

**Cycling and Behaviour Change:  
Using games to improve the experience for families**

**GeoVation 'Mission:Explore' – Final research report**



**It's adventure  
but not as you know it!**



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West of England**



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<sup>1</sup> The Technology Strategy Board's role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business in order to increase economic growth and improve the quality of life. [www.innovateuk.org](http://www.innovateuk.org).

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## ***Executive summary***

Digital games and media are being harnessed for educational purposes, with some now being used to promote sustainable behaviour. Such approaches exploit current trends in technology use and the popularity of digital gaming to encourage new activities or to change people's behaviour. Mission:Explore is a project that taps into this new area, and is focussed on encouraging children and young people to get out and explore their local area through posting online challenges – which participants take part in to score points, earn rewards, and unlock achievements. The innovation was driven by a pro-social motivation to get people engaging with 'geography' in its widest sense, and to encourage local community participation as a way of addressing contemporary social issues. The social diffusion of Mission:Explore is based around developing a user community of participants.

This research has focussed upon the potential of expanding the locations of the challenges posed by Mission:Explore to incorporate parts of the National Cycle Network (NCN), with the rationale being that this could be a motivating factor in encouraging greater use of the network, and consequently help in promoting cycling and active travel more generally. The aim of this research has been to explore the different ways in which families engage in game-playing, understand their current cycling behaviours, and explain how bringing the two together might be a motivating factor in encouraging them to cycle more and make greater use of the NCN routes in their area.

The findings from the study show that in line with existing research, there are two main motivations for families to play games together: the first (and strongest) is simply for fun; the second is that playing games together gives them time together as a family, which can sometimes be difficult to find when different family members have busy and varied activity schedules and diverse interests.

When asked about the notion of setting challenges along the national cycle network, there were several interesting suggestions of what families would like:

- i) Challenges structured around the activity of cycling itself (i.e. instructional activities related to skills riding the bike, using gears, etc...). This was suggested as a way of increasing both adults and children's confidence in using the bike, which was suggested as a significant barrier to families cycling more.
- ii) Areas of cycle track engineered to be more physically exciting. Children and adults enjoyed the simple feeling of being on their bike, and the suggestion was that at points along a stretch of the route there could be the option to divert from the main, direct path and explore areas with ramps, berms,

banked corners, chicanes, and other additions to make the experience more fun.

- iii) Attractively landscaped areas at which to stop, rest, and explore along the route. Some of the participants enjoyed taking new routes for the adventure, however said that some structure to this would improve the experience. Areas that provide information about the route and challenges tailored to the local area would be welcomed. These should not be far off the track and should be clearly marked.

The key message to be taken from this research is that whilst playing games together was always seen as an enjoyable part of family life, there is a question as to how motivational adding a gaming element to the NCN would be in the context of encouraging greater use. The key barriers to greater use of the network identified were:

- I) A lack of confidence on bikes (amongst adults, which could be passed to the children);
- II) Concerns for safety linked to the fragmented nature of the network, and the need to cycle for a distance on-road to access car-free portions of the NCN (related to the previous point);
- III) A lack of knowledge about how and where to cycle in the local area.

As such, it is unlikely that providing challenges alone will encourage families that do not cycle much (or at all) to get out there and use the NCN, because such an approach does not address these deeper-seated barriers.

However, for families that are already experienced and confident in cycling together, it was seen as a welcome addition to their more routine experiences of the NCN routes in the area. All parents that were interviewed were extremely enthusiastic about any efforts made to provide activities for them to do with their children, and from this perspective there is merit in improving NCN in the ways described above.

To summarise: Improving NCN routes through the addition of challenges or games en-route is not a quick-fix cure-all, however it could fit well into the current toolkit of approaches to improving cycling infrastructure, and further contribute to the NCN providing a more engaging, fun, and desirable cycling experience for users.

## **1.0 Introduction**

### **1.1 Project overview**

Mission:Explore seeks to 'help young people and families explore and experience the world in new ways through making new kinds of journeys'. It provides young people (of varying age ranges, with different approaches for different ages) with missions to complete – activities to discover and undertake with points or tangible rewards available to incentivise. The GeoVation funding is targeted at encouraging use of the National Cycle Network and seeks to understand how the 'gaming layer' can be used to help tackle habits and make cycling more desirable. The intention is to pilot along one cycle route in 2011 and further in 2012.

Previous research suggests behavioural change works best when individuals receive real-time immediate feedback on their own choices and they are able to compare their choices with other individuals (see Chatterton et al., 2009; De Young, 1996). Hence, success in behavioural change is linked to real-time personalised information, which makes invisible consumption visible, and allows participants to expose their behaviour to conscious scrutiny (e.g. Nye & Burgess, 2008). In addition, the social comparison aspect important to behavioural change involves the making of plans in front of others has a pledge component which is seen as psychologically meaningful (e.g. Nye & Burgess 2008), allowing participants is to “measure themselves and debate” through an opportunity for reflection and self-learning (Hobson, 2001). However, in traditional behavioural change the motivation to engage in the change is often lacking. Adding a gaming layer can alter this motivation and position it within a series of smaller challenges that make-up an overarching goal.

The proposed supporting research aims to investigate what currently happens when families play games in different scenarios, and how elements of game-playing create behavioural change amongst the family group. A series of interviews with a whole family unit will investigate how families play games (electronic and otherwise), including motivation and outcomes. How game-playing is used by families to explicitly create behaviour change and how it might unintentionally change behaviour will be examined. In addition, a smaller number of focus groups with families who cycle together will examine the motivation for cycling as a family including an examination of how barriers might be overcome and outcomes from the activity. Ethnographic research following one or two of the family groups will take place to observe behaviour on the family cycle trips. Finally, two groups of senior school children from years 7 and 10 will take place to see how far such game-playing may occur beyond the family group. Year 7 is taken as cycling rates increase dramatically amongst this age group as children become independent for the first time and year 10 to contrast the younger children ,as peer groups are cemented and social norms about socialising are strong.

## **1.2 Aim and objectives**

The aim of this work package is to better explore how and why families play games with particular focus on behavioural change in a variety of settings. It will focus on what motivates families to play games, how different members engage, when these games take place and what happens as they take place, with a focus on the overall behavioural effects of taking part in the game for the individuals and the family. The findings may be utilised by the innovator to fine tune the game designs in the future and could enable development of game theory and behavioural change. Specifically, the following objectives will be pursued:

1. To understand the motivation families have for engaging in game-play, both for individual members and as a group;
2. To explore how and when families and children engage in game-play
3. To identify what makes a game engaging amongst families and children and creates sustained involvement for both families and children and how far this can be related to a travel (behaviour change) situation and context
4. To understand how, when and in what contexts games create behavioural change, including games with deliberate behavioural change motivations and those that change behaviour more by chance, and how far this might be translated to a travel behaviour change context
5. To identify what happens when families and children go cycling, including motivations and outcomes, with specific interest in relating findings to travel behaviour change theory and contexts.

## 2.0 Literature review

### 2.1 Summary

Mission:Explore seeks to ‘help young people and families explore and experience the world in new ways through making new kinds of journeys’. It provides young people (of varying age ranges, with different approaches for different ages) with missions to complete – activities to discover and undertake with points or tangible rewards available to incentivise. The GeoVation funding is targeted at encouraging use of the National Cycle Network and seeks to understand how the ‘gaming layer’ can be used to help tackle habits and make cycling more desirable. This literature review draws together existing research into how families play games, how games can encourage behavioural change, and furthermore how the motivational power of games might be a useful tool in the aim of increasing use of the National Cycle Network.

### 2.2 Games

There are many different types of games, played for a range of reasons. The scope of the literature at this level is extremely broad, and spending time going into depth on the multitude of different literatures related to the subject adds little to the task of completing the aims of this project. It is necessary at the outset of this review to explain the type of game that is under investigation, so as to explicate the remit within which this discussion is based.

Juul (2003) presents a useful overview of seven different definitions of games from existing research, which serve as an appropriate starting point for this review.

Source	Definition
<b>Huizinga (1950, p. 13)</b>	[...] a free activity standing quite consciously outside “ordinary” life as being “not serious”, but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings which tend to surround themselves with secrecy and to stress their difference from the common world by disguise or other means.
<b>Caillois (1961, p. 10-11)</b>	[...] an activity which is essentially: Free (voluntary), separate [in time and space], uncertain, unproductive, governed by rules, make-believe.

Source	Definition
<b>Suits (1978, p. 34)</b>	To play a game is to engage in activity directed towards bringing about a specific state of affairs, using only means permitted by rules, where the rules prohibit more efficient in favor of less efficient means, and where such rules are accepted just because they make possible such activity.
<b>Avedon &amp; Sutton Smith (1981, p. 7)</b>	At its most elementary level then we can define game as an exercise of voluntary control systems in which there is an opposition between forces, confined by a procedure and rules in order to produce a disequilibrium outcome.
<b>Crawford (1981, Chapter 2)</b>	I perceive four common factors: representation [“a closed formal system that subjectively represents a subset of reality”], interaction, conflict, and safety [“the results of a game are always less harsh than the situations the game models”].
<b>Kelley (1988, p. 50)</b>	A game is a form of recreation constituted by a set of rules that specify an object to be attained and the permissible means of attaining it.
<b>Salen &amp; Zimmerman (2003, p. 96)</b>	A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome.

Whilst there is great diversity within the literature, Linehan *et al.*, (2011) provide a useful explanation of the common features of most games, and suggest that successful games have the following elements:

1. Require the player to take some actions or decisions in order to reach goals.
2. Excel at providing immediate, appropriate and specific feedback to players. This feature is at the heart of the motivation, sustained attention, learning and fun experienced by game players.
3. Have a complex system for presenting players with rewards for achievement.
4. Methodically teach players the skills needed to meet complex challenges. Long, complex tasks are broken down into short, simple components. These components are trained individually before being chained together.
5. Players are expected to demonstrate excellent performance of a skill before they can advance to using that skill in a more challenging environment. Complex tasks,

then, simply require the chaining together of these previously learned simple skills.

6. Where games present the player with options for taking action, no one action should be obviously correct, while others are obviously incorrect.

The Mission:Explore ‘game’ is an innovative blend of on-line information and real-world adventure, which encourages the exploration of the places where people live (or visit) through providing specific challenges that must be completed (for example, a person completing a mission may have to explore a destination to find a specific landmark photographed on the website).

In this sense the platform has the most in common with current examples of ‘m-learning’. M-learning is an umbrella term used to describe a multitude of emergent approaches to facilitating learning through providing contextual information to individuals as they explore real-world locations, with content delivered through increasingly ubiquitous advanced mobile ICT technologies such as smartphones (see: Costabile *et al.*, 2008; Huizenga *et al.*, 2009; Facer *et al.*, 2004). Whilst strictly a teaching method, the *experience* of m-learning is likened to the experience of a game because it involves a less (obviously) structured pedagogic approach, within which boundaries between learning outcomes and the enjoyable experience of exploration and ‘adventure’ are blurred. The behaviour change aspect of this project requires similar outcomes to a learning objective, in that information must be delivered, processed by individuals, and retained. M-learning is returned to later in this review.

Therefore this review focuses largely on literature which has explored the behavioural and learning potential of approaches such as m-learning, and explores the different games that have been used within these. With reference to the project objectives, the importance of game-playing within families is explained first, before moving to consider how games can be used as motivational tools in the facilitation of lasting behaviour change.

### **2.3 Family game-playing**

Ulicsak and Cranmer (2010) focus on computer/video gaming in exploring how families perceive and experience playing together. They note the lack of research in the field, ‘the literature review found that there was little information about gaming as a family and virtually no information on young people’s opinions on gaming in families’ (p. 7). More typical explorations of game-playing in families are concerned with the therapeutic potential of games in addressing family issues (for example, see: Blechman *et al.*, 1976). The aims of such approaches are far removed from the aims of this project, and such research does not contribute to the development of this review. The report by

Ulicsak and Cranmer (2010) explains the findings from a piece of empirical research conducted to address this, and explores gaming in families from the perspective of what types of games are played, who (within the family) is playing the games, and why family gaming occurs.

The main motivation for playing games as a family is enjoyment, and more specifically this enjoyment is related to the fun of spending time together in joint family activities (Ibid). The report notes that gaming is only one of several different activities which families enjoy together, of which bicycle trips are also explicitly mentioned: ‘Families reported that joint activities strengthened family relationships. These could also include shopping or bicycle trips, but gaming was included as one such activity’ (Ibid, p. 15). Thus, whether playing computer games or riding bicycles, the key aspect is that they are a family activity. Therefore, in the context of this research, the value of the gaming layer in changing travel behaviour and encouraging greater use of the National Cycle Network is not in the activity of gaming itself, but rather the in *motivational* potential of games to get families to get on their bikes and use their time together to explore the network in their local area and beyond.

Besides the motivation to play together there are several further motivations that adults and children described when talking about gaming as a family. Different age groups have slightly different reasons for wanting to play together, and these are summarised in Table 1 below.

Motivations given in interview	
Adults	Children
For the enjoyment of the game/family time	For the enjoyment of the game/family time
<ul style="list-style-type: none"> <li>▪ To help children play alone in other contexts</li> <li>▪ Because it’s something parents do</li> <li>▪ To improve children’s social skills</li> <li>▪ To improve factual knowledge</li> <li>▪ To improve problem solving</li> <li>▪ To moderate game-play (specifically related to computer game content)</li> <li>▪ To improve hand-eye coordination (relevance to cycling proficiency?)</li> <li>▪ Because they were asked</li> </ul>	<ul style="list-style-type: none"> <li>▪ So that parents can moderate content</li> <li>▪ Because they would otherwise have to play alone</li> <li>▪ Because they try harder when an adult is playing</li> <li>▪ To show grown-ups what to do (related to technical aspect of computer games)</li> <li>▪ So that grown-ups can help/teach</li> <li>▪ So that grown-ups can spend time with them</li> <li>▪ Because the grown-up enjoys it</li> <li>▪ To spend time with that grown-up</li> </ul>

**Table 1 - Motivations for gaming in families (Ulicsak & Cranmer, 2010)**

It should be noted that most of these motivations came as a secondary function to the enjoyment of the game and of spending time together, nonetheless it is worth noting that the motivations to engage in game play can be diverse and involve more than the simple act of gaming itself.

#### **2.4 Games and motivation**

Therefore, at the most basic level, people play games because they are fun. However what might constitute a ‘fun experience’ could also be described by several different synonyms (i.e. energising, enjoyable, liking, interesting, rewarding, and pleasurable) (see: Baranowski *et al.*, 2008). Furthermore it is likely that different people will attribute different explanations of the experience of a game, and there is a particular divide in language between children and adults. However, it is suggested that this variation in descriptions the experience of a game is largely in name only (Corbeil, 1999), and there is commonality in the qualitative experience of ‘play’. Cramer *et al.* (2004) have explained that games have an intrinsic motivational aspect which is largely a result of the curiosity they stimulate. The act of engaging with the game can be inherently satisfying: ‘A sense of accomplishment is gained by a thorough comprehension and mastery of the causes and effects of the gaming environment; hence there is a strong desire to understand it’ (p. 4).

