave at us… "there's the kids on that bike". Everybody sees us and shouts out at us, and everybody waves at us…" (Interviewee, Carrie).

Likewise, multiple examples of positive interactions were provided in the surveys and interviews when cycling with their children. This included shouts of praise from passing vehicles, a HGV driver tooting his horn encouragingly for a young boy cycling next to his mother, and lots of waving and smiling at child passengers. A number of mothers also expressed how they would often be stopped and asked questions about their cycle configurations from other parents. These positive interactions were welcomed by mothers and helped to reconcile the anguish they sometimes felt from any negative incidents that occurred.

Multi-Tasking Mothers

"I have a spreadsheet (laughs) and everything is sort of carefully planned out. So, I work, I work Saturdays when my partner is home and looks after the children. But on school days. I also do work, but I don't work every day and it changes each week, which day I'm working…My whole life is run by alarms on my phone." (Interviewee, Amber).

A high percentage, 88% of respondents were in employment (both as employees and self-employed). All of the mothers surveyed fell within the UK 'working age' category, with 86% over 35 years old (but under 64-years-old), and the remaining participants, 14% were aged

between 18-34. There was an even split between those in paid employment working full-time, 37% and those working part-time, 37%. The remaining 14% who were self-employed worked a mixture of full and part-time hours. For the remainder of participants, approximately 7% of mothers were looking after their children full time, whilst 5% included a mix of those in full time education, unemployed, retired, disabled/carer or on maternity leave.

The survey asked questions about the type of cycling trips mothers were carrying out with their children (see Figure 9) below. This question was multiple choice, allowing respondents to choose as many options as they liked. One exception to this was for those mothers who selected 'We only use our bikes for leisure purposes', which subsequently prevented them from choosing any of the other options.

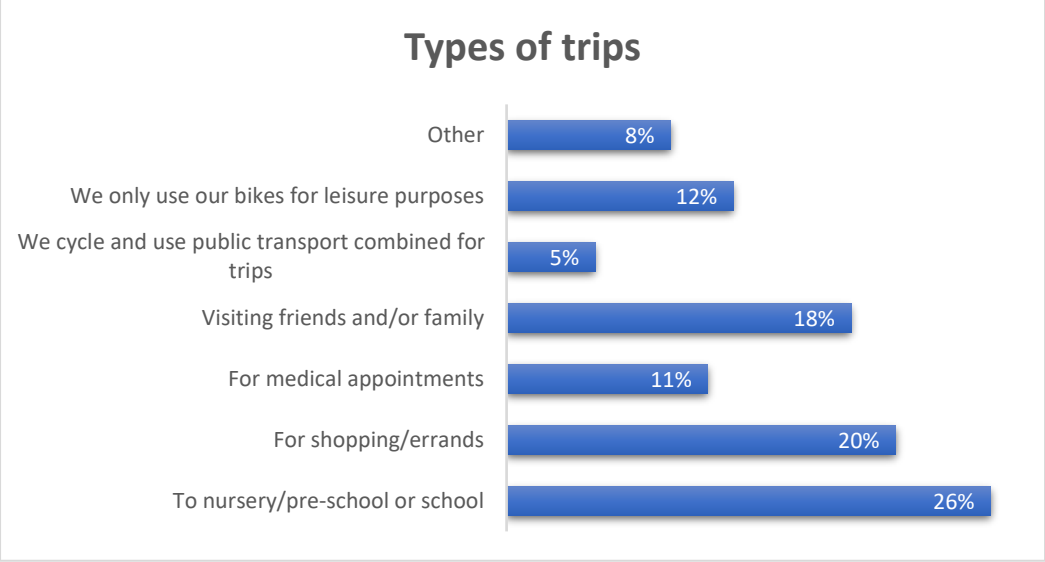


Figure 7 Survey Respondents Type of Cycle Trips carried out (sample size 3357)

The most popular trips were for education, followed by shopping and errands and visiting friends and family. The 'other' category was also selected a number of times and allowed a written response to clarify the specific trip purpose they were carrying out. Having analysed the 'other' responses further, with hindsight an additional two categories could have been added to original list. This would include a category for 'after school and weekend activities' such as travelling to clubs for sports, music and also visits to places of worship. If this had been offered as an individual category it would have been selected by 2% of respondents.

The second category would be for those who cycled for leisure but not exclusively. In other words, they carried out utility cycle trips mentioned in Figure 9, but they also used their

bicycles for leisure purposes on occasion. This made up 3% of the 'other' category. The remaining 3% of responses written down in the 'other' category fitted into those already provided in Figure 9, with respondents including additional details of their trips such as travelling to specific types of shops or to visit friends.

In this research 88% of those mothers who responded to the survey, were in paid employment and were successfully managing to juggle working and cycling with their children. This suggests that the practice of employment and cycling can be compatible in the right conditions. Of course, it is important to note that mothers cycling with children is currently a very minority practice and so the practice may well be incompatible for the vast majority of mothers in the UK.

In the interviews, mothers were asked to describe a regularly journey that they carried out with their children. The journey to school, nursery or childcare was chosen by 21 of the 30 mothers interviewed, making it the most popular type of trip undertaken. Other trips included cycling to after school activities such as swimming or gymnastics, into town for shopping and to places of worship at weekends. The high number of trips to education settings correlates with the information in Figure 9, which showed that trips for education were also the most common cycle journeys undertaken by those surveyed. Most mothers interviewed, had jobs that required juggling the school or nursery run with their own employment. Accordingly, mothers were asked their views around claims that working in employment, carrying out household errands and escort journeys were incompatible with cycling.

The majority of those interviewed said that they were only able to accomplish all their 'motherly duties' because they were cycling. Specifically, because they attached meanings of convenience to cycling as a mode of transport,

"Cycling is what helps me do those other commitments. As we don't own a car this is the quickest way to get around, it's quicker to cycle or to walk there" (Interviewee, Jess).

Table 4 below shows the breakdown of trips carried out by survey participants in the various employment types (this question allowed mothers to choose multiple options).

		Employment Type		
		Employed (Full Time)	Employed (Part Time)	Self-Employed (Full or Part Time)
Types of trips	Nursery/pre-school or school	64%	73%	74%
	Shopping/errands	51%	57%	62%
	Medical appointments	25%	29%	35%
	Visiting friends and/or family	45%	50%	53%
	Cycle and use public transport combined for trips	41%	32%	18%

Table 4 Survey Respondents, Types of Cycling Trips by Employment Type (sample size 1225)

*Those who chose the 'cycle for leisure only' and 'other' options have been omitted from this table.

It is evident that a slightly higher number of trips were carried out by those working part-time hours and self-employed mothers. One exception to this was the 'cycle and use public transport combined for trips' option, whereby full-time employed mothers undertook these types of journeys in higher numbers than part-time and self-employed working mothers. Unfortunately, this question did not seek further clarification as to the types of cycle trips that were being combined with public transport. This means they could have been for combined with any of the cycle trips listed previously in Figure 9 on page 125. Any future research on this topic might want to look into the types of cycle trips typically being combined with public transport use in more detail.

That higher number of cycling trips are carried out by those working part-time and self-employed could be explained by their employment hours allowing them more flexibility to carry out certain trips during the day. Certainly, the convenience and flexibility of working part-time was brought up in the interviews by a number of mothers. Suzy, a mother to three children aged 3, 7 and 10-years-old, worked part time as a doctor. On days where she was working, her early start meant it was not compatible with cycling her children to school. However, she was able to cycle them to school on the days she wasn't working,

"… the days where I take them to school is because I work part-time, the days where I cycle to school, I have no other commitments… So, I prefer to cycle because it's faster than walking. And parking around the school is just hideous. So that's only ever done in absolute extreme…I would usually prefer to cycle because it's just so much faster to get there, faster to get home, so I can get more stuff done faster". (Interviewee, Suzy).

For Suzy, convenience meant different things. On the one hand, cycling was convenient because it was quicker than walking, therefore it saved her time. On the other hand, whilst during her interview she'd mentioned that cycling was not as quick as driving to school, she still deemed cycling more convenient because it was less stressful than driving due to having to navigate a chaotic school run with lots of other parents driving and trying to find parking spaces close to school.

For some of the mothers interviewed, like Suzy's experience, it was only possible to cycle their children to school on days that they weren't working, or on days where they were able to work from home. Therefore, for some mothers, it wasn't practical or convenient to combine their working hours with the school run as they often started work much earlier than the time that their children needed to be at school. Sonia, mother to two children aged 6 and 8-years-old, had to travel into London by train for her commute a couple of times a week. However, her children's school was in the opposite direction to the train station, making it difficult to effectively cycle the school run and then cycle back in the opposite direction to catch her train on time. Furthermore, she was reluctant to leave her expensive tandem bicycle locked up at the station, due to fears of it being stolen.

"So, I am commuting and I'm like really trying to fit in that school run on two days a week, you know, to do at least drop off or pickups…but it's not convenient because the schools in one direction, the train stations in another direction. Yeah. I don't feel even though the train station has securish parking, I don't feel comfortable parking the tandem. It's a high value bike" (Interviewee, Sonia).

In this case, Sonia was unable to make the practice of her employment fit with taking her children to school for two main reasons. Firstly, time constraints prevented her from being able to successfully manage cycling her children to school and getting back to the train station on time to catch a train. Secondly, the inconvenience of having her expensive cycle stolen if

she left it at the train station was too much of a risk for her to take. For Sonia both these factors made cycling on days that she needed to travel into London problematic and highlights how cycling with children is only convenient if certain factors align. Similarly, for a number of the mothers interviewed this meant cycling on days where they had to travel into a specific workplace was not possible.

During the interviews a number of mothers noted how the Covid-19 pandemic, affected their working patterns. For instance, some mothers working full-time hours, (who had previously had to travel into a specific workplace), were now able to carry out their job at home on more days due to hybrid working arrangements. During the focus group discussions, one mother mentioned how both a change in management and the Covid-19 pandemic enabled her to do the school run by bicycle more easily,

"So, when I worked in another organisation, where I had a boss who did not have children, the need to present myself at work at a particular time of the day was very important to her. When that changed, I worked for a man who had two children, he wasn't bothered that I came in later to work… With more middle-class mothers working at home, everything, certainly everything for me is much easier…So just the being around more and not having to travel as much and being tied to the train timetable quite so closely has made everything easier". (Focus group participant, Dana).

This meant that some mothers were no longer having to rush into (and back from) workplaces to carry out the school run. The absence of having to travel to another location for a set time, made their morning and afternoon routines much more relaxed and conducive to cycling to school. This raises questions about how cycling interacts with working cultures. As shown previously, some of the mothers interviewed gave examples where they could only cycle on the days they didn't work or have to physically be present at a specific workplace. That is, even though on the days where they cycled they often found it the most convenient mode to use, this was because they effectively had more time in their day to fit cycling in. However, for many mothers they struggled to manage to make cycling work for them on days that they had certain work commitments.

Nevertheless, for those mothers that did not have the flexibility of home-working or part-time hours, they found other ways to ensure they could still cycle with their children before going

on to their workplace. For example, a number of mothers specifically chose nurseries that were on route and close to their work premises. In particular, those interviewed with nursery school aged children found the earlier operating hours of nurseries compared to schools (because not all schools had wraparound care) meant that this made cycling to work more compatible with their working hours. In some cases, mothers specifically chose a nursery that was closer to their workplace than home, allowing them to cycle their child to nursery and then continue straight on to work,

"The nursery we picked was part of my commute, right? It's kind of like a no brainer… I'll take him to nursery and then and then I'll go to work" (Interviewee, Edith).

"My journey to work is only something like another 500 metres" (Interviewee, Niki).

For Niki and Edith, choosing a nursery that was not the closest to their home, actually facilitated cycling by making it more convenient for them because of the time savings of being able to leave work later because their child's nursery (whilst further away from their home) was so close to their workplace.

For some mothers, the distance and direction of their child's place of education did not prove a deterrent to them cycling. Rather, they were determined to cycle regardless. For example, Olivia, mother to one child aged 5 years-old, lived in a rural area and regularly cycled her daughter to a childminder using a front seat attached to her own bicycle. This was a fifteen minute journey on the bicycle as opposed to a five minute journey in the car. Olivia's workplace was in the opposite direction to the childminder, meaning she would have to double back on herself and then continue to cycle in the opposite direction for an 11 mile commute to work. For Olivia, however, it did not matter that this journey took longer to cycle than doing it by car, because the benefits she and her daughter gained from this journey, were more important to her than time savings,

"It's more social. It's more a sort of nice bonding time with my daughter to be able to chat with her... And to be honest, I like having a chance to have a daily bit of exercise. Yeah, because I have a mainly desk based job where I just struggle with an opportunity to get out and be active. And so, it's kind of like setting me up for the day" (Interviewee, Olivia).

Mothers often talked about cycling being convenient because it saved time, money or avoided the often stressful nature of driving. For Olivia, however, she explained that she often struggled to fit regular exercise into her day due to being so busy. Therefore, being able to cycle her child to school and then continue on to work was convenient to her as it allowed her to achieve her aim of exercising. That her journey by bicycle took her much longer than if she did it by car, was not a problem. She also mentioned how much she valued being able to create emotional bonds with her daughter whilst cycling and again whilst she said this journey was longer by bike she did not actually find that inconvenient to her because of the wider benefits.

Accordingly, whilst convenience in terms of time and money savings was important to many of the mothers interviewed it was not necessarily of key importance. Rather, as shown in the previous section on motivations other meanings associated cycling with fun and allowing them to spend quality time with their children, plus the physical, mental and environmental benefits with their practice of cycling were equally important. Nevertheless, this did not mean that cycling with children was always straightforward. Some mothers expressed that fitting in cycling with their children alongside employment, household duties and other tasks could be quite stressful and required meticulous planning to achieve,

"In terms of time, is definitely faffier to get out of the house when you're cycling than if you were just going to plonk them straight in the car…I have to take the bike apart to fit it in the house to get all the bikes inside. I have to take all the bike seats off and the follow me and it all takes time. Rather than just closing the car door" (Interviewee, Diana).

"It's total, total juggling. And it just and it's just not relaxing. It's just ridiculous really. But I really, really believe in cycling and, you know, humans and bikes they are good together" (Interviewee, Kath).

The need to be well organised, can also be seen as a particular skill that is required by mothers to allow them to cycle with their children. This will be further explored in the competences section. Overwhelmingly, however, whilst some of the mothers agreed it was logistically difficult at times to balance cycling with their other tasks and duties, they were able to do so because as demonstrated previously, they felt so strongly that cycling with their children was something they wanted to do.

It became apparent that materials in the form of different cycling configurations or cycling equipment also played a significant role in cycling being associated with meanings of convenience. This was important for those mothers trying to juggle employment with other care duties such as the school run but also for trips such as shopping and running errands. For instance, Libby was able to share her practice of cycling with a partner due to the aid of a specific attachment. Libby lives in London and is a mother of two children aged 4 and 8-years-old. She cycles with her 4-year-old daughter in a child seat and her 8-year-old son cycles independently on his own bicycle. Libby regularly cycled her daughter into nursery before continuing on to her son's school, where he locks up and leaves his bicycle on the school premises, before cycling on her own to her workplace. For the return journey however, Libby's husband carries out the journey in reverse. Libby had researched cycle seats that could easily be removed and shared between bicycles to enable both her and her husband to be able to do the nursery run.

"I needed a child seat that needed to kind of slot in and slot out because my husband would do pick-ups and I would do drop-offs. So, the seat would remain wherever the child was" (Interviewee, Libby).

Libby explained that the convenience of being able to switch a child seat between the two bicycles was important for two reasons. Firstly, it allowed her and her partner to fulfil both their parental and employment responsibilities. Because they could both use the child seat on their own bicycles it meant that they could organise their work schedules so that her husband left for his workplace earlier in the morning, which meant whilst he couldn't do the morning drop-off, he was able to leave his workplace earlier at the end of the day (whereas Libby was still working) and do the pick-ups. The flexibility of their work schedules and also the fact that they were also able to leave the bicycle seat in storage at their daughter's nursery further increased the convenience of sharing the one seat between the two bicycles. It also saved them money as they did not need to purchase two separate seats. Whereas many of the mothers talked about convenience in terms of time savings or the convenience of not having to drive (which many found stressful), the costs savings made by cycling rather than driving were also deemed convenient.

Many of the mothers in this research noted how using trailers, cargo cycles or even standard adult cycles with child seats and pannier bags attached, allowed them to carry out trips for

multiple purposes i.e. the school run, after school activities and shopping. In addition, because they didn't have to use cars for these journeys, they also saved money on fuel costs and saved time from not having to drive around looking for a parking space. Many of those interviewed also mentioned how driving often made them quite anxious. Therefore, being able to cycle certain journeys rather than driving also contributed to lower levels of stress. Accordingly, materials such as child carrying cycles contributed substantially to making journeys easier for working mothers, and in turn meanings of convenience due to time and costs savings and the avoidance of stress.

Materials

Materials play an integral role in any practice. They are the tangible 'things' that allow a practice to take part, notwithstanding that materials must necessarily link to meanings and competences for a practice to actually happen. In cycling there are a multitude of materials required for the practice to occur. These include bicycles, cycle parking, infrastructure for cycling and other types of equipment frequently used by cyclists in the UK such as helmets and high visibility gear. The practice of cycling takes many different forms and each of these 'styles' of cycling will utilise different types of materials including different types of cycles, clothing and infrastructure. They will also have different meanings associated with them and different competences required to take part in the practice. For this part of the research, the following section will look at the types of materials utilised in the practice of mothers cycling with their children in the UK.

The Type of Cycles Being Used

One of the first questions in the survey asked mothers how many children they had, aged 11 and under. 40% of mothers had one child and 51% had two children. The remaining 9% had three or more. This largely reflects the average family size of 1.89 children in the UK (Sanders, 2019). It was important to understand this for several reasons. Firstly, the number of children a mother has can influence the type of bicycle configuration she uses. This is especially the case for mothers with two or more children and if the children can cycle independently or needs to be carried (or a mixture of both). Secondly, the focus group discussions had flagged, from the outset, the difficulties often faced by mothers when cycling with more than one child. These included, managing the safety of multiple children when they are riding their own

bicycles. Plus, the skills required to operate a child carrying bicycle with several children due to weight load and distribution. These points will be discussed in more detail under the competences section.

A long list of bicycle configurations (see Table 5) was listed in the survey to ascertain the popularity of the types of cycles that mothers use with their children. This question was also included to see if the use of certain cycles had any influence on the types of infrastructure used when riding with their children (this will be discussed in more detail later). For the purposes of this research, the configurations of bicycles have been split into two main categories, 1) 'child carrying bicycles' such as cargo cycles, tandems, triplets and child bike seats, tagalongs or trailers added to an adult bicycle and 2) 'independent cycling', that is where mothers and children cycle together but each person rides their own bicycle. It is also apparent that in some cases a mix of both set ups could be used. For instance, a mother may have a 3-year-old in a child seat attached to her adult bicycle and then have a 7-year-old who cycles alongside them on their own cycle.

The exact wording of the question was: "This question contains quite a long list of different bicycle set ups. Please can you tick the following bikes that you currently use with your child/children". Table 5 below shows the selection of the various options provided.

Adult cycles with attachment	**Child seat -non-electric**	**16%**	**46%**
	Child seat- e-assist	**3%**	
	Trailer non-electric	**7%**	
	Trailer e-assist	**2%**	
	Tagalong-non-electric	**4%**	
	Tagalong-e-assist	**1%**	
Cargo style cycles	**Triplet/tandem non-electric**	**1%**	
	Triplet/tandem -e assist	**1%**	
	Cargo Bike -non-electric	**2%**	
	Cargo Bike- e-assist	**9%**	
Individual cycles	**Balance bicycle/cycle**	**34%**	**54%**
	Adult bicycle non-electric	**19%**	
	Adult bicycle e-assist	**1%**	

Child Carrying Cycles

Independent Cycling

Table 5 List of Cycle Configurations from Survey Respondents (Sample size 2,503)

Respondents were allowed to choose multiple options to ensure that information could be captured for those mothers who had more than one bicycle or a mix of different sets up. The total number of selections was 2,503. From the table above (Table 5) 'independent cycling options' both adult and children riding their own bicycles were the most common selection at 54%. Child carrying cycles were chosen 46%. Overall, 17% of cycles had e-assist and within the cargo cycle category, 72% of all cargo style cycles had e-assist. This is perhaps not unsurprising as these types of cycles are designed to carry more than one child, which typically increases the weight/load that a mother has to cycle with. Accordingly, e-assist is specifically designed to help with this.

Combinations of Cycles Used by Mothers

Whilst Table 5 above shows the different types of cycles currently used by mothers who filled out the survey, it does not capture fully where mothers use a mix of different cycles for cycling

with their children. It was evident that many mothers owned more than one type of cycle or child carrying equipment. For example, some mothers who owned cargo cycles also owned a standard adult bicycle as well. Similarly, their children also had their own cycles. The mix of cargo bicycles and children's own bicycles was elaborated on during comments from all three phases of the research. That is, many of the mothers had chosen a cargo cycle due to the convenience of being able to carry multiple children and get from A to B quickly. However, the majority of mothers still wanted their children to learn how to ride their own bicycles at some point. As demonstrated in the previous section on meanings, many mothers assigned importance to their children learning to cycle their own bicycles as an essential life skill, plus the wider association to physical and mental health benefits from cycling. Subsequently not all journeys would be carried out in child carrying cycles and some independent riding would also occur.

During the interview process, it also became apparent that many mothers used different configurations depending on their journey purpose. This included using different cycles or equipment depending on factors such as the distance of the journey, the amount of time they had to get somewhere, or the type of infrastructure they would be using. For instance, if mothers were under no particular time pressure, they might consider letting their child ride on their own cycle. Conversely, if they were under pressure to get somewhere for a particular time, they might choose to ride with their child as a passenger so that they could better control the speed and duration taken to complete the journey.

In the interviews, Niki, who lived in a hilly area in Yorkshire and mother to one child, 4-years-old, pointed out that, as they often used a variety of different types of infrastructure on one journey, this would dictate which combination of their cycle configuration they would use,

"She can ride her own bike and so we do a little bit of cycling like that. I've got a follow me tandem. Like a hitch on my bike. So, we put her bike on the back of it and then she tends to go on the child seat, then we get somewhere where the infrastructure's better and she goes on the follow me. And then we get somewhere where the infrastructure is really good and she gets off the follow me and cycles by herself" (Interviewee, Niki).

Similar to Niki's experience above, many of those interviewed explained that they also followed similar patterns of switching between configurations to allow their children to ride

their own bicycles, as well as being carried when navigating certain types of infrastructure. Using a mixture of different equipment or switching between configurations reinforces the organisational skills mothers are often required to employ. For example, mothers required forward planning to ensure that they have the precise materials available such as different bike set ups or equipment to allow cycling in different contexts (as described above) to take place.

Furthermore, the cost of additional materials needed or the willingness to spend time and effort to change configurations during a journey, connects back to the meanings mothers taking part in this research assign to their practice of cycling with their children. On the one hand, in Niki's example above, it is apparent that she associates some elements of cycling with danger, as Niki will not let her daughter sit on the tagalong or ride her own bicycle independently until she is on infrastructure which she considers safe. However, once Niki is content that there is safe infrastructure, she allows her daughter to ride independently. This highlights that she also associates positive elements to the practice of cycling, such as physical and mental health benefits and the importance of learning life skills i.e riding a bike. Similarly, the interviews demonstrated that other mothers were also willing to switch between configurations during a journey, despite the effort involved. This reveals they also feel strongly that their children have the opportunity to cycle their own bicycles due to those positive meanings highlighted above.

The Cost of Cycling With Children

The cost of bicycles can range from very little, if gifted or purchased second-hand, to over £5k for some of the e-assist cargo cycles or triplet style cycles. The survey asked mothers to add up the cost of their current configurations. Figure 10 below demonstrates that 60% of those surveyed had spent over £750 and 30% had spent over £2,000. Respondents were also asked about whether they had purchased their cycles new or second-hand, with 41% having bought them brand new and 23% making second-hand purchases. Just over a third of the mothers 34% had bought their cycles and equipment as a mix of new and second-hand. Finally, 2% had equipment gifted to them for free.