In a related piece of research, Jay *et al.* (2009) explored the influence of public artwork installations along cycle routes, and the effects of these upon young people’s perceptions and experiences of using the route. Their results show that of the artworks which young people engaged with, those that were seen as ‘interactive’ or ‘fun’ held the most appeal and enriched the experience of using the cycle path. In the specific context of this project, it is important to note that younger people enjoyed the opportunity to have interactive installations along the route on which they could climb, explore, and play. This is directly related to the gaming aspect of the Mission:Explore platform, and suggests that a gaming layer applied to the National Cycle Network would benefit most from encouraging families to interact with locations along the route, to explore more widely than perhaps just the cycle path itself, and furthermore to focus on providing an adventure and objectives that extend beyond the purely aesthetic (see: Jay *et al.*, 2009). Importantly, the report notes that ‘for young people the public art contributes positively to the pleasure and interest of a cycling journey’ (Ibid, p. 11). Specifically, the installations were seen to improve the experience and ‘alleviate some of the boredom of cycling along a route’ (Ibid). In relation to this, Haddock *et al.* (2009) have found that adding a gaming layer to the use of a stationary exercise bike lead children to put greater energy into cycling than they did when cycling alone; importantly, without an increase in the *perceived exertion* of cycling. This demonstrates that the gaming aspect is

a motivator to put greater physical effort into cycling, and the authors explain that this could be particularly effective if the game in question ‘made the children more likely to exercise or to exercise for a longer period of time’ (Ibid, p. 5) – as is the case with the Mission:Explore platform. Discussion in the following section considers the relevance of this to encouraging travel behaviour change.

The motivational aspect of games has long been recognised, and there are many examples of attempts to use games as a part of effective and engaging teaching methods (for example see: Sanchez, 2011; Linehan *et al.*, 2011; Puttick & Storeyguard, 2007; de Freitas, 2006; Kirriemuir & McFarlane, 2004; Corbeil, 1999; Brougère, 1999). More recently, the advancement of home computers and now new mobile technologies has expanded this potential. As explained previously, with particular relevance to this project, several studies have explored the potential of m-learning, which extends the use of computer-based learning to the use of emergent mobile technologies such as smartphones, and which has been explored as a way of encouraging students to engage with teaching materials whilst exploring physical environments that they are relevant to (for example, see: Costabile *et al.*, 2008; Huizenga *et al.*, 2009; Facer *et al.*, 2004). The continued advance of mobile ICT technology means that there are ever-increasing opportunities to blend the ‘gaming layer’ into the experience of using the National Cycle Network. In particular, the affordance of locations-based services (GPS positioning) in combination with seamless internet connectivity mean that it is easier to engage with the game information in real-time on-the-move.

## **2.5 Games and behaviour change**

The capacity for games to encourage behaviour change is at the core of this project. Through the inherent gaming aspect of the Mission:Explore platform it is intended that engaging families in the ‘game’ of completing missions by exploring parts of the National Cycle Network will assist in encouraging changes in behaviour and increased use. Reflecting on the literature which explains the motivational power of games, several studies have specifically explored the use of games to bring about behaviour change. Hegerle *et al.* (1979) have explained how games have been used by teachers to change disruptive behaviours in the classroom. Amaro *et al.* (2006) have explored the use of an educational board game (named Kalèdo) to encourage healthy eating amongst children. More recently with the proliferations of computer technology, the focus of attention has shifted to the potential of computer games. Southard and Southard (2006) suggest that activity-contingent computer games (for example dancing games) have the potential to encourage behaviour change in children, and be effective as a motivational tool for greater physical exercise in general. Similarly, Mhurchu *et al.* (2008) have explored how children’s enjoyment of computer games can be transferred utilised to increase physical activity through active computer games. These final examples can be seen to have a

particular relevance to this project, where an implicit aim is to increase physical activity (i.e. use of the National Cycle Network). Baranowski *et al.* (2008) assert that computer games could have great potential in effecting health-related behaviour change, and go into greater depth in explaining how the intrinsic motivational qualities of computer games is key in this respect, most importantly, that people are doing the new behaviour quite simply because they ‘want to do it’ (Ibid, p. 81). This rationale is developed in the context of this project to apply specifically to travel behaviour change, and this is explained further below.

It should be noted that whilst these studies all present findings which suggest that games could be a motivator to *longer-term* behaviour change; none of these have explored the efficacy of such an approach over time (for example using panel data). Therefore they provide no specific findings concerning the durability of the changes to behaviour brought about by games, and whilst the findings of the above studies are promising, caution must be taken when inferring the true long-term value of this approach.

Baranowski *et al.* (2008) use Social Cognitive Theory (SCT) (see: Bandura, 1986; Saunders *et al.*, 2007) and the Elaboration Likelihood Model (ELM) (see: Petty & Cacioppo, 1996) as a theoretical foundation for a discussion of how video games can encourage behaviour change. Four key steps in behaviour change are identified as: attention, retention, production, and motivation (Baranowski *et al.*, 2008). The ELM explains that attracting and retaining a person’s attention is the first critical step in getting them to process the information that is necessary to encourage the change in behaviour. Previous research suggests behavioural change works best when individuals receive real-time immediate feedback on their own choices and they are able to compare their choices with other individuals (see: Chatterton *et al.*, 2009; Kearney & De Young, 1996). Hence, success in behavioural change is linked to real-time personalised information, which makes invisible consumption visible, and allows participants to expose their behaviour to conscious scrutiny (see: Burgess & Nye, 2008). In addition, the social comparison aspect important to behavioural change involves the making of plans in front of others has a pledge component which is seen as psychologically meaningful (e.g. Burgess & Nye, 2008), allowing participants is to “measure themselves and debate” through an opportunity for reflection and self-learning (Hobson, 2001).

However, in traditional behavioural change the motivation to engage in the change is often lacking. Adding a gaming layer can alter this motivation and position it within a series of smaller challenges that make up an overarching goal. By encouraging actual use of the cycle network as a part of the ‘game’, the important information necessary for instigating and maintaining travel behaviour change can be delivered in a format which is inherently fun – and furthermore the information is reinforced by the *actual experience* of the new behaviour (e.g. cycling as a family). Family group members can

therefore be motivated by both the enjoyment and curiosity engendered by the game itself and furthermore by the opportunity that the experience provides for joint family activity.

Reflecting on the above discussion, it can be seen that the prime motivation to game playing is to have fun. However, a variety of additional factors, including spending time with others, mastery, self-esteem, accomplishment and motivation for achievement and exploration are also key motivators. The location of the game can affect accessibility and motivation for the game. A game might be situated virtually on a computer or games console or may be situated in a specific physical location. Games might be co-located between the two, so the use of mobile or hand-held computing occurs alongside the physical location of a gaming layer. Games can be used for behavioural change, especially where there is a need to test competences, skills or abilities in relation to others playing by the same rules, adding a competitive, social comparison element to gaming, strengthening the motivation to engage and succeed. In addition, games can be used to teach new behaviours, especially with incremental rewards and punishments used to shape new behaviours. The longevity of behaviour change as a result of gaming is relatively unknown, does the game have to continue or can the game have left a distinct motivational marker enough that the game need not be present any longer for behaviour to continue in the new changed manner?

## **2.6 Gaming and cycling**

The project aims to see if introducing games into the cycle network can increase cycling amongst families. Barriers to cycling include feeling unsafe and vulnerable in heavy traffic, especially in light of poor infrastructure and lack of segregated, dedicated or prioritised routes for cyclists (Bannister, 1988; Krizek & Roland, 2005; McClintock & Cleary, 1996; Nankervis, 1999; Newby, 1993) The most common reasons cited for cycling are for enjoyment, fitness, cost, flexibility and in urban areas, relative speed (Clearly & McClintock, 2000; Davies *et al.*, 2001). For families in particular, road safety (and safety from crime to a lesser extent) is a key concern for parents and they perceive a trade-off between ensuring children's safety and fostering their independent mobility (Bickerstaff & Shaw, 2000; Cahill *et al.*, 1996; Tyrell, 2000).

Social norms tend to err in the favour of personal security over independence; Lorenc *et al.* (2008) state: "parents' concerns about the safety of active transport may reflect social pressures to be a 'good parent' by adopting cultural norms defining safety, as much as assessments of the risks associated with different transport modes" (pg 11). Lorenc *et al.* (2008) conclude that many interventions aimed at encouraging cycling relate to safety, but this may inadvertently be discouraging take up of cycling as a result of overemphasising the dangers. It is also noted that when good infrastructure is put in

place, it does not necessarily increased amount of cycling (Davies *et al.*, 2001; Welleman, 1997), perhaps because these social norms are so hard to overcome and concerns over safety dominate. In addition, good infrastructure alone does not overcome other social barriers to cycling highlighted by TfL (2009) which suggest parents of young families in particular not only have safety fears, but also feel psychologically removed from using a bicycle, for example it might be a long-time since they have cycled and the norms are forgotten along with having concerns over physical fitness to cycle.

Therefore several questions remain: How might games improve take-up of cycling, emphasising the positive elements of cycling and cycle networks? How might games help to move away from the negative connotations of danger and cycling? How far can they increase motivation for families to use the cycle network?

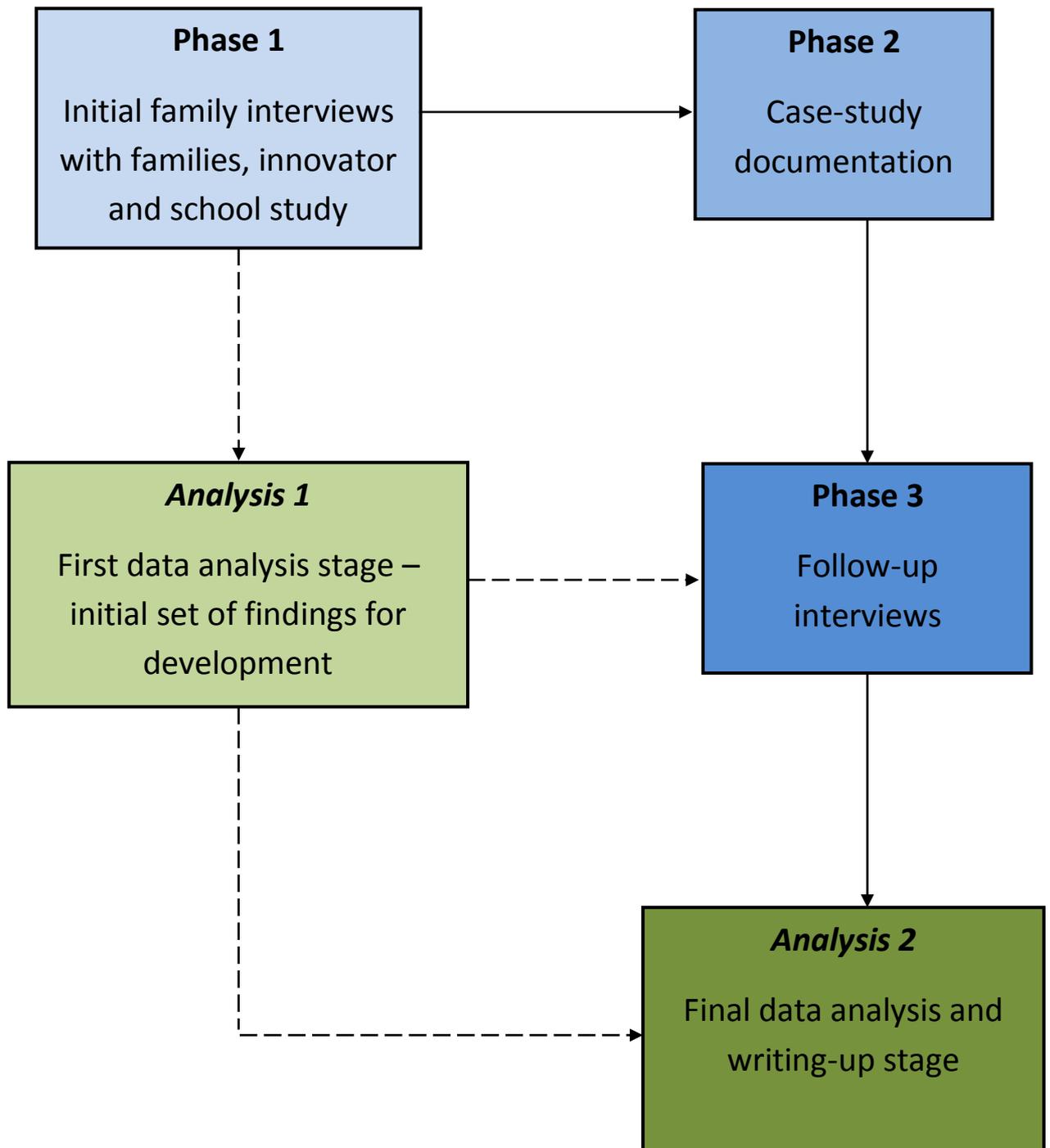
### **3.0 Methodology**

The research strategy detailed below will address the project aims through an exploration of families' experiences of game-play, families' cycling behaviour and motivations for cycling, and children's game-play outside of the family context. In particular, the motivations of both the family as-a-whole and the individual members to engage in games together and to cycle as a family are of importance. For ease of reference, the specific aims/objectives of this research are reiterated below:

1. To understand the motivation families have for engaging in game-play, both for individual members and as a group
2. To explore how and when families and children engage in game-play
3. To identify what makes a game engaging amongst families and children and creates sustained involvement for both families and children and how far this can be related to a travel (behaviour change) situation and context
4. To understand how, when and in what contexts games create behavioural change, including games with deliberate behavioural change motivations and those that change behaviour more by chance, and how far this might be translated to a travel behaviour change context
5. To identify what happens when families and children go cycling, including motivations and outcomes, with specific interest in relating findings to travel behaviour change theory and contexts.

The research strategy involved a three-phase methodology which consisted of an initial round of interviews with 8 family groups with varied cycling experience, which was followed by ethnography with four of these families (which included the generation of visual and narrative data) to produce case-studies of the cycling experience to be used as a part of the analysis. Following this, the final stage will consist of follow-up interviews with each of the families involved in the second phase to explore their experiences of the National Cycle Network in greater depth.

### 3.1 Research strategy overview



## 3.2 Research strategy detail

### 3.2.1 Phase 1

The first phase of data collection recruited 8 family groups to take part in interviews, and two groups of schoolchildren who took part in focus groups. Participants were recruited using the researchers' existing contacts. The researchers had access to contacts who can liaise with local families. A study area in Stroud was chosen to reflect urban and rural characteristics near an off road cycle network, and a study area in Bristol was decided upon to represent cycling experiences in an urban environment near a mixed off-road and on-road cycle network.

#### *Part I – Family interviews*

Purposive sampling was used to recruit 10 families into three distinct sets based upon different levels of cycling activity, described below:

- **Set 1:** Four families were recruited that *regularly* used the cycle network as a group and who can be seen to possess a good deal of knowledge on the experience of using the network together. The families in this set were well equipped (i.e. bikes, safety equipment, child seats, etc...) and motivated for cycling.
- **Set 2:** Three families were recruited that have *some limited experience* of using the cycle network as a group. Families in this set occasionally cycled together but did not do it as a regular family activity. These families were equipped for cycling, however did not have the inclination or the motivation for it to be a routine family activity.
- **Set 3:** One family were recruited who had *little or no experience* of using the cycle network as a family group. The family in this set still spent time together as a family, however they did not spent this time cycling. They were not be well equipped for cycling (not having enough bikes or safety equipment) and therefore had little opportunity to engage in this activity.

Initial Interviews lasted around one hour, taking place in the family home and comprising of the whole family being present and discussed travel behaviour;

interactions with the local environment; game playing; and use/knowledge of the cycle network.