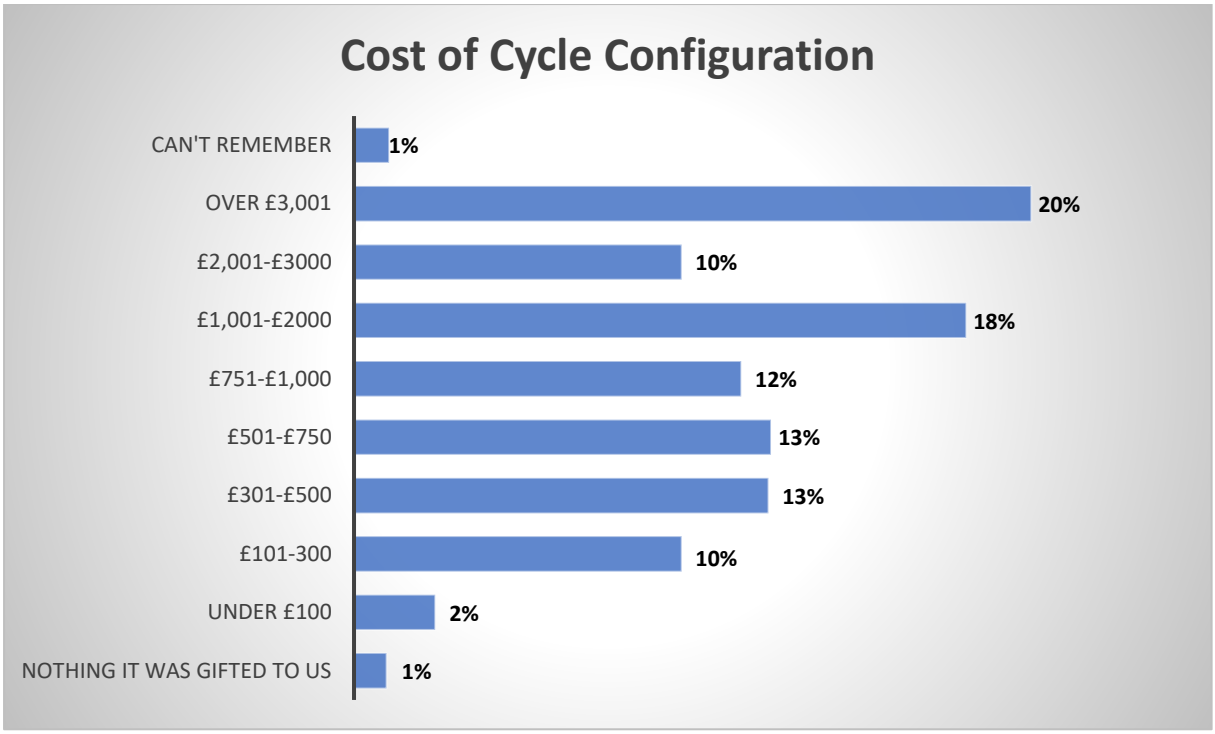


Figure 8 Survey Respondents combined cost of cycle configuration (sample size 1223)

The household income of the mothers who were surveyed was much higher than the national average, with 83% of participants living in a household earning above the median average household income of £30,500 (O'Neill, 2021). In addition, 30% of all mothers surveyed were living in a household that earns above £80,000 per annum after tax. Similarly, the education levels of those surveyed was high, with 40% having a degree (or equivalent) and a further 49% at postgraduate level.

All three of the focus group discussions highlighted the high cost of family cycling equipment and the impact this has on the take up of cycling with children. Some of the focus participants worked closely with low income groups, where cycling was not practiced in high numbers. Whilst they felt the reasons for low take up of cycling in such groups was more complex than just the cost of cycling, they nevertheless, agreed it was a barrier,

"…it's a massive barrier to start cycling as a family especially when you need cargo bikes. I mean like a Tern long tail bike it's like £4000 upwards, up to £8 -9,000 and box bikes as well…I work with a lot of people from Asian communities, they often tend to have several young children, so a bike seat on the back of your bike just doesn't do it when you have three children. And so, it's just outpricing them and they just keep going back to their cars and in a way, I can see why" (Misha, focus group participant).

The focus group participants also pointed out that for many of the women they worked with, they didn't necessarily view themselves as someone who cycles with their children, therefore unlike many of the mothers taking part in this research, they did not have strong motivations to cycle. This, combined with their low incomes meant they were not in a position to purchase expensive cycling equipment or take a risk on purchasing something that they might not get on with. In comparison more affluent mothers could make an incorrect choice, without serious financial consequences.

During the interviews, it became clear that a number of mothers had made a mistake with their purchases,

"…the bike seat, we bought it thinking that it would fit my bike...but basically, I had a really odd-shaped frame. And I couldn't actually fit the bike seat to the bike" (Interviewee, Laura).

Some of those interviewed described how they had started out with relatively cheap equipment and then switched to more expensive options once they found that it was something they wanted to do more of. Of course, it is important to consider that the mothers in this research had chosen to participate presumably because they were successfully carrying out the practice of cycling. They might have had some bad experiences with equipment but were in a position to undertake a process of 'trial and error' before getting it right. Moreover, presumably they also assigned positive meanings to cycling which helped them continue with the practice in spite of purchasing the wrong equipment or cheaper equipment to start with.

What is unclear however, is the number of mothers who might have tried to cycle with their children using cheap equipment which didn't work, and they subsequently gave up cycling as a result. With this in mind, did those mothers (as highlighted previously with the example of the low income mothers above) give up because they couldn't afford to buy additional equipment. Or was it that they did not have the same strong motivations to cycle, as common amongst the majority of mothers taking part in this research. Therefore, when their equipment didn't work they just decided to stop cycling. Delving more specifically into these questions is unfortunately outside the scope of this study but would be an interesting topic for future research.

In addition, as mentioned previously, those mothers on lower incomes did not necessarily have the option to purchase different types of cycling equipment until they found the right

'fit' for their family's needs. The focus groups participants and interviewees mentioned that because child carrying cycles and equipment tended to be more expensive, being able to 'try before they buy' would be useful. One mother, Sonia, noted how she spent a lot of time undertaking online research about the different cycle set ups available and as a result she was convinced that she wanted a Christiana branded three-wheel cargo cycle for her and husband to both use to transport their children. Sonia opted to try out a couple of different types of cargo cycles before buying,

"So, we went to Cambridge and they had this thing in the park, one of the cargo bike sellers there. And then we went to try them out and we were like, so sold on the Christiana. And, and we tried it out and my husband was like, "that's not enough space for my legs actually" ... And of course, it had to work for both of us. And then I was like, "Oh yeah, the Nihola's going to be perfect for us then" …and then once we rode a two-wheeler [Nihola], there was no going back. It was going to be a two-wheeler for us" (Interviewee, Sonia).

That Sonia was so meticulous in her research into the various child carrying cycles on offer, can be seen to link back to the meanings assigned to the practice of cycling. For Sonia, cycling with her children was clearly important, she had taken considerable time and effort to ensure that she purchased the correct materials to enable her and her husband to cycle with their children. For mothers who don't assign such strong positive meanings to cycling, it is again unclear if they would undertake such detailed research and effort to track down a suitable cycle.

Family cycling libraries, similar to those set up in the Cambridge park Sonia details above, were discussed in detail during the focus groups. Participants of the focus groups pointed out that there were a number of family cycling library facilities across the UK, with some offering both short and longer term loans to parents. These were seen by the focus groups as a great way of opening up more expensive cycling options to lower income families,

"We have a brilliant scheme here which is Peddle my Wheels. Which is kind of a subscription thing where you can get cargo bikes and you can buy them on instalments which are interest free, that is a brilliant scheme. Then there is carry me bikes …where you can loan, I think cargo bikes for the week and buy them as well. So, there are few schemes available. Our

local council has a cargo bike hire but that is obviously time limited but it's a good way to try it out. (Focus Group Participant, Misha).

The merits of these schemes appear to be a positive step towards introducing child cycling to more people. Nevertheless, in their existing form they appear small scale schemes, and it is unclear if they would be able to facilitate mass cycling with children. Whilst currently outside the scope of this study, further research into the potential impacts of family cycling libraries would be an ideal topic for future research.

Cycle Parking at Home

The ability to park a bicycle and store associated cycling equipment is another key material essential to the practice of cycling with children. In this research, when asked about storing cycles and associated equipment, parking did not seem to be a significant issue for those mothers who responded to the survey (see Figure 11 below). This may be in part due to the sampling of the survey, whereby mothers who took part in this research were doing so because they were successfully managing to cycle, therefore presumably have no significant issues with storing cycles at home.

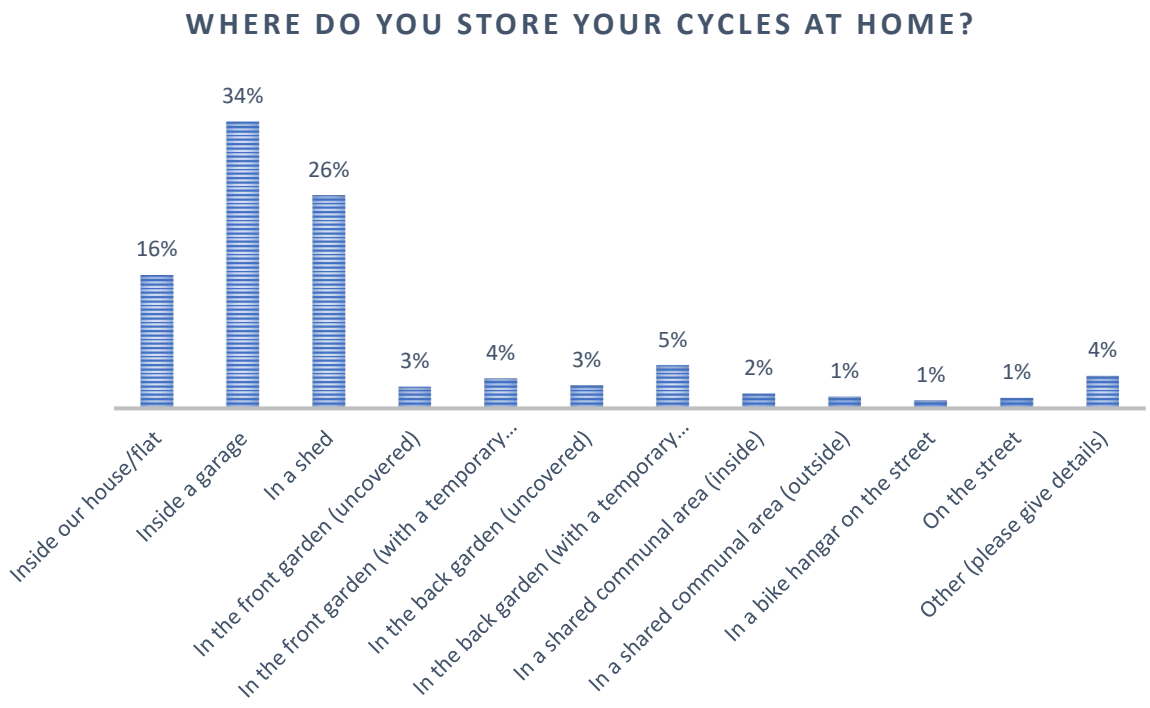


Figure 9 Survey Respondents cycle parking at home (sample size 1499)

Respondents were able to choose more than one option, as some bicycles may be kept in a mixture of places. Only 1% kept their bicycles outside of their properties on the street. A further 3% kept their cycles in a shared communal area, and 1%, made use of council provided on-street bike hangars. The remaining 91% were able to store their bicycles in or on their own property. This 91% included 16% of mothers storing cycles inside their house and 34% in a garage. The remainder of those surveyed, stored their equipment outside in their gardens, with 26% using a shed and the remaining 15% stored them either uncovered or with a temporary cover, in their garden. *4% of respondents chose the 'other' category however did not offer further clarifications in the comments.

Although the majority of mothers surveyed were able to park their cycles within their own properties, this did not mean that parking was straightforward or without problems. 12% of participants noted that they did not have sufficient space to store their cycles at home, plus 19% stated that accessing and moving their cycles in and out of their home storage was often difficult. For example, survey comments were forthcoming from those living in flats, highlighting the impracticalities of storing their bicycles inside due to not being able to carry them up flights of stairs and into their properties. Instead, many had no option but to leave them in shared communal spaces. In some cases, this caused issues such as neighbours complaining about their cycles blocking hallways, as well as a fear of them being stolen.

A number of mothers mentioned that they lived in terraced style housing with no access to their back garden, except through their house. In these cases, mothers had to bring their cycles in and out of their home each time they used them. This often required lifting them up steps or through narrow hallways inside or in some case having to take parts of their cycle apart to be able to fit them into their storage space. However, despite the effort this took it was deemed necessary due to fears of cycles and equipment being stolen or getting damaged by the elements if left outside,

"I used to keep the trailer indoors in winter months. This meant removing the guards and wheels every evening and a difficult manoeuvre up the steps and through a door frame only just wide enough for it. It then took up a significant space in our small living room. Every morning repeat in reverse. This with small children demanding attention. Sometimes twice a day if it's raining…" (Survey respondent).

Indeed, it appears that for those mothers without large houses with a garage or a spacious garden to store cycles in, the logistics of moving cycles in and out of their houses was often problematic. In many cases the lack of space made their practice more time consuming and required much more effort than those mothers who were able to simply wheel their cycles in and out of storage places with ease. In some cases, additional materials were needed to ensure they could adequately store their cycles. For instance, Alison, mother to two children aged 1 and 4-years-old, had to buy additional equipment to help move her electric bicycle, which is fitted with a front and back child seat, in and out of her house,

"… We've got a driveway and we've got quite a narrow path down the side of the house and then the door opens onto that path… but it's quite a tight turning circle. So, you don't, you don't even get a good run up, to bump it up the front step. So, I put a ramp thing in, it's just a thing like, it's not fitted or anything…It was just from Amazon… It's just like a heavy black rubber thing." (Interviewee, Alison).

Misha from the focus groups talked about her electric bicycle, which due to the battery was much heavier than a standard cycle. She described how there is only a narrow pavement outside their dwelling, so there is no room to lock the bicycle out the front. Instead, her husband has installed an internal ramp so that she can push/wheel it up a flight of stairs and then keep it inside the flat. She noted that ideally, she would love to have a cargo cycle, but it would not be possible due to the weight and size, as she simply would not be able to store it at home.

These examples of different materials being used to facilitate bike storage also demonstrates the interrelated links between materials, meanings and competences. That is the specific competences such as organisational skills and the mother's know-how of how to correctly disassemble and reassemble their cycle on a regular basis, or how to navigate a cycle up a ramp into their property. Similarly, when questioned further about their efforts both Misha and Alison talked about the importance of cycling with their children, linking back to the positive meanings that have been raised throughout this research pertaining to the physical and mental health benefits, the wider positive impact on the local environment and how these mothers were determined to cycle because they felt strongly that it was a good thing to do. Finally, it also highlights that the practice of cycling with children is not as simple as just

putting a child onto the back of a bike or into a cycle, rather requires much more effort for some of those taking part.

Another key issue raised by a number of the survey participants, related to the next phase of their cycling. That is, they were able to store bicycles on their property at the moment because they had young children, who had very small bicycles that did not take up much space. Or, they were using a child seat attached to an adult bicycle, so were only required to store that one adult bicycle. However, they expressed concerns that as their child outgrew their child seat or small child bicycles, at some point they would need to switch to a different configuration which they would struggle to store, or manoeuvre into their current storage space.

The fact that children are constantly growing means that the practice of cycling with children, does inevitably change over time. As such, the various materials needed to carry out the practice also change and this can impact on how or where they are stored,

"Our storage space is getting tight as the kids' bikes get bigger - we can just about manage two adult bikes and bikes for an 8 and 11 year old" (Survey respondent).

This appears to contrast with accommodating children in cars or when walking. In that with driving and walking, as children grow, it is usually the case that less equipment is needed i.e child seats or pushchairs are no longer required as they reach a certain age. In comparison with cycling, however, as children get older they require larger sized equipment hence the creation of possible issues in relation to finding a suitable storage space at home for some families.

Indeed, a number of examples were provided both in the surveys and the interviews illustrating how some mothers were unable to carry out particular journeys by bicycle due to their current storage issues. One mother who currently cycled with her child, had recently had a new baby. Ideally, she wanted to purchase a cargo cycle so that she could ride with both children at the same time. Unfortunately, a lack of space at home for a cargo cycle, meant that at the time of filling out the survey, this was not possible,

"We have enough space for my old bike setup but not enough secure space for a cargo bike so I cannot cycle with my new baby" (Survey respondent).

Comparable issues arise in a later section discussing competences. That is, where mothers have children that are certain ages and are transitioning between being carried and cycling independently. As they get older the configurations need to change and this can require different or additional materials and competences to carry out the practice of cycling. This will be discussed in more detail in the competences section.

Cycle Parking in Public Spaces

Whilst the survey only asked questions about storage at home, the issue of cycle parking at end of journey destinations was discussed during the focus groups and interviews. The types of locks and infrastructure used by mothers to secure their cycles can be seen as another 'material' that is integral to the practice of cycling. As previously mentioned in the focus group discussions, the lack of cycle parking at home for those living in flats or terraced houses or smaller sized properties was seen as a particular issue which prevented more mothers taking up the practice, especially for those in lower income groups. However, the fear of theft at end of journey destinations was potentially a problem for all mothers. In the survey, 37% of mothers noted that they had previously had a cycle stolen. Unfortunately, the question did not specify if the theft occurred at home or when their bike was locked up in a public space.

In this research, the most popular journeys carried out by mothers with their children were to education settings such as schools. The fear of theft at these locations was much lower compared to other public spaces. This was because most schools generally provided cycle parking on site, but also had a good level of security with most sites 'effectively' locked down during school times and thus preventing access into school grounds,

"So I leave the kid's bike and my trailer at school as it's got CCTV, so it's fine. And they've got dedicated bike racks which is just by the main entrance" (Interviewee, Harriet).

"They don't lock them because this is in the school and just behind the gate gets locked for the kids to be in anyway" (Interviewee, Suzy).

Similarly, a number of nurseries, used by the mothers being interviewed, appeared to have secure storage space for child seats or for small balance or pedal cycles. These spaces were frequently shared with other parents storing car seats or buggies, but it was apparent that

the nurseries were flexible in allowing cycle equipment to be left, which allowed the mothers to feel confident that they would be safe.

Nonetheless, a number of mothers were also carrying out journeys to places of worship, gymnastic clubs or swimming lessons. For these types of journeys, they were required to secure their cycles in public places. Most mothers interviewed were very conscious of their cycles being stolen and so armed themselves with a variety of different locks,

"… it's got two large panniers that they actually put their feet inside the panniers but I can chuck a big chain at the bottom of that as well. Okay. So yeah, so we've got like one of these big heavy metal chains basically and that's what we use and there's a wheel lock on the front wheel as well" (Interviewee, Carrie).

"I tend to…we've got a long chain combination lock…And we tend to pile them all on top of each other and thread it through as much, you know, all of them at once. So, it looks as complicated as possible as well" (Interviewee, Sarah).

A number of mothers mentioned that carrying good quality locks added a lot of weight to their cycles. Some of those interviewed with older children who were riding their own cycles independently, had them carry their own to help spread the weight. Nevertheless, some mothers often found themselves carrying locks and various other paraphernalia which sometimes made cycling for these journeys harder work due to the extra weight being carried. For instance, Ellie, who cycles with her 6-year-old, frequently found herself weighed down with items such as heavy locks and swimming kit, when cycling her daughter to swimming lessons. However, despite this making her journey slightly uncomfortable, she felt it was worth the inconvenience as opposed to her bicycle being stolen.

Another issue that was raised in relation to parking cycles in public spaces, was not only the lack of secure cycle parking but also the lack of cycle parking that was suitable for cycles with a larger footprint such as trailers, cargo cycles and tagalongs,

"The issue of the cargo bike…the parking can be a bit of an issue. Covered bike parking is great unless you're going to block everybody else from getting in. So, you can get in, but you can only fit right on the end of it..." (Focus group participant, Dana).

Some mothers noted that they often couldn't use cycle stands in public spaces because their cycles would block the pavement or space around them for other users. In such cases they would often have find railings or lampposts to use instead.

Infrastructure Preferences

The various types of infrastructure available in the UK for mothers to cycle on can be considered a key material in the practice of cycling. During the focus groups, participants were unanimous that different types of infrastructure impact on the practice of cycling with children. In particular, they felt that inconsistent and a lack of safe cycle infrastructure was a major barrier stopping more mothers taking up cycling. Whilst infrastructure is seen as a 'material' in the practice of cycling, cycling on certain types of infrastructure also has strong links to meanings, for instance, on busy roads which have high speed limits and are heavily trafficked, many mothers would associate meanings of danger with such roads and avoid them,

"…we've got one road that even I wouldn't do it, we've got one roundabout which I think has the most accidents for cyclists in the whole of Edinburgh and there's no way in hell, I don't even go around it on a road bike and certainly wouldn't put my son around it" (Focus group participant Dana).

It was also clear that having children definitely impacts on the types of places they will ride. Perhaps unsurprisingly, nearly all mothers surveyed or interviewed conveyed that they would carefully consider the types of infrastructure that they use when having a child in tow,

"I look at cycle infrastructure very differently and things that I would have no problems about using as an adult, sort of a cycle lane next door to a 60 mile an hour road, okay, that's segregated because it's on the pavement, but if you wobble off, you're into the line of the traffic, it's quite, quite terrifying (Interviewee, Ellie).

Notably, some of the interviewees also pointed out that they were more cautious when riding on their own, since having children. For example, they were mindful that they had commitments to their family and so consciously took what they deemed less risks when cycling alone as a result, signifying that meanings of mothering are also important, even when

their children are not with them. Issues around confidence were also explored in detail during the interviews and will be discussed more fully in the competences section.

As mentioned, the focus group respondents had very strong feelings on how cycling infrastructure in the UK played a central role in whether mothers could carry out certain journeys by bicycle. As a result, the focus group discussions were instrumental in influencing a number of questions in the surveys. In particular, asking mothers which types of infrastructure they are comfortable cycling on (see Figure 12 below). This included asking mothers about the types of infrastructure they would feel comfortable using on their own (without children in tow). They were then asked the same question depending on the bike configuration they used. That is a) a child carrying cycle and/or b) children riding alongside the mother independently on their own cycles.

It is important to note that survey respondents were not replying in terms of what infrastructure they currently use, rather their stated preferences in terms of what infrastructure they would be comfortable to use if it were available to them.

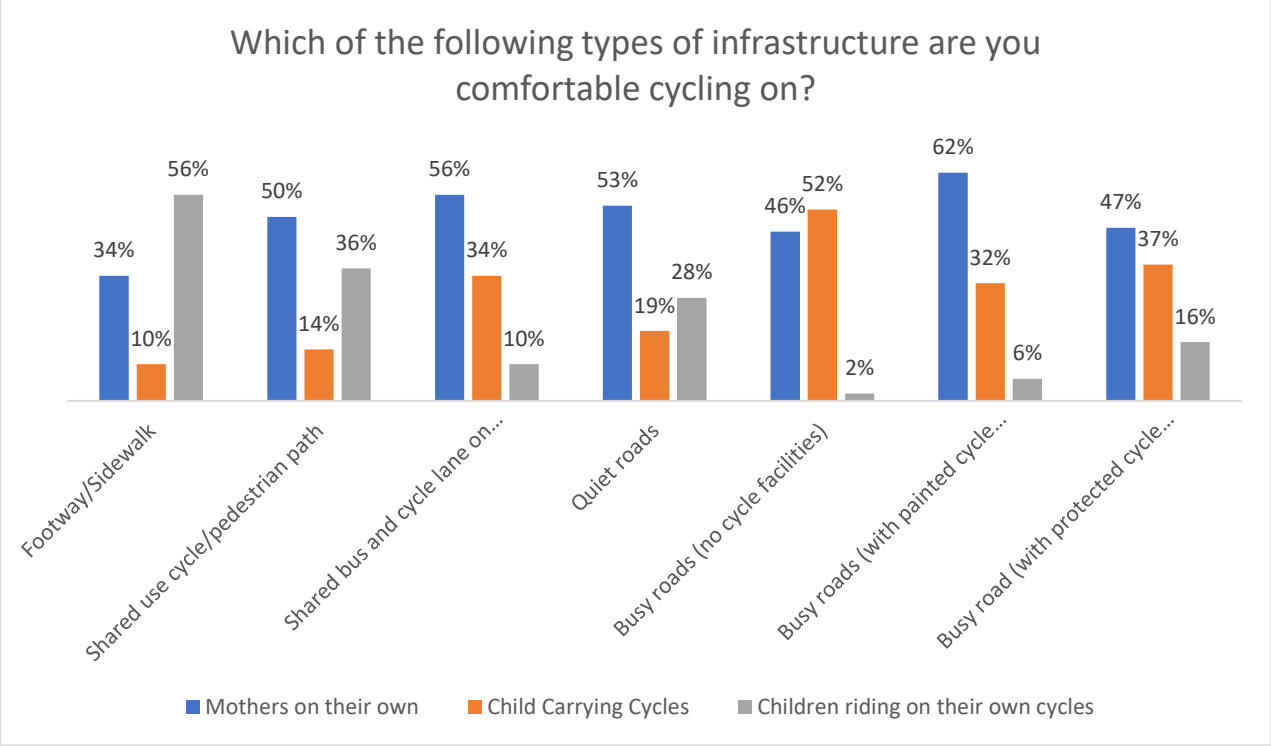


Figure 10- What infrastructure are mothers comfortable using in different scenarios? (sample size: Mothers on their own - 6060, Child Carrying Cycles – 3340, Children riding on their own cycles – 2684)

The options provided in the survey were similar to those used by Aldred (2015) in her research on adult's attitudes to children cycling, where parents were asked their opinions on various

types of infrastructure. However, the categories used in this research were simplified and contained fewer examples of infrastructure types than in Aldred's research, due to infrastructure being one small part of questions asked in the survey for this study. In addition, the results shown in Figure 12 above, also reinforced many of the comments and discussions around infrastructure discussed in all three of the focus groups. These will now be discussed below.

Mothers Cycling Alone

When asked about which types of infrastructure mothers riding solo were comfortable with, there was a relatively high number of mothers expressing confidence to ride on all the different scenarios provided in Figure 12. It is important to note, however that most of the survey respondents could be assumed to be confident cyclists due to the fact they were cycling with their children on a regular basis. For instance, if a mother lacked the confidence to cycle alone, or was a nervous cyclists, it is unlikely that she would feel comfortable riding with her children. This was reinforced during the interview process, where the majority of mothers expressed they were a confident cyclist. Although it became apparent during the interviews that many of the mothers had differing opinions on what a confident cyclists looked like. Discussions around confidence will be looked at in more detail in the competence section.

The lowest preference for mothers (when cycling alone) was in relation to footways. The use of footways in cycling is a thorny issue as cycling on footways is technically forbidden by Section 72 of the Highway Act 1835 (Highway Act 1835, 1835). Although, a grey area exists around children using footways due to the lack of criminal liability for anyone under the age of 10, plus police discretion is advised if an adult is cycling considerately on a footway (Butcher, 2012; Hirst, 2020,30). Nevertheless, most mothers refrained from using the footway if they were cycling on their own, unless they felt it was only safe option to use. Conversely, when mothers were cycling with their children, particularly those where their children were cycling independently, their use of the footway was much higher. However, in both cases, some mothers felt guilty using footways because they felt they would be judged by other people for doing so. This again demonstrates the links between meanings and materials and will be discussed in more detail in the section looking at mothers cycling with their children independently.

Mothers Cycling With Child Carrying Cycles

It is useful to note that for child carrying cycles, the preference to cycle on shared use paths was much lower than for mothers cycling on their own or with children riding independently. The focus group participants discussed the impact of barriers (frequently found on shared use paths) and deemed them a major obstruction for mothers who want to use traffic free spaces with their children but are often prevented doing so due to accessibility issues. One of the participants of the focus groups was involved in organising community family rides and noted it was a common concern for many,

"What I come across a lot on family rides, is we have people who want to come along on long tails and box bikes and also adapted bikes. We have a lot of people with disabilities who have the same issues, in that, a lot of cycle paths have bollards in the middle. They're blocked off by stones or whatever and have a lot of barriers… I think that's really a problem that infrastructure often has barriers itself which only allows a standard cycle to go through without difficulties" (Focus group participant, Alice).

The focus groups discussed how they believed the various barriers on cycle routes showed the lack of thought given to people with small children or people with disabilities that need to use non-standard sized cycles to carry out day to day journeys. Interviewees and survey respondents alike expressed their frustration due to the extra time and physical effort it often took to manoeuvrer their cycles around barriers or steps. The survey showed that 18% of mothers had experienced 'Guard railing barriers/steps that cause an obstruction to your journey' (see Figure 8 on p120). A number of those using child carrying cycles noted in their survey responses the impact these barriers had on them. This included mothers having to find alternative routes, which often involved longer distances. Or in some cases, taking a break from cycling for a short while,

"When both my children were in a fixed cycle seat, we stopped cycling as it became impossible to traverse styles / fences / obstacles lifting them in the bikes. Marginally better as toddlers but still risky getting toddler off a tandem and asking them to stand still for us to move the bike… especially near canals / rivers. Added a lot of stress to the situation" (Survey respondent).

Whilst shared use paths are commonly viewed as safe infrastructure because cyclists don't have to mix with motorised forms of traffic, these barriers were in many cases not fit for purpose for some mothers and as a result often induced anxiety when using them. For instance, many survey responses indicated that whilst mothers did not attach meanings of danger to this form of infrastructure (as they might to infrastructure such as busy roads) they did however attach meanings of stress due to the uncertainty that often faced them when using shared use paths. That is, mothers frequently worried if they would be able to get around the barriers or need to ask for assistance from someone passing by. Or if they were unable to get through, then they would need to find an alternative route.

Similarly, another area of concern that was raised in all three phases of this research highlighted issues between pedestrians and cyclists on shared use paths. Conflict with dog walkers came up on numerous occasions during all three phases of the research. For many mothers, they found the unpredictability of their own 'wobbly children' on bicycles, mixing with dogs on extendable leads, or unleashed dogs was a particular issue. For instance, dogs on long leads walking across the path of where their children were cycling, or dogs off lead wandering into their path which they feared could cause collisions. A number of interviewees described how they were on high alert when dogs were around, and they constantly had to call out instructions to their children to be mindful of avoiding wandering canines that could change direction at any given point. Despite the various issues raised however, mothers generally agreed that shared use path options were still preferable to cycling on busy roads with motorised vehicles because the risks appeared far less serious in comparison.

In relation to the use of the various 'Busy Roads' categories for mothers using child carrying cycles there appears at first glance to be several anomalies. For example, mothers felt less confident using busy roads (with painted cycle lanes) compared to busy roads (with no cycle facilities). A number of comments from the surveys also highlighted how painted cycle lanes were often inconsistent and stopped suddenly. Likewise, vehicles can still be found to park or be driven across/into them, causing obstructions and safety concerns when using them. These concerns were also shared by mothers cycling on their own, and with children cycling independently alongside their mothers.

The response to 'Shared bus and cycle lane on road' was also much lower for child carrying cycles as opposed to mothers riding on their own. Two participants in the focus groups,

London and Edinburgh based, noted that they had bus lanes where they lived. Both felt confident and untroubled cycling on them when alone, and where necessary if using their cargo cycles because they were generally wide enough for buses to pass them with sufficient space. However, agreed that if their children were on their own cycles, this was not infrastructure that they would want them to cycle on, as they did not feel it was safe enough due to a worry that their children might wobble and veer off path.

Visibility issues were also highlighted in the survey responses and interviews in relation to the popularity of 'Quiet Roads'. In the focus groups, one of the participants noted that quieter roads, particularly in suburban areas and in cities, often had parked cars and traffic calming measures such as speed humps or chicanes. Therefore, when using child carrying cycles, parked cars often caused visibility issues for tagalongs and trailers due to being quite low down. Similarly, navigating speed bumps or chicanes with heavier cycles such as cargo cycles could be problematic due to the way such cycles handle. The issue of handling larger, non-standard cycles will be discussed in more detail in the competence section.

In addition to some forms of infrastructure appearing to restrict some mothers use of them due to accessibility or safety concerns, it also became apparent some forms of infrastructure were only used by mothers at certain times of the day or certain days of the week, thus restricting the times they could use them . For instance, Izzy, a mother of three children aged 3, 6 and 8-years-old, uses a cargo cycle for a number of journeys. She lives in a suburban area of the East Midlands, and regularly undertakes two trips that includes a section with a painted cycle lane. During her interview, whilst describing the types of infrastructure she uses, Izzy mentioned that she was aware of existing research on the safety of painted cycle lanes. As a result, her use of this particular stretch of infrastructure has recently changed. She now prefers to use the painted cycle route on a Sunday morning, as the road is much quieter than on a Friday after school when she cycles her children to swimming lessons,

"…and then we go out onto what would be a busy road and it has a painted cycle line. So, I actually sometimes avoid it because I know the stats on painted lines are not great…Sometimes I go along the painted cycle lane and around a roundabout, which again I do on a Sunday morning, but I wouldn't necessarily do on a Friday" (Interviewee, Izzy).

Whilst Izzy considers herself a relatively confident cyclist, she explained she feels more comfortable riding on the cycle lane with painted lines, on days where traffic levels are quieter. Other interviewees also noted that they preferred where possible to cycle at certain times of the day. A popular example being the number of interviewees who noted that when doing the school run by bicycle they often set off for school much earlier than they would if driving or walking. This was to allow them to avoid the high number of motorised vehicles around the school entrance on morning drop offs. Indeed, most mothers throughout all phases of the research expressed a preference for using roads and cycle lanes on days or times where motorised traffic was lower in volume, such as avoiding peak times or cycling on Sundays.

Mothers Cycling With Their Children Independently

Given previous concerns raised during the focus groups about cycling with children on infrastructure with motorised traffic, expectedly, very few mothers surveyed felt comfortable allowing children to ride their own bicycles on any of the 'Busy Road' categories. Those with protected cycle lanes scored slightly higher at 16% as opposed to 2% for busy roads (no cycle facilities) and 6% (with painted cycle lanes). Nevertheless, but not unsurprisingly, for children riding independently, protected cycle lanes were considerably less popular than the traffic free options provided such as footways 56% and shared use paths 36%.

Indeed, for the majority of the mothers interviewed, they also did not live in locations that had protected cycle lanes. For the few that did (in London and Edinburgh), they stated that the routes they used did not feature protected cycle lanes. It is unclear however, due to the wording of the questions used in the survey if mothers are not using protected cycle lanes because they are on typical commuter style routes that don't cater to their journey needs, or for some other reason such as safety,

"That perceived, perceived and real risk to your child and the relationship with driver behaviour. So yeah, fast cars even by separated cycleways are suboptimal…" (Focus group participant, Shona).

For instance, the safety of protected cycle routes was raised in the focus groups, with concerns over how much protection they actually offer on busy roads with fast moving vehicles. Discussions centred around how some protected cycle lanes only offer light

segregation meaning that motorised vehicles can still drift or be purposely driven into the lanes, or indeed park in them. As a result, most of the focus group participants said they would be reluctant to allow their children to cycle independently on them.

During the interviews, it was clear that none of the 30 mothers interviewed, were willing to cycle on busy roads with their children when cycling independently. Instead, a number stated that in cases where they had to travel via a busy route they would use the pavement instead, even though they knew it was not recommended,

"I would do something that's not strictly forbidden, but I think obviously frowned upon. I would go on the pavements on certain sections because that would make our journey much safer. So, we used to live right next to a very busy roundabout that I didn't want to tackle. I would tackle it myself, but not with a child. So, I would cross at the pedestrian crossing. And it was still that early in the morning, that it wasn't as busy, but you definitely had to kind of take your time and not be in people's way" (Interviewee, Edith).

The high number of comments, in both the surveys and during the interviews, also demonstrated that many mothers only allowed their children to ride on the pavements. This would take place in a number of ways. For some mothers, they felt it was inappropriate to ride on the pavement themselves, so they cycled adjacent to their child on the road. However, this often caused issues when they came to junctions,

"… my child now prefers to cycle on pavements due to the traffic. However, legally I am not allowed to be on the pavement with her. I often will cycle on the road parallel with her. We also have pavements too narrow for two bikes side by side and pavements on only one side of the road. This means I either need to be on the opposite side of the road from my child shouting at her, cycling against the traffic, or navigating narrow paths" (Survey respondent*).*

Some of the interviewees also allowed their children to ride on the pavements but they remained on the road. They described similar situations to the quote above where they had to navigate crossing junctions and often had to trust that their child would follow their instructions. For example, if there were traffic lights and the mother's light was on green, they had to proceed across the junction and leave their child on the footway and instruct them to wait until they told them it was safe to cross. The mother would cycle across the junction, pull over to the side and shout instructions back at their child. When questioned if they felt it

would be safer to be on the pavement with them, they agreed it probably would, but they worried about being reprimanded by other road users. When probed further on this, they expressed that they felt they were in a no-win situation. They felt it was too dangerous for their child to cycle on the road, however agreed that their child crossing a junction on their own was also problematic, especially if they didn't follow the instructions properly, or misheard them.

However, as mentioned above, they did not want to cycle on the road themselves as felt they would be judged and receive criticism from other road users. The use of certain types of infrastructure (in this case footways and busy roads) again shows a mix of meanings associated with their use including danger, fear of being judged by others and guilt at potentially putting their children in harm's way.

In comparison, a number of mothers said that they made the decision that it was safer for both them and their child to ride on the footway. Many comments in the survey stated, that whilst they did not like to do it, if they could not ride on the footway with their child, then they would not be able to cycle at all because they attached meanings of danger to the alternative infrastructure available to them. In addition, they also felt their children lacked the necessary competences to cycle on the road, including those with protected or painted lines.

Footway cycling came up frequently in the interviews too, with a number of mothers explaining that for some parts of their journeys they felt that using it for small sections was the safest thing to do. They pointed out however, that they adapted the way they rode on them because they knew technically it was not permitted. Therefore, they tended to cycle much slower than normal, giving way to pedestrians and politely alerting other users of their presence when passing. Nevertheless, most mothers felt conflicted. The felt judged if they chose busy roads but they also felt judged if they used the footways. This bears similarities to points made in a previous section where mothers frequently questioned if they were doing the right thing and were made to feel guilty and question whether cycling with their children was the right thing to do.

One of the mothers interviewed, Jess, who cycles the school run with her 6-year-old daughter, would use a section of footway in close proximity to the school. Although this section was

usually well used by other children walking to school, Jess purposely planned their journey, so they set off much earlier than everybody else, thus managing to avoid this area and any conflict when it was at its busiest. This links back to earlier comments in the previous section about how mothers were often restricted to using some forms of infrastructure at certain times. Many of the mothers cycling on footways highlighted that they made every effort to do so with care and caution. The majority of mothers said that most people they encountered appeared to have no problem with it. With only a few mothers having experienced issues where they were criticised,

"So, yeah, I've had plenty of people who would say, you know who would tell us off for being on the pavement… I think one lady was pushing a pram and there was a lady walking beside her and my youngest was ringing a bell in good time, no issues. And they were completely ignoring him and so he stopped behind them. And she turned around and she said, "Well, where do you expect me to go?" And I was just like "If you could just let them past that would be great, you know". There's not, there's just no appreciation for, you know, it's a three year old on a bike doing pretty well ringing a bell" (Interviewee, Anna).

Anna who has two sons aged 4 and 6 years-old lived in a suburban area of Northern Ireland and talked in more detail about how upset these types of encounters left her feeling. She felt very strongly about teaching her two sons how to cycle because she thought it was a good form of exercise and riding a bike was an important life skill. Whilst she knew that cycling on the footway was not legal she was frustrated at the lack of safe choices to cycle in her area,

".. the only cycle paths that we have are used as car parks, people just park their cars all along them. I wouldn't take the kids on the road because, you know, coming up to junctions and cars are just entering the cycle lanes and there's just, there's just not enough of a cycling community here. Everybody's in cars, everybody has this car culture. And I just wouldn't trust my kids at the age they are on the roads. Maybe in a few years' time" (Interviewee, Anna).

Anna's comments about a car culture and a lack of cyclists in Northern Ireland was also raised in the focus groups by one of the participants who worked for a cycling charity in Belfast. She also noted that there was a distinct lack of cycling infrastructure in Northern Ireland which combined with negative media coverage of both cyclists in general, but especially those cycling with children, appeared to create a vicious circle preventing a higher take up of cycling.

A lack of cycling culture was also raised by survey respondents and interviewees, particularly those living in some suburban and rural areas of the UK with low number of cyclists. Many commented that it was very unusual in their areas to see other cyclists, let alone mothers cycling with their children. Consequently, they felt that they had to ensure they cycled responsibly and not break any rules of the road because of their visibility to others. That is, because so few people cycled in their local area, that they were cycling with young children made them very noticeable to other road users. As a result, they felt that they had a responsibility to set a good example so as not to give 'cyclists a bad name'.

Whilst busy roads were unsurprisingly not favoured by mothers cycling with their children independently, 28% of mothers stated they would feel comfortable using quiet roads with their children on their own cycles. One participant in the focus group who lives in London, mentioned how a number of recently implemented local school streets had allowed her 11-year-old child to cycle home safely on his own,

"school streets… is actually what enables my eldest to cycle to school because he basically cycles through a network of three school streets that all connect and so it makes essentially an LTN for the, for the school runtime anyway" (Focus group participant, Rebecca).

However, no definition was provided in the survey question as to what constitutes a 'quiet road' so there was room for interpretation on behalf of the respondent. For some this might mean a road with a 20mph speed limit or perhaps a road that is within a school street or low traffic neighbourhood (LTN). Conversely it could be a road that, regardless of its speed limit has limited motorised traffic on it and as such feels 'quiet' to the user,

"Yeah, we are on the road, single lane, country road the whole way until we get to the next village where her childcare is and that's only a very small village… There's very little, very little traffic that passes us. Maybe in from where we live to the village where childcare is, I get passed by maybe max five cars and a bus if we're late…" (Olivia, Interviewee).

For instance, Olivia, mother to one child aged 5-years-old, lives in a rural area and cycles her daughter to a childminder along a rural road with a 60mph limit. In this case, however, the local conditions of Olivia's particular route were such that she considered this route 'quiet'.

Competences

For the practice of cycling with children to occur, certain competences are needed. In social practice theory terms, this includes aspects such as the 'skills' to cycle and the 'know-how' of the rules of the road, or other pertinent knowledge or 'unwritten rules' to follow in order to perform the practice. As mentioned previously, there are many different forms of cycling. Some of these practices require substantially different types of skills to perform them. For instance, the techniques and skills required for downhill mountain cycling or track cycling would be very different to those needed for utility cycling. This next section looks at the various competences such as the 'skills' and 'know-how' needed by mothers to cycle with their children in the UK.

Choosing The Right Cycling Equipment

During the interviews, a large proportion of mothers mentioned they had undertaken in-depth research before choosing their equipment. Their 'know-how' of how to choose a specific cycle configuration came from a number of sources. This included advice from bike shops or friends and family. Additionally, a number of mothers said they had observed other families cycling and had stopped and asked for information about the cycles they were using.

The most popular choice, by far however, was gathering information from the internet. In particular, the Cycle Sprog website and family cycling Facebook page were highlighted many times in survey responses and the interviews, as an important source of information due to reviews and first-hand accounts from other parents of the different types of cycles available in the UK. Of course, it is important to note that the survey for this research was promoted on both of these sites, which could in part explain the high number of mentions.

The interdependence of meanings, materials and competences have been raised previously and it became evident that acquiring some competences were woven together tightly with material aspects and meanings that mothers associated with their practice. For instance, as some mothers started cycling with their children, they became aware that they needed other cycling equipment to make their journeys more comfortable and/or to try and improve their safety. Fears about using child carrying cycles such as trailers or tagalongs on infrastructure where they had to mix with motorised vehicles were raised due to the visibility of (or lack of)

their children. These concerns meant that mothers associated meanings of danger to their practice and had to acquire the knowledge of what materials were needed to improve (in this example) visibility of their children,

"I have got a little sticker at the back…baby on the bike" (Interviewee, Edith).

"When with my child on a front seat I have an adapted hi viz with a "child on board" sign attached" (Survey respondent).

"I added safety flags and fold out reflectors to the sides of our cargo bikes and tandems. This made an appreciable difference to the number of close passes we get" (Survey respondent).

Most mothers noted that they used the internet or asked advice from other cyclists they knew about the best methods to make themselves seen. This included materials for cycling at certain times of the day, such as lights, reflectors and high visibility equipment. A number of mothers also invested in cycling cameras to act as a visible sign to other road users that they were being recorded, in the hope that this would improve how drivers interacted with them, as well as being able to use footage as evidence in the event that any incidents did occur.

Experiencing certain bodily sensations such as riding in wet or cold conditions led to a realisation that mothers required certain materials to maintain comfort levels when cycling. This 'know-how' often developed as the mothers did more riding and found themselves cycling in all seasons. For example, many of the mothers had been caught out in bad weather and found that both themselves and children had got really cold, particularly as the seasons changed from autumn to winter, or they had got soaked from a sudden downpour,

"Probably one of the biggest factors is the cold because you because you're cycling at a ten year old's pace, everyone else is going much slower and you're not heating yourself up yet. And, and it's just…well just miserable to cycle" (Interviewee, Jenny).

Similar to Jenny's experience, a number of mothers riding with their children independently, found that they would frequently get cold due to riding at much slower speeds to match their child's pace. This led to a realisation that they needed to invest in specific materials such as warm weather cycling gear to help keep them warm when riding. Mothers were also concerned about keeping their children warm too and carried out similar research to locate child-sized clothing suitable for wearing in colder temperatures.

Nevertheless, even when some mothers thought they had the right clothing for the weather conditions, they discovered that their children might not agree. This was particularly the case for those using child carrying configurations. That is, because the mothers were cycling, they would create a certain amount of body heat which, combined with suitable clothing would keep them warm. However, their child passengers (either sat in a cargo cycle, trailer or a child seat) would often get cold because they were stationary and not moving.

Edith, who lives in Edinburgh and was frequently cycling in wet and windy conditions realised after a few months that her 3-year-old was not enjoying being in the front child seat because his face was getting wet and cold from rain and wind. Once Edith realised this she looked online at various options and purchased a face shield which worked like a motorbike visor protecting her son's face and making for a much more comfortable journey for him. This reinforces earlier comments on how mothers often went beyond what could be considered a normal range of competences and purchase of materials to enable them to cycle with their children and ensure they were comfortable.

Many of the mothers with cargo cycles noted how they had in-built rain covers that they could use. However, during the interviews a number of the mothers mentioned how they were often bothersome,

"It's a bit of a fiddle because it has to be on really tight. It's not too bad though…But we've also got a box cover. So, if I am not sure if it's going to rain or not I bring that as it covers the box and offers some protection and keeps the children a bit drier but not as much as with the rain cover on" (Interviewee, Jess).

We've got the rain, we've got the bubble rain covers, but it's an absolute faff so yes, I don't use that, but it's got just such a storage cover, so I'll put that on over up to his chin (Interviewee, Jan)

As a consequence, after discovering the complicated nature of installing rain covers, many of those using cargo cycles stopped using them and tried other materials instead such as waterproof clothing for their children. As has been previously mentioned, the motivations to cycling (by those taking part in this research) and the meanings attached to their practice were such that they displayed substantial commitment to make cycling work for them. For

example, finding alternative solutions or purchasing additional materials to ensure they can continue cycling comfortably in all weather conditions.

Confidence to Cycle

An essential competence required to perform the practice of cycling is the confidence and skills to ride a cycle in the first place. An assumption can be made in this research, that those mothers who took part in this study, did not lack the confidence to cycle. Subsequently, not only did they possess the skills and know-how of how to cycle on their own. They also had the confidence to carry out the practice with their children. Of the thirty mothers interviewed, all but one had regularly cycled before having children. During the interview process, a question was asked about whether they considered themselves a confident cyclist. The majority of mothers answered that, yes, they did consider themselves to be confident whilst riding, albeit that they still had concerns about their safety due to the behaviour of other road users.

A number of interviewees also noted that whilst they were confident cyclists they did not necessarily think they were 'good at' cycling, providing examples of not being very fast, struggling to cycle up hills or not being particularly mechanically minded if anything went wrong with their cycles. For instance, Fiona mother to one child aged 5-years-old and who lived in a rural and hilly area of North Wales, had recently switched to an electric cycle, which she was aware that some people felt was 'cheating' but it had been a game changer for her cycling,

"Like I said, you know, I'm confident but I don't feel like I'm particularly good at it and particularly cycling uphill. I would never have done that if I hadn't had got the electric bike. I wouldn't have been able to physically do it with him on the back" (Interviewee, Fiona).

The interviewees were asked whether they felt the same level of confidence when cycling with their children. The response to this question was mixed and a number of the mothers had to pause before they answered. For instance, whilst some mothers felt confident, they admitted to cycling with a heightened awareness of the potential dangers and how they would ride in a different way with their children compared to when they are on their own,

"I'm a cautious cyclist generally, and I always have been. And I would say I'm even more cautious when I'm on my own than I was, and I'm even more cautious again when I've got the children on the back. But that said, I do still feel very confident" (Interviewee, Alisha).

"I would basically take, I would take less risks and maybe we wouldn't be going on the road, particularly busy roads. So maybe we would take a longer route and try to stay off the road as long as possible" (Interviewee, Carrie).

"I ride more defensively with them and I will more readily take to the pavement or cycle route, or not travel by cycle at all" (Interviewee, Isla).

"And I'm, I'm still confident. But I'm aware, I'm more aware of the context that we're cycling in, right? Yeah, I'm more aware of risks" (Interviewee, Jenny).

In the focus group discussions, there was consensus that lack of confidence was an issue for many women and mothers in the UK, who didn't cycle on a regular basis like those taking part in this research. A number of the focus group participants worked for organisations seeking to build women's confidence to enable them to cycle more. This included a number of schemes across the UK where female ride leaders were trained to take small groups of women on led rides. Many of these rides were initially designed for beginner cyclists but with the opportunity to progress to longer distances and faster speeds if desired. Other schemes included those specifically designed to help provide mothers the confidence to ride with their young children,

"… a lot of the women were telling us they were too scared to use their bike for transport because what happens if I get a puncture or what happens if my chain comes off and I don't know what to do? And then I'm stuck at the side of the road with kids, and I can't get home. So that's one of the schemes I've been doing. Up in Newcastle, I did the confidence building session on an off-road path and we took weighted dolls and put weighted dolls in the bike seat, so they got used to that feeling of having something wobbly and unpredictable on the back of the bike for a bit. Then we did some off road practice with their own babies and then we started building up again from short to ultimately longer rides, just to get confidence up". (Focus group participant, Alice).

The focus group participants discussed how the image of cycling appeared to play an important role in the meanings some women associated with cycling and how some of these meanings stopped them from acquiring the necessary competences to cycle. That is, the women they worked with thought cycling was seen as something that other people did and wasn't 'for them'. In particular, the focus groups highlighted that women from ethnic minority backgrounds had particular issues around the confidence (or lack of) to cycle.