### ***Part II – School focus groups***

Focus groups were run with two groups of children based on life-stages (year 7 children were recruited to represent children at threshold of independence, and year 8 children as a group who represent just beginning to cycle independently to contrast to this), to explore how likely children are to play games on their own. Two groups consisted of half of a class of students chosen by the tutor group leader to fill half a lesson, around 30 minutes in length, the year 7 focus group had 16 children (8 male, 8 female) and the year 8 focus group had 15 children (8 male, 7 female) resulting in 31 children in total.

The groups focussed upon how children play outside of the family context, including questions on how likely children are to play games on their own, where and when they are likely to play games, and who (outside of their family) they like to play games with.

### ***Part III – Interview with innovator***

In order to capture the stakeholder viewpoint, the people behind the innovation (Mission:Explore being placed in the cycle network to encourage more family cycling) were also interviewed. A group interview took place involving Daniel Raven-Ellison (The Geography Collective), Martyn Brunt and Elisabeth Roberts (Sustrans) in Sustrans, Bristol July 2011. The interview was semi-structured, lasted 90 minutes and was designed to understand the origins of the innovation, the aims, objectives, barriers to implementation and future of the innovation. The interview was recorded on a Dictaphone.

#### **3.2.2 Phase 2**

This phase consisted of a case-study documentation of families' experiences of using the National Cycle Network. Four families from the original sample of 8 (2 from set 1, and 2 from set 2) were selected to complete a family cycle trip on the cycle network and report back on their experiences. Case studies of families from set 1 were included to provide data on how families that regularly cycle use the network, including the routes followed and the points of particular interest. Case studies from set 2 provided data that contrasts this and shows how families with less regular cycling experience use the network. The aim was to encourage as natural an experience of a family cycle as possible, therefore the routes the families followed was largely decided by them, with

the only stipulation being that it began and ended at their home, and utilised the NCN Route 45 through Stroud. This allowed families some freedom, and provided some variety to the data generated in this stage. Part of the follow-up interview in Phase 3 involved mapping this ride and discussing the routes chosen.

Families were asked to record their journey using a number of approaches - they were provided with two digital methods of recoding the journey – a helmet cam to record the journey in its entirety, to be worn by one member of the family, a digital still camera for participants to log points of interest along the way. In addition, they were encouraged to note anything else of interest using blank journals.

### **3.2.3 Phase 3**

Follow-up interviews were conducted with the three case-study families to complete the data collection. A map of their journey was completed at the next interview. This map was annotated with geo-located narrative data and photographs recorded by the participants explaining their experiences of different parts of the cycle ride. Families will be asked to focus upon documenting the places along the route which they travel to/through, how they interact with their local area, how enjoyable/motivating they find the experience, and what the experience of cycling as a family is like.

The follow-up interviews took place again with all the family present, lasted around one hour, took place in the participants' home, and focussed on exploring how the families interacted and engaged with different locations along the routes chosen, why they chose to follow the routes they did, and what they enjoyed and disliked about using the cycle network together. The findings from this phase of data collection have been used to provide recommendations on appropriate ways in which the gaming layer might be applied to the cycle network as a motivator for families to use it.

The innovator was again interviewed at Phase 3 – one year on from the initial interview. This time Daniel Raven-Ellison from The Geography Collective was interviewed at his home in August 2012 to assess how the innovation had developed, how barriers were overcome and where next for the innovation. The interview lasted around 90 minutes and was recorded on a Dictaphone.

### **3.3 Data Analysis**

The data collected for this research was subjected to thematic analysis using NVivo 9 software. A starting set of relevant themes was constructed from the project aims with reference to existing research. This focus of the starting set of themes was kept

relatively broad to accommodate the exploratory nature of the topic, and this allowed sub-themes to be constructed where additional definition or differentiation of the data was required. The same process of analysis was carried out in to data analysis rounds in Phase 1 and Phase 3, with several additional sub-themes being generated in Phase 3.

The themes and sub-themes coded in the analysis are included below.

Main themes	Sub-themes
Family game-playing [location: when, where]	
Family game-playing [motivation]	<ul style="list-style-type: none"> <li>▪ Main reasons</li> <li>▪ Secondary benefits</li> <li>▪ Imagination, games, and exploration</li> <li>▪ De-motivations</li> </ul>
Cycling [location: when, where, who]	
Cycling [motivation]	<ul style="list-style-type: none"> <li>▪ Practical</li> <li>▪ Experiential</li> </ul>
Cycling [experience]	<ul style="list-style-type: none"> <li>▪ Sensory experience</li> <li>▪ Activities en route</li> <li>▪ ‘Fun cycling’</li> </ul>
Barriers to cycling	<ul style="list-style-type: none"> <li>▪ Practical</li> <li>▪ Experiential</li> <li>▪ Safety concerns</li> </ul>
Behavioural change	<ul style="list-style-type: none"> <li>▪ Encouraging others to cycle</li> <li>▪ Educational gaming</li> </ul>
Mission:Explore	<ul style="list-style-type: none"> <li>▪ Opinions</li> <li>▪ Suggestions</li> </ul>
Public Spaces	

Thematic datasets were then drawn together, and included all relevant data from the interview and focus group transcripts, and the pictorial data, notes and narrative data generated by participants in Phase 2.

### **3.4 Ethical considerations**

All of the data generated in this research will be treated confidentially. Data was anonymised so that it will not be possible to identify an individual from their comments and contributions. Further to this all of the original data was securely destroyed by the researcher following analysis at the close of the project.

Informed consent in this project was obtained and retained in written form. Family groups and individual participants had the right to withdraw from the study at any time they choose, and have their data destroyed by the researchers. In the case of the family groups, the researcher explained the purpose of the research to all participants at the beginning of each interview, go over the code of conduct and the right to withdraw. In the case of the school sample, written consent was obtained from parents of the children, and also from the school. Furthermore the children were taken through the code of conduct for focus groups followed for this study and asked to agree to its terms.

The health and safety of the families that were asked to take part in the family cycle (part 2 of the research) was considered important. To take part in this phase of the research all of the cyclists were required to take reasonable personal protective measures (and it was suggested that helmets and high visibility clothing should be worn) and all bikes must be fitted with lights. Participants were asked not to deviate significantly from the designated cycle network route. The families were informed of these stipulations and required to confirm these in writing before they are allowed to take part.

## 4.0 Findings

The research findings are presented below. The section is divided into three parts, each explaining how the findings are related to the aims of the research presented on page 4. Discussion in this section moves first through family game-playing, explaining the motivations that families have to play games together; where and when family game-play occurs; and what different members of the family particularly enjoy (or sometimes dislike) about the experience. The section then moves to discuss families' cycling behaviour, explaining the motivations for cycling and the barriers they often face in getting out on their bikes (together or individually). Attention is also paid here to the mental and corporeal experience of cycling, explaining what different family members like and dislike about it, and considering the role of imagination, fun, and exploration in making family cycling desirable. Finally the section draws these strands together to discuss game-playing and travel behaviour change. The final part presents several examples of how games have changed participants' behaviour and considers what this means in the context of travel behaviour change. Participants' opinions of Mission:Explore are discussed, alongside suggestions for how they felt it might benefit their experiences of the NCN. The section ends with data which explains how families would encourage other families to cycle.

### 4.1 Game playing

#### 4.1.1 Motivations for game-play

There was a broad range of motivations discussed for playing games as a family, and also individually or with friends outside of the family context. The main motivation for playing games in all contexts was fun. Children and adults alike enjoyed the experience of playing together. The extracts below show several participants' responses when asked what motivated them to play games:

*"Because it's fun" (Child, ID03)*

*"Because they're fun" (Child, ID06)*

*"Because it's fun" (Child, ID07)*

*"It would be for fun and to keep the kids busy and happy" (Adult, ID03)*

*"I quite like to unwind from school and forget everything I've learned! I try to enjoy my time at home as much as I can. It's just a way to have fun" (Child, ID05)*

Strongly linked to the sense of fun and enjoyment was the opportunity games provided for spending time together as a family, as one participant noted:

*“Well, it’s really fun just getting together and doing something, because it’s fun if you do anything, really, together” (Adult, ID05)*

This was a common theme which ran through participants’ articulations of the experience of family game-playing. Family time was something which was valued by participants, and it was seen that game playing often provided a focal point around which this could happen.

*“For me that’s an ideal way for the family to spend time” (Adult, ID02)*

*“It’s family... you know, spending time and having fun and laughs and things like that – instead of just sitting down and watching TV, you all get to play games. There is no point in having a family is there if you are not going to spend time with each other” (Child, ID08)*

Some parents explained that it was often difficult to have time all together as a family, particularly when the children were all of different ages and had varied interests.

*“I suppose it’s just a way of the whole family being together. We all do have different ages and things. But we can all come together, and we can all take part” (Adult, ID03)*

*“Well it’s nice for us to get everyone together isn’t it? For us all to get together and actually do something, because often we’re off doing different bits. So it’s something that we can all do together, and that’s probably the thing that’s best about it” (Adult, ID03)*

Several parents spoke of playing games together to give the children an experience of family and a sense of belonging. Playing games was seen as a time during which the children had their parent(s) full attention.

*“That’s what they want, that’s all they really want – to be part of a family and to feel secure within that. So that’s why I would like to play more and they [children] definitely remember those times more than anything I think” (Adult, ID02)*

*“They do definitely love it when you play games with them because they have got your undivided attention” (Adult, ID01)*

This was discussed as especially significant when a parent had a particularly busy work schedule; in cases like this families would sometimes have to snatch a piece of time

within their hectic or mismatched routines, and would play games to make the most of this time together.

*“We usually play ‘I-Spy’ in the car. That’s one way of doing something together because Daddy usually goes to work until quite late, so we barely ever see him” (Child, ID06)*

*“I think it’s more about getting everyone together because Dad works quite a lot and we don’t see him as much. He goes really early in the morning when we’re asleep; he comes home later in the evening” (Child, ID07)*

There was an understanding amongst all of the parents interviewed that this time was important, and they made an effort to ensure that they had time together with the family.

*“I like keeping people round the table for a bit longer. If you spend ages cooking a meal you just think well, it’s kind of nice to do that... to keep everyone together. I know there are a lot of families where Dad would not do that, too busy you know, passing ships and all that” (Adult, ID01)*

Whilst the findings show that the dominant motivations to play were for the experience of fun and spending time together, several further themes emerged from the interviews which explained other motivations which play a part in the experience of game playing. A common explanation of the value in playing games together was in the skills that the parents felt these activities taught to the children. Participants explained how games were important for promoting both physical and social skills.

*“I think there is also a kind of learning element to it. I think with things just like hand-eye coordination, kind of physical skills, also quite a lot of social skills... And levels of commitment – and you know, some of those things that are very difficult to learn about in other settings. So when we had people over yesterday and we were playing cricket and football, it was about negotiating the rules and picking the teams and adjusting things as we went along. There are quite a lot of subtleties to it” (Adult, ID03)*

*“I think we play games to socialise, I think it’s a way of being with people and having fun with people. Especially when there’s a really wide age-range and conversations in the adult sense might be more difficult to manage, games can really bridge that gap” (Adult, ID05)*

There is therefore value in playing games as a family as it gives the opportunity for the children to learn skills from their parents, and to negotiate social situations amongst their peers and with adults.

*“There’s a socialisation going on, not overtly, but just seeing it happen – seeing how we get on or not” (Adult, ID01)*

*“Life is about learning through experience and children experience life through play if they can. I think that they have to work out disputes and negotiate with kids their own age” (Adult, ID02)*

However, whilst the educational function of games was consistently articulated as a positive aspect of playing together, this can be seen to form at best a secondary motivation for playing games. One family discussed how whilst the learning aspect was desirable, it wasn’t the reason that they played games together – it was more simply and additional benefit of the enjoyable experience of family time.

*“But when people came around yesterday we weren’t thinking ‘oh, we’ll all go and do this; let’s do some social learning’” (Adult, ID03)*

Interestingly, the social and physical benefits of game-playing to children were discussed only by adults in the interviews, and did not form part of the motivations for playing that children described.

The findings presented above explain the main motivations to game-play which were discussed consistently throughout all of the family interviews. Beyond these, there were several other motivations which formed inconsistent themes or only applied in certain contexts; these are presented below.

When discussing additional motivations for playing games together, several children noted that playing together as a family or with friends allowed them to play games which would not be possible alone.

*“Because if you play on your own, say if you were playing football, you might want a keeper and then you could have a game” (Child, ID03)*

*“There’s a bit more choice isn’t there? You can do a few more things when you have got more players” (Child, ID03)*

Several of the children interviewed also like the competitive element of family games, whilst others liked the cooperative element. Several children liked the experience of trying to beat their parents at a game or challenge. Parents themselves didn’t feel competitive against children but sometimes appreciated the motivation that the competitive element gave to children being involved. Others were more motivated by the cooperative element games – particularly family games, and this was discussed in relation to activities that the family could all do together, with the parents helping the children. Cooperative games had an additional motivation of allowing a particular game

to appeal to a wider range of ages, and different family members with different levels of skill and experience could work together to complete tasks which might be too difficult for some of the children if they were attempted alone. Several of the parents felt that cooperative games were preferable to competitive ones, whereas others viewed these as equally beneficial.

Playing games as a family was also seen to open up opportunities for socialising more widely with other families and friends. This finding shows that there is merit in considering the motivations for game-play beyond the individual family unit or peer group, and looking at the motivations for children and adults from quite a broad age range to play together in a larger group.

*“I’ve done it with another friend and it’s really fun. We went somewhere, we met up with another family, and some other families, and we played a really, really big game of cricket” (Child, ID05)*

*“It’s a nice way to socialise, we just do volley ball – community volley ball – and it was a nice way to meet people” (Adult, ID05)*

*“There’s a family we do apple juicing with. I’m not sure you’d count that as a game, but we hire an apple press and we chop apples together and we make apple juice, that’s quite fun” (Adult, ID04)*

Finally in relation to the motivations for game-playing, there was also a discussion of the contextuality of game-playing, and parents explained that whilst playing together would often be for fun, at other times it could be simply to kill time, stave off boredom, and keep children happy. This motivation for playing games was most-often discussed with reference to specific situations, for example during travel or on holiday:

*“Partly it was filling the time. We had a long journey and it was a way of not getting bored” (Adult, ID03)*

*“If we go out and we’re wanting to entertain Reginald, if we go out for a meal or something like that, then cards are brilliant, and we’ll do that. It works really well” (Adult, ID06)*

### **De-motivations to family game playing**

Whilst participants explained that generally they were motivated to spend time together and to play games as a family, there were several instances where explanations were given for de-motivating factors which discouraged either parents or children for taking part in games or activities as a whole family group. One of the main de-motivations to

family time was that one or more of the children were reaching an age of independence, and therefore did not want to continue doing things together as a family.

*“We try to do lots of leisure things together as a family, but it’s increasingly less with Anita<sup>2</sup>, She just likes to hang out on her own. In reality Anita is older [mid-teens]; there is a five year gap between them [the older and younger siblings] that stops some of the possibilities” (Adult, ID01)*

Another family discussed how they were de-motivated to cycle together for leisure because they were frequent cyclists, and the functional or routine aspects of cycling meant that it was not seen as a desirable leisure activity.

*“We have got busy lives, we have got work and they go to school, and everything that we do that is needing to get somewhere is all done by bike or walk or whatever. So I guess going on a cycle for pleasure isn’t something we do as often as we should, because we just do it all the time anyway. So if we said to them ‘we are going on a ten mile bike ride’, they will probably go ‘aaargh!’ It’s not like a novelty; it’s certainly not a novelty for them because we do it all the time” (Adult, ID04)*

This finding demonstrates that activities which are routine or lack excitement do not motivate people to take part for leisure, and there is a potential opportunity here for the challenges posed by Mission:Explore to re-imagine people’s perceptions of routine cycle journeys, and encourage them to use these routes more for leisure. This is discussed further in Section 4.2 below, and is further expanded upon in the discussion section.