Despite attempts to engage with mothers from ethnic minority backgrounds via social media groups and cycling organisations, the overwhelming majority of mothers, 93%, who completed the survey in this research were from a white background. 2% were from a mixed background, 2% Asian background and the remainder from other ethnic groups. The focus group discussions noted that many of the women from ethnic minority groups that they worked with, had not learnt the skills to cycle as a child and this appeared to directly affect their confidence to cycle as adults.

This was also evident in the interviews. For instance, Neena, a mother of one to an 11-year-old daughter, was from a south Asian background and explained that when she was growing up her brothers all had bicycles, but she didn't because girls in her community were not encouraged to cycle. Whilst she did use her brother's bikes when she could, it wasn't until she was an adult that she owned her own bicycle. She also noted that because she cycled so infrequently as a child, she didn't initially feel very confident riding on roads. To help overcome these issues she undertook adult cycle lessons through the council to help build her confidence.

The focus group participants also highlighted that, for many women from ethnic minority backgrounds, cycling is not seen as an activity that women should participate in. As Misha in the focus group noted, actually having the confidence to be seen cycling in public in the first place can be quite difficult for some women,

"It's just not the thing to do for a girl. They are often from communities where traditionally women are housebound and housewives don't get encouraged to do something for themselves. So, they tend to feel really guilty as well to do something for themselves and not being at home cooking and cleaning, which is a shame really. We've got cycle instructors

trained up from the Asian communities so that they have a woman that, oh yeah, I can identify with that woman- she's like me" (Focus group participant, Misha).

Constant Chivvying – The Organisational Skills Required to Cycle

As mentioned in a previous section cycling with children often requires a certain level of organisational skills. During the interviews, mothers were asked to describe a regular journey that they undertook by bicycle. The majority of these were to education sites, with the remainder including trips to gymnastics or swimming lessons, into town or to places of worship. Before they started detailing their trip, mothers were asked about pre-routines to get ready for their journey.

For many of the mothers this involved similar patterns of behaviour. That is, roughly ten to fifteen minutes before they were due to leave, they would ensure that their children started getting ready for their journey. This commonly involved making sure they had been to the toilet, had put their shoes on and were wearing suitable clothing for the weather conditions. It also entailed making sure they had all the necessary items they needed, such as bags, packed lunch, helmets, high visibility, water bottles and locks. Some mothers would also make sure that the tyres on all bicycles were pumped up before leaving. For those using electric cycles, they would check they had charged the battery sufficiently for their planned journey. Many of the mothers tried to ensure that these items were easily to hand to prevent both themselves and their children having to spend time looking for them.

Some of the interviewees noted that their routines would depend on where their bicycles were kept. For instance, Libby who lives in London and is mother to two children aged 4 and 8-years-old, stores their cycles in a bike hanger on their street about a fifteen meter walk from their house. Although their cycles were only kept a short distance away, it was important, that they had everything they needed for their journey when they left the house. To prevent having to make any additional trips back and forth, Libby would ensure her children placed their bags and helmets by the front door before they were due to set off.

Jenny, who lives in a suburban area of Scotland and has a 10-year-old daughter (but also two older children as well), noted that all their bicycles are kept in a shed in the garden. She has installed cycle racks in the shed with each bicycle stacked up against the rack. This meant that her children are able to go in and take their own bicycles out, ready to ride. It was also

apparent that for mothers with slightly older children, who were able to ride their own bicycles independently, they were often more hands on in getting ready for their journey. For example, they were able to get themselves ready and retrieve their own cycles without physical help from their mothers.

In contrast, some mothers, due to where their cycles were stored, had to rely on their partners help to get their bicycles ready for them,

"… we live in a row of 1960s terraces and the bikes are in what used to be the coal shed out in the back and my partner brings them round to the front first thing in the morning before he leaves for work. So, they're out the front ready" (Interviewee, Amber).

"So first thing in the mornings, so about 7:00 in the morning, my husband will go and take the bike out of the upstairs, where we have an unusual situation. We bought two flats but we have to join them together…he will open the flat up and he will take the bike out and he would put it outside on top of the garden steps for me. And he'll lock it and put the cover on for me. And then about an hour and a half later, I will come out with the kids" (Interviewee, Alisha).

The quotes above demonstrate that for some mothers the preparation needed before even getting onto their cycles can be quite convoluted and cumbersome. Likewise, as raised in a previous section on storing cycles at home, not having straightforward access to cycles required mothers to be organised and have systems in place to enable their practice of cycling to run smoothly. This was especially important given the sometimes-unpredictable nature of young children, as discussed below.

For many of the mothers in this research, it was apparent that getting children ready was often one of the most difficult challenges, particularly for journeys that required them to be somewhere for a certain time. For instance, in some cases mothers were often required to have a 'hands on' approach in getting everything ready for the journey, particularly for younger children. It was clear that this could at times be quite stressful, due to having to repeatedly provide instructions or physically 'manhandle' children into getting ready,

"Well because my child is still very small and not very obedient. I guess I do a lot of physical chivvying. So sometimes it's "oh we're still putting our shoes on" (Interviewee, Niki).

“Are we leaving now, are we really leaving? No, we're running late. Have you got your shoes on, no you haven't got shoes on yet? General chaos!” (Interviewee, Isla).

When trying to get children ready for a journey, a number of the mothers noted that their children did not always want to cycle. Or they needed extra help to get them ready for their journey. For example, Edith, who lives in Scotland and has a 3-year-old, talked about her son going through a particular stage of development where he was quite emotional in the morning. As a result, she needed assistance from her partner to get him dressed whilst she could get the bicycle and relevant equipment ready. Similarly, other mothers mentioned how their children sometimes had to be cajoled into cycling,

“I'm actually finding it really quite hard to get him to go out on the bikes. So, this morning, I had to kind of give him a really long run up to the idea of taking a cycling journey at the moment. So, it's becoming quite, quite arduous. And I've really got to keep up with it. Otherwise, he'll just think, yeah, I don't have to cycle anymore” (Interviewee, Kath).

Organisational skills were also required when managing children of different ages. Another issue which was highlighted during the focus groups and interview process related to cycling with children of different ages. Whilst a number of mothers had taken part in this research to discuss their practice of cycling with a child under the age of 11, many of these mothers also had older children, which meant they often cycled together as a family. The mothers with older children noted how it was sometimes difficult riding with teenagers and children under 11 because of the different skill sets of their children. However, mothers with children under the age of 11 also struggled with similar problems. For instance, the skills of a 4-year-old and an 8-year-old could also differ quite drastically and trying to manage two young children of different abilities could be problematic.

Suzy, mother to three children aged 3, 7 and 10-years-old, frequently cycles the school run with her youngest in a rear child seat, and the other two children riding their own bicycles. However, on the return journey they have a number of small hills to cycle up. Suzy notes,

“Yeah, it's harder for the 7-year-old as he hasn't quite got to grips with his gears yet, and he needs a lot of prompting as to which one to be on. So, he can often be very slow on the hills because he's not quite prepped for it yet but the 10-year-old is pretty good” (Interviewee, Suzy).

To overcome variations in speed and ability, a number of mothers raised the importance of having an organised plan to overcome these differences. Jenny, who lives in Glasgow, Scotland, has a 10-year-old daughter but also has two older children aged 12 and 15-years-old. Jenny, her partner and three children regularly cycle together as a family. One of their weekly journeys includes cycling to church- a 12 mile round trip from their home. Jenny describes how the older children are much faster at cycling than the 10-year-old but where possible they try to stick together as a group. They do this by using a number of different techniques and careful planning before each ride. That is, Jenny ensures that the older children are aware of their roles and responsibilities when cycling with their younger sister,

"So, the 10-year-old is definitely slower…on the road sections, we call it dice five and we get into a dice five shape. So, we tend to have the 10-year-old and an adult at the front and then one of the other two children in the middle and then the other child and the other adult at the back and we get into quite a tight formation…they all know what they're doing and we know what they're doing" (Interviewee, Jenny).

Being organised and ensuring that everyone knows their role was important in keeping everyone safe. This was deemed an important skill as many of the mothers taking part in the research had multiple children under the age of 11, and often struggled with the differing speeds and abilities of their children. Therefore, having a specific plan was seen as essential for safety and ensuring the ride was not stressful.

Look Where You're Going!

Another important skill needed to cycle with children appeared to be having clear lines of communication, particularly for those children riding independently. The majority of interviewees expressed that they constantly coached, guided and occasionally shouted instructions to ensure their children cycled safely,

"It's quite a lot of like, you know, "you need to speed up". Yeah, "look where you're going" those kind of conversations" (Interviewee, Suzy).

"I'm like watch out, do this do that. And then when they're near that little stretch, I'd be like, careful there's a bus, careful there's gravel, careful there's spilt glass…" (Interviewee, Sonia).

Interviewees stressed the importance of providing clear instructions to their children when using roads due to safety concerns of their children mixing with motorised vehicles. Nevertheless, instructions were similarly communicated to children using shared use paths and footways, with children constantly being reminded to be careful around other users such as pedestrians and as mentioned in a previous section dog walkers due to concerns about collisions between children and dogs.

However, it was clear that not all children responded well to instructions. In the focus groups one of the participants noted her eldest child was very sensible and she felt that she could trust her and take her on quite busy roads because she listens carefully to instructions. In comparison, her younger son often gets distracted whilst cycling and they had experienced a few incidents because he was not concentrating or following instructions. Anna, mother to two children aged 4 and 6-years-old, mentioned that she also had to carefully consider the types of places they can cycle to, because, whilst her younger son is very sensible, her older son frequently daydreams and fails to listen to instructions,

"… the younger one is very good and I have a lot of confidence in him and how he handles his bike and his reactions. The older one, not so much. Yeah, like I remember one day we were cycling and he was about four at the time he was quite young and we're cycling through a car park and he was singing the national anthem because he likes the rugby and he cycled straight into the back of a car, a parked car. And I said, Why…What were you doing that you didn't see that car? And he said, I was singing and I was closing my eyes, have to close your eyes when you're singing the national anthem" (Interviewee, Anna).

Many of the mothers interviewed experienced similar problems with their own children and despite giving their children clear instructions, they noted that their personalities were such that they often didn't listen or in some cases thought they knew best and ignored communications from their mothers. Sibling rivalry was also highlighted, with children sometimes ignoring instructions due to siblings bickering or trying to cycle 'at the front' and thus not concentrating on what they were being told. Rebecca from the focus group, who has three children mentioned that they constantly wanted to race and compete with one another. As a result, she had to install rules that they could only do this when they were cycling in the park. Isla, mother to two children aged 5 and 9-years-old, said her children frequently got competitive with each other,

"…and then you have to split the two kids up because the two of them, they both want to be in front or behind or just where the other one is and yeah, it is highly annoying and they ride too close to each other and they overtake each other" (Interviewee, Isla).

Isla confided that it was really stressful when they behaved like this, especially when they cycled on the road and would often ignore her commands. If her partner was with her, they would have to assign a child to each parent to try and avoid any potential conflict. However, if she was cycling with her children alone, which she often did, she admitted it could be quite demanding trying to manage the two children without help.

Sibling rivalry also extended to seating arrangements. For example, for those with cargo cycles, a number of mothers noted how siblings would 'tussle' for a particular seat. Carrie, mother to 5-year-old twins gave the example of her Tern GSD bicycle which allows two children to sit on the back (one behind each other) and how her twins would frequently compete as to who was going to get the front seat. Another mother noted that she had to draw up a rota as to where each child sits, due to certain 'positions' in their cargo cycle being deemed better than others.

Whilst arguments about seating arrangements could, in most instances be easily managed by mothers ensuring their children take turns, it was a constant worry for many of the mothers interviewed when their children didn't listen to instructions (for any reasons), as they feared this could potentially result in serious consequences. Therefore, mothers were constantly on high alert and often avoided cycling on roads until they felt that their children could be trusted to follow specific instructions. For some mothers this was frustrating as they felt it severely limited where they could cycle.

Given that many of the mothers expressed their high levels of stress whilst issuing commands to their children. They were asked if they were ever able to have relaxed conversations with their children. This seemed to depend on the type of infrastructure being used, the configuration of the cycle, as well as the age and ability of the child. For instance, Diana, mother to two children, uses a rear seat for her 2-year-old whilst her 3-year-old rides on a tagalong attached to her cycle. As she is in control of both children, she rarely had to communicate specific instructions, however, she mentioned that her 3-year-old frequently

tried to have conversations with her but due to the road conditions and associated noise she simply cannot hear what she is saying.

In comparison, a number of mothers noted that for the parts of their journey when they are on shared use paths or cycling through parks or green spaces, these were much more conducive to having relaxed conversations,

"On the fully off road bit we can chat with them there because it's so nice…it's quite relaxing not to be continually watching for traffic" (Interviewee, Isla).

"…when I'm on the main road, I would not have conversations or I would say, no, I can't talk right now. We just need to get across that, you know, across that junction or at the traffic light, you know, for waiting for the green light. Then we could have a little singsong or a chat, you know, kind of like a mixture of both" (Interviewee, Edith).

An earlier section highlighted how negative incidents experienced by mothers could sometimes make them question whether they were doing the right thing cycling with their children due to concerns around how safe it was to cycle with a child in the UK. However, these quotes above, plus many similar comments in the survey, pertaining to the enjoyment mothers frequently shared with their children whilst cycling, are the types of moments that undoubtedly help mothers persist with the practice.

Adaptability – The Constant Changing of Skills

During the interviews it became apparent that mothers required a number of skills to ensure that they could cycle with their children. These appeared to be different to the 'skills' that would be common for someone carrying out the practice of cycling on their own in the UK. For instance, whilst a utility cyclist in the UK would need to understand how to handle a cycle in different weather conditions, topography and when using a variety of infrastructure types, alongside knowing the rules of the road and how to interact with other road users. For mothers, whilst they needed to master the above skills, in addition, it appeared that they had to frequently adapt skills and make judgement calls often at a moment's notice when riding with their children. This was because children are often unpredictable, they don't always follow rules and therefore additional skills were needed due to executing a journey with (in

some cases) multiple children, children of different ages, abilities, and differing personality types. These will now be discussed below.

Making Decisions on The Fly or Careful Planning?

A previous section highlighted how mothers needed good organisational skills to ensure that everyone had the right equipment, clothing and to be ready to leave the house to ensure they arrived at their destination on time. Other organisational skills were highlighted in an earlier section showing how mothers were able to balance employment, escort trips and other care duties with their practice of cycling due to careful planning. However, were mothers able to plan for every eventuality?

Being organised was clearly important and it has been highlighted throughout this research that the mothers taking part were highly motivated to cycle and carefully planned most areas of their practice. This included undertaking research to choose the most suitable cycling configuration for their needs. Or ensuring their children had the right clothing to keep them dry and warm and selecting infrastructure that they felt was the safest option for their children. However, despite this careful planning, it became apparent that was it simply not possible to plan for all circumstances.

During the interviews, mothers were asked how they approached or would approach a journey they hadn't undertaken before. Specifically, how did they acquire the know-how of working out suitable routes to cycle with their children, particularly given that some were using non-standard cycles which could be an issue if they came across any physical barriers. Or for those cycling with their children independently, how did they devise which routes they could use to avoid heavily trafficked roads?

A number of prompts to this question were provided such as asking, do you undertake a dummy-run first, look at a map or use a specific cycle app to help you plan? Perhaps unsurprisingly, very few mothers had time to carry out a dummy run first. This was particularly the case for those who were single parents, or co-parenting. Nevertheless, even those mothers who had partners at home, found that time-management would be an issue for testing out a route,

"Like ideally, I would prefer it if I could test things out first but the reality of having two small children, I don't have the opportunity. I'd need to find some sort of babysitter to do that, you know, I've looked on Google Maps and like, I been to the nursery before in the car and yeah. So yeah, Google Maps, car and then left with plenty of time and with the mentality that we just, if I have to stop and push the bike if it doesn't feel safe" (Interviewee, Alison).

For most mothers interviewed, they did not have the time to test out routes beforehand. Although they did take time to research a new route making use of online/paper maps, cycle apps or advice from local cycle groups. A number of the mothers highlighted that if looking for a new route, then they would ideally search out shared use paths, routes that go through parks or green spaces or quiet roads. Furthermore, in order to avoid heavily trafficked roads, they would be happy to take what they considered 'safe infrastructure' even if it meant having to cycle a much longer way around. Similarly, if they did encounter infrastructure that they thought was not safe, then they would just get off and walk with the bikes if they needed to.

However, it became clear that despite careful planning they sometimes found themselves having to make sudden changes whilst out cycling with their children. For instance, if they'd inadvertently chosen a route which they thought would be suitable but then turned out to be a lot busier or had complicated junctions or guard rail barriers that they had to navigate. This resulted in them having to make decisions 'on the fly' to varying levels of success. Fiona, mother to one child aged 5-years-old had planned a route to a Country Park when her son was much younger and was in a rear child seat on her cycle. Despite checking maps and studying the route before she left, she was faced with a number of barriers including a kissing gate which she struggled to get through. In addition, when reaching the Country Park, she was met with a number of steps,

"So, we've ended up at the country park at the bottom of this flight of steps and he was like two or something…I couldn't push the bike up with him on it, so I had to take him off, run to the top of the steps and say – stay – do not move and run down. And we hadn't seen anybody like all day. And then luckily a random man appeared and picked my bike up for me" (Interviewee, Fiona).

Encountering these types of issues for mothers was quite stressful. Jan who lives in Wales with four children aged 7-years old, 10-year-old twins and an 11-year old had also been caught

out when cycling with her children on a new route and found herself and her children on a very narrow busy road with cars passing them closely at speed. She described how she ended up getting very nervous, which her children then picked up on and she struggled to keep control of the situation. As a result, she will now only cycle a new route with her children if she has carried out a test ride first and is confident that both her and her children have the necessary skills to ride it safely.

Another issue which has been researched previously in relation to cycling with children, pertains to how a cycle carrying children handles in different weather and road conditions. Whilst most mothers stated that they had mastered how their cycles handled after a few rides, it was clear that certain weather conditions did challenge them, particularly those using child carrying cycles. This sometimes meant that mothers had to make judgement calls on when they deemed it was safe to cycle,

"I would have like a cut off if was any windier than 30km an hour. You know, I've never checked the weather forecast as much since I started cycling…I don't really want to deal with gusts of wind that nearly knock you off, let alone with a little one on there. So like 35km an hour cut off and then I'm going to take public transport" (Interviewee, Edith).

Many of the interviewees were cautious riding in windy conditions and similar to Edith quoted above, regularly checked the weather forecast to ensure they didn't get caught out in bad weather. Anna, mother to two children, living in Down, Northern Ireland, regularly cycled down to the beach with her children. However, she stated that if there were high winds it was just too dangerous because there was little protection along the promenade and she feared that her 4 and 6-year-old would not be able to control their own bicycles.

Ice and hills also presented a dangerous combination. Indeed, there was an overwhelming consensus in relation to cycling in icy conditions, with none of the interviewees willing cycle if they knew there was ice, regardless of whether they were using a child carrying cycle or cycling independently with their children. This was deemed too risky, and it was agreed that there were no safe techniques to ride in such conditions. This was particularly felt by those who lived in more rural areas where roads and cycle routes were often not gritted or treated. However, even those living in suburban, or city areas felt it was simply not worth attempting to ride in ice.

In addition to making judgement calls for different weather types, the interviews also highlighted how mothers frequently made decisions on how they positioned themselves when cycling with their children. This was often dependent on the type of infrastructure they were using but could also be dictated by the behaviour of other road users. That is, whilst communicating with their children was seen as a key technique that mothers used to keep their children safe, road positioning was also highlighted as important skill. In particular, how mothers had to adapt to what was going on around them. For instance, if using roads, the majority of interviewees made their children ride in front of them so they could have their child in their line of sight at all times but also to act as a buffer to traffic coming from behind them. However, sometimes mothers had to quickly change positions if they felt threatened,

"So, I go behind and at certain times I will come alongside her, just if I feel that, you know, the cars are being particularly aggressive or whatever, sometimes I'll go alongside her, but mostly she's out in front, just within earshot" (Interviewee, Harriet).

Although most mothers interviewed explained they had their children in front of them, or to the side of them. Concerns were raised about upsetting other road users, especially if riding next to their children in a two abreast fashion. One mother mentioned that she was aware it seemed to irritate other road users but felt the safety of her child outweighed their momentary inconvenience. Similarly, many of those interviewed stated they would try to take a more central position in their lane and would avoid cycling in the gutter as felt that it was easier to be seen in a more prominent position when riding on roads with other traffic. For some mothers however, there was a reluctance to be seen to be taking up too much road space for fear of getting in the way of other road users. Comments highlighted previously had shown that some mothers felt a responsibility that they didn't 'give cyclists a bad name', and as such not upset drivers by cycling too far out from the kerbside.

Cycling With Another Adult

Given that mothers were often having to make judgment calls and deal with unforeseen situations, was having another adult in attendance helpful? During the focus group discussions, a common theme arose in relation to how much easier it was to cycle with children if you had another adult to assist. This was deemed particularly helpful for those riding with their children independently on their own cycles. Just under (7%) of mothers

surveyed in this research were single parents, with a further (3%) co-parenting (living at different addresses). The remainder of mothers (90%) lived in a two-parent household. In the interviews, for those mothers who had indicated they had a partner at home, a question was asked regarding the impact of having their partner accompany them when cycling with their children.

Many of them did note that they felt less stressed if there were two of them. In particular, that they felt more comfortable riding on roads, due to being able to use the technique of 'sandwiching' their children. That is, they could have one adult in front leading the way, their child/children following in the middle position and the other adult could take up the rear 'protective' position. For mothers with more than one child, the logistics of managing multiple children became much easier with an additional adult helping out.

Diana, mother to two children aged 2 and 3-years-old, lives close to Manchester and during the interview explained that she had a trip planned which required her traveling with her two children to Victoria Station in the City Centre, that weekend. However, she was very nervous about managing this trip on her own and was waiting to find out if her husband was able to accompany her and their children before she could decide on their travel plans,

"I feel really safe cycling to work and the city centre. But beyond the city centre like towards the north it's rubbish…We have this road called Deansgate in the city centre which is a very big road, and I don't understand why they haven't put a cycle lane in and if they did then I would cycle to the station with them… I would do it, but if my husband isn't coming on the Saturday, I don't think I'd do it. I don't think I'd cycle to Victoria Station on my own with the two of them. Yeah, I'd only do it if he was, if he was sandwiching, if he was behind her on the follow me" (Interviewee, Diana).

A reluctance to cycle on roads without their partners accompanying them, was also mentioned by a number of the survey respondents,

"I try to avoid using the road where possible unless I ride with my partner" (Survey respondent).

"I don't travel on roads without my partner" (Survey respondent).

"I do occasionally cycle at the front of my two children on cycle paths and a very quiet road if my partner follows behind, but I would not be comfortable doing this alone" (Survey respondent).

Comments from the surveys and interviews highlighted that if mothers did have a partner along they would be more willing to cycle on certain types of infrastructure such as busier roads. However, in the absence of their presence they were reluctant to do so and instead used either quiet roads, shared use paths or the footways. This suggests that when mothers are cycling with their children solo, they are limited in the type of routes they can undertake. This again emphasises the interrelated nature of meanings, materials and competences here. With mothers assigning meanings of danger to certain infrastructure and as a result questioning their competences to cycle on them safely with their children unless they have an additional adult with them.

However, not all mothers who were interviewed, had partners who cycled. Likewise, for those single mothers or ones who co-parented, this was not an option available to them. Moreover, a small number of mothers, during the interviews, said that having their partner along actually made them more stressed as their partner did not know the 'system' of how they usually cycled with their child/children. Therefore, having an extra person was often more of a hindrance than a help,

"I think initially when we started it was like, "Oh, you go at the front with the kids" but now the kids know what they're doing. I know what I'm doing…So, you know there's certain crossings where we all wait, bunch up and cross over like that sort of thing. And one week when my husband was cycling with us, he streamed off ahead and it was like, you're not following the rules!" (Interviewee, Izzy).

Skills and Adaptation of Riding Techniques as Children Grow

It has been shown throughout how dedicated the mothers taking part in this research were to their practice of cycling with their children. Although some admitted to being fair weather cyclists and taking short breaks from cycling during colder or wetter periods, or sometimes after a particularly negative incident mothers might have a few days or weeks off to consider what had happened. Nonetheless, the majority would cycle all year round. For example, 72%

of mothers surveyed as part of this research were cycling at least on a weekly basis. Moreover, whilst 17% of respondents were cycling less frequently than weekly, they were still cycling at least once a month[1]. However, it became clear that a particular issue arose for many of the mothers using child carrying configurations, that was particularly difficult to overcome. That is, how mothers were required to constantly adapt how they ride with their children as they grow older,

"I think we realised that, that every time your child grows and matures you have to change something about the way that you do your cycling" (Focus group participant, Vivian).

For instance, one of the most challenging transitions occurred when a child went from being carried on a cycle to learning to ride their own balance bike or pedal cycle. Mothers in this research discovered they were unable to cycle alongside their child until they were confident that they had adequately mastered stopping, starting off again and balancing whilst pedalling. For some children, this process could take anything between a few days to a few months.

This appeared to cause two main issues. Firstly, many mothers found that a journey they had previously undertaken was now much more complicated. That is, a journey that might have taken fifteen minutes door to door, would now take much longer if their children were riding their own cycle. Amber, mother to two children aged 4 and 8-years-old previously carried out the school run with her 4-year-old in a rear child seat or tagalong whilst her 8-year-old rode his own bicycle. This journey would take approximately five minutes. However, when the younger child started riding her own cycle, Amber had to switch to running alongside her daughter (for the whole journey) as she was not confident that she could safely manage the route without additional assistance,

"I trust my 8-year-old. He's very sensible he rings a bell, he's very polite and he's very aware of when to give way to people…but my 4-year-old, she's too young to really understand that. So that's why I'm kind of running along next to saying use your brakes, use your brakes. And then she can't, she can't ring her bell yet while riding" (Interviewee, Amber).

[1] Question 4 of the Survey asked mothers how often they cycled with their children. One option was 'I used to cycle with them but no longer do'. This was chosen by very few participants so further analysis was discounted as not deemed statistically significant.

Secondly, a journey that a mother felt comfortable taking, when she was carrying her child as a passenger, might no longer feel safe for her child to ride on their own cycle due to them having to mix with other road users. For some of the mothers interviewed, this meant that they actually had to stop carrying out certain routes for a while until they were confident that their children could manage them safely,

"I feel like when he was on the bike seat that was so convenient...It's actually trickier now that he's cycling independently, and we don't have a way to carry him. Yeah, I don't have a way to carry him on my bike. I feel like this, this is the tricky part because for longer distances or for trickier routes now I feel like I have to drive. Whereas I could just put him on the bike to get there" (Interviewee, Beth).

These breaks could be short, such as a few months. However, in some cases if the routes involved busy roads, it sometimes meant that certain journeys could not be cycled for a few years. Indeed, for some mothers such as Beth quoted above, who had a 4-year-old who had recently started learning to ride his own bicycle, some of the journeys Beth had previously cycled with her son, now had to be switched to being driven because he no longer was able to fit in the child seat on her bicycle. Beth was unclear as to how long it would be before she felt comfortable that her son would have the relevant skills to safely ride some of the journeys they had previously carried out. These breaks in the practice will be discussed in more detail in the Discussion section.

Chapter 6: Discussion

RQ1 - Meanings, Materials And Competences

Using the Shove et. al (2012) three element model provided a useful lens in which to view and frame the results of this research. This following section provides a discussion and summary as to the different materials, meanings and competences which play an integral role in the practice of mothers cycling with their children.

Meanings

According to Shove and Pantzar (2005) for a practice to persist the practitioner must get something positive out of it (Shove and Pantzar, 2005, 58). However, this research demonstrated that the meanings associated to the practice of cycling with their children were fraught with contradictions for most mothers, with both positive and negative aspects to their practice existing. The next two sections will discuss the positive and negative sides of cycling with children and how mothers were able to persist and overcome the negative elements of their practice.

The Positive

For many of the mothers taking part in this research, it appeared that cycling was an enjoyable experience to share with their children. Indeed, this 'positivity' was demonstrated in all three phases of the research with mothers explaining the joy that cycling brought them. In particular by allowing them to spend quality time with their children whilst simultaneously doing something that provided physical and mental health benefits, plus teaching their child a valuable life skill and benefiting the environment.

It also raised some interesting points relating to parental bonding whilst travelling with children. For example, previous research has shown the time spent travelling with their children in cars enabled parents to create emotional relationships with their children (Dowling, 2000; Barker, 2011; Westman, Friman and Olsson, 2017). Cycling, however, whilst not rejected as a mode in which bonding could take place, was nevertheless, not highlighted as being conducive to building such relationships or authenticating good parenting. However, in this research the option 'fun and bonding opportunity with my child' was chosen as the

second most popular option in the survey for cycling with their child/children (see Figure 7) , demonstrating that cycling was also propitious to forging emotional relationships.

As detailed in the Literature Review, working in full or part-time employment is regularly presented as not being conducive to cycling with young children in the UK. This is due to the time constraints and logistics of travelling between mothers' own employment and education sites. The logistics of carrying school equipment such as PE kits, musical instruments and books by bicycle are also viewed as incompatible. Additionally, carrying out trips for shopping, visiting friends or family is also seen as difficult for similar reasons. That so many mothers (88%) were in paid employment and also able to cycle with their children for a variety of different trip purposes, poses a number of questions, given that previous research regularly cites that these two activities are not compatible.

From a social practice theory framework perspective, employment is and of itself a practice, albeit it one that takes many different forms depending on the nature of the work involved. Shove et al. (2012) describe how "bundles and complexes arise and disappear as a consequence of competition and/or collaboration between practices" (Shove, Mika and Matt, 2012, 88). Previous research, as outlined in the Literature Review, has suggested that the practice of working in employment makes it difficult to carry out the practice of cycling with children. Thereby, the practice of employment could be seen as being in competition to the practice of cycling with children.

However, despite previous research suggesting that mothers struggle to combine cycling with their children with employment and other household duties, for those taking part in this research, there is in fact 'collaboration' (Shove, Mika and Matt, 2012, 88) between the two practices that allows co-existence of both employment and cycling with children to take place. Furthermore, not only were mothers able to find time to cycle with their children, for many mothers taking part in this research they also attached meanings of convenience to cycling with their children.

This included convenience in relation to time-savings, with cycling often seen as quicker than walking, public transport and car use due to the additional time it often took to find parking spaces when driving. High levels of anxiety were often linked with driving, therefore many mothers also found cycling more convenient in terms of being less stressful than using their

car. The stressful nature of driving was also highlighted in Jain et al's (2011) research on the logistics of the school run for working mothers. Whereby, the pressures of driving between home, schools and employment sites and trying to find a parking space, the fear of getting stuck in traffic and the possibility of being late all contributed to an anxiety around driving (Jain, Line and Lyons, 2011).

Additionally, despite the initial outlay for purchasing their cycle configuration, many mothers assigned meanings of cost savings to their practice of cycling. For instance, those who owned cargo cycles were using them in a similar way that they would a car, carrying multiple children for various journey types, but without the need for high running or maintenance costs such as fuel and insurance etc. The use of materials such as child carrying cycles has also been linked to meanings of convenience in other research. Sersli et al. (2020) in their research on cycling with children in Vancouver, Canada, demonstrating similar benefits found in this research, that is mothers who owned cargo cycles said they were able to use them in a comparable way to how they'd use a car, carrying children, shopping and other equipment but without the high costs of running a motor vehicle (Sersli et al., 2020).

Nevertheless, despite these meanings of convenience, it was also apparent that cycling with children sometimes required careful planning and was not always straightforward. Being organised is often linked to mothering, with mothers constantly having to multi-task and juggle lots of activities at the same time (Dowling, 2000; Jain, Line and Lyons, 2011; Gilow, 2020). It was clear that many of the mothers taking part in this research often had to be well organised to cycle with their children. This mirrors findings by Gilow (2020), in her research on domestic mobility work, where she notes the military precision of planning mothers needed to undertake to ensure they can fulfil both employment and household duties (Gilow, 2020).

The Negative

Running parallel to the positive meanings associated with the practice of cycling with their children were a number of negative ones. As highlighted throughout this research, previous literature has shown that one of the main barriers preventing more women from cycling is a fear of cycling on busy roads due to safety concerns. These concerns were amplified when cycling with children and it was apparent that certain types of infrastructure elicited meanings

around road danger and stress for those trying to manage young children who at times might not always follow instructions designed to keep them safe. These findings correspond with Aldred's research into child cycling, with parents associating meanings of danger to certain types of infrastructure and a reluctance to allow children to cycle on roads without some form of protection or traffic calming (Aldred, 2015b).

The literature review has shown that cycling is often associated with negativity and danger. It also demonstrated how, in particular, parents/mothers who cycle with their children frequently receive criticism from others when using this mode. These criticisms were often due to cycling being deemed unsafe and hence questioning the parenting skills of someone who would put their children into what they considered a dangerous situation. Many of the mothers also mentioned how they were often described as being 'brave' for cycling with their children. This is not the first time the phrase brave has been used in the context of cycling. Spotswood et al's. (2015), analysis of cycling as a social practice highlights notions of bravery were often associated with utility cycling because, "Cycling was not viewed as normal, and therefore to 'brave' the streets a cyclist needed to be adventurous, perhaps aggressive, and above all dedicated" (Spotswood et al., 2015, 26).

Many mothers also experienced negative incidents on a regular basis whilst cycling. These included verbal incidents ranging from being scolded by members of the public for cycling on the footpath with their children or being shouted at for seemingly putting their children in danger for cycling with them on the road. More serious verbal abuse saw other road users use threatening language towards the mothers taking part in this research. Many of the mothers when surveyed and interviewed, detailed how they had experienced close passes by drivers, being driven at purposely, and for a small number of mothers actual collisions with other road users. In addition to this, because cycling is such a marginalised activity in the UK, mothers choosing to cycle with their children were frequently judged for their parenting skills leaving mothers feeling guilty for their choice of cycling with their children.

That so many mothers had experienced incidents such as close passes and being purposely driven at by other road users, reinforces the research carried out by Aldred et al. (2016) regarding the constant micro-aggressions and regular near misses faced by cyclists on a regular basis as highlighted previously in the Literature Review and how this contributes to meanings of danger and negativity around cycling.

Reconciling the Positive and Negative

This mix of both positive and negative experiences left a large number of mothers constantly questioning if cycling with their child was the right thing to do and whether the positive experiences were enough to outweigh the negative ones. Research carried out by Buck and Nurse (2021), found similar tensions in their research on cyclists in Liverpool. This included cyclists talking about the stressful nature of cycling due to 'material deficiencies' such as the lack of or badly designed cycle infrastructure, "It is clear that there is a contradiction: even though cycling may be perceived as 'bad', it is still good" (Buck and Nurse, 2021, 70). Aldred's (2013) research on cyclists in Cambridge and Hull, found similar narratives with the cyclists they interviewed deeming cycling as joyful and pleasurable but at the same time highlighted the dangers of cycling due to near misses, assaults, harassment and collisions (Aldred, 2013).

It became apparent that for many mothers; strong emotional and moral meanings aligned to the practice of cycling with their children. In particular, it was these meanings that enabled them to overcome many of the negative issues that appeared to be part and parcel of their practice. It was clear that many of the mothers did feel a number of emotions such as anxiety and distress at particular incidents that involved threats to them and their children. Nevertheless, it appeared they were able to rationalise these, allowing, (for the most part), the positive elements of cycling to outweigh the negative incidents, thus permitting them to continue practicing cycling with their children.

Materials

This research demonstrated that a multitude of different types of materials were essential for the practice of cycling to take place. For some materials, mothers could choose and make decisions as to which ones they utilised. For instance, they could choose what type of cycle configuration or equipment they needed, within their available budget. However, other materials, such as the availability of certain types of infrastructure like cycle lanes or public cycle parking were largely outside of their control. The availability (or otherwise) of certain materials inevitably influenced how mothers could cycle with their children.

The research showed a staggering range of the types of cycles and equipment now on offer in the UK and used by mothers. This included, standard adult and children's bicycles plus child

carrying cycles such as cargo cycles, trailers, bike seats and tagalongs. The need for other pertinent materials such as specific clothing and equipment, also played an integral role in making the practice more comfortable. For example, wind shields to protect children on front bike seats from the elements and waterproofs to keep both mothers and children dry and warm. Investment in high visibility, reflective items and cameras were also increasingly sought after materials for safety reasons.

The availability of different cycle configurations allowed mothers to cycle with children of different ages and with multiple children. However, the cost of such materials meant that not all mothers were able to afford the configuration that would best suit their needs. In research carried out by Sersli et al. (2020) they discuss how recruitment and defection from practices is closely linked to access of a practice, "Some practices will be inaccessible for some people because of an unequal distribution of materials, opportunities to develop competences, or negative meanings" (Sersli et al., 2020,2). As a result, it is possible that the cost of materials creates a barrier to more mothers who do not currently cycle, to enter the practice. Similarly, for those that are currently cycling but do not have unlimited funds to purchase the equipment they need, this could limit the amount of cycling that they wanted to carry out.

Other important materials essential in the practice of cycling with children, related to where mothers can safely store their cycles when not riding them. Leaving cycles in public spaces was a shared unease for those mothers who undertook journeys that required them to leave their cycles unattended. Whilst in countries with high cycling levels, many bicycles are fitted with integral locks (Aldred, 2013, 16), in the UK and other countries with low cycling levels, cyclists are usually required to remember to take locks with them. Consequently, additional materials such as the need for receptacles like pannier bags and baskets to carry locks in were required. In addition, for those with non-standard sized cycles which did not always 'fit' the cycle parking spaces offered in public, this caused them concern that they might get into trouble for locking their equipment to 'non-official' cycle parking.

The lack of cycle parking that suits the needs of mothers using larger child cycling configurations highlights current cycling policy that caters for the single commuter and those using standard shaped cycles. The result of this however, links back to meanings of guilt that mothers associated with their practice of cycling as detailed previously. In this case, they associated meanings of guilt because their cycles might be causing an obstruction to others

due to them not using the allocated cycle parking provided, even though the provision of current cycle parking was not suitable for their needs.

Whilst in this research, due to the affluent status of most mothers taking part in the survey, at-home storage was not highlighted as a particular issue, this contrasts with wider research which pinpoints cycle parking (or lack of) in homes, being a particular barrier for many in the UK (Heinen and Buehler, 2019; Almendros, 2020). For instance, a Sustrans report in 2020 showed that over 35,000 Londoners were on a waiting list for spaces in (council supplied) on-street storage (Almendros, 2020). In other places in the UK, 21% of respondents questioned in the Sustrans Bike Life study, said that lack of anywhere to store their bicycle at home or at work was the main reason they didn't cycle (Almendros, 2020).

Nevertheless, whilst many of the mothers were able to easily park their cycles at home, some exceptions did occur, particularly for those living in flats or terraced housing. With some mothers having to devise innovative solutions to storing their cycles, such as purchasing ramps to help bypass steps into their properties or having to take components on and off their cycle equipment each day in order to fit them inside.

The types of cycling infrastructure available to mothers also played a critical role in how, where and when their practice can take place. Many mothers expressed that there were only certain types of routes or infrastructure that they would use with their children. The findings of this research were similar to those conducted previously on this topic, highlighting a preference for traffic free routes and quiet roads (Aldred, 2015b; Riggs and Schwartz, 2018; Hatfield et al., 2019; Ravensbergen, Buliung and Sersli, 2020; Sersli et al., 2020).

There was a slight distinction between cycling preferences between those carrying their children as passengers and those cycling with their children independently. For example, those using child carrying cycles, were slightly more willing to use a wider range of infrastructure types, including busier roads, because their children were being carried as passengers. Nevertheless, there were still concerns about the safety of using certain types of child carrying equipment due to fears of materials such as trailers, tagalongs and even child seats not being fully visible to other road users. A survey carried out in Australia with parents on the safety aspects of riding with children in child carrying cycles found that, "Riding in a more central lane position was identified as a strategy for improving visibility, maintaining

more room to manoeuvre, and discouraging passing" (Hatfield et al., 2019, 38). This could help explain the reason for less mothers expressing a preference for busy roads (with painted cycle lanes). That is, the larger width of child carrying cycles and the narrowness of painted cycle lanes, means cyclists sometimes struggle to cycle within the 'lines' of this infrastructure and as a result feel that it is less safe to cycle.

The mothers taking part in this research also showed a reluctance to cycle with their children on bus lanes. Previous research has highlighted that for those with child seats, tagalongs or trailers, the close passing of large vehicles such as buses, can be unsettling as it affects the balance of the rider (Hatfield et al., 2019). However, it appeared that this very much depended on the width of the bus lane in question. Some research has shown that bus lanes are popular with cyclists due to this infrastructure requiring them to mix with fewer vehicles. The width of the lane can also contribute to making those cycling on them feeling more separate from motor vehicles in the adjacent lane (Reid and Guthrie, 2004; Aldred, Best and Jones, 2019). Conversely, in some cases, narrower bus lanes were found to encourage sup-optimal overtaking, encouraging the close passing of cyclists by bus drivers (ibid).

Responses from all three phases of the research raised question about whether materials, in this case specific infrastructure designed to encourage and facilitate cycling, was actually beneficial for mothers cycling with their children in child carrying cycles? In similar vein to the design of shared use paths where mothers using non-standard cycles were often restricted due to physical barriers such as guard railing, bollards and steps, the design of materials such as painted cycle lanes appear to restrict where some mothers can ride due to their non-standard cycles being too wide for them to safely cycle within the lines.

Indeed, previous research has shown how cycle infrastructure consisting of painted lines on roads, is often unpopular with cyclists (using all types of cycles) due to the design at intersections, where cyclists and other road users are often forced to mix back together at junctions, making cyclists feel unsafe (Beck et al., 2019; Pidd, 2019; Adams and Aldred, 2020).In comparison, roads without any painted lines were seen by many of those using child carrying cycles in this research as preferable. This was because mothers could take a more central position which they felt was safer, due to being more visible to other road users and preventing them getting squeezed into unsatisfactory positions at junctions, where cycle lanes often end abruptly.

Even protected cycle lanes on roads were relatively unpopular with mothers cycling with their children (both child carrying and independent riding) due to concerns that wands or bollards (used to separate cyclists from motorised road users) did not offer enough safety due to other vehicles still being able to enter the cycle lanes or park in them. For those mothers riding with their children independently, frequent concerns such as whether their children would wobble, get distracted or not listen properly to instructions were common. Therefore, even when cycle infrastructure was provided on roads, there was often a reluctance to use it.

However, their unpopularity, could also be explained due to the lack of on-road protected cycle lanes in the UK. According to Sustrans' Bike Life reports which is an ongoing assessment of infrastructure, travel behaviour and cycling initiatives across twelve cities in the UK. They looked at half of the cities included in their study and found that "…where data is available, only 19 miles of protected bike lanes on roads physically separated from traffic and pedestrians exist. This equates to 0.2% of the total miles of roads in the same six cities (9,351 miles in total)" (Sustrans, 2018a). Accordingly, because mothers were surveyed from areas across the UK including those living in rural and suburban areas, it is possible that they did not have protected cycle lanes in their area and as such had no experience of using them and therefore did not select them as a form of infrastructure they would feel comfortable using.

A further issue for those using child carrying cycles, which has been raised in previous research, relates to infrastructure with obstructions (Gaffga and Hagemeister, 2015; Clayton, Parkin and Billington, 2017; Hatfield et al., 2019). For instance, many mothers had experienced problems from guard railing on routes or cars blocking access points when cycling, which frequently required mothers having to re-adapt routes as a result. These types of obstructions were particularly common on shared pedestrian/cycling routes, frustratingly, the very sort of infrastructure that mothers wanted to use when cycling with their children, due to not having to mix with motorised vehicles.

Shared use paths also raised another issue, in particular for those cycling with their children independently. That is, the potential for conflict with pedestrians, and particularly those accompanying dogs. The recent cycling design standards LTN 1/20, also raise similar concerns and provide guidance on managing user conflict, "Although there are few recorded collisions between pedestrians and cyclists on shared use paths, the fact that the two user groups travel at different speeds and sometimes in different directions, can affect the level of comfort of

both groups. It is a particular concern for visually impaired people" (Department for Transport, 2020b,84).

Surprisingly, in relation to the provision of materials such as cycle infrastructure, the location of where participants resided in the UK, did not appear to have that much of an influence in how the practice was undertaken. For instance, previous research has highlighted that differences between cities, towns and rural villages prevail, with those living in smaller towns and rural areas often facing more sparse transport provision than other areas (Noack, 2011; Shergold and Parkhurst, 2012; Clark, Chatterjee and Melia, 2016; Gill, 2019; Tao, Fu and Comber, 2019).

However, in many cases if cycling infrastructure was lacking, mothers would simply find alternative routes. In particular, in the absence of safe infrastructure, they would choose routes which might not necessarily be the most direct. This sometimes meant their journey would take much longer but correlates with research carried out in an Australian study of parents who cycle with their children, where routes that entail a longer distance would often be chosen if they felt safer to use than the most direct route available (Hatfield et al., 2019, 38). Similarly in this research a longer but safer route was often preferred to cycling on busy roads. For many, this would include cycling on the footway. Or for certain parts of the journey that they felt were particularly unsafe, mothers would just dismount their cycles and walk for small sections.

Nevertheless, some of the mothers who resided in large cities such as London, Edinburgh, Manchester and Birmingham noted that there were examples of good quality cycle infrastructure where they lived. Although, in many cases it was not always that useful to their needs, as tended to be located on main commuter routes. This meant that it did not necessarily match with the types of journeys they were carrying out. Previous research has pointed towards women carrying out shorter multi-trip type journeys and how transport systems that seek to move as many people from A-B are not always conducive to the trips that mothers need to carry out (Emond, Tang and Handy, 2009; Hanson, 2010; Prati, 2018). Of course, that is not to say that all cycle infrastructure was unusable by mothers. As noted in a previous section, one mother lauded the recent implementation of low traffic neighbourhoods and schools streets in her area which had opened up safer routes for her and her children.

Competences

For a mother to carry out the practice of cycling with her children, it was necessary that she had particular competences. The Theory Chapter summarises the different types of competences and divides them into two broad categories: skills and know-how. It became apparent that mothers cycling with their children were required to obtain specific skills and know-how to safely cycle with their children in the UK. Research has indicated that in places where cycling is marginalised, such as countries like the UK, this requires a particular set of competences (Aldred and Jungnickel, 2014; Sersli et al., 2020), in particular, how to cycle in close proximity to motorised form of traffic. It could be argued that many of these competences shared similarities with other forms or 'practices' of cycling, such as the skills to ride a bicycle and the know-how of how to safely navigate cycling on different types of road infrastructure. However, it was also apparent that some skills and know-how were specific to the practice of cycling with children.

One particular example needed in the practice of cycling with children therefore, related to the know-how of which type of cycle configuration would best suit their family's needs. For instance, because cycling with children in the UK is such a niche activity, before a mother acquires the types of competences mentioned above, they also need to be able to obtain competences in relation to information on 1) what types of cycles were available, and 2) what would be a suitable choice for their specific needs based on factors such as cost, storage, local topography and number and age of children being carried.

In countries with high cycling levels where cycling with children is widespread, it is unlikely that mothers would have to undertake detailed research on suitable equipment, rather this know-how would be implicit. That is, because if there was already a strong culture of cycling, most mothers would know where and how to access equipment for cycling with children. In this research, it was evident that mothers garnered this information from a variety of sources. The volume and quality of advice on offer in relation to child cycling appears to have grown substantially in the past five years, with key resources such as the Cycle Sprog website and Family Cycling Facebook page continually highlighted throughout this research, where high numbers of mothers retrieved pertinent information from.

As previously mentioned in an earlier section, Shove et al. (2012) discuss how "the careers of individual practitioners determine the fate and future of the practice itself" (Shove and Pantzar, 2007,3). Therefore, as more people participate in a practice, their experiences may differ from others. That is, they may use different materials, assign different meanings and utilise different competences within the practice and thus the practice continually evolves and changes. It appeared that in this research, knowledge in relation to cycling with children was an ongoing process and constantly changing depending on individual circumstances.

For example, this research showed that as mother's cycled more frequently, and in different conditions, they often made adaptations to their practice. Many of the mothers provided examples which seemed to go above and beyond what would be considered a 'normal' adaptation, thereby demonstrating that to successfully cycle with children in the UK requires substantial commitment both in terms of time but also in purchasing extra materials. That is, mothers continually learnt ways in which to make their practice more comfortable. The issue of bodily sensations particularly pertaining to comfort have been discussed previously in social practice theory (Madsen and Gram-Hanssen, 2017) and in this research it was evident that mothers frequently purchased various equipment, after cycling in adverse weather conditions, to keep themselves and their children dry and warm.

Similarly, when mothers experienced negative incidents with other road users, they researched additional ways in which to make themselves more visible, using high visibility, reflective materials or flags. Furthermore, for those mothers who experienced issues and wanted to be able to provide proof of negative interactions with other road users, it was clear that many mothers had researched cycle cameras and wearable signs either on their person or cycle, to show that they were running cameras to act as a deterrent against sub-par driving. However, for the less motivated mother, or one without the financial resources to afford these extra materials, raises questions as to how accessible cycling with children in the UK currently is?

It is apparent from government statistics that there are low numbers of women cycling in the UK (Department for Infrastructure, 2021; Cycling Scotland, 2022; Department for Transport, 2022c; Llywodraeth Cymru, Welsh Government, 2022b). The reasons for such low numbers have been outlined in the Literature Review. Of particular relevance to this section, when looking at competences, pertain to an assertion that women often lack the confidence to

cycle in countries with low cycling levels (Garrard, Rose and Lo, 2008; Frater and Kingham, 2018; Sersli et al., 2021). However, when it came to the skills needed to cycle with a child, it was clear from the interviews, that all of the mothers (except one) had cycled previously and classed themselves as fairly confident riders.

This confidence waned slightly when cycling with their children and it was clear that riding with children required different skills. This was because, young children, due to their age and own lack of skills often wobbled, got distracted or failed to follow instructions. Even for those mothers with slightly older children, whilst they had fewer concerns relating to their bike handling skills, there was still some unease that they could get distracted or not listen to instructions. This is similar to the findings of Sersli et al. (2020) in their research on mothers cycling with children, which found that many mothers would not feel comfortable cycling on certain routes with their children, even though they would happily ride them alone (Sersli et al., 2020, 5).