A final de-motivation that was discussed arose when children thought that their parents weren’t good at the game they were involved in – particularly if this was the type of game that a child might more normally play with friends. This applied particularly to games of imagination and role-play which many of the children discussed inventing (see: Section 4.1.2). Parents were sometimes seen as not ‘getting’ the game and spoiling the experience for the children.

*“Beth didn’t have a friend around but she wanted to play fantasy games. Daddy couldn’t do it; he took it far too seriously. She got really upset, that was quite interesting” (Adult [mother], ID05)*

*“When I did it with Ivy [sister], she always makes it really fun, but when I do it with Dad, he takes it really seriously. We were playing schools and he made me write 2000 lines really neatly, and I got really bored” (Child, in response to above)*

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<sup>2</sup> Note: All participants in this report have been assigned a pseudonym.

*“I just need to stick to the football and the cricket [laughter]” (Adult [father], in response to above)*

This demonstrates that there is merit in considering what sort of games and challenges would be suitable to encouraging children and adults to engage with the NCN both individually and together as a group, and suggests that there are specific types of activity that might only be suited to one of these contexts.

This section has explained in detail the findings related to the motivations that children and adults have in playing games. The findings show that the main motivations for playing games are for fun, and when playing together this is strongly entwined with the experience of spending time together as a family. Beyond this, there are several further motivations: adults felt motivated to play with their children for the learning experience it provided (in terms of both physical and social skills); several children noted that playing games with others expanded the range of possibilities for play; both adults and children at times enjoyed the cooperative and competitive elements of different games; and finally it was noted that playing games as a family was a good way of socialising more widely with other families and friends.

In contrast to these motivations, the findings show that there are also de-motivations to playing games and doing activities together, the most significant of which in the context of this research being that a difference in ages between the siblings in a family could mean that children reaching the age of increasing independence no longer wish to ‘play’ with their families, and might now prefer to socialise primarily with their peers. Other de-motivations discussed were routine experiences of cycling as functional meant that it was not desired as a leisure activity; and some children explained that there were certain types of games which parents were not good at, therefore making playing these as a family a negative experience.

#### **4.1.2 Where and when game-play occurs**

Game play happens in many different locations, at all different times of the day, and in different contexts (e.g. family, individual, and peer). Indeed, the findings show that it is difficult to draw a strict line around what exactly it is that constitutes ‘playing’ or a ‘game’, as there are many different activities which families explained that they enjoyed undertaking together or individually, which created an experience of enjoyment and fun, and yet might not be traditionally classed as playing or a game.

The most popular times and places for playing together as a family were at the weekends or during the evenings, although most of the families explained that they often have quite busy individual schedules and so need would like to find more time for playing together. When playing games as a family these tended to be focussed on indoor games (particularly board games or computer games), games played in the garden (if there was space) which included more sporty games, and games played in local public spaces such as parks. When playing with friends, several of the children were also allowed out into in their local area, for example in the street outside the front or rear of the house, or in neighbouring friends' gardens. Playing in the local area was one of the most frequently discussed safety concerns of parents, and several of the children interviewed were not allowed to go and simply 'play in the street', as they lived near busy roads, or were too far from friend's houses to be able to go alone. Safety was a consistent theme which was returned to in the groups, and should be a key consideration when exploring how to encourage behaviour change in young people – particularly in an individual context. Issues of safety are discussed further in Section 4.2.2.

A key theme running through families' discussions of play was the importance and strength children's imagination in creating their own types of games for themselves and their families to play. Children's creative powers were one of the main resources for games, and it was evident that the children really enjoyed both making up and playing their own games.

*"They mostly do creative play stuff like make up games like schools and dance studios. They will just come up with their own plays and music" (Adult, ID05)*

*"Well, we basically pretend to be stuff. We might be animals or we might be humans, we might be really poor, living in the jungle, something like that" (Child, ID07)*

*"I noticed on the fields when we go to the playing fields they have made their own games and they've got rules and they're constantly negotiating it and everything else. Yes it's quite amazing to watch actually" (Adult, ID02)*

*"The dinner table games we made up. One is called the Harry Potter game and you have to go round and list all of the characters until it's exhausted" (Child, ID01)*

One participant explained how she thought that the children often found adult's attempts to direct or dictate how and when play should occur was disruptive to their experiences and desires for creative play.

*“They’re definitely in their world without adults and that is how they like it, to be honest. I think some parents are so controlling and interfering in who the kids play with and where they’re going to go next – added to all the after school clubs and everything. It’s quite a strong thing these games that they play that the adults have no idea about; no idea about the rules, no idea what’s going on”* (Adult, ID02)

There was also evidence that children would change and personalise ‘proper’ (or bought) games that they found to be uninteresting.

*“You have imaginary games with your Match Attack cards”* (Adult [mother], ID03)

*“Yes we don’t play proper Match Attack because it’s boring. I made a proper Match Attack”* (Child, in response to above)

*“They do a lot of making up games with the original. They sort of go ‘this game’s a bit boring’, and they will change it, make something more fun”* (Adult [mother], in response to above)

Children’s imaginations are a valuable resource in any attempts to design games or challenges for children or the family as a whole, and there is merit in considering how this aspect might be incorporated into the functionality of gaming interventions aimed at encouraging travel behavioural change.

Linked into this creative drive was the sense of adventure that children enjoyed in their games. Several of the parents had tapped in to this, and engaged in games as a family which encouraged elements of exploration. Several families discussed how they enjoyed going on treasure hunts together, and that these were normally organised events run by local authorities or volunteer groups, as opposed to activities they had set up themselves.

*“There was the treasure hunt, where you had to spot as many little Lego figures as you could on the route. The person who found the most got a prize. That was quite fun, kids really liked that because it was a very slow game because you were following a stream to spot these things, and it was amazing, the concentration – people really got into it”* (Adult, ID03)

*“At Three Brooks [local nature reserve] they’ve got an orienteering course built in. Not only are we using the area, we are actually exploring using the maps so*

*they [the children] are learning about the maps. They go around and find new areas and they are doing the work themselves” (Adult, ID08)*

Having an adventurous or exploratory aspect to more normal activities such as walking or visiting local public spaces helped to engage the children and to provide a sense of purpose to the activity.

*“We did the treasure hunts a little bit and that’s quite fun, because you’ve got a goal I suppose. Anything where you’ve got something in your mind that you’re aiming for, that helps you. I think it helps engage the children, because I think a lot of the time they spend is ‘pointless’, you know? You go and visit the National Trust houses and they say ‘is that it? We came all that way for this!’ It helps is you create something which has a bit of a purpose” (Adult, ID08)*

With relevance to the previous finding about the importance of imagination, when children discussed going on treasure hunts or orienteering courses they explained that sometimes there would be a theme, which they could use to pretend and make the experience more absorbing.

*“So often you’ve got a theme, like it might be ‘explorers and scientists’ or something like that. The last one we went to, they did about the kings and queens. It was sort of like it was based on the Queen’s Jubilee and they had different kings and queens from the past” (Child, ID08)*

Another family discussed the Scouts (in which the father was a Scoutmaster), and similarly this involved activities and games outdoors, in which children would be set tasks to find items hidden or compete in teams to complete objectives and puzzles. Related to this, a recurrent ‘game’ discussed in several interviews was ‘Geocaching’. Geocaching involves using mobile GPS devices – most often smartphones – to seek out ‘caches’ that are hidden in the local area and further afield (see: [www.geocaching.com](http://www.geocaching.com)). This again was explained as a very popular way of spending family time, and a good way for the children and the whole family to explore their local area and beyond, working cooperatively to find caches and improve their online rankings.

The findings show that adding an element of exploration and adventure is able to make more mundane experiences of public spaces exciting and novel; this is highly relevant to the context of gaming and behaviour change, and there is an apparent opportunity to re-conceptualise public spaces such as the NCN for children and young people and make the experience more desirable. This is discussed further in Section 4.3 in specific relation to travel behaviour change, and in particular to the perceived barriers to cycling that many families face.

## 4.2 Family cycling

This section goes into detail explaining the findings related to families' motivations for cycling, their experiences of cycling together, and the main barriers that families face in cycling together.

### 4.2.1 Motivations and experiences

The data demonstrated that there were generally two types of motivation for families to cycle: practical motivations and experiential motivations. Practical motivations related more to the instrumental aspects of cycling such as costs, time, and fitness, and these applied most frequently to parents' motivations for more day-to-day, functional cycling to access work, shops, etc. Experiential motivations related more to aspects such as enjoyment and family time, and it was largely experiential motivation that encouraged families when they went leisure cycling together. The discussion below presents the findings that are relevant to families' motivations to cycle together as a leisure activity, and therefore focuses predominantly on experiential motivations.

*“There are some very attractive cycle routes around here, off-road and on-road that are very pleasurable” (Adult, ID01)*

*“It’s great. Whenever we do it [cycle together] it’s really nice isn’t it? We really enjoy doing it so it’s something which we will probably do more and more” (Adult, ID04)*

*“We recently took Archie on a cycling trip to the Forest of Dean, and then you’re on cycle tracks and the whole purpose is cycling, and for me that’s an ideal way for the family to spend time” (Adult, ID02)*

*“What we have found is that you see a lot more, the scenery is great, and you can stop wherever you want, like when we have our picnic. There are no constraints and we go and make a whole day of it; like we just take our lunch and we see so much with cycling” (Adult, ID08)*

*“Rather than just going up and down, backwards and forwards, we’d do something that appreciated the views across the other valley, and we could just explore an area we hadn’t been before” (Adult, ID01)*

Enjoyment of the local environment and the physical pleasures of being out on the bike were the most consistent themes which arose when families spoke about their positive experiences of cycling together.

## Senses

Participants described in detail the sensory experience of their cycle rides together; several explained the excitement and pleasure created by kinaesthetic experiences of speed and flow:

*“Percy [child] likes to go really fast don’t you, on the bike? When you are on the back of my bike on your tagalong you go ‘faster, faster, faster!’ So we go really whizzing and he likes to race against you guys [the family]. He likes to overtake so we have to pedal really fast to go past” (Adult, ID03)*

*“I can go fast. I’m on a bike. It’s quite fun. It’s just a lovely feeling” (Child, ID05)*

*“Like, there’s this big dip thing and its really fun to go fast on your bike, it would probably be quite hard to make any more, but that would be fun, to have a bit more of that” (Child, ID01)*

Other participants explained the sights that they saw along the route, and discussed how these contributed to the experience of the ride.

*“One of the things I really like about that cycle path is the wildlife. It’s pretty; it’s really pretty. It’s got lovely trees and flowers and a river, and it’s just a really nice environment to be in” (Child, ID04)*

*“We saw a robin, people riding bicycles, buttercups, stinger nettles, leaves, friends, bridges, roads, cars, greens, joggers, people lying down in the stream to cool down, people cycling along the street, people walking with dandelion seeds in the air, two dragonflies, a magpie, and some butterflies” (Child, ID03 – reading from notes taken on family cycle in Phase 2)*

In relation to this, there was an interesting discussion in one family interview about the presence of graffiti under one of the bridges on a local cycle path along which they had ridden. The children responded more positively to its presence, thinking that the graffiti they had seen was attractive and added something to the experience. The parents were not as enthusiastic, and felt that graffiti had some negative connotations about which they were less certain.

*“Oh yes, the graffiti divided us as a family” (Adult 1, ID05)*

*“I think it’s pretty, I mean, not pretty, but I think it makes it have more of a character, the place” (Child 1, in response to above)*

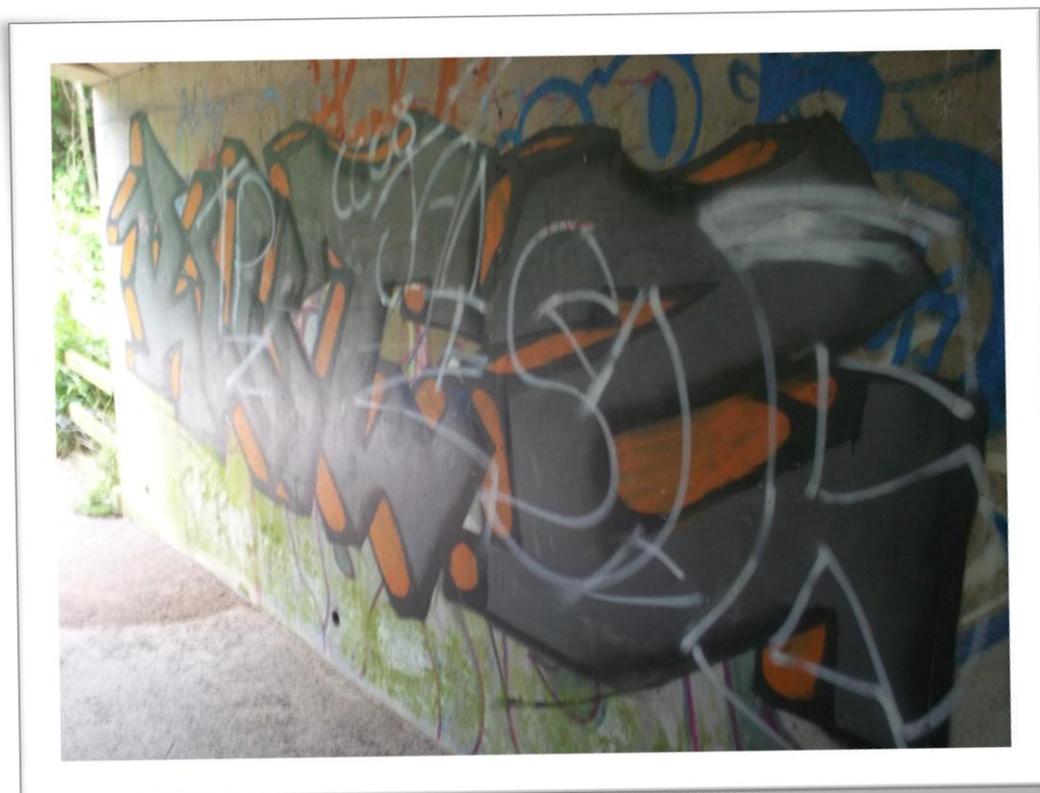
*“I wasn’t so sure” (Adult 1, in response to above)*

*“I thought it was awesome!” (Child 2, in response to above)*

*“Some of it was well done wasn’t it? Some of the actual skill in doing it was good” (Adult 2, in response to above)*

*“Some of it was rubbish” (Adult 1, in response to above)*

*“I think it gives it a character but also it could make people feel a bit vulnerable or something” (Child 2, in response to above)*



**Photo of graffiti taken by family on cycle ride in Phase 2**

This demonstrates the diversity of opinion and preference in terms of what individual family members enjoyed about cycling together. During their interviews, participants discussed their favourite aspects of family rides, and these were consistently varied amongst different members of the family.

The importance of *novelty* in the experience and of the sights and senses along cycle routes was highlighted by several participants. Sometimes family cycle rides provided a new experience for both the adults and the children; or a fresh way of exploring places with which they were already familiar.

*“We went along the footway and we sort of got a different route to go, we were seeing a bit more and it wasn’t like you are going on a motorway like you would. You can see more out in the countryside and that’s what we like doing”* (Child, ID08)

*“You have got the canal on one side and the river on the other side as well, so quite often you are cycling between the water on both sides which is nice. There’s lots of things to look at and they have been doing work on the canal so it was interesting to see. We hadn’t been for a while so there were lots of changes”* (Adult, ID05)

This desire for novelty is related to the earlier finding that regular and routine experiences of more functional, day-to-day cycling could be a de-motivation to spending leisure time together in this way, and it is evident that having a dense of novelty or adventure on a cycle ride helps create a positive experience for families.

Participants also discussed the other sensory elements of cycling, noting the sounds and the smells which merged with the sights and the feelings of cycling to create the overall experience.

*“We also heard birds singing, aeroplanes, people shouting, cars, bikes, the stream rushing, fire, and bees”* (Child, ID03 – continuing notes from family cycle in Phase 2)

*“The thing that I really like about that bridge is that when you cycle over it, it has got loose slats. The concrete slats that form the bed of the track are loose, so as you go over it they go ‘bloop, bloop!’ So depending on the speed you go you get different sounds. It’s like a xylophone”* (Adult, ID05)

*“We smelled Lucozade®, the stream, garlic plants and stingy nettles”* (Child, ID03)

*“A house had loads of lovely roses like growing down the fence and the new cycle path, and they smelt so nice. They just hit you like ‘ah!’”* (Child, ID05)



### **A child experiencing the ride**

One participant explained how she felt that the *overall* sensory experience of the cycle ride along cycle paths was often neglected in the face of a dominant focus on landscaping and sights along the route. Smell in particular was seen as a neglected consideration in terms of the experience, and yet both smells and sounds were seen to have an effect on participant's experiences of the cycle. Participants discussed negative experiences of both of these senses, in particular relation to harsh traffic noises and dogs fouling the cycle path.

*“Also I said about the traffic noises. It is just quite bad because the canal was really nice, but then it kind of spoils it because of all the traffic noises and stuff”*  
(Child, ID05)

*“We smelled a dog poo bin, it was a hot day! We did meet some dog poo, which wasn't very nice”* (Adult, ID03)

It is evident that sights, sounds, smells, and kinaesthetic aspects of speed and flow often contribute to creating a rich experience of the local environment, and this corporeal pleasure attained from cycling helps form some of the strongest reasons that families enjoy their rides together. The findings above demonstrate that understanding the sensory experience of cycling is important in considering how infrastructure might be better designed to provide a pleasant, engaging, and attractive environment in which to ride.



Child's notes on senses during her Phase 2 cycle ride

### Activities

Another central part of the experience of cycling is found in the activities that families stop for along the route. These activities might either constitute the 'destination' of the ride, or be different places at which the family stops along the course of the cycle ride. For many of the participants their more regular experiences of cycling were constituted by functional trips, in which cycling and the cycle paths they utilised were a means of reaching their destination, as opposed to being the 'destination' *per-se*. This more routine experience or conceptualisation of cycling as simply the 'means to achieving the end' was broken down somewhat during family cycle rides, and as the findings above have explained, the experience of cycling itself became one of the most positive aspects of a family ride. Nonetheless, destinations along the route maintained a prominent place in participants' explanations and articulations of cycling together, often families would

cycle as a part of a day out to somewhere, and so the destinations in these cases were just as important as the cycling itself in families' discussions of their experiences.

*"I don't know how I feel about cycling for cycling's sake; not going anywhere in particular. We don't do a lot of this kind of cycling; we generally use our bikes as transport to get somewhere. We have to go to a tea shop or pub to make it feel more ended and purposeful"* (Adult, ID04)

This was a recurrent theme in the data; it was more usual even during leisure cycles together that the family would have some sort of destination around which to focus their cycle and to give the ride a sense of purpose. Having a reason for the cycle appeared to give a kind of *validation* to the family cycle, within which the participants could then enjoy the actual experience of cycling together. Particularly for children, having a destination (or several destinations) was important as it spurred them along on longer rides, provided points of rest along a route, and gave them something to aim for.



### Destinations on family cycle rides

*"I don't really like just cycling; I prefer cycling to a destination. When we got to Stonehouse, the place where we got biscuits, I thought that was good because it was a destination to get to, but we didn't have to get there quickly"* (Child, ID05)

*“I think it’s about having something at the end, isn’t it? Because we had homemade biscuits at the hotel and that kind of got you there didn’t it?” (Adult, ID05, in response to above)*

Halfway stops at pubs or picnic grounds or other points along a route were frequently described as a positive part of the experience. These would often provide a type of ‘reward’ for the exertions of the cycle, and provided a frame within which to set the experience.

At other times, participants would stop at points of particular interest, often to explore the natural environment or to enjoy the scenery.

*“I liked when we were looking at the moorhens or coots, we stopped to look at them, and they were really cute” (Child, ID05)*

*“There’s this stream that runs alongside the cycle tracks. Any time we just saw a good place to paddle, we just stopped and paddled. So yes, it’s very fun” (Child, ID03)*



### **Stops along the way**

Such stops and momentary diversions served to punctuate the experience and break up the perception of the cycle ride being overly long. Several of the parents noted that

having stops along the route served to make the experience more manageable for their children, particularly if the family included a younger child who might not be as experienced at cycling long distances as the other members.

*“I think stopping helps Beth. I think when you got to Stonehouse you were quite amazed that we were there, because it hadn’t felt like you had cycled far, and I think that’s because we had been stopping so often to look at things” (Adult, ID05)*

Therefore at times a family cycle could become a bit more of a chore for children if the ride was difficult or hilly. Again, stops along the way could serve to reduce the negative impact of this and to improve the experience for adults and children alike.

The findings show that a final activity which is important in the experience of cycling is the opportunity it provides for socialising with other cyclists and pedestrians using the same route. Several participants explained that they would often meet friends, acquaintances, and strangers during their cycle rides.



### **Sociability on a cycle path**

Sometimes families would incorporate this social aspect more deliberately into their rides, by cycling to visit friends and family in the local area as they progressed along a

route. At other times, chance encounters on the cycle path would lead to a break in the cycling for a chat.

*“One of the things that I like about cycling is seeing other cyclists; saying hello to them or if you happen to be going the same way as them you might chat to them for a bit, or if you see someone with a puncture you might stop and help them and all that sort of stuff. The camaraderie of cyclists!” (Adult, ID04)*

### **Cycling as ‘the destination’**

The findings presented above describe the different sensations and activities associated with cycling, explaining that many different elements together interact to create the experience of the cycling together as a family. One of the key themes to emerge is that having a destination is important in creating a positive experience of the ride, and that activities conducted along the route can give more of a sense of purpose to family cycling than simply going on a ride for the sake of going on a ride. What this research suggests is that within the context of Mission:Explore, there is merit in considering that cycling itself – or the National Cycle Network – could become the destination in its own right, as opposed to being an (albeit pleasant and enjoyable) way of accessing a more fixed or traditional ‘activity’.

This theme arose through discussion of the ways in which cycling was an activity which very often is pleasurable in-and-of itself, largely for the sensory reasons explained earlier. Participants enjoy the kinaesthetic experience of speed and flow that cycling provides – the sense of being out in nature and connected to the world around in a way which is not possible to attain when travelling by other forms of transport. Cycling provides effortless speed that walking or running cannot match, whilst at the same time retains a connection to the physical environment and a sensory experience that is lost to the car driver or motorcyclist. Earlier discussion has highlighted that both the children and the adults alike enjoyed parts of a route where they could swoop down hills, bank round corners, glide along under the shade of trees, and race against one other.

In the family interviews discussions of the experience of being on the bikes was often linked by children to their experiences of more playful cycle spaces than the NCN routes. These tended to include BMX parks and mountain bike trails, which were perceived as areas for a kind of fun/playful cycling in a way which cycle paths were not.

*“Talking about the mountain bike trails and so on, I can see why Johnny would find that much more enjoyable than just going out for a regular trip. I mean he does quite like cycling – you know, just touring – but certainly something like mountain bike trails are more fun” (Adult, ID07)*

There was a discussion of how the NCN routes could be improved if there were ‘alternate routes’ immediately adjacent to the cycle path which could facilitate more playful cycling. Several participants suggested that it would be beneficial to have the option to divert into areas of bumps, dips, and berms.

*“It would be good to have one part which is a nice straight track, and then a little bit up the left-hand side or whatever; where there’s a little bit of jumps and bumps and all that sort of thing. They’d love it” (Adult, ID06)*

It was felt that such additions might be a motivator for children to use the NCN more frequently and independently, to use it for fun as opposed to simply for access, and even to request a cycle path as a destination. The rationale behind these suggestions stemmed from the fact that the children interviewed would often *request* to go cycling in local parks, woods, and commons, and these would often have such features and would be exciting places to go and cycle in their own right.

*“If you had, like, bumps along there and bits that you could whizz along, I think you would be more tempted to just go, ‘well, let’s go for a gentle cycle ride’. You’d probably be more likely to go along with your friends, wouldn’t you? Because where you do like to go, boys, what you really like is the common, because there are lots of little dippies up on the common. It’s the pure fun of it isn’t it?” (Adult [father], ID03)*

*“Yes yes yes!” (Child, in response to above)*

*“It’s them saying they want to go, so I’m not having to persuade them; not having to cajole them or anything like that” (Adult [mother], in response to above)*

This finding is returned to in Section 4.3.1, where links between gaming and travel behaviour are discussed, and suggestions for Mission:Explore challenges on the NCN are presented.

Alongside wishes for more infrastructural interventions into the experience of using cycle paths, there were also articulations of more simple pleasures that participants had experienced during playful moments along a cycle ride together. One family discussed playing games together whilst they cycled, often involving cycling in formation and a leader passing a message back through the group – something akin to ‘Chinese Whispers’. Another child explained how she enjoyed doing ‘skills’ on her bike, including cycling no-handed and steering with her feet.



### **Skills on the bike**

The findings presented here are useful in explaining how cycle paths might be re-conceptualised or engineered to create a more playful aspect to cycle rides for families, tap into children’s desires for and exciting sensory experience of using their bikes, and help to make cycle paths somewhere to go, as opposed to something to use.

Away from families, children in the school focus groups (aged 11-13) were only allowed to cycle alone when they had a distinct destination; exploring or using the bike itself was not encouraged, largely as this was thought to be unsafe, both in terms of personal safety but also road safety. Children did expect this to change as they got older however.

#### **4.2.2 Barriers to family cycling**

Despite there being a great deal of positive discussion about the experience of cycling together as a family, nonetheless the findings show that there are several barriers to family cycling which most often outweigh the pleasurable aspects and discourage parents from taking children out on their bikes as much as they would like to. These findings are important as they serve to frame this research and explain the relative importance of the experience with respect to issues of safety and confidence on bikes.

## Safety

The findings demonstrate that one of the main factors that made the positive experience of cycling together as a family possible was being on off-road cycle paths, where there is freedom from cars and the stresses these can create.

*“I think one of the big things is being away from the cars, cycling is so much more friendly and peaceful when there aren’t cars around” (Adult, ID04)*

This participant then went on to describe in greater detail the experience of cycling on the roads compared to the experience of cycling on paths, and evident within this were strong concerns for safety, particularly when cycling with children.

*“We did a route the other day and there was part of it that was on-road, and then suddenly we got a bit that was off-road. I realise that when I’m cycling on roads there’s a tension, especially when I’m out with Lucy and she tends to go in front, I outride a little bit past her. I’m constantly watching and really aware of the dangers, especially cars cutting us up and that kind of thing, and the noise and the fumes and everything... and then suddenly you get onto a cycle track and you relax; it’s a really noticeable difference. And then we’re back onto a road again and suddenly the tension’s back. It got much noisier and felt more dangerous” (Adult, ID04)*

Concern for children’s safety when cycling on roads was a recurrent theme throughout all of the interviews; it was something which had a strong negative effect on the experience of cycling together as a family. Because of this, safety concerns have been identified as one of the key barriers to participants’ cycling more together as a family.

Traffic was the key issue when parents discussed the safety of themselves and the children when cycling together. Several of the parents felt that when taking children out on their bikes roads were not an option as there was too great a risk. Parts of the cycle network which were on-road were also deemed to be unsafe, despite having dedicated cycle lanes.

*“The trouble is, the National Cycle Network is great, but to go as far as we’d like sometimes, a lot of it is road. So it’s trying to find every place we can get to without a road. Bristol is deemed as the first cycling city, a lot of money went into it, but a lot of it was painting a line on a road. You think, ‘yes, that’s okay, but not for children’” (Adult, ID08)*

Cycling together on on-road routes was perceived as prohibitively dangerous and stressful in many instances for all of the families interviewed, particularly for longer rides or through busier areas. This meant that families sometimes would not access off-

road NCN routes which could only be reached by cycling on sections of on-road cycle path. The concerns over safety reported by parents were completely removed on off-road routes

*“I mean, Percy and I are now cycling. Percy’s using his own bike more and more but it’s still quite nerve-wracking, cycling with him. Cycle paths are nice because quite a lot of his friends are still learning, and just for the confidence and stuff like that” (Adult, ID06)*

Confidence on bikes was an issue raised repeatedly in all of the family interviews, and it was mentioned as an issue with regards to both children and adults.

### **Confidence**

Perceptions of safety when cycling together as a family were linked to the levels of confidence that participants felt in being out on the roads.

*“I haven’t really been cycling for years, so I think it’s confidence as well, you know? I suppose because I’m older and I’ve got young kids I’m more aware of the difficulties that cyclists can have, but I think it’s definitely confidence and I wouldn’t let the kids cycle around here” (Adult, ID02)*

Particularly for the families that lived in more urban neighbourhoods with higher levels of car traffic, children were quite restricted in their freedoms to go out into their local area, beyond their own gardens. This did not apply only to cycling; several of the parents felt that it was simply too dangerous for children to be out near busy roads in any unsupervised situation, and there was a discussion of how this had increasingly become the norm in and amongst the parents’ peer groups of other families. This was discussed earlier in relation to where and when game playing occurs.

*“That’s a barrier I think we’ve got to address. I think it does feel like something’s changed over the years. I don’t know any of our peer group who let their kids walk around or cycle by themselves” (Adult, ID06)*

A key issue was seen to be a lack of confidence on bikes amongst adults as well as children, as one parent noted:

*“Adults are as nervous as children!” (Adult, ID08)*

One of the key themes that ran throughout the discussion of safety in cycling on the road was that if adults are not confident on their bikes, then this would lead to them being less likely to cycle with the children, which in turn would result in the children

themselves being less confident. In one interview the parents discussed how they felt responsible for their children's levels of confidence in cycling on the roads, and also that the children had the proper cycling skills to support this.

*“It’s copying isn’t it; if they [the children] can see we’re nervous they’re going to think ‘well, why are you nervous? Should I be nervous?’ So Janice [mother] and I are confident cyclists and we go out with our children on the roads to expose them to that so they’re exposed under our guidance” (Adult, ID07)*

*“I think it’s my ‘mother’s view’ as well with the children, because I like the idea that they are confident to ride on the road but they’ve gained that confidence because Mum and Dad have ridden on the road with them, they’ve done their bike-ability through school and holiday courses” (Adult, following from above)*

The issue of low confidence was one which was returned to in several of the interviews when participants were asked how they would encourage other families to cycle more. One family discussed how it would be useful to have educational aspects built into areas of the NCN, which could allow both adults and children to practise their bike-handling skills in a safe, off-road setting, to help increase their confidence and to encourage them to cycle more together. This is returned to in Section 4.3.2.

A key theme amongst the school children was that parents were concerned about allowing children to cycle alone. Certain places were allowed, for example, to and from school, to the park, to the local village centre and often short journeys between friends' homes. Almost all the journeys children were allowed to do coincided with a definite place or activity at the end, they were far less likely to be allowed to go off exploring on their bike. Children themselves would like to do more exploring and felt they were ready, but understood their parents concerns which mainly lay around road safety. They all felt this would change in a few years time as well, as they got older and were very much looking forward to their independence that the bicycle would afford them.