Additionally, as can be shown in a previous section which looks at the different types of infrastructure mothers will use when cycling on their own, it is clear that they often practice cycling in a different way, compared to when they have their children with them. This suggests that a mother employs a different set of skills and competences when cycling with her children. This will be explored in more detail shortly.

Nevertheless, despite the frequency with which many of the mothers taking part in this research cycled with their children and their purported confidence, some still questioned their competence as a cyclist due to not being fast, mechanically minded or able to cycle up hills at speed. Aldred's (2013) research highlighted similar. That is, some of the cyclists interviewed in her research entitled "Incompetent or Too Competent?" found that even amongst cyclists who cycled on a regular basis each week, they did not necessarily relate to being a 'proper cyclist'. Rather they considered that only those who could ride at speed, cover long distances and were able to fix mechanical issues earned that description. In addition, and in similar vein to the example provided earlier in this research of one mothers use of an electric cycle 'as cheating' this was also raised in Aldred's research by one of the female participants, "Not many people have electric bikes and you feel a little bit of a fraud…" (Aldred, 2013, 260).

A key part of managing cycling with children required organisation. As mentioned previously in the meanings section above, whilst many mothers attached meanings of convenience to their practice of cycling, this often came with a caveat of needing to be organised. The interviews demonstrated that many of the mothers had routines they had to follow before they could even leave the house. These commonly included getting cycles ready, children dressed appropriately and ensuring they had all the necessary cycling accessories and any other equipment they might need for their journey. Some of the mothers noted that this part of their practice could be time consuming and so the need to have the various 'materials' they required for their journey to hand, or in a designated space was essential.

Communication was also vital. For those with children cycling independently, mothers constantly gave instructions to their children. These include commands to ensure they were aware of various obstacles, alongside information on when to stop/start and when to slow down or speed up. Cycling with more than one child, plus the age and personality of a child was also highlighted as requiring a particular set of skills in the practice of cycling with children. For those using child carrying cycles, there were additional capabilities needed to manage how their cycle 'handled' due to the extra weight being carried. Hatfield et al's. (2019) research corroborates the skills parents needed to acquire to get used to the additional weight of riding with children, including awareness that cycling with larger vehicles also resulted in, "reduced acceleration, reduced travel speed, reduced manoeuvrability, and longer braking distance" (Hatfield et al., 2019,37). Plus, for those with children of different ages, it required managing the difference in abilities of children, due to older children frequently being able to cycle at faster speeds and further distances than their younger siblings.

The difficulties and stressful nature of travelling with young children, including getting them ready to travel has been previously mentioned in the Introduction Chapter. Cajoling unwilling children all added to the stressful nature of getting ready to leave the house. Of course, it could be argued that these issues are not specific to cycling journeys, rather a typical routine for anyone with young children. Indeed, Gilow's (2020) findings on child escort trips for mothers (including car use) detailed similar issues of "family related mobility as a highly energy-consuming activity" (Gilow, 2020,3). That is, children often don't want to leave the

house (for any purpose) and getting children ready to leave the house by foot or by car could also entail a degree of ‘chivvying’.

Summary

This research demonstrated how a multitude of meanings, materials and competences are required for mothers to successfully carry out the practice of cycling with their children. It was also evident that the elements interconnected with one another in order for the practice to occur. In line with social practice theorists who posit that practices are dynamic and constantly changing, (Reckwitz, 2002; Shove and Pantzar, 2007; Shove, Mika and Matt, 2012; Nettleton and Green, 2014) it was apparent that the practice of cycling with children was no exception to this. Mothers constantly adapted their practice depending on situations presented to them. This might be a variation in weather conditions, requiring adaptations to what materials they needed to keep them warm or dry. Alternatively, the need to modify competences as their child grows and begins to undertake more independent cycling themselves.

Whilst cycling with children is still very much a practice on the periphery of society, many mothers noted the increased availability of materials such as child carrying equipment and additional information to aid the competences needed to cycle with their children. For instance, whereas previously, many mothers had struggled to find information or a range of equipment to facilitate their practice. It was clear that over the past five years, increased information via sites such as Cycle Sprog, the family cycling Facebook group plus organisations like Sustrans, Cycling UK and Joyriders (to name a few) had emerged to aid a clearly growing need to provide information on family cycling. Furthermore, five to ten years ago it was often only possible to source two or three models of cargo cycles or other child carrying equipment. However, the current UK market has increasing numbers of options such as triplets, two and three wheeled cargos (both standard and e-assist) plus many other models, to allow children to be carried by bicycle (Cycle Sprog, 2019; Mintel, 2021; Cycling UK, no date).

RQ2 –Links Between the Elements

It was clear from the research that meanings, materials and competences are inextricably linked to one another. Not only must the three elements be present for the practice to exist, they must also continually connect with one another to allow the practice to stabilise (Shove, Mika and Matt, 2012). Most social practice theorist would agree that practices are constantly evolving and changing due to a degree of fluidity occurring each time a practice is performed. Therefore, recognition that practices may be performed differently under certain circumstances such as undertaking journeys of differing lengths, or cycling in varying weather conditions, are seen as being within the parameters of a continually "unfolding practice" (Schatzki, 1996).

For carriers of the practice (in this case mothers cycling with their children) when links break this can result in a temporary pause or a permanent break where their practice ceases completely. For example, Shove et. al (2012) make reference to individual carriers defecting from practices if links become broken between the three elements, "Individuals are constantly taking up and dropping out of different practices as their lives unfold" (Shove, Mika and Matt, 2012, 67). Therefore, there is a clear distinction between breaks which are permanent, that is a practice stops completely, as opposed to those temporary pauses that see mothers 'step out' of their practice for a short period of time before returning to it again.

For those mothers taking part in this research, for the most part, meanings, materials and competences were connecting with each other to allow their practice of cycling to take place. One could assume that because mothers chose to take part in this research, they were successfully managing to cycle with their children . However, it became apparent throughout the research that links between the three elements did sometimes 'break' resulting in mothers taking a temporary break from their practice.

A small number of survey respondents had taken temporary breaks from their practice as a result of a change in individual circumstances. These were due to broken links which occurred for a variety of reasons. For instance, where some mothers decided to stop cycling for a few months during pregnancy or in the immediate period after giving birth. During the interviews, a number of mothers noted how they had previously had a cycle stolen or damaged during a

collision. This meant that they were unable to cycle for a short period of time whilst they found a replacement or fixed their cycles.

Similarly, circumstances outside of their control such as the weather could also affect their practice, with some mothers being what they termed 'fair-weathered' cyclists and often retired their bicycles during the colder and darker winter months. Those interviewed declared that they would refrain from cycling in icy conditions, hence they would stop and then re-start their practice once weather conditions permitted. Some mothers also mentioned that their children did not always want to cycle and so this also resulted in breaks of various lengths of time. The following section looks at some of the most common 'pauses' that were highlighted in this research.

Transitioning Between Being Carried And Riding Independently

Although some mothers were able to manage the transition of children growing and adapt their cycling accordingly. This was not always possible. For instance, child carrying cycles such as child seats, trailers and tagalongs commonly had strict weight and height limits for use. Therefore, as children inevitably grew taller and heavier, they were no longer suitable for transporting their child. Some mothers dealt with this problem by purchasing cargo cycles. These types of cycles specifically designed to be used with multiple children could cope with heavier weight limits and extend the time that children could be carried for a number of years.

For others, however, this option wasn't available to them. They may not have the space to store a larger cycle at home or have sufficient funds to purchase one. For those that couldn't switch to cargo cycles, this meant that mothers were no longer able to use their existing cycle configuration to transport their children. For those mothers taking part in this research, who weren't able to purchase a cargo cycle, this often meant they switched their focus to teaching their child to ride their own bicycle independently. Consequently, a pause occurred whilst cycling competences were transferred from the mother to the child.

In such cases, a temporary break of links between the three elements happened because teaching a young child to ride was not always straightforward and could take anything from a few days to a few months before a child was competent at cycling. In line with the findings of Ravensbergen et al. (2020) a child learning to ride their own balance bicycle or pedal cycle was not always an instant process. In the first stages, the child would require someone to

walk/run alongside them ready to catch them whilst they learnt how to balance and/or pedal at the same time (Ravensbergen, Buliung and Sersli, 2020, 342). It also meant that whilst children were learning to cycle, their mothers would no longer be able to ride their own cycles with them because they needed to stay in close range ready to guide or catch their children whilst they adapted to riding independently.

Although many children were able to accomplish the ability to move forward on their bicycle, skills such as stopping and starting and awareness of other people in close proximity, often took longer to master. This meant that for many mothers, they were no longer able to carry out journeys that they had previously made because their children were not yet fully competent at cycling. For instance, whereas previously a mother could put her child in a rear or front seat and cycle a three mile trip to nursery, this was not possible for their 4-year-old child who had only just learnt to ride a bicycle as they could not cover the distance independently. Equally, if the route their mother had previously taken involved roads or complicated junctions, mothers were not comfortable with their children cycling on this type of infrastructure and mixing with motorised forms of traffic.

Whilst in countries with high cycling levels, the availability of cycle infrastructure which allows children to safely gain the competences needed to cycle independently is largely forgiving of wobbly children, in the UK, this type of infrastructure is often lacking (Pucher and Buehler, 2008a; Emond, Tang and Handy, 2009). Also of note, with many mothers under time restraints due to their busy schedules, they simply did not have the extra time it would take to cycle the journey, with their child cycling at much lower speeds when using their own cycle. Time constraints making cycling difficult has been raised previously in Sersli et al's (2020) research, "Mothers were often pressed for time, negotiating tight schedules between work and mobility of care. A few mothers suggested chronic time constraints curtailed opportunities for bicycling…" (Sersli et al., 2020, 6).

Accordingly, the scenarios above could result in a short break from cycling with their children, for certain trips. However, it was clear from the research, that for some mothers, journeys they had previously carried out on a regular basis were likely to stop for much longer periods until their children were competent at cycling longer distances and/or able to be trusted to ride alongside other road users. Sometimes these journeys were then carried out by another mode of transport such as a car, or the journeys ceased to happen at all. Two of the mothers

interviewed were able to continue utility style trips with their children who had recently learnt to cycle. Nevertheless, this involved both mothers having to run alongside their children, for considerable distances, whist they cycled. One of the mothers, told how she was running approximately eight miles a day to allow her 4-year-old daughter to cycle the school run. Whilst admirable, this seems like an option that would not be possible for many mothers.

Nonetheless, and as demonstrated in an earlier section, many of the mothers were very committed to cycling and attached strong moral beliefs that it was a worthwhile activity. Accordingly, whilst some journeys were now unable to be carried out by bicycle, most mothers still cycled with their children, albeit for much shorter journeys. From the interviews, a number of mothers noted that whilst they had to cut back on some utility style journeys by bicycle, they instead did more leisure cycling in parks or green spaces, with the hope that once their children learnt the requisite skills, they could return to more utility style trips when they were older.

Negative Experiences Whilst Cycling

The Literature Review demonstrated that cycling in the UK is often viewed unfavourably by society. With cyclists regularly being the source of annoyance for other road users and negative connotations of cyclists as rule breakers, dangerous and arrogant (Spotswood et al., 2015, 27). In addition, for those parents choosing to cycle with their children as a mode of transport, this often generated questions about their parenting skills and calls that they were endangering their children (Jain, Line and Lyons, 2011; Ravensbergen, Buliung and Laliberté, 2019b; Sersli et al., 2020). The lack of a cycling culture in the UK contrasts sharply with countries such as the Netherlands, Germany, Sweden and Denmark, where in comparison, cycling with children is seen as a 'normalised' activity (Emond, Tang and Handy, 2009; Wardlaw, 2014; Eyer and Ferreira, 2015; Aldred, Woodcock and Goodman, 2016a; Haustein, Kroesen and Mulalic, 2020).

The Literature Review also highlighted research carried out by Aldred et al. (2016) on the daily microaggressions that cyclists regularly have to contend with such as close passes (Aldred, Woodcock and Goodman, 2016,72). In this research, a common broken link affecting mothers, involved the occurrence of negative incidents when cycling with their children. It was evident from the surveys, that a large number of mothers had experienced hostile

environments when cycling with their children. Not only did these issues influence the type of infrastructure they were willing to use with their children (see previous section), but they also resulted in some mothers taking a short break from cycling.

As shown previously, 56% of mothers surveyed had experienced hostile types of behaviour from other road users that could result in harm or even fatalities. These included incidents such as, vehicles pulling out in front of them, close passes and purposely being driven at by other road users. Also, 37% of mothers surveyed had suffered from verbal abuse and 4% from sexual abuse or harassment from other road users. When experiencing these types of issues, some mothers were able to make changes to their routes to avoid the potential of further conflict, but this was not feasible for everyone. Instead, some mothers needed to reflect and process what had happened and did this by taking time off from their practice. It was apparent, particularly from the comments during the survey process that many of the mothers took time to ponder whether the risks and negativity they experienced when cycling was worth continuing with their practice.

Even though only a small percentage of mothers took temporary breaks from their practice as a result of the negative incidents described above, as has been shown throughout this research, the mothers taking part in this study were highly motivated to cycle. They were also aware that cycling was viewed negatively in society and that their own practice was deemed unusual. Accordingly, when experiencing hostile or unpleasant behaviour from others, many of the mothers were able to rationalise this part of their practice, due to having such strong beliefs that cycling was a good thing to do with their children. This might not be the case however, for mothers who do not share these motivations.

Permanent Broken Links

Although cycling with children is carried out by a low number of mothers in the UK and would be considered by many to be a proto-practice (Julsrud and Farstad, 2020), links between the three elements were being made successfully by the participants in this research. Additionally, whilst links did often break for the mothers taking part in this study, as has been demonstrated in the section above, these were predominantly ‘pauses’, albeit it of different periods of time, but not permanent breaks. For a permanent break to occur the links between the three elements would have to stop connecting completely for an individual and their

practice would then cease completely. There were no examples of permanent breaks (yet) for the mothers taking part in this research. However, from many of the comments made throughout the research (from all three phases) it is possible to predict what might cause a permanent break.

When asking mothers how employment fitted with their practice of cycling it was clear that for many mothers, being able to combine cycling with working often involved meticulous planning and for some mothers, cycling was only possible on days they weren't working, or on days where they were able to work from home. As such the connection of these links were often quite fragile. A change in their working practices could mean that they would be unable to make cycling with their children fit into their schedule. Bonham and Wilson (2012) in their research on how women's cycling stops and starts depending on the current circumstances in their life note how changes in working patterns are a common reason for women dropping out of cycling (Bonham and Wilson, 2012, 205).

A number of the mothers interviewed noted how they were currently managing to cycle with their children because they were in nurseries that were located in close proximity to their work. One of the mothers discussed how she was unsure, once her child starts school if she would be able to juggle cycling to school and continuing onto work due to the time pressures as a result of the location and direction of the school being much further away from her workplace. Similarly, some mothers noted that during the Covid-19 pandemic they had been working from home more, however they were now being encouraged to come into their workplaces on more days of the week, which could potentially impact on their ability to cycle their children to school.

Nevertheless, for the mothers taking part in this research, whilst trips to education site were the most popular type of journey, other utility trips were also being undertaken, so even in the absence of being able to cycle to school, nursery or childcare, it is likely due to the strong meanings the mothers taking part in this research have towards their practice of cycling, they would continue cycling with their children in other ways. It is unclear however, if those who attach fewer positive meanings to their practice of cycling would stop cycling as a result of any complicated logistics arising from new working patterns.

Cycle storage was another potential threat to breaks between the three elements. During questions about storing cycles, a number of mothers highlighted concerns about whether they would be able to store their cycle configurations as their children grew, and the equipment would become larger in size. Lack of cycle parking provision in the UK has already been highlighted in the Literature Review. Similarly, during focus group discussions, it was clear that a lack of storage could contribute to not only preventing the take up of cycling in the first place but if cycles outgrew their storage space, this could result in a permanent break in cycling because the alternative would be to somehow store cycles outside in public spaces, which was problematic due to high levels of cycle theft in the UK (Office for National Statistics, 2017).

This was a particular concern for those on lower incomes, or those living in flats or terraced houses with a lack of space to store cycles. This combined with the fear of cycle theft was seen as a major issue. For instance, the focus group participants noted that parking and theft were closely interlinked, and whilst cycle theft is common across the UK, many of the lower income women they worked with had experienced theft of cycles. Research carried out by the Office for National Statistics (2017) also found that theft was higher in urban areas, those living in flats or maisonettes and those with incomes below £10,000 per annum (Office for National Statistics, 2017). Consequently, the focus group participants noted that if cycles were continually stolen, people often gave up on cycling because they simply could not afford to keep replacing cycles.

This research has previously highlighted how many mothers had experienced negative incidents when cycling including close passes, being purposely driven at and being verbally abused. The survey demonstrated that a number of mothers had stopped cycling for a short time to help them process what had happened to them and to decide if it was worth continuing with their practice given how they felt after such incidents. However, it is possible, that other mothers (not taking part in this research), had previously tried cycling with their children but upon experiencing abuse, harassment, or dangerous driving around them stopped their practice because they did not attach the same meanings of importance or have such strong motivations to cycling as those who took part in this research did. For example, they may not have deemed the practice worth continuing due to the negative aspects that could place themselves and their children in harm's way. Unfortunately, delving into this

particular area in more detail is outside the scope of this research. Understanding more about mothers who had previously tried cycling with their children but stopped due to issues such as experiencing verbal/sexual abuse and inconsiderate driving from other road users, would however, be an interesting topic for future research.

Summary

Social practice theorists often talk about the fluid nature of practices, constantly evolving each time a practice takes place (Reckwitz, 2002; Shove and Pantzar, 2007; Shove, Mika and Matt, 2012). This was apparent in the practice of the mothers taking part in this research, with mothers frequently adapting their practice dependant on the specific circumstances they experienced. This might include varying weather conditions or when using different types of infrastructure. However, it was also apparent that in some cases a broken link between the elements resulted in a practice being paused. The most common reasons being when children transitioned between being carried on a cycle to learning to ride themselves, or when mothers experienced negative incidents which caused them to stop and think about whether cycling with their child was the right thing to do.

There were no examples of permanent breaks because the mothers taking part in this research were currently successfully carrying out the practice of cycling with their children. However, indications as to what might cause a permanent break could potentially be predicted from all three phases of the research where certain issues were highlighted. These included changes in individual circumstances such as working hours or location of workplace changing, potential storage issues as larger equipment is needed and mothers being able to deal with continued negative incidents. This research was unable to provide detailed information on permanent breaks because no examples were found in the study. This highlights a specific gap in understanding how permanent breaks occur, particularly amongst mothers who may have been cycling previously with their children, however stopped practicing (for whatever reason). Further research on this would be useful to gauge the specific reasons why mothers stopped cycling with their children.

RQ3: Getting More Mothers Cycling in the UK

Whilst over 1,300 mothers took part in this research and were very passionate about sharing information about their practice, mothers cycling with their children is still very much a fringe activity within the UK. As previously mentioned in the Theory Chapter, it could be considered as a proto-practice due to such low numbers currently participating in it (Julsrud and Farstad, 2020). If the practice of cycling with children is considered a proto-practice, this means that the elements of the practice exist. However, they have not yet linked together in such a way to earn practice status and thus become a mainstream activity (Shove, Mika and Matt, 2012, 25).

What needs to happen for a proto-practice to become a 'practice' which flourishes? The recruitment of carriers is key. For example, for a practice to become embedded in society it necessarily needs to have large numbers of people undertaking the practice. The previous section highlighted the often fragile nature of links between the elements and how if they break, this can result in carriers taking a temporary or permanent break from their practice. Hence, the minimisation of broken links is also essential to allow a practice to persist and to stop people defecting. That is, for a practice to become widespread it must be able to recruit more carriers and the elements must continually connect with one another to stabilise the practice, thereby allowing routinisation of the practice to occur (Reckwitz, 2002; Shove, Mika and Matt, 2012).

Accordingly, if the practice of mothers cycling with their children is to become mainstream, this would potentially require a significant change in all three elements to occur. Furthermore, a need to a) recruit more mothers to the practice and b) ensure links between the elements are maintained to ensure their continued participation. The following sections will consider what needs to change or improve to encourage more women and mothers to commence cycling. Or for those who might have previously cycled, what was needed to encourage them to make a return to cycling.

Recruiting More Carriers and Preventing Broken Links

The question of how to get more women cycling in the UK has been the topic of previous research both in terms of academics (Emond, Tang and Handy, 2009; Xie and Spinney, 2018;

Prati, Fraboni, De Angelis, et al., 2019; Shaw et al., 2020) but also by many grassroots and national cycling organisations such as British Cycling, Cycling UK, Joyriders and Sustrans, who have designed specific projects to provide information and practical help to get more women on cycles. The reasons for such low numbers of women and mothers cycling in the UK have also been highlighted previously in this research.

Women's lack of confidence and reluctance to cycle on busy roads mixing with other motorised forms of traffic is frequently cited as a factor. Consequently, it stands that if mothers are not comfortable cycling on their own, road safety concerns are further amplified when a young child or multiple children are in tow (Ravensbergen, Buliung and Sersli, 2020; Sersli et al., 2020). In addition, care duties and the need for mothers to carry out multiple journeys such as juggling employment, escort trips and errands are often seen as incompatible with cycling (Emond, Tang and Handy, 2009; Hanson, 2010; McCarthy et al., 2017; Prati, 2018).

In contrast, the majority of mothers taking part in this research had previously cycled on a regular basis before having their children. During the interviews, most of the mothers agreed that they would class themselves as confident cyclists and possessed the necessary competences to cycle on their own. Even though cycling with their children required some adaptations to the way they rode, due to carrying child passengers or riding independently with very young people (as demonstrated in a previous section), the transition from cycling alone to cycling with children was something that they were able to accomplish, due to their past experiences of cycling.

Furthermore, the mothers taking part in this research assigned positive meanings to their practice of cycling despite various difficulties that arose from their practice such as issues with cycle storage, navigating different types of infrastructure not always designed for using with children and abuse from other road users. Likewise, they often went to great lengths to carry out the practice of cycling with their children and were fully committed to it. However, for those women and mothers who don't attach meanings of positivity or have such strong motivations, how are they to be recruited to the practice of cycling?

The Shove et al. (2012) three element model used in this research demonstrated how meanings, materials and competences are inextricably linked. For example, if materials such

as safe cycling infrastructure are lacking, then it follows that the meanings associated with cycling can be negative and linked to danger. Moreover, the competences then needed to cycle require the ability to mix confidently in fast moving traffic with other road users. Because previous research continually cites women's reluctance to cycle on roads with busy traffic, the next section begins by looking at how changing materials (in this case infrastructure) could help change meanings and competences and potentially help recruit and maintain more women and mothers to the practice of cycling with their children.

Changing Infrastructure

This research showed that the types of infrastructure available to mothers undeniably influenced when and where they would ride. The survey illustrated that the majority of mothers were happy to use most types of infrastructure when riding alone, although a preference for not mixing with motorised vehicles still prevailed. Conversely, if they had their child with them, these preferences changed significantly. Unsurprisingly, a preference for what they deemed 'safe infrastructure' was paramount. Indeed, as with previous research relating to infrastructure types when cycling with children, mothers overwhelmingly wanted safe routes such as protected cycle lanes, shared use paths and quiet roads with low levels of motorised vehicles (Aldred, 2015b; Hatfield et al., 2019; Sersli et al., 2020).

In countries with high levels of cycling such as the Netherlands, Denmark, Germany and Sweden, cycling for utility purposes is a widespread activity (Kuipers, 2013; Oosterhuis, 2016). Consequently, meanings associated with cycling with children are that it is a 'normal' and safe activity to undertake, which is upheld by the high numbers of children cycling as a mode of transport in these places, as well as mothers using cargo cycles, trailers, or child bike seats to transport their children around (Emond, Tang and Handy, 2009; Eyer and Ferreira, 2015; Ravensbergen, Buliung and Sersli, 2020).

Of course, this 'normalisation' of cycling is somewhat aided by the cycle infrastructure in these countries, which provides high quality networks of routes that are designed to link common destinations together and are separate from motor vehicles (Pucher and Buehler, 2008b; Wardlaw, 2014). Furthermore, having such cycle infrastructure available, also influences the competences needed to cycle. Whereby, cyclists in countries with high cycling

levels do not need to have the skills or know-how to cycle on busy roads with fast moving vehicles, as is currently required by most cyclists carrying out utility journeys in the UK.

Improved infrastructure in the UK could therefore lessen broken links that can cause temporary or permanent breaks from the practice. For instance, in Research Question 2, it was demonstrated that a number of mothers had taken a temporary pause after experiencing negative incidents when cycling. Whilst a few mothers had experienced incidents when using footways or shared use pedestrian/cycle paths, overwhelmingly incidents occurred when using roads without specific infrastructure for cyclists. This included being purposely driven at, close passed or receiving verbal abuse from other road users. Tensions between cyclists and drivers, have been raised previously in the Introduction Chapter and the Literature Review with cyclists not only being the source of annoyance for other road users (Spotswood et al., 2015, 27) but with cyclists regularly having to deal with close passes and aggression from other road users when mixing together on roads (Aldred and Crosweller, 2015; British Cycling, 2019).