## **Knowledge**

This final main barrier discussed by participants was a lack of knowledge about the cycle paths in the area, and a perceived lack of information about where to cycle.

Some of the comments related to a lack of information that would allow people to plan cycle trips, such as information provided by local authorities and cycling organisations.

*“I think just some cycle routes, just some suggestions of cycle routes that we could do with a focus, that’s what I would love to do. Since we’ve lived here [seven years] I know that there’s some kind of cycle track in the Forest of Dean, but that’s all I know. I’ve never gone there and it’s just a vague notion really. I’m always kind of trying to find things out, but practically it just seems too hard” (Adult, ID02)*

It should be noted that this was a *perceived* lack of information amongst some participants, and that several different participants had very effectively sourced information about cycle routes and other activities in the local area.

Another issue which arose in the interviews was the sense of a ‘missed opportunity’ to provide information on the ways in which local attractions, shops, and services could be accessed by the cycle path.

*“There are pubs and things, but you wouldn’t know that necessarily, if you’re cycling it. You don’t know that you can branch off after a couple of miles and find a pub. So a bit more information would be good” (Adult, ID03)*

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*“There’s a gym and a soft play centre down there, which is incredibly popular, but I don’t think many people cycle to it; they drive to it which is crazy because it’s just there, it’s just off the cycle path” (Adult, ID05)*

*“It’s a missed opportunity really. I think on one of the industrial estates there is a café, but it isn’t right next to the water and it is not immediately obvious where it is; it kind of feels like it wouldn’t take much to bring a lot more life into more destinations, variety” (Adult, in response to above)*

It was suggested that by providing more information on ways to access local places from the cycle path it could encourage people to perhaps cycle to the as a part of a leisure trip, as opposed to driving.

Two families discussed a lack of information on the actual cycle paths themselves, which included issues with signposting and way-finding.

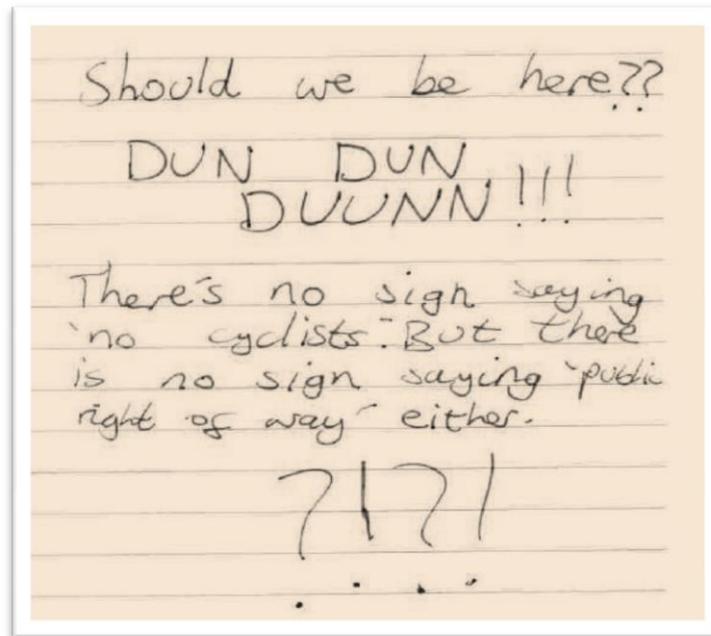
*“[There needs to be] better signposting, I do think the signposting is poor. It took me a while to figure out how the path connects” (Adult, ID05)*

*“Actually, you need a map. It’s a bit weird because you’ve got these offshoots, and it did take me a long time to get my head around it” (Adult, ID04)*

A final point made in relation to a lack of information was the way in which having signs to indicate that cyclists were indeed on a cycle path was reassuring and gave families confidence in the fact that they were ‘on the right track’.

*“When you go onto the beginning of it, it’s a bit misleading because it feels like a sort of road rather than a cycle track, but then you go down and find it’s a cycle track. I think it would be helpful if you had a sign saying ‘you’re in the right place, you’re on the cycle track” (Adult, ID01)*

*“Yes: ‘you’re all right; you’ll be alright!’” (Adult, in response to above)*



**Child’s notes showing uncertainty over rights of way**

In the interviews with more experienced cycling families, there was discussion about how their personal knowledge of cycle paths and routes in-and-around their local area was seen to reduce or negate the need or desire for ‘official’ information and designated cycle routes. Several of the participants explained that they cycled extensively on a daily basis, and yet were relatively unaware of the details regarding NCN designated cycle paths.

This has relevance to the Mission:Explore platform as its aim to encourage people to explore their local area could help attend to this lack of knowledge about cycling , through families and young people heading out on their bikes and learning about the local area from personal experience.

### **4.3 Games and travel behaviour change**

This final section of findings draws together the themes discussed above and presents the results related to how gaming interventions might encourage travel behaviour change. This section first discusses data which relates directly to behavioural change, then moves to explain participants opinions of – and suggestions for – the Mission:Explore platform, before finishing with findings related to how participants would encourage others to cycle.

#### **4.3.1 Behaviour change**

Travel behaviour was discussed from a number of perspectives in the family interviews. Several of the children who were interviewed were at an age at which they were seeking (and being afforded) increasing independence, and this often included being able to travel more extensively by bike in their local area. The common trips that the children were making with their new-found freedom were trips to school and leisure trips with friends.

*“Since this term I’ve been cycling to school [alone] some of the time, so it’s about three or four days a week that I’ve been cycling to school!” (Child, ID07)*

*“Alex is year six, so in September he goes up, so it’s kind of a way of moving him towards independence” (Adult, in response to above)*

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*“Ivy, you went off recently with your friends – your first cycling outing – didn’t you?” (Adult [father], ID01)*

*“Oh yes, they cycled all the way to the next town, six girls aged ten and eleven” (Adult [mother], in response to above)*

*“Yes, it was good. It felt slightly strange, not having any adults with us, but strange in a good way” (Child, in response to above)*

This age of independence was discussed as a kind of ‘natural point’ of behaviour change. There is potential here for interventions such as Mission:Explore to support this point of change and to provide challenges and games which encourage children who have reached this age to explore the NCN routes and establish greater confidence and interest in cycling independently.

With reference to the earlier findings related to safety concerns, it can be seen that there are two aspects of behaviour change in relation to encouraging young people and families to cycle. The first (described above) is in encouraging children and young people to cycle individually and with friends once they have reached an age at which they are able and allowed to do so, the second is in exploring ways in which to encourage families to cycle more together *as a group*. The findings show that before children are considered old enough to be out by themselves in the local area, any efforts to encourage behaviour change will only be successful if directed at the family group, as opposed to children and young people individually. For example, with specific reference to the Mission:Explore platform, individual challenges aimed at younger children might not be successful at encouraging participation simply because the younger children would not be allowed to access them by themselves. Therefore there is greater merit in setting collaborative or team-based challenges which would encourage the whole family to take part. For older children with more freedom to explore their local area, setting individual challenges could tap far more effectively into their desire to explore this freedom and learn more about their local area. Therefore different approaches are required to satisfy the needs of children at different stages of independence.

Several of the interviews included a discussion of how behavioural change had been brought about amongst the children through game-playing, and this was particularly in reference to educational games to which children were exposed in school. Pedagogic approaches which incorporated a gaming element into encouraging learning outcomes were popular with the children who used them. Several of the participants were familiar with using computer-based games which incorporated a gaming element into their homework, for example in which they would complete questions to score points and unlock rewards.

*“It’s for school, you play games on it. You can play a game and you have to answer maths questions against other people in the world” (Child, ID01)*

One family discussed how they provided home education for their child, and much of this involved an element of play in learning. This blurred the more traditionally formal distinction between education and home life.

*“Home education is a bit of a game, the whole thing is a bit of a game really isn’t it? Instead of doing PE we go out in the garden and play catch. Lots of learning around maths and that sort of thing is game based so we play lots of maths games” (Adult, ID04)*

In terms of behaviour change, games in this context are able to make learning more fun, and therefore promote enthusiastic involvement from children and create a new perspective on – and motivation for – ‘lessons’.

*“I think it’s a very good way of learning and a painless way of learning as well”*  
(Adult [mother], ID04)

*“So Lucy, if you had to choose between a lesson with games and a lesson without games which would you choose?”* (Adult [father], in response to above)

*“A lesson with games; silly question, why wouldn’t you?”* (Child, in response to above)

The key advantage of adding a gaming element to encouraging behaviour change is that games can provide a point of focus or motivation around which another – perhaps less desirable – activity can be positioned (for example maths). Games are able to re-frame activities, and this has relevance to the findings presented earlier.

In the context of this research games have the potential to assist in travel behaviour change in two interrelated ways:

- First, as earlier discussion has explained, most games are – by their nature – enjoyable for the players; furthermore, games (and particularly games which children enjoy) most often involve elements of imagination and novelty. Referring to an earlier finding, games therefore have the potential to encourage travel behaviour change through making routine experiences of cycling more exciting and exploratory. Cycle rides along local NCN routes which have become boring through their familiarity could potentially be re-cast through a gaming intervention to create a new purpose and add new experiences to a ride.
- Second, adding games to cycle routes has the potential to make the NCN *the destination*, as opposed to a ‘means to an end’. This has been identified earlier as an important theme which has emerged throughout this research. Children enjoy riding their bicycles and will often *request* to go cycling, however this is largely focussed on locations in which they can do ‘fun cycling’ activities (such as ramps and dips), and not in the more functional, flat, regimented environs of the cycle network. Providing little areas alongside a route where cyclists could divert for of a playful ride was discussed by children as something that would draw them to the NCN.

These findings are taken forwards in the following section in relation to families opinions of – and suggestions for – Mission:Explore.

### 4.3.2 Mission:Explore and the National Cycle Network

This section presents the findings from discussions in which participants gave their opinions of the Mission:Explore platform and gave suggestions for how it could be applied to the National Cycle Network.

Parents and children alike had mostly positive opinions of the idea within Mission:Explore to post challenges on NCN routes and to encourage exploration. Children responded to the idea of exploring, having adventures, and competing with one another (particularly siblings) whilst out together as a family. Several of the parents were very supportive (and grateful) of efforts to give them ideas for activities with/for their children,

*“I think it’d be a real goer for families who are searching for things to do. They’re doing that all the time and it usually costs an absolute fortune or it doesn’t please everybody so when they’ve gone on cycle rides it’s like they all want different things from it. No one’s quite clear or sure about what the purpose is, so yes, I think it’s a great idea” (Adult, ID02)*

One family discussed how they liked the idea of having challenges to go and do because this could facilitate them meeting other people from their local area.

*“I personally think that a lot of people are looking for opportunities to meet up with other people, so I think structuring things which enable people to come together would appeal to a lot of families. You can go and do something but there’s a chance there’ll be other people there with kids” (Adult, ID06)*

Conversely however, one family were less supportive of the idea of having any kind of structure to their experiences of their cycle rides.

*“When we went to Dads’ Camp I have got a Mission:Explore book about things to do when you’re camping, and I had skim-read that in the past. I didn’t take it with us and we ended up making loads of things to do in Dads’ Camp, we didn’t feel the lack of a guide or what to do. I think I would feel the same about cycling, I don’t need an extra thing” (Adult [father], ID05)*

*“If I go to a museum with the kids I don’t want to take the hand-outs, I don’t want to do the trails generally, it just feels like too much hard work” (Adult [mother], ID05)*

Therefore it is evident that challenges and activities to do along cycle routes are not for everyone. Some people will be fully equipped and motivated to do some exploring on their own. However particularly for families who cycled less frequently than they would have liked to, or who were less knowledgeable about or confident in setting out and

exploring their local area, having some kind of structure or suggestions for activity was seen as a positive thing.

When discussing challenges on the NCN, families gave a range of different suggestions for how they felt that this might best work for them or what types of challenge would motivate them the most. The following sections move through the three different types of suggestions that families described.

### **Bicycle challenges (skills and confidence)**

An interesting suggestion from several participants was for there to be challenges based on cycle paths which aimed to help children (and sometimes adults) practise and improve their cycling proficiency, whilst also being enjoyable. This is linked to earlier findings concerning perceptions of safety and the link between this and confidence when cycling as a family.

The suggestions from one family included having challenges which improved skills in changing gears, cycling at speed, taking corners, braking, cycling no-handed, manoeuvring (slalom), and balance.

Another participant explained that there was a ‘bike skills’ area at the end of one of their local cycle paths, which had since been removed, and that this was something which the children enjoyed using and which they would like to see more of.

*“At the end they’ve got like a sort of bike skill thing. That would be fun to have a bit more of that” (Child 1, ID05)*

*“Because you quite like that mountain biking thing don’t you? You’ve done a bit of that with Daddy, some bike skills stuff” (Adult, in response to above)*

*“I like that kind of thing too...” (Child 2, in response to above)*

There was a suggestion that such bike skills challenges could be incorporated into the rewards earned, and that a member of Mission:Explore could then have a ‘stats’ section on their profile which recorded their various levels of proficiency in different bike skills, which they could use to show off to other members of the site and to motivate them to improve.

*“You could have stats for how fast you can go on your bike; for speed, stamina, control, distance you can travel no-handed. How many bunny hops you can do in a row” (Child, ID03)*

Such challenges might not link in directly with the exploratory focus of Mission:Explore challenges, however in encouraging children and adults to engage in this way and to improve their skills it has the potential to give families the confidence to be more adventurous on their bikes and to go out and explore. Such challenges could be included in and amongst other exploring tasks or could form their own set, with perhaps a specific award to be gained for bike proficiency or skill.

A final point made in relation to bike skills was the idea to have an online compliment to the real-world cycling challenges which consisted of learning about bikes themselves; about how they work and how to maintain them.

*“You could have little mini-games on how to put the chain on, like all the different stages of pit-stopping a bike” (Adult [mother], ID03)*

*“So it’s like changing the tyres, pumping the tyres, fixing the chain – all with the mouse. You could try picking something up and then putting it into place” (Adult [father], in response to above)*

*“You could construct a bike; put a bike together” (Adult [mother], in response to above)*

Again, such suggestions are outside of the current structure of the Mission:Explore platform, however participants discussions suggest that having additional on-line supporting content such as this could be a valuable addition to any explorer’s ‘survival skills’.

### **Fun cycling**

The second types of suggestions made in relation to Mission:Explore came in the form of providing opportunities for ‘fun cycling’ along NCN routes. The majority of the data related to this has been presented earlier in Section 4.2. Here it is worth reiterating that this was a strong theme that ran through participants’ discussions, and it can be seen to be of particular significance because it taps directly into the cycling experience itself, as opposed to activities to be done whilst on a cycle ride. The sensation and pleasure of

being on the bikes was one of the main reasons families enjoyed cycling, and so having activities which utilise and enhance that experience were discussed very positively.

Returning to the earlier discussion, having physical challenges set in the form of jumps, dips, and swooping turns was seen as a way of making the NCN the *destination*. Children who enjoyed doing these things would actively seek out and request to go to BMX parks, mountain bike trails, and even simply bumpy bits of common ground. There is an opportunity for such elements to augment the cycle path and encourage children to explore on and around it to find these fun sections.

*“If there was some kind of good edging to the cycle path, there are little bits where it goes up and around in the trees and stuff. If you made the track really nice, you could zip up and come back down, I think kids would really like that”* (Adult, ID06)

*“You could easily do little bits off to the side couldn’t you? Because when you’re cycling as a family sometimes, you’ve got someone who’s a bit slower and they want to go on the flat, but then you’ve got someone like Ivy who maybe wants to do a bit of off-road”* (Adult, ID05)

It is evident that challenges based around the physical form of the environment would be largely predicated on infrastructural upgrades to cycle paths, and therefore this finding represents to greater degree suggestions for improvements to the NCN itself. However there is an opportunity for Mission:Explore challenges to encourage members to explore ‘off the beaten track’ on their bikes, and to forge out their own – more exciting – cycle paths in areas adjacent to the official NCN route itself. Indeed, this was already seen to be happening:

*“There are some bits where there’s the main cycle track and then to the side there’s just like a little hill you can go over. People have sort of made their own haven’t they? They’ve decided that that would be fun to go there”* (Child, ID05)

This discussion of having new areas and alternative, playful diversions along the routes of the NCN leads into the final section of suggestions for Mission:Explore.

### **Landscaping and infrastructure**

There was a mixture of opinion about the merits in providing activities to do during the cycle ride itself, with some participants preferring to cycle continuously without stops, whilst others appreciated having points at which they could rest and punctuate the experience, especially when travelling with children over longer distances. The main

suggestions that participants had for challenges or activities were related to exploring the environment around the cycle path, and finding out information about the local area – including some of the history of places of interest and information about the local flora and fauna.

*“There’s loads of history around that way. People go ‘what’s that?’ And they don’t know because there’s nothing to tell them” (Adult, ID03)*

*“We were confused about whether they were moorhens or coots, there were no nature panels, there is nothing to help you with your nature spotting, we could have used a little panel telling us about it” (Child, ID05)*

Therefore some participants felt they could be aided in their explorations through having some kind of basic information about where they were, and perhaps what they had found or what they were seeing.

When participants discussed ways in which to help children and families stop along their route in order to undertake challenges, it was found that participants perceived a lack of designated spaces at which to do so.

*“It’s difficult stopping because I’m aware that the thing the cycle path lacks is like, picnic benches in really pretty places or more traditional play-parks where you get off and hang from some bars or whatever, which I think is really nice” (Adult, ID03)*

One participant raised a key issue in relation to this and explained that they would be hesitant to stop and explore the area surrounding the cycle path because of a lack of security for bikes when these had to be left behind.

*“I think the worry is leaving the bike somewhere, where if you went off to explore, the bikes would be safe, you know? You wouldn’t want to have it stolen, it would just be ridiculous” (Adult, ID04)*

Within this suggestion however there was an understanding that too much intervention or infrastructure could negatively affect the local environment, could spoil the experience of the natural areas bordering cycle paths, and be counterproductive to encouraging exploration and enjoyment of a route.

*“But then again, you don’t want to take away from it. You don’t want to have like big information posters up because it takes away from the feel. It needs balance” (Adult, ID04)*

*“There’s this bit off the cycle path where I walk with the dog, down by the river. It’s lovely down there. There are kingfishers and herons and all sorts; and it’s really, really beautiful. It’s probably 20 to 30 feet down, and you can’t get a bike down. If you had a route that went down and around, it would be great... Having said that, it would be good and then it wouldn’t be good because then it’s no fun for me when I want to be there with the dog and there’s no one there!” (Adult, ID03)*

This demonstrates that there is a tension between the need to minimise the impacts of infrastructure on the experience of being out exploring the local environment, whilst at the same time (specifically on the cycle path) needing to provide some infrastructure to make exploring possible for families (i.e. having places to lock bikes, having information about the area). As one participant above notes, there is a balance to be struck here.

Therefore in summary, this section has explained participants’ opinions of, and suggestions for Mission:Explore. This research has found that there is a generally positive view of efforts to provide challenges for children and to give families activities to do together. This is particularly applicable to families that are less equipped or experienced in cycling, or less knowledgeable about their local area. The main suggestions for what families would like in challenges and activities revolve around providing challenges to improve skills and confidence on bikes, suggesting areas for more playful cycling, and providing infrastructure to allow families to dismount and explore the areas adjacent to the NCN.

#### **4.3.3 Encouraging others to cycle**

This final section explains the findings about how families said they would encourage other families to cycle. This data is relevant as it helps in understanding what the participants saw as the most effective ways in which to overcome the main barriers to cycling that they had identified – namely: a lack of confidence on bikes amongst adults and children; safety concerns regarding cycling together on-road and children going out on their own on bikes in the local area; and a lack of information about where to cycle in the local area.

There was a single common theme that ran through participants’ discussion of encouraging other to cycle, and this was personal encouragement and support.

*“Talk to them, I mean there is something about that personal contact and knowing others who cycle, and people going ‘oh yes, it’s really great!’” (Adult, ID05)*

*“Talk to people, enthuse about it!” (Adult, ID04)*

Related to this was a suggestion that cyclists should lead through example. Seeing people in the local area doing the same was suggested to encourage others to cycle as a result.

*“It’s setting an example. The ex-mayor, you often see him cycling around the place and I just think there is something about going into town as a family that just kind of shows people it can be done” (Adult, ID05)*

*“We’re not bashing people to cycle, and not go in their cars; but on the other hand we just do it. It’s a kind of get on with it, and if other people see that it’s fun they’ll join in” (Adult, ID01)*

Beyond this, actually taking other people out for a cycle ride was seen as the most effective way of breaking down these barriers. One family described it as being ‘cycling ambassadors’:

*“Cycling ambassadors, that’s what we need. We were cycle ambassadors for a friend of ours” (Adult, ID05)*

Several of the families explained this notion further, and described how they had taken out or accompanied friends and acquaintances on their initial experiences of cycling in the local area, and that this had been able to bring about travel behaviour change towards more frequent cycling.

*“When people visit we just say, well let’s go somewhere, and we’ve got some spare bikes. It’s like everything isn’t it; the only reason we went Geocaching was because someone else suggested it, so we went with them” (Adult, ID01)*

*“I said to my friend, ‘why are you not cycling?’ and she said ‘somebody told me it was really dangerous, people can leap out on you and there are big dogs and you can’t really see who’s hiding in the bushes’. So I told her it wasn’t and helped her to fix up her bike so she could ride the next day. And I asked if she’d like me to go with her, and she said ‘oh, yes please, I’m a bit nervous’. So we cycled together which was very pleasant and she really enjoyed it and she has cycled ever since” (Adult, ID05)*

The participants explained that accompanying people on cycle rides and building confidence in this way meant that it could create a more lasting change in the way people travelled in the local area, and that in their experience friends and acquaintances had gone on to cycle for leisure and to introduce their children to cycling on local cycle paths.

#### **4.4 Findings summary**

To summarise, game-playing within families occurs in many different places, at all time of the day, and in different contexts (e.g. family, individual, and peer). This research has found that families enjoy playing games together for a range of reasons, with the main motivation being – quite simply – for fun and to spend time with one another. Conversely this research has also explained several de-motivations to playing games as a family. Reasons for this included children reaching their teens, wanting greater independence, and spending time predominantly with friends/peers as opposed to family; and children perceiving adults not to be ‘getting’ their games, particularly games which involved an imaginative or fantasy element.

Families’ motivations to cycle together align quite closely to their motivations to play games together, and it can be seen that leisure cycling has many of the key features of a game in the enjoyable sensations it creates and the challenges it poses. As such, spending time together as a family was one of the main reasons people enjoyed family bike rides. The experience of family cycling was broken down into enjoyment in the corporeal experience and sensations of cycling itself, and the activities conducted along the route. Families generally reported strongly positive experiences of cycling together on off-road cycle paths; however cycling on-road was identified as one of the key barriers to cycling more. Safety concerns and issues of confidence on bikes were seen to be strong de-motivators to taking children out on their bikes.

When considering adding a gaming layer to NCN routes, the greatest potential in this notion is in making cycle paths a destination, as opposed to only a form of access. There were two main ways in which this was suggested:

- 1) Through expanding the possibilities for different types of cycling experience on the NCN. This would include areas to improve cycling skills and increase confidence on bikes, and areas for more ‘fun cycling’, which would include more features of BMX tracks and mountain bike trails.
- 2) Through providing the necessary infrastructure to allow families to stop and conduct activities off of the cycle path. This would include more areas to sit and places to secure and leave bikes.

There is the potential for Mission:Explore to structure challenges and activities around the above point. Children liked the exploratory and competitive aspects of having missions on cycle paths, and most parents were positive about having additional ideas for activities that they could do together. However, adding missions alone to cycle paths does not clear the more serious and entrenched barriers to cycling together as a family, and therefore where adding a gaming layer is argued to be a useful approach to improving the appeal of cycling and enriching the experience of a cycle path, it should be

a part of a *toolkit* of measures to encourage greater cycling, which must include methods of improving perceptions of safety on on-road routes, and increasing the confidence of both adults and children on their bikes.

## **5.0 Innovator Discussion**

The key issues of the project from the innovators behind the concept of placing Mission:Explore in the National Cycle Network are discussed here. The innovation team was interviewed before the first round of family interviews, and the innovator was again interviewed at the end of Phase 3.

### **5.1 The innovation**

The Mission:Explore innovation grew out of a book developed by the Geography Collective (a group of teachers with experience from primary school to university-level teaching), which has a series of missions to complete. There was a feeling of a need to locate the missions more and to get people to engage and interact with and about the challenges. This coupled with an awareness of Yellow Arrow and Geocache, where people share their interactions with their social network, led to the idea of technology, including the Internet and smart mobile phones, as a way of creating greater interaction with the missions. Links to cultural, historical and artistic elements of journeys can be introduced into the challenges as they become context specific and located in the environment. Integration with technology through a website helps locate the missions in specific locations. Hence, the innovation is a series of games or missions that can be explored and completed within a local environment, in this case linked to Sustrans national cycling network. This can build on a series of projects along national cycling network of art and the travelling and landscape series of installations that are playful and interactive. This can link with the infrastructure and can be simple, like viewing platforms etc. (as recently installed in Boston). The technology allows a community of explorers can be created who engaged with various objectives, places and locations and have tagged and noted their interactions.

### **5.2 Benefits of the innovation**

The Geography Collective saw the outcomes of the innovation as being wider than just modal shift to walking or cycling; it would be a nudge or act as a mechanism to enable individuals to have greater connectivity with the world around them and to foster a stronger sense of engagements and belonging within their local area. This included:

- Getting people to explore their local environment much more closely
- Getting people to explore other communities they would not normally do so.

- Getting people out of doors. Therefore getting them to be more active and hence more healthy and fit.
- Increasing social interaction, especially between different generations
  - increasing empathy towards and developing skills to deal with local and global issues like climate change or conflict.
  - allowing individuals to explore in a creative manner, where questions and outcomes may not be known at the start and may change throughout the journey.

For Sustrans they also include the potential of the innovation to help individuals explore and integrate more closely with their local environment, and examining how the national cycle network can help achieve this. It is also linked to the need to increase the amount of play in the local environment for individuals that has eroded over the years as traffic has increased and attitudes towards play has compartmentalised play and made the street and road space for traffic only.

### **5.3 Barriers to the innovation**

A variety of barriers preventing the innovation from being as effective as possible identified upfront include:

- **Competition for time.** Competition from television and computers and other less physically engaging activities. Child's day already taken up with many time-dependent activities. Hence, a major question remains, will there be time for families and children to do engage with this innovation?
- **Attitudes of parents and authorities** who see playing outside as dangerous and the taking of risks by children to be minimised or managed.
- **Knowledge of parents and authorities** who themselves do not know the local environment well to be able to pass-on judgement of risk and how to interact with the local environment to the child.
- **Technology barriers.** Technology must work as would be expected and capture, record and provide for the innovation, overall must support and enhance the innovation. The interaction between technology and user is crucial.

#### **5.4 Theory behind the innovation**

Much of the need for this stems from a need to translate knowledge into behaviour. The team noted that many parents know that walking and cycling and playing outdoors is what should be happening but when it comes to encouraging their children and even leading by example this is not happening in practice. Children are not free to roam outside like they once did and yet there are polls that support the notion children want or desire to be outside, but the barrier comes from parents who keep them inside. In addition, the team cited research that supported the sustainable travel towns project in 2004, that said most 0-5 year olds are passengers in cars and that older children do not roam on foot very far. Sustrans note a move to look at behavioural change and transport “soft measures” to complement their work on developing cycle and walking infrastructure in the UK. A major focus is on children and younger people encouraging the next generation to be less dependent on the car. The knowledge that children like collecting stickers and badges underpins the collective part of the gaming, which the technology again can support.

#### **5.5 Engagement and set-up with stakeholders**

The Geography collective is the creative and technological arm to the innovation. AMV BBDO is giving marketing support; they aim, for example, to use the Netmums website. Also, Arla, a milk product co-operative, is involved in marketing and on pack promotions of the innovation may occur. They have provided financial support as part of their Kids Closer to Nature campaign, to help more children access nature. Stakeholders are engaged with throughout the process. The Geography Collective involves 25 people, all of whom teach from primary school to university level and so have indirect engagement with children and youngsters. More direct engagement also happens at festivals and events throughout the UK, where discussions with parents and children can happen.

#### **5.6 Future directions beyond the project**

Initially the technology is functional but simple, future technology could involve virtual animations onto landscapes and the like to help engage interactivity between technology, gamer and location.

There are possible future connections with organisations such as RSPCA, the Forestry Commission, British Waterways and the National Trust where challenges can be co-located. Possible pricing structures and negotiations are ongoing. Ownership of space and placement of challenges is the key to the future. It is clear in terms of who owns property space but less clear about ownership when it comes to cultural space.

Potential competitors include Scavingr (<http://www.scvngr.com/>) in the USA. Also Twitter, Facebook and Foursquare. But they could also aid the innovation and be used along with it.

### **5.7 Towards evaluating the innovation**

The aim is for Mission:Explore to have 100,000 users registered on the website by 2013. In addition, success would mean more people using cycle networks, especially younger people travelling more sustainably and getting outdoors. Part of the evaluation will be to see if children begin to roam further away from home through walking and in particular cycling as part of being involved in the innovation. Knock on effects are worth investigating too, such as whether increasing leisure cycling and whether that affects day to day commuter cycling too. Specifically would be good to see a doubling of people using the cycle network at a location where the innovation was taking place. But, success may be different in nature to this, so there is a need to keep open mind to see how it unfolds. For example, people may indeed cycle more, but elsewhere than the cycle network; or it could be that not so many people may register with the website but those that those who do may be very dedicated and enthusiastic users. People may use the missions in different ways than would be expected, creating their own games and developments. Metrics may not be able to capture all of these additional benefits.

### **5.8 Reflections after the project**

This section presents an overview of the outcomes of the project, and reflects on the innovators' success in achieving their aims:

#### **Aim 1 – Cyclists:**

*For 7.5% more people (on the previous year) to be using the National Cycle Network*

There was an aim to achieve 15% growth on the cycle network at places where Mission:Explore was working within the cycle network (7.5% growth was through the innovation itself and the remaining 7.5% was through Sustrans promoting the cycle network). A total of ten locations were selected, York and Leicester were the area with most prominent use, but figures around 15% were probably optimistic. However, it is noted it has been hard to assess exact figures due to the difficulty in getting baseline and after accurate cycling statistics. It is acknowledged that the growth in cycling will take longer and that the project would have benefited from being longer in length, at least an additional year before findings would begin to show the growth in cycling numbers. It may also have been beneficial to concentrate on placing the missions within fewer

locations or to group locations together regionally. In hindsight 10 areas to place the innovation within was too optimistic. Flexibility surrounding the project would have helped too; set-backs (for example in gaining cycling statistics) have knock-on effects which cannot be fully compensated for, especially when the target audience is families which involve children of school age where the school calendar and holidays create a difficult challenge. The innovators note that they intend to achieve this aim by the revised target of September 2013

### **Aim 2 – Users:**

*For users to invest more time on missionexplore.net, through:*

- *50% being repeat visitors*
- *10% returning over 100 times*
- *1/20 people who sign-up to win a badge*
- *Users to rate content as >70% positive*
- *100,000 users by April 2013*

Since re-launching the Mission:Explore website in October 2011 to 28th August 2012 (and as a result of GeoVation funding), Mission:Explore has had over 50,000 unique visitors who have made nearly 500,000 page views. Together these people have marked over 17,500 missions as started.