Events such as those described above often made mothers question if cycling was the right thing to do. A previous section in this research, detailed incidents of negative events experienced by mothers. In particular, how it made them feel anxious, frustrated and upset but also guilty about whether cycling was in fact too dangerous an activity to carry out with their children. Some mothers did take a short pause in their practice, however because they also attached positive meanings to their practice of cycling, they were able to continue. Nonetheless, as discussed in Research Question 2 more research needs to be carried out on whether improved infrastructure could make a difference to mothers (without such strong motivations) who previously cycled but stopped when experiencing negative incidents such as those described above.

It was acknowledged by focus group participants and those interviewed that the infrastructure needed to help recruit more mothers to the practice of cycling, did not necessarily require heavily engineered solutions such as the building of protected cycle routes, or shared use paths, although these were advocated where possible. Rather the implementation of school streets, low traffic neighbourhoods and 20mph limits and zones, were also seen as propitious to making mothers feel safer when cycling with their children. Recent research on school streets and low traffic neighbourhoods show promising results in

relation to benefits for cyclists and at a low cost compared with other alternatives such as protected cycle lanes (Aldred and Goodman, 2020; Hopkinson et al., 2021; Laverty, Goodman and Aldred, 2021) Likewise, as highlighted previously, one of the focus group participants living in London, had benefited from the implementation of low traffic neighbourhoods and school streets, where, as a result of being located in close proximity to one another, had effectively created 'safe networks' for her child's journey to school.

Increasing the number of and improving the quality of shared use pedestrian/cycling paths were also seen as a way to encourage more mothers to cycle with their children, because they don't require mixing with motorised forms of traffic. However, many issues were raised by participants of this research about this type of infrastructure. A particular frustration involved frequently being thwarted by guard railing, steps, or other barriers which prevented them accessing or cycling on such routes. 18% of those surveyed had experienced these types of barriers and struggled to bypass the various physical barriers and in some cases had to find an alternative route

Previous research has also highlighted issues with shared use infrastructure, with these types of obstructions being problematic to anyone using non-standard cycles (Gaffga and Hagemeister, 2015; Hatfield et al., 2019; Laker, 2020). Similarly, sharing shared use paths with pedestrians, particularly those walking dogs was also raised during the interviews as an issue when cycling with young children. For example, the mixing of children riding their own cycles and dogs off lead, or on long retractable leads were the cause of much stress according to many participants in this study.

One of the focus group participants noted that Transport note LTN 1/20 may offer some hope to improvements being made on shared use paths. This transport note seeks to encourage where possible, and if space allows, separated tracks for pedestrians and cyclists. LTN 1/20 would also seek to prevent the inclusion of physical barriers noted above, which are often problematic for those with non-standard cycles (Department for Transport, 2020b). However, focus group participants assumed it was unlikely that measures would be applied retrospectively to many of the existing shared used infrastructure across the UK. Therefore, focus group participants recommended the removal of existing guard rail barriers, which could potentially allow more access to these routes, and improve the experience of those using them. Similar suggestions for the removal of barriers and making shared use paths more

accessible for all users, have also been recommended in a recent report put together by Sustrans and Arup to make cycling more accessible, “Remove or adjust gates and access barriers, address ramp angles, steps and cambers to ensure they are suitable for all types of cycles and users” (Burns, Man Oram and Claris, 2020, 58).

The location of safe infrastructure is also of importance to facilitate the types of journeys that mothers regularly carry out. Many of the better quality routes in the UK (and those in other countries with low cycling levels) are often designed primarily with commuter patterns in mind, facilitating cycling from residential areas into central city/town locations and back (Lam, 2022). Those mothers interviewed who did reside in towns or cities with protected cycle lanes or superhighway type infrastructure, mentioned that they did not use them for their day to day journeys with their children because they were not on the routes that they were using.

Correspondingly, many other mothers were also carrying out journeys that required multi-stop trips such as to education sites, for household errands and to their own places of work, however cycle infrastructure was often not available for their journeys. Therefore, as found in previous research, a lack of cycle networks linking key sites such as schools, shops and workplaces makes cycling a less convenient and safe mode of transport for many mothers (Riggs and Schwartz, 2018; Sersli et al., 2020).

If cycle infrastructure was implemented to support the types of journeys mothers regularly carry out, this could also help cycling become associated with meanings of convenience and potentially increase the numbers taking part in the practice. Previous research has suggested that working in employment and carrying out care duties is incompatible with cycling with children in countries with low cycling levels. Conversely, this research showed that a number of mothers were able to combine the practice of cycling with their children and being employed. Certainly, in contrast to previous research, many of the mothers surveyed and interviewed, attached meanings of convenience to using cycles, due to trips often taking less time and being less stressful than using other travel modes such as walking, public transport or driving.

Nevertheless, whilst the majority of mothers in this study attached meanings of convenience to their practice, this was closely interlinked with the need to be organised and often involved meticulous planning for their practice to happen. Although a lack of specific cycling

infrastructure on the routes mothers used wasn't the only reason that drove the need for meticulous planning, it was nevertheless a factor. Those interviewed explained that they could not always take the most direct route to their end destination, because they considered some parts of their journey unsafe. This meant they often had to take longer routes adding on time and distance to their journey.

For example, interviewees noted, if their child was cycling on the footways to school, they would often leave much earlier than needed to avoid any conflict with pedestrians due to increased footfall on pavements around the school during drop off and pick up times. Or if cycling on the road, they would again leave much earlier to avoid an influx of drivers arriving at the school gates at the same time, as many considered mixing with school run drivers too dangerous. Therefore, improving infrastructure on routes that mothers regularly carried out journeys on, such as the school run, would be welcomed by those taking part in this research by making their journeys both safer and quicker.

With previous research highlighting women and mother's preferences for cycling on protected cycle infrastructure (Emond, Tang and Handy, 2009; Prati, 2018; Ravensbergen, Buliung and Sersli, 2020; Sersli et al., 2020), it could be assumed that providing or improving infrastructure that links the types of places that mothers regularly carry out journeys on, could also help attract new recruits to the practice of cycling with their children. Firstly, it could lessen meanings of danger associated with cycling and require less specific competences such as mastering skills to mix with motorised traffic which are often needed when cycling in the UK. Secondly, by providing safe infrastructure on the routes that mothers undertake regular journeys on, this could make cycling more convenient for carrying out care duties and escort trips that are frequently cited as being impractical for mothers (Riggs and Schwartz, 2018; Sersli et al., 2020).

This might also help prevent those broken links which were predicted for mothers if their working practices changed. This included scenarios where they were no longer able to work from home, or if they moved to a job further away that made it inconvenient to cycle to work and carry out other care duties/escort trips with their children by cycle. That is, if infrastructure provided more direct and safe routes, this could cut down on the time needed to cycle to places. However, it is still unclear, without further research, if improved

infrastructure would help those who work in sectors which have more rigid working hours and less flexibility in their schedules.

Recruiting Mothers from Lower Income and Ethnic Minority Groups

The focus group participants also highlighted the additional complexities of mothers from low income and ethnic minority backgrounds in relation to cycling. They detailed a number of schemes they worked on with mothers and women across the UK designed to help build confidence and teach the various skills for cycling alone and with their children. Some of the participants contributing to this research had a specific remit to encourage cycling amongst women from lower incomes and ethnic minority groups. They concurred that for many of these women, they associated meanings of danger with cycling and that cycling wasn't 'for them'.

For example, they noted that women from lower income groups tended to associate cycling as a mode linked to poverty and therefore perceived cycling as cementing their low social status. Motherwell's (2018) study about women and cycling in Glasgow reinforces these claims, with her research demonstrating a widespread belief that those who cycle do so because they are too poor to own a car (Motherwell, 2018, 19). This also mirrors other research where those on lower incomes have a negative view of cycling due to its status being linked to lack of choice in transport modes (Aldred and Jungnickel, 2014; Sustrans, 2022). Although conversely, (also) in the Motherwell (2018) study, some viewed those who cycled as clearly "…more of a middle-class thing…because bikes are expensive…" (Motherwell, 2018, 19).

For those working with women from ethnic minority groups, they found these groups frequently associated meanings of danger with cycling and again did not see cycling as an activity 'for them'. A previous example was provided by one of the mothers interviewed (from a south Asian background) who was not allowed to cycle as a child and therefore lacked the confidence as an adult to cycle, until she undertook cycle training with her local council. In addition, meanings linked to cycling were further complicated due to some cultures and communities deeming cycling as an activity that should not be undertaken by a woman.

Of course, there will be many women from white backgrounds that also did not learn to cycle as children. However, the numbers of women cycling from ethnic minorities are especially low in the UK and even in countries with high cycling levels such as the Netherlands and Denmark (Haustein, Kroesen and Mulalic, 2020), suggesting that wider issues may also play a role in these low numbers.

These additional factors for women from lower income and ethnic minority groups clearly adds extra layers of complexity on top of the dynamics of understanding the meanings most women and mothers associate with cycling. Nevertheless, that such low numbers of women and mothers cycle currently in the UK from all socio-demographic backgrounds demonstrates that changing the negative meanings associated with cycling needs to occur for all groups of women in the UK, albeit with extra consideration for some socio-demographic groups.

Change in Other Materials to Recruit More Carriers

The cost of child cycling equipment has also been discussed previously in the Literature Review and also in an earlier section. There were many remarks during all three phases of research, about the price of some of the higher-end equipment such as e-assist cargo cycles often costing between £3k upwards. For many wanting to use cargo cycles, this was seen as too expensive for their current financial circumstances. In particular, for mothers who are not existing cyclists, or display strong motivations to cycle like those who took part in this research, it is likely that the high cost of cycle equipment is a major disincentive to take up the practice of cycling with their children.

The cost of cycling was discussed in detail in an earlier section, highlighting that for many people living on low incomes, even buying second-hand cycles for their children may be unviable. For that reason, it was posited that to make the practice of cycling with children more obtainable for those on lower incomes, the cost of cycling would need to be made more affordable. Some examples were provided in a previous section regarding subscription schemes set up by local councils or cycling organisations, which allowed the purchase of cargo cycles in interest-free instalments to help spread the cost.

Those focus group participants who worked with low income mothers, felt any interventions that could help cycling become more affordable, alongside improvements in cycle storage for those on lower incomes, were central to increasing cycling in these groups. Measures to make

cycling cheaper would most likely be welcomed by existing mothers who cycle as well, including those taking part in this research. Whilst many of the mothers in this study would be considered affluent, with 83% living in a household earning above the national median average household income of £30,500 and 30% living in a household that earns above £80,000 per annum after tax, there were still many who were unable to purchase their preferred choice of equipment, due to it being out of their financial reach.

Research Question 2 highlighted that one of the most common broken links for mothers taking part in this research was when their child was transitioning between being carried to learning how to ride their own cycle. For some mothers, not having the financial resources to purchase child carrying cycles was a particular issue. For example, if mothers were unable to switch to cargo cycles or other cycles such as tandems and triplets that can carry older children, this meant they had to pause their practice of cycling. That is, because when a child could no longer be carried in/on their mothers cycle, they had to learn to ride their own bicycle.

Interviewees and comments in the surveys discussed how many mothers noted that if they could afford it, they would have purchased a cargo cycle so that they could carry their child for a few more years. This was because once their child had outgrown their bicycle seat or tagalong, they were often unable to cycle on routes that they previously had. An earlier section had highlighted how Beth was no longer able to cycle her 4 year-old to nursery because he had outgrown his bike seat, instead she was now having to drive him because the journey was currently too far, and she considered it unsafe for him to ride his own bicycle there. Many mothers provided similar examples of not being able to carry out similar journeys, however noted that if they could afford a cargo cycle that would enable them to continue cycling with their child until they were competent enough to ride the routes independently.

During the interviews, many of the mothers mentioned, that when looking at purchasing child cycling equipment, being able to test-ride models before buying would have been really useful. 'Family cycling libraries' were highlighted by a number of the focus group participants as being an ideal way to introduce more families to the different types of cycles on offer. These libraries, often run by local authorities or community organisations provide a variety of cycle equipment such as child seats, trailers and cargo cycles for people to try out on set days,

usually in a park or local green space. Some of these schemes also allowed mothers to borrow/loan a child carrying cycle for a small financial deposit either on a short or long term period.

In particular, such schemes were highlighted as a helpful way to support mothers who want to cycle with their children but were not sure about committing to expensive equipment before knowing if it would suit their needs. By trying out a number of different models, this allowed those test-riding them to see how different cycles handled, whether they suited the riders height, and if they worked for their specific family needs. This is important, as many mothers taking part in the interviews described how they had bought equipment online or second-hand and found they had made the wrong choice and were left with equipment that wasn't suitable.

This also raises a potential broken link. That is, as mentioned in an earlier section, those who attach fewer positive meanings to cycling or do not have the funds to keep purchasing cycle equipment until they 'get it right'. Therefore, they will most likely either give up before they have even started their practice, or if they do purchase unsuitable equipment, this will cause either a temporary or possibly permanent break because they are unable to use it. Accordingly, an increase in these types of facilities across the UK would be welcomed as a practical measure to help enable more mothers and families to access cycle equipment before committing to buying. Nevertheless, as mentioned in a previous section, in their existing form they appear small scale schemes, and it is unclear if they would be able to facilitate mass cycling with children.

Another issue raised in some of the focus group discussions, related to why schemes to purchase e-assist cycles or cargo cycles weren't given the same type of discounts or tax breaks that the government had provided to stimulate the electric car market via the Plug-in Car Grant (Department for Transport, 2021b). Whilst this grant was recently withdrawn in 2022. It was suggested that if the government were serious about trying to encourage active travel and reduce car use, then it made sense to allow e-assist cargo cycles to be purchased at a discount. It was apparent from the mothers taking part in this research, that many of them used their cargo cycle as if it were a car (transporting multiple children) and in some cases had replaced their second car with a cargo cycle. Focus group participants were unanimous

in their discussions that access to grants to help finance cycles and related equipment for family cycling purposes, would be welcomed.

Some mothers, in this research, did state however, that they had been able to purchase their cycle equipment at a discounted price through the government cycle to work scheme. This scheme allows employees to 'hire' a bicycle for an agreed period and pay for it through their monthly salary. At the end of the hire period they are able to purchase the bicycle and can save from between 32% (lower rate taxpayer) and 42% (higher rate tax payer) off the total cost of their purchase (Department for Transport, 2019a). However, for many of those on lower incomes, this wouldn't be a feasible option. That is, as pointed out by a number of the focus group participants, many of the low income families they worked with were unemployed, on benefits, or worked zero-hour contracts. As such, they were not eligible for the cycle to work scheme in its current form.

A recent report by Sustrans and Arup also highlighted that those on lower incomes are excluded from the cycle to work scheme and make recommendations for a "UK-wide scheme to subsidise the cost of a cycle for people who are not eligible for the existing Cycle to Work scheme…People at risk of deprivation should receive greater support than others to access a cycle. The UK government should also consider removing VAT from cycle sales" (Burns, Man Oram and Claris, 2020, 72).

Whilst the implementation of more schemes to help with the cost of cycling was deemed important. It was pointed out that improved cycle parking and preventing theft were two issues that also needed to be addressed. Lack of cycle parking provision in the UK has already been highlighted in the Literature Review, with below-standard parking provision across the UK in a number of public places, being seen as a particular issue for those wanting to cycle (Heinen and Buehler, 2019; Almendros, 2020; 2CV, 2021). Additionally, for non-standard cycles which necessarily have a larger footprint than standard cycles, even where good quality parking exists, it is often not suitable for those wanting to park cargo cycles and cycles with trailers attached (ibid).

The focus group participants also noted that the groups they worked with were reluctant to purchase cycles or related equipment as they had nowhere secure to store them at home. They explained that many of the women they worked with resided in small dwellings, often

flats or terraced style housing without access to a garage or garden (except through their property), and hence, struggled to adequately store cycles inside their properties. Although most mothers taking part in this research were able to securely store their cycles and equipment at home, it was clear that some did struggle. For instance, a number of mothers made comments in the survey (see previous section) that they had to store cycles in communal areas, or some had to take their cycles apart every time they used them so they could fit them inside their house. Similarly, theft of cycles when left at end of journey destinations was also a worry to many of those who had to leave their cycles unattended.

Focus group participants believed the solution to these parking issues were to designate on-street car parking spaces as secure cycle shelters instead. Discussions around the best way to approach this varied from installing specific on-street cycle hangars or simply a number of Sheffield stands which were covered to allow protection from the elements. It was also stressed that any such parking must have provision for non-standard cycles as well. These suggestions are similar to those in the recent Sustrans and Arup report, looking at making cycling more inclusive. They largely concur with the suggestions made in this research including retrofitting cycle storage in multiple occupancy housing, the rolling out of more cycle hangars on street, and improving provision for non-standard cycle parking which has a larger footprint than standard cycles and therefore needs additional space when parking (Burns, Man Oram and Claris, 2020, 61-63).

Summary

The number of mothers currently cycling with their children in the UK is low. For a practice to flourish it needs a constant supply of recruits and minimisation of broken links to ensure carriers don't defect from the practice. The mothers taking part in this research largely associated positive meanings with their practice and had the necessary competences to cycle with their children, even in the face of sub-par infrastructure, and negative incidents such as verbal abuse, careless and dangerous driving around them. For those who don't possess these competences or attach positive meanings to cycling however, potentially poses a challenge to recruit (and keep) more carriers to the practice, thus it remains a proto-practice and marginalised activity.

For the practice to become more mainstream a change in all three elements is needed. This section has shown how connected the three elements are, and how a change in materials could result in a change in meanings and competences, and vice versa (Reckwitz, 2002; Shove, Mika and Matt, 2012; Shove, 2019). For example, improving materials such as cycle infrastructure via the implementation of more protected cycle lanes or low traffic neighbourhoods and speed restrictions, can influence the meanings associated with cycling as a mode, as well as the types of competences needed to cycle.

The outcomes of this are twofold. Firstly, improved infrastructure could help reduce the hostile environments that mothers taking part in this research frequently found themselves experiencing when cycling. Such improvements would make cycling a more enjoyable experience for existing mothers who cycle. It could also prevent some of the broken links that occur when mothers take breaks from their practice as a result of negative behaviours from other road users. In addition, if more mothers can cycle with their children due to safe environments existing, this can also help foster positive meanings around cycling so that it becomes a normalised activity. In turn, the combination of safe infrastructure and cycling being seen as 'normal' activity, could also potentially allow the recruitment of mothers who don't have quite as strong motivations as those taking part in this research, or lack the necessary competences such as skills or confidence to cycle in fast moving traffic.

Similarly, the location of where cycle infrastructure is placed is also of key importance for the practice of mothers cycling with their children, due to the types of journeys mothers regularly undertake in the UK such as carrying out care duties, child escort trips and combining these with their own employment. Previous research has suggested these types of trips are incompatible with cycling. Whilst this research found that mothers taking part in this study were able to cycle these types of trips, it required specific organisations skills because journeys often took longer and as a result most mothers were only able to cycle on days where they worked from home or if they had flexible working conditions.

More safe routes linking the places where mothers typically travel on could recruit more carriers by making cycling safer and changing the types of competences currently needed to cycle in the UK, i.e. navigating road space with motorised vehicles. Having to cycle amongst fast moving vehicles results in meanings that link cycling as being associated with danger. However, changes in infrastructure could change these meanings to more positive ones and

also those of convenience if safe routes are more direct and link the places mothers need to travel to.

Likewise, improving residential cycle parking and making the cost of cycling equipment more affordable, could also encourage an increase in participation for those mothers who previously have been unable to afford cycling equipment, or have limited space to store cycles at home. Making cycling equipment cheaper through loans or grant schemes could also assist existing mothers who do cycle but have children who have outgrown child seats and trailers, therefore offering more options for those mothers who might want to purchase cargo cycles. This would allow them to cycle with their children as passengers for longer periods of time and prevent broken links that can occur whilst children are still learning the skills to cycle. In addition, because current infrastructure in the UK is often unforgiving of children learning the process of cycling, by providing younger children infrastructure where they don't have to mix with motorised vehicles, this would allow them to gain the confidence, skills and experience to cycle in a safe environment.

Chapter 7: Conclusion

A Problematic Practice? Mothers Cycling With Their Children in the UK

This research set out to better understand the practice of mothers cycling with their children (aged 11 and under) in the UK. Using the Shove et al. (2012) three element model allowed identification of the various materials, meanings and competences key to mothers cycling with their children. As a result, this study has demonstrated an in-depth view of issues such as the different types of cycles used, the frequency and types of journeys regularly carried out, how much mothers spent on their cycles and where they parked them. It also showed how different types of cycle configurations could influence the type of infrastructure used, as well as the age, ability and personality of a child.

Whilst it could be argued that mothers (using any form of transport) generally require exceptional organisations skills to manage hectic schedules of child escort trips, household duties and employment (Barker, 2011; Jain, Line and Lyons, 2011; Gilow, 2020), combining cycling to the mix appeared to add further complexities. This included the need to plan and predict for multiple eventualities for what might be just a 10 minute journey. Indeed, this research exposed the often painstaking preparation it takes for a mother to cycle with their children.

For instance, many mothers had to juggle other commitments such as employment and household duties around their cycling, allowing them to only cycle on days where they could fit it in around these other responsibilities. As a result, they often had to adhere to strict schedules. This comprised of having set routines in place before even leaving the house and choosing specific clothing or equipment to make their journeys more comfortable. For many mothers, safety was a high priority, so planning safe routes to reach their end destination was also of importance and ensured careful consideration of where and when they could cycle.

Most mothers in this study had previously cycled on a regular basis and therefore were comfortable cycling with their children because they were confident cyclists and felt they had the necessary skills to do so. Nonetheless their practice was not always straightforward, and it was evident that tensions inherent to their practice existed. The surveys and interviews highlighted many examples of negative situations facing mothers when cycling with their

children. These included struggling to bypass physical barriers on certain routes with child carrying cycles, to facing abuse or sub-par driving from other road users.

Indeed, the research highlighted the often dark side of cycling, with examples of verbal abuse and other negative experiences commonplace. However, it was also filled with examples of joy, with mothers assigning positive meanings to their practice, including convenience, fun, bonding experience and wider benefits to the physical and mental health of themselves and their child. Undeniably, it was these benefits, combined with strong motivations to cycle which allowed them to overcome the various difficulties they might face.

As highlighted previously in the Literature Review a disproportionate amount of writings about motherhood present a bias towards white, heterosexual middle-class mothers (usually married) (Sutherland, 2010; McLaren, 2018; O'Reilly, 2021). In a similar vein to previous research, the majority of mothers taking part in this research shared similar socio-demographic traits. The household income of the mothers who were surveyed was much higher than the national average, as was the education level of participants. Likewise, 93% of those participating in this research were from a white background. Although, the mothers taking part in this research were purposively sampled so a degree of bias may be evident here.

The very low numbers of mothers cycling with their children in the UK highlights that cycling needs to be made more appealable to women from all socio-demographic backgrounds. However, many of the focus group participants posited that those from lower income and ethnic minority groups required additional support. The topic of cycling amongst lower income and ethnic minority mothers/women was considered when discussing confidence in the competences section of Chapter 5 and then again in Research Question 3, albeit they are not covered extensively. Certainly, it appears that additional factors for women from lower income and ethnic minority groups clearly add further layers of complexity to the particular topic of how to recruit more mothers to the practice of cycling. However, due to the sample of mothers taking part in this research, additional insights into mothers who cycle with their children from ethnic minority groups or lower incomes remains a gap in current literature that undoubtedly should attract further research.

This research also looked at the interrelatedness between materials, competences and meanings, including an understanding of how the practice of cycling can be affected by links

between the three elements becoming broken. However, because the mothers taking part in this research were successfully carrying out the practice of cycling with their children, it became apparent that links were, in most part, connecting effectively. That is, the recruitment of mothers to take part in this research required that they were practicing cycling with their children.

In the absence of any examples of mothers who had taken a permanent break from cycling, it was however, still possible to make some predictions as to why and when broken links might occur and how this could result in the practice being temporarily paused or come to a complete halt. For instance, as demonstrated in an earlier section the most common broken links occurred when children transitioned between being carried on their mother's cycle to riding independently. Similarly, negative incidents such as suffering verbal abuse or dangerous driving around themselves and their children also resulted in mothers deciding to pause due to safety concerns.

A number of mothers taking part in the research, had experienced the issues mentioned above and as such had taken a 'pause' in their practice. However, due to their strong motivations to cycle with their children they had been able to overcome these issues and find ways in which to recommence their practice. It is unclear though, why some mothers who have previously cycled with their children, were unable to find a way to re-start their practice. Therefore, further research is needed with mothers who previously cycled but no longer do so, to better understand the various circumstances leading up to a permanent break in their practice.

How to Increase the Number of Mothers Cycling?

In addition to understanding what might cause breaks in the links between the three elements, this research also sought to understand how more mothers could be recruited to the practice of cycling with their children. Whereas this research featured mothers who were successfully cycling, it is still considered a niche practice in the UK, compared to countries with high levels of cycling such as the Netherlands, Denmark, Germany and Sweden, where cycling for utility purposes and with children is a widespread activity (Kuipers, 2013; Oosterhuis, 2016). To understand how to recruit more mothers, it is important to understand what is preventing higher numbers of mothers from cycling in the first place.