55% of users are now repeat visitors, 5% more than the target. 3% of visitors have returned over 100 times (7% less than our target) and 12% 10 or more times.

The innovators note that while 90% of those who sign-up have earned a badge, it is too early with the cycle project to know the follow through rate.

Currently over 4,000 users are registered on the site. The innovators suggest that they are unlikely to reach the 100,000 users target at this stage without additional funding, but that they are working on doing so.

### **Aim 3 – Clients:**

*To have 10 fully-paying clients by the end of 2014, and 100 by 2015*

Using the Mission:Explore branded website and their own branded versions of the platform the innovators already have over 15 fully-paying clients. These range from schools to charities to businesses, and include: National Geographic, the London 2012 Cultural Olympiad, and a NESTA project with Sanctuary Housing. The innovators also have a project with fellow GeoVation winners 'ITS' to increase the number of families using buses in Lowestoft – another transport motivation project. The Mission:Explore work continues and significant development with partners has continued, most notably

from companies that provide school and education trips, Thames Water, Sanctuary Housing and ITS with buses in Lowestoft.

## 6.0 Conclusions

This section draws together the findings presented in the previous sections and discusses these in the context of existing research into cycling, game-playing, and behaviour change.

### 6.1 Discussion

As discussed earlier, this research has demonstrated that it is difficult to strictly define or identify exactly what it is that constitutes ‘playing’ or ‘a game’. There were several activities which families discussed which created experiences of enjoyment and challenge akin to game-playing, and yet which might not be traditionally described as such. Cycling is one such activity that might not specifically/fully fit the definition of a ‘game’ (see: Juul, 2003; Linehan *et al.*, 2011). Cycling can be a leisure activity, and so fits into many of the common criteria for games listed in existing research, however it is distinct in its lack of two core features of games: (i) rules of play and (ii) a range of different (often graded) outcomes. Nonetheless, family cycling has much in common with a game in the sense of enjoyment it creates, the social interaction it promotes, the sense of achievement it can produce, and the effort that is required to take part (Juul, 2003). It is important to consider therefore that adding a gaming layer to the NCN is not transplanting a game onto an otherwise arduous or unpleasant experience, it is more simply adding to a cycle ride the extra features of a more defined structure of rules and a more tangible and quantifiable outcome (in this context in the rewards earned for completing missions). This has potential implications for the degree of motivation that gaming interventions can give families to cycle. Also, it suggests that some caution is necessary when making any interventions, as these will be layered on top of what is often an already enjoyable experience for a number of reasons; therefore there is a risk that imposing a gaming layer could in fact *detract* from the essence of what makes cycling for leisure fun.

As emphasised throughout this report, the main motivation for families to play games is for enjoyment of the game and of the time it gives them to spend together. Secondary motivations included playing together for the educational value of games (teaching children physical, practical, and social skills), and allowing a wider range of games to be played than would be possible alone. This is consistent with existing research by Ulicsak and Cranmer (2010), who found the same motivations in their research into gaming in families. In addition, this research has identified two motivations which are not included in existing research. The first of these is that parents are often motivated to play games simply to occupy children and to give them something to do. This motivation is particularly relevant in specific contexts such as during travel or on holiday. The second

motivation is that family games encourage socialising with other families in a larger group; getting together with other families and playing games was seen to provide additional social benefits, and once again expanded the range of games possible.

The motivations for families to play games together are contrasted against some of the de-motivations that the findings demonstrate. The most important and consistent of these is the experience of children and young people as they move toward and reach the age of adolescence. During this key developmental part of life, young people often desire and move towards greater independence and a sense of autonomy in their lives. This often involves moving away somewhat from the control and rules imposed during childhood, and to do so requires a break away from activities which signify more childish behaviour (Spear & Kulbok, 2004). It is evident that when reaching the age of independence, playing games together as a family is one of the activities which can sometimes be seen as childish during this phase, and some of the participants who were at this stage preferred to spend most of their personal time with their friends and peers than with their families. This is an important finding in the context of how games or challenges might be targeted on the NCN. To motivate young people of all ages, it will be necessary to provide a range of experiences which are sensitive to the different stages of development through which young people go.

A second de-motivation found by this research was that children sometimes felt that adults weren't very good at certain games. This was particularly related to games which involve fantasy and imagination. A reason for this can be found in research by Caillois (2006). Caillois explains that some games do not have rules in the same way as others, and are more 'free form' (for example: playing with dolls, playing soldiers, playing house, etc...). In these instances fiction and role-playing take on some of the function of rules, and thus provide the game with its necessary structure. Therefore, in cases where parents might join in with a game of fiction created and played by children, their unfamiliarity with – and hence 'incorrect' actions in – the fictional world cause them to unwittingly break the children's rules, in much the same manner as someone cheating or playing improperly in a game with a more defined structure.

The imagination of children has been identified as a valuable tool in designing challenges and games for the family, and it has been suggested that it would be useful to incorporate this into any gaming interventions aimed at encouraging travel behaviour change. This finding demonstrates that whilst fictional elements to games are strongly desirable for children, attention must be paid to the potential for these to de-motivate children to playing games as a family. The de-motivations to family game playing discussed above have not been identified in existing research, and as such this project contributes to the existing body of research in this area.

The literature review has explained that games are well recognised for their ability to motivate people to put greater effort into otherwise undesirable or difficult tasks (Haddock *et al.*, 2009); to be an effective educational tool (Sanchez, 2011; Linehan *et al.*, 2011; Puttick & Storeyguard, 2007; de Freitas, 2006; Kirriemuir & McFarlane, 2004; Corbeil, 1999; Brougère, 1999); to encourage greater physical activity in children (Southard & Southard, 2006; Mhurchu *et al.*, 2008; Baranowski *et al.*, 2008); and to be able to bring about lasting behaviour change (Hegerle *et al.*, 1979; Amaro *et al.*, 2006). Indeed, this report has presented findings which explain some of the motivational power of games to encourage children to engage with school work and to learn. To encourage behaviour change in the context of family cycling however, there are specific challenges to be overcome, and these are discussed below.

### **What value might gaming interventions add to the NCN?**

The first question is whether an experiential intervention (i.e. providing a more fun and engaging experience of the cycle ride through challenges) is needed into an activity which is already (under the right conditions) seen as very enjoyable. Previous discussion in this report has gone into considerable depth in describing and explaining families' experiences of cycling together. On the experiential side, cycling provides a unique sensory experience, and the act of cycling itself – the feeling of movement; the sights, smells, and sounds – is often the main reason that people enjoy it. More traditionally, the more intangible, experiential elements of cycling have been ignored in research in favour of more instrumental analyses of how and why people travel on bikes (Spinney, 2009). However more recently there have been efforts to explore the kinaesthetic and sensory experience of cycling from a range of perspectives (see: Spinney, 2006, 2009; Aldred; 2010; Taylor, 2003; Horton *et al.*, 2007).

This research has explained how participants discussed the enjoyment of movement on the bike, and – at times – the thrill of swooping along the cycle path. Taylor (2003, p. 1617) describes the pure experience of cycling as 'a sense of exhilaration, or pure delight, in just experiencing motion without strain or struggle'. Therefore in the context of a gaming intervention into the experience of cycling, there is a need not to disturb or displace this fundamental 'delight' of being in the saddle. As explained in the findings, participants suggested that such pleasurable kinaesthetic and sensory experiences of cycling could in fact be facilitated through providing areas for – or simply encouraging – 'fun cycling' along the cycle path. As previously emphasised, children will often seek out the exhilarating cycling experiences in local parks and BMX tracks, and there is an opportunity for Mission:Explore challenges (and other gaming interventions more generally) to *promote* thrilling and engaging feelings and experiences of simply cycling on the NCN.

This research has shown however, that at times the enjoyable corporeal experience of the cycle ride does not persist; particularly on longer, hillier, or familiar routes. Here the strain of cycling takes its toll, and the joys of the sensory experience turn to exhaustion and boredom. The findings show that during these times the family cycle can become more of a chore. Taylor (2003, p. 1617) has commented on how a sense of exertion can detract from the pleasures of cycling:

*‘Clearly, where the effort of self-propulsion is greater – as it is in going uphill, or struggling against the wind – attention will naturally tend to be focused more on this expenditure of physical energy and less on the pure sensation of motion itself.’*

It is evident that this can also be linked to experiences of fatigue from long cycle rides, as described in this report. Research by Jay *et al.* (2009) has similarly shown that at times simply cycling along a route can be boring. As discussed previously, Jay *et al.* found that art installations dotted along a cycle path were seen to provide a point of focus, rest, and engagement that could break up the monotony and enrich the experience of the cycle ride. In a similar sense, there is the opportunity for a gaming intervention along the cycle path to do the same thing, and to help alleviate some of the boredom experienced at times along family cycle rides. By posting challenges at strategic points along a route (i.e. after hilly sections or more substantial distances), some of the negative experiences of cycling could be mitigated by providing rest a place for rest, divert attention to a different and exciting task, and give a chance to re-focus and refresh before continuing. As the findings of this research show, such missions could be focussed around exploring the natural/local environment adjacent to NCN routes (and perhaps providing some supporting information for this), and in giving a sense of purpose to the experience leisure cycling.

### **Are gaming interventions a motivator to greater NCN use?**

The second question raised is whether (and if so how) gaming interventions might fit within current understanding of travel behaviour change, and how useful these might be in encouraging greater levels of cycling in families. As the findings of this research demonstrate, there are two key elements of a gaming intervention to the NCN that can be seen as potential motivating factors. The first is in the possible enrichment of the experience of family cycling that such additions represent, and the second is in the potential for games to make cycle paths the destination, as opposed to the means of access.

Baranowski *et al.* (2008) have explored this latter point in the context of health-related behaviour change, and have noted how the *intrinsic motivational qualities* of games

(here computer games) have made people *want to do* the new behaviour. The same point has been emphasised throughout the findings of this research. There is a real potential for gaming interventions that focus on adding excitement and fun to cycle paths to make them more of a place that children and adults want to go to – as a destination in-and-of themselves. This finding is related to discussion in Section 2.5 of current behaviour change theory, which suggests that capturing a person's attention and retaining it is the first critical step in encouraging them to process the information necessary to bring about more lasting behavioural change (Bandura, 1986; Petty & Cacioppo, 1996; Saunders *et al.*, 2007; Baranowski *et al.*, 2008). In this sense, having a gaming element as a part of the experience of cycling can be seen as a 'hook' – or initial way of holding people's attention – and therefore it can be argued to be a useful tool in bringing about one of the key stages in a person changing their behaviour.

In specific relation to the Mission:Explore platform, having the online aspect of the gaming intervention – in which members have an online presence and profile, and can work to earn rewards and to be ranked in relation to peers – means that there is a robust mechanism in place to reinforce, support, make explicit, and self-evaluate the behaviour change. Existing research suggests that having such features as a part of a behaviour change intervention is essential. As has been explained earlier, behavioural change is most effective when individuals have to opportunity to measure their performance against others (Kearney & De Young, 1996; Chatterton *et al.*, 2009), when they are able to visualise and assess the change in real-time (Burgess and Nye, 2008), and reflect upon this in a social context (Hobson, 2001). Mission:Explore has the ability to provide these features, and the findings of this research have explained how participants felt that the online and social aspects of the Mission:Explore platform could be expanded upon and improved specifically for cyclists.

Whilst this all suggests that a gaming intervention *in-and-of itself* should be a strong motivator in encouraging families to change their cycling behaviour, it does not take into account the wider context within which families' travel behaviours are set. As such it runs the risk of being overly optimistic of the power of gaming interventions in the face of key barriers to cycling discussed throughout this report.

The findings of this research show that the main barriers to cycling more which families experienced were issues of safety, confidence, and knowledge. Many parents do not feel able to let their children roam free on bikes and foot in their local areas, and furthermore are very wary of cycling on roads together as a family. Contemporary cycling research supports these findings. It has been explained that barriers to cycling listed in existing research are feeling unsafe in heavy traffic, poor cycling infrastructure, and a lack of segregated or prioritised routes for cyclists (Bannister, 1988; Krizek & Roland, 2005; McClintock & Cleary, 1996; Nankervis, 1999; Newby, 1993). Within this

there is a tension between the desire amongst parents to afford their children independence and the desire to keep them safe (Bickerstaff & Shaw, 2000; Cahill *et al.*, 1996; Tyrell, 2000); most often the desire to keep children safe overrides the desire to give them more freedom (Lorenc *et al.*, 2008).

Heavily entwined into perceptions of freedom is the issue of confidence on bikes amongst both children and adults. The findings of this report show that learning skills and gaining confidence from parents is an essential aspect of children wanting to cycle. If adults are not confident on bikes then it was generally accepted that their children would be far less likely to be exposed to cycling or to have the opportunity to learn from their parents. In this sense there is a vicious circle of low confidence being passed down from parent to child. It has been explained that having a gaming element could help to overcome some of these barriers, and that bike skills challenges on safe, off-road routes could be a good way of increasing the proficiency of both the older and the younger generations of cyclists, to everyone's benefit. However, there remains the issue of how people would access any such area, and as such the barriers listed above remain.

In the cycling context it can be seen that the main barriers to cycling that a gaming intervention would seek to overcome are not experiential – families for the most part enjoyed cycling together and would like to do more of it. The main barriers are *physical and perceptual* – related to safety, confidence, and knowledge – and it is unlikely that providing challenges alone will prove sufficient motivation to families to overcome these powerful issues. That is not to say that having a gaming element is of no value, it has been explained that many participants felt that different types of challenge could enrich the experience of cycle paths in a number of ways. The data suggests however, that these alone are not likely to be enough to overcome the barriers to cycling, and therefore gaming interventions should be considered as an innovative addition to any toolkit of measures aimed at changing travel behaviour change from several different perspectives.

## **6.2 Further questions and future research**

At the close of this report, it is evident that there are several new questions which have been raised throughout the course of this research. This project has been successful in generating useful findings about the motivational qualities of a gaming intervention in encouraging travel behaviour change, however as has been explained, this is a relatively unexplored area, and more research is needed to gain a fuller understanding of the applications of such approaches in a range of different travel contexts.

It would be useful to extend the time-frame of future studies to assess the potential of games to encourage longer-term behaviour change. Panel data is required to make

robust assertions about the motivational qualities of gaming interventions over time. Indeed, this is true of behaviour change research more generally, and it was noted earlier that existing research into the power of educational games to encourage behaviour change is only able to suggest their value in the long-term, not provide evidence for it.

It would be useful to conduct further research with families once the Mission:Explore challenges on NCN routes are set up and operational in their local areas. This would mean that families could be asked to actually go out and experience Mission:Explore on their local cycle paths, and additional depth and insight could be gained into the positive and negative aspects of these interventions.

Finally, the sample of families that participated in this research could be extended to include those who live in different areas, for example rural areas or places that are ranked lower