The Literature Review showed that the main barriers preventing more women and mothers cycling can be categorised into three main areas. To summarise, these include a fear of cycling with motorised forms of traffic. A lack of cycling culture in the UK resulting in cycling not being relatable to many women and mothers and finally, the burden of care duties being too difficult to combine with cycling. However, the various barriers listed above are not new, and literature has shown that some of these issues have been known and largely unchanged for the past few decades, although the solutions to overcoming them remain complicated.

Consequently, a need for continual research into the barriers facing women/mothers and cycling is of course important, albeit not the primary focus of this study. Rather, the intention of this research was to build a comprehensive picture of how mothers in the UK are practicing cycling by using the lens of social practice theory and categorising the practice into the elements of materials, meanings and competences. In doing so, it was hoped that this would provide valuable information, not only to better understand the practice but that could also potentially help provide information to help shape future policies to recruit more mothers into cycling.

Whilst some literature on mothers cycling had previously been carried out, there was a specific gap in research looking at the experiences of mothers cycling with their young children for utility journeys in the UK. Conducting this research and thereby classifying the practice of mothers cycling with their children into the three elements of materials, meanings and competences, provided information that had not been previously captured. Furthermore, the use of the Shove et. al (2012) three element model in this research, not only established a comprehensive picture of how mothers are practicing cycling in the UK, but also demonstrated the ways in which the three elements linked together in many different ways.

By capturing the interrelated nature between the three elements, the research also allowed predictions as to how links might break between the elements, particularly for those mothers who may not share the strong motivations to cycle as those in this research did. Furthermore, understanding the interrelated nature of these elements is undoubtedly important when considering policies to increase the numbers of mothers cycling in the UK. This is because not only must the three elements be present for the practice to exist, they must also continually connect with one another to allow the practice to stabilise (Shove, Mika and Matt, 2012).

Therefore, if a change occurs in one element, this can affect a change in the remaining elements. But how does understanding the materials, meanings and competences and the way they interlink, help recruit more mothers to the practice of cycling with their children?

Changes in elements to enable changes in policy?

Due to the interrelated nature of the three elements, making changes to just one of the elements, could initiate variations in the other two. Therefore, when considering how a change in policy could help recruit more mothers to the practice of cycling with their children, presumably consideration of all three elements is equally important?

Competence and Meanings

Many cycling organisations, such as those represented by the women who took part in the focus groups discussions have sought to improve both the meanings and competence elements of cycling as a practice. For instance, in relation to competences, participants talked about how they delivered schemes across the UK especially for women. These schemes provided cycle training and led rides to help build confidence and practical skills teaching women not only to ride but to feel comfortable doing so. As a result, the women they worked with started to change the meanings they assign to cycling. That is, where previously they would consider cycling dangerous or 'not for them' providing them with the competences to cycle leads to cycling being viewed as positive and something that 'is for them'.

Similarly, many of the focus group participants praised the increasing number of family cycling libraries being set up around the UK. These schemes help provide information on the different types of options available for those wanting to cycle with their children, in addition to letting families test ride various cycles before they buy. These type of schemes can also be seen as contributing to the competences needed for cycling, where information or the know- how about different types of child carrying cycles or other pertinent information is increased.

Nonetheless, whilst many of the focus group participants were involved with localised often small scale schemes to help enable more women to cycle, does the fact that such schemes are needed simply reinforce cycling with children is a marginal activity where mothers need specialist training and equipment to take part? This does not mean that these schemes are not needed, nor are they worthwhile, as they have likely enabled positive change to those who have participated in them. Indeed, overcoming the lack of a positive cycling culture and

reversing the negative meanings currently associated with cycling in the UK is vital, albeit it a monumental task given previous discussions of the negativity often found surrounding cyclists. However, does the fact that such schemes are needed to help change the meanings of cycling to more positive ones and to help women and mothers acquire the necessary competences to be able to cycle in the UK, further reinforce that cycling is a marginal practice that you need to opt into?

Materials

In returning to an earlier question – '*presumably consideration of all three elements is equally important?*' Put simply, no. Rather, wide scale changes to cycling infrastructure in the UK, has continually been highlighted as necessary, both in previous literature and throughout this research as the most important component needed to make cycling easier and safer for those mothers currently cycling with their children, as well as attracting more mothers to the practice.

Although mothers taking part in this research were able to overcome a lack of what would be deemed by many as 'safe' cycling infrastructure, this was because they were highly motivated to cycle and in many cases willing to go to extra lengths as demonstrated throughout the study to enable their practice to occur. Nevertheless, many of the mothers were frustrated with a lack of safe infrastructure for the very fact that they had to put so much effort into cycling with their children. Certainly, most mothers taking part in this research wanted better infrastructure to make their own cycling practice safer but also to make it more convenient. Additionally, whilst a preference for protected cycle lanes or quiet roads existed, also of importance was the location of infrastructure which would help enable the types of journeys mothers carry out. For example, linking together networks of routes that facilitated journeys between their homes, education settings, employment and other locations such as shops, leisure centres and places of worship.

Accordingly, whilst changes undoubtedly need to happen in all three elements to allow the practice of mothers cycling with their children in the UK, it does appear that the issue of infrastructure (or lack of) is of particular importance. Indeed, for those mothers who don't assign such positive meanings towards the practice of cycling, it appears in the absence of safe cycling infrastructure, vying for space and mixing with other road users appear too

difficult and too dangerous to overcome. This in turn results in the inability to attract large numbers of women and mothers to the practice at the present time in the UK.

Unfortunately, successive UK governments have struggled in the past and missed many opportunities to stem the rising levels of car use and reverse the decline in cycling. In part a previous reluctance to specify national guidance or commit sufficient funding to local authorities to implement cycling schemes, has meant slow progress and varying standards of cycle infrastructure across the UK needed to encourage cycling, and particularly to attract a more diverse type of cyclist such as women and mothers (Golbuff and Aldred, 2011; Wardlaw, 2014).

Indeed, enabling cycling in the UK appears to present itself as an almost Herculean task to policy makers and local authorities charged with implementation on the ground. It could be argued that the UK struggles to compete with countries with high cycling levels such as The Netherlands, Germany, Denmark and Sweden, because successive UK governments failed to make changes in the 1970s when it first became apparent that growing car use was a policy issue (Golbuff and Aldred, 2011). That is, those countries with high cycling levels (particularly where mothers and children commonly cycle) began integrating cycling into wider transport policy thus changing the fabric of their road systems many decades ago. In contrast, because the UK proceeded with car centric policies instead, it has made it too difficult for the UK to unpick decades of car dependency. These policies resulted in low numbers of people cycling, but also a lack of diversity amongst those who do cycle, with particularly low levels of women and mothers participating.

However, it is apparent that other cities and countries have acted quite recently and achieved impressive modal shift over a short period of time, hopefully rendering arguments that it is too late to make changes moot. These include cities and countries such as Paris, New York and Hungary (Kuster, 2016; New York City Department of Transport, 2020; Vandy, 2020). There are also encouraging statistics in relation to measures undertaken more recently by some of these places, in relation to women's levels of cycling. For instance in New York, before various cycling interventions were put in place, male cyclists outnumbered female riders by 3:1. but have since seen female commuter cycling increasing four times faster than male commuter cycling (New York City Department of Transport, 2020).

Similarly in Paris, a report into the gender parity in cycling carried out after the implementation of temporary cycling measures during the pandemic (which have since been made permanent), saw an increase in women making use of shared bicycle schemes and speculation that an increase in protected cycle lanes has resulted in more women riding their own cycles in the Paris region (although official data has not confirmed this) (Malandrino and Berman, 2020).

Of course, as noted before, the implementation of infrastructure alone does not necessarily automatically equate to an increase in mothers and their children cycling. However, as this research has shown, the majority of mothers cycling with their children in this study had previously cycled before having children and therefore were comfortable cycling with their children because they were confident and felt they had the necessary skills to do so. Whilst more research would need to be carried out, it is possible that if schemes such as those in New York and Paris result in more women cycling for commuting, this could help build their confidence and in turn they may become more receptive to start cycling with their children. Moreover, if change can occur in short space of time for cities and countries previously considered car centric such as Paris and New York, this offers a glimpse of hope for the UK in making similar changes.

Final Thoughts

Although it may be an oversimplification that mothers in countries with high cycling levels seem to simply leave the house, jump on a cycle and ride to their destination, it is unlikely that their practice, (having seen the efforts described in this research), is as complex and laborious as mothers in the UK. Importantly, whilst the mothers in this research were willing to accept the extra effort required to allow them to cycle with their children, not everyone would be willing to go to such lengths, explaining why cycling with children is still very much a minority practice in the UK.

For the practice to become mainstream amongst mothers and their children, cycling needs to be something that does not require such effort. Mothers should not have to unduly worry about their children's safety if they choose to cycle as a mode of transport, nor should they have to worry about being verbally abused or judged negatively by others each time they leave the house. Unfortunately, until significant changes take place all three elements, but

particularly a change in infrastructure, mothers cycling with their children will continue to be a niche activity in the UK.

Appendix 1 – Focus Group Questions

- What do you think the positives to cycling with children are?
- How is cycling with children perceived where you live/work?
- What do you think are some of the barriers when cycling with children?
  (Possible prompt – weather, topography, infrastructure)
- What do you think are the best types of places/infrastructure to cycle with children?
  (Possible prompt – how much difference does it make if riding a child carrying bicycle compared to children cycling alongside their mother on their own bikes?
  Possible prompt – what about for those cycling in rural areas? How might this differ to those riding in cities and more suburban areas?)
- How much of a barrier do you think the cost of child cycling equipment is to some families?
- Is there anything that you think could be done to help make the cost more accessible to mothers/families?
- Parking (or lack of) is constantly raised as a concern both at home and end destinations. Do you have any suggestions on how this might be improved for people cycling with children?
  (Possible prompt-what about with larger and heavier child carrying cycles?)
- For women who have taken a long break from cycling or for those that have never learnt to cycle. What do you think are practical steps that could be taken to encourage them to start cycle with their children?
  (Possible prompt – how helpful do you think cycle training, led rides, buddys, provision of bikes, bike maintenance etc would be?)
- What do you think are the main issues with mothers trying to cycle with children of different ages and abilities? How might these be overcome?
- Mothers are often required to juggle many things such as work, household errands and childcare. Aside from cycle specific policies are there any other factors that might need to change to help facilitate the switch to cycling?
  (Possible prompts – flexible working hours, school drop off times (especially if children at different schools).

Appendix 2 – Survey Questions

Cycling with Children Under 11

Q1 **What is this research about?**

This survey is being conducted as part of a PhD research project at the University of Westminster. The aim of the research is to look at the experiences of mothers who cycle with their children (aged 11 and under) for everyday journeys in the UK. It will seek to understand the different types of bikes being used and preferred types of infrastructure for cycling on with young children. It will also look at any barriers facing mothers cycling with their children. You must be aged 18 or over to participate in this survey.

What will I be asked to do?

You will be asked to complete an online survey which should take approximately 10-15 minutes. Participation in this study is entirely voluntary. You may decide not to answer any survey question or stop answering the survey at any point. You will be asked for some personal information (age, ethnicity, employment status etc) in the survey. Cycling data suggests that cycling levels vary according to a range of demographic factors, and asking for this data will enable the research to investigate whether there is any relationship between these characteristics and attitudes, decisions or experiences relating to cycling. If you are willing to participate in follow up research (30-45 min telephone interview) you will be asked to provide your email. If at a later date you decide not to take part, there is no obligation to do so. You may also decide to withdraw from this project at any time by emailing the Researcher, Dawn Rahman, at w1804096@my.westminster.ac.uk or the Research Supervisor, Professor Rachel Aldred at r.aldred@westminster.ac.uk If you notify us of your withdrawal, all your survey data will be destroyed. If you would like to make any complaints about this research please contact Professor Harry Charrington (Head of Architecture and Cities) at charrih@my.westminster.ac.uk or telephone +44 (0)20 7911 5000

What happens to the data I provide?

The information you provide will be retained for 5 years after this survey to support this further research and is then destroyed. All the information you provide will be treated as confidential and, if published, will not be identifiable as yours. All computer data files will be stored securely, encrypted and password protected. The researcher will keep files in a secure place and will comply with the requirements of the General Data Protection Regulation 2018 and the Data Protection Act 2018. Information from the survey will be coded to preserve your anonymity and confidentiality, and will be summarised in the final write up and any publications resulting from this study in an anonymous format. Anonymised quotes may be used, but these will not be identifiable as yours. If you have any questions or comments regarding this research or would like additional information or a brief summary of the outcomes, please contact the Researcher, Dawn Rahman, at w1804096@my.westminster.ac.uk. You can also contact our Data Protection Officer at dpa@westminster.ac.uk.

I have read the above information and I freely consent to participate in the survey

- ○ I consent (and am aged over 18) (4)
- ○ I do not consent (or I am under the age of 18) (5)

Q2 How many children do you have under the age of 11?

- ○ None (1)
- ○ 1 (2)
- ○ 2 (3)
- ○ 3 (4)
- ○ 4 (5)
- ○ 5+ (6)

Q3 Are you a single parent?

- ○ Yes (1)
- ○ No (2)
- ○ I co parent (living at different addresses) (3)
- ○ Prefer not to say (4)

Q4 How often do you cycle with your child/children?

- ○ Daily (1)
- ○ A couple of times a week (2)
- ○ Once a week (3)
- ○ Twice a month (4)
- ○ Once a month (5)
- ○ Less than once a month (6)
- ○ I used to cycle with them but have now stopped (7)

Display This Question:

If How often do you cycle with your child/children? = I used to cycle with them but have now stopped

Q5 You have said that you have now stopped cycling with your children for everyday types of trips. For the following questions can you answer them by thinking back to when you were cycling with your children.

Q6 Which types of cycling trips do you carry out with your child/children?

- ☐ To nursery/pre-school or school (1)
- ☐ For shopping/errands (2)
- ☐ For medical appointments (3)
- ☐ Visiting friends and/or family (4)
- ☐ We cycle and use public transport combined for trips (7)
- ☐ We only use our bikes for leisure purposes (8)
- ☐ Other (9) _____

Q7 Why do you cycle with your child/children? Please choose all that apply

- ☐ Quick and convenient (1)
- ☐ Cheap way to travel (2)
- ☐ Environmental reasons (3)
- ☐ Healthy/good exercise (4)
- ☐ Fun and bonding opportunity with my child/children (5)
- ☐ Don't have access to other forms of transport (6)
- ☐ Other (please give details) (7)

Q8 This question contains quite a long list of different bicycle set ups. Please can you tick the following bikes that you currently use with your child/children. If you use more than one, please tick multiple options.

- ☐ Adult Bike with front/back child seat (non electric) (2)
- ☐ Adult bike with front/back child seat (electric assist) (3)
- ☐ Adult bike with trailer attached (non electric) (4)
- ☐ Adult bike with trailer attached (electric assist) (6)
- ☐ Adult bike with tag along (followme/ trailgator etc) (non electric) (7)
- ☐ Adult bike with tag along (followme/ trailgator etc) (electric assist) (10)
- ☐ Purpose built tandem/triplet (non electric) (13)
- ☐ Purpose built tandem/triplet (electric assist) (14)
- ☐ Cargo style bike including longtail (non electrical assist) (15)
- ☐ Cargo style bike including longtail (electrical assist) (16)
- ☐ Adult bike (with no child carrying equipment attached) (non electric) (17)
- ☐ Adult bike (with no child carrying equipment attached) (electric assist) (18)
- ☐ Child/children ride their own bicycle independently (balance bike/pedal bike) (19)

Q9 Did you buy your current bicycle set up brand new or secondhand?

- ○ Bought brand new (1)
- ○ Bought secondhand (4)
- ○ It was gifted to us (free) (5)
- ○ A mix of new and secondhand (7)

Q10 Thinking about your current bike set up. How much did you spend on your bikes combined?

- ○ Nothing it was gifted to us (1)
- ○ Under £100 (2)
- ○ £101-300 (3)
- ○ £301-£500 (4)
- ○ £501-£750 (5)
- ○ £751-£1,000 (6)
- ○ £1,001-£2000 (7)
- ○ £2,001-£3000 (8)
- ○ Over £3,001 (9)
- ○ Can't remember (10)

Q11 When riding on your own **WITHOUT** your children, which of the following infrastructure are you comfortable cycling on? (please tick all that apply)

- ☐ Footway/sidewalk (1)
- ☐ Shared use cycle/pedestrian path (2)
- ☐ Shared bus and cycle lane on road (3)
- ☐ Quiet roads (4)
- ☐ Busy roads (no cycle facilities) (5)
- ☐ Busy roads (with painted cycle lanes) (6)
- ☐ Busy roads (with protected cycle lanes) (7)

Q12 When you ride with your **child in a child carrying bicycle**, which of the following infrastructure are you comfortable cycling on? (please tick all that apply). Child carrying means any type of bike such as a cargo bike, tandem, trailer, child seat or tagalong/followme tandem.

- ☐ Footway/sidewalk (1)
- ☐ Shared use cycle/pedestrian path (2)
- ☐ Shared bus and cycle lane on road (3)
- ☐ Quiet roads (4)
- ☐ Busy roads (no cycle facilities) (5)
- ☐ Busy roads (with painted cycle lanes) (6)
- ☐ Busy roads (with protected cycle lanes) (7)

Q13 When your child/children cycle alongside you **on their own bicycle(s)**, which of the following infrastructure are you comfortable cycling on? (please tick all that apply)

- ☐ Footway/sidewalk (1)
- ☐ Shared use cycle/pedestrian path (2)
- ☐ Shared bus and cycle lane on road (3)
- ☐ Quiet roads (4)
- ☐ Busy roads (no cycle facilities) (5)
- ☐ Busy roads (with painted cycle lanes) (6)
- ☐ Busy roads (with protected cycle lanes) (7)

Q14 Which of the following have you experienced when riding with your child/children? (Please tick all that apply)

- ☐ Guard railing barriers/steps that cause an obstruction to your journey (1)
- ☐ Vehicles blocking cycle lane or dropped kerbs (2)
- ☐ Close passes from other road users (3)
- ☐ Purposely driven at by other road users (4)
- ☐ Car door being opened on you as you cycle past (5)
- ☐ Vehicle pulling out in front of you (6)
- ☐ None of the above (7)

Q15 Thinking about the previous question. Did this have any impact on how you cycle with your child/children?

- ○ Yes I stopped cycling completely with my child/children as a result (1)
- ○ Yes, I took a short break from cycling for a short while but am now cycling again with my children (2)
- ○ Yes, I adapted my route as a result (3)
- ○ No because there is no alternative route I can take (4)
- ○ No, I haven't let it bother me and have carried on cycling as normal (5)
- ○ Other (please give details) (6)

Q16 Which of the following have you experienced when riding with your child/children? (Please tick all that apply)

- ☐ Verbal abuse from other road users (1)
- ☐ Sexual harassment/abuse (2)
- ☐ None of the above (3)

Q17 Thinking about the previous question. Did this have any impact on how you cycle with your child/children?

- ○ Yes I stopped cycling completely with my child/children as a result (1)
- ○ Yes, I took a short break from cycling for a short while but am now cycling again with my children (2)
- ○ Yes and I adapted my route as a result (3)
- ○ No because there is no alternative route I can take (4)
- ○ No, I haven't let it bother me and have carried on cycling as normal (5)

○ Other (please give details) (6)

Q18 Thinking about when you stopped cycling or took a break from cycling with your children. Did any other factors influence your decision? Please give details

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Q19 Where do you store your bicycle(s) at home? (please tick all that apply)

- ☐ Inside our house/flat (1)
- ☐ Inside a garage (2)
- ☐ In a shed (3)
- ☐ In the front garden (uncovered) (4)
- ☐ In the front garden (with a temporary cover ie. tarpaulin) (5)
- ☐ In the back garden (uncovered) (6)
- ☐ In the back garden (with a temporary cover ie. tarpaulin) (7)
- ☐ In a shared communal area (inside) (8)
- ☐ In a shared communal area (outside) (9)
- ☐ In a bike hangar on the street (10)
- ☐ On the street (11)
- ☐ Other (please give details) (12)

Q20 Thinking about your how you store your bicycles at home. Please tick all statements that apply

- ☐ We have sufficient space to store our bicycles at home (1)
- ☐ We do not have sufficient space to store our bicycles at home (2)
- ☐ Accessing and moving our bicycles in and out of our home/garden is no

problem (3)

- [ ] Accessing and moving our bicycles in and out of our home/garden is often difficult (4)
- [ ] Other (please give details) (5)

Q21 Have you ever had any of your bicycles stolen (please tick all that apply)

- ○ Yes (1)
- ○ No (12)

Q22 What is your age?

- ○ 18-24 (2)
- ○ 25-34 (3)
- ○ 35-44 (4)
- ○ 45-54 (5)
- ○ Over 55 (6)

Q23 What is your ethnic group?

- ○ Asian or Asian British (includes any Asian background eg. Bangladeshi, Chinese, Indian, Pakistani or other East/South Asian) (5)
- ○ Black, African, Black British or Caribbean (includes any Black background) (6)
- ○ Mixed or multiple ethnic groups (includes any Mixed background) (8)
- ○ White (includes any White background) (9)
- ○ Another ethnic group (includes any other ethnic group eg Arab) (18)
- ○ Prefer not to say (19)

Q24 What is your current employment status?

- [ ] Employee in full time job (1)
- [ ] Employee in part time job (2)
- [ ] Self-employed, full or part time (3)
- [ ] Full time education (4)
- [ ] Unemployed and available for work (5)
- [ ] Permanently sick/disabled (6)
- [ ] Retired (7)
- [ ] Looking after children full time (8)
- [ ] Other (please give full details) (9)

Q25 What is your total household income after tax?

- ○ Below 10,000 (1)
- ○ £10,001-£20,000 (2)
- ○ £20,001 -£30,000 (3)
- ○ £30,001-£40,000 (4)
- ○ £40,001-£50,000 (5)
- ○ £50,001-£60,000 (6)
- ○ £60,001-£70,000 (7)

- ○ £70,001-£80,000 (8)
- ○ Over £80,000 (9)
- ○ Prefer not to say (10)

Q26 What is the highest level of education you have completed?

- ○ Primary School (1)
- ○ Secondary School up to 16 years (GCSE, O-Levels, Nat 5s) (2)
- ○ Higher or Secondary or Further education (A-levels, Scottish Highers/Advanced Highers, BTEC etc) (3)
- ○ College or University (Degree) (4)
- ○ Post graduate (Masters/ PHD) (5)
- ○ Other (6) _____
- ○ Prefer not to say (7)

Q27 In which Country do you live?

- ○ England (1)
- ○ Northern Ireland (2)
- ○ Scotland (3)
- ○ Wales (4)

Q28 In what region do you live?

- ○ East of England (1)

- East Midlands (2)
- London (3)
- North East (4)
- North West (5)
- South West (8)
- South East (9)
- West Midlands (11)
- Yorkshire/Humberside (12)

Q29 In what region do you live?

- Antrim (1)
- Armagh (2)
- Down (3)
- Fermanagh (4)
- Londonderry (5)
- Tyrone (6)

Q30 In what region do you live?

- ○ Aberdeen and North East (1)
- ○ Highlands and Islands (2)
- ○ Tayside, Central and Fife (3)
- ○ Edinburgh and Lothians (4)
- ○ Glasgow and Strathclyde (5)
- ○ Scotland South (6)

Q31 In what region do you live?

- ○ Mid Wales (1)
- ○ North Wales (2)
- ○ South East Wales (4)
- ○ South West Wales (5)

Q32 Please provide the **first part** of your postcode only. This is to allow identification of whether you live in a rural, suburban or urban area which is really important to the findings of this survey. For example if your postcode is N2 6GH please just put **N2**

Q33 Thank you for taking the time to fill out this survey. If you would be willing to take part in this research further, please provide your email address below. This would involve a 30-45 minute telephone or video call, talking in more depth about your own personal experiences of cycling with children. If at a later date you decide not to take part, there is no obligation to do so.

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Q34 If you would like to be entered into a draw to win a £10 voucher, please provide your email address below.

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Appendix 3 – Interview Questions

- **Questions about your cycling** – To include whether they cycled previously and if they were a confident cyclist? Do friends and family cycle and are they supportive of you cycling with your child/children, or do they have concerns? Has a stranger ever made comments (positive or negative) about you cycling with your child/children?
- **Questions about their bicycles and how they got started**-How did you get started – how did you choose you cycle set up (did you get advice from friends/internet/other?). Did you test ride any bicycles first? Would trying out a range of child carrying bicycles been useful?
- **Questions about a particular journey they undertake**- Interviewees were asked to describe in detail, a regular journey they undertake with their child/children. This included descriptions of any preparation they had to do before they left i.e getting helmets on or bicycles out of sheds/garages etc. Prompts included the type of area they were cycling in, i.e city, town, rural and if it was a hilly area. They were then asked to describe the infrastructure they were using and if there were any particular issues that arose on their trip and/or if there were certain sections, they didn't enjoy riding on and/or if there were sections they really enjoyed. Prompts also included whether they would undertake the same trip in different types of weather and also once it gets dark.
- **Questions about the logistics of cycling with their children –** interviewees were asked if they have to plan routes beforehand when they ride with their children? If they have more than one child, how do they manage trips – do you have a particular style of riding, are there only certain routes you can do? How do you juggle cycling with your children and other commitments such as work (paid and unpaid)? How confident are you that your children follow instructions when cycling – have you had any incidents when cycling?

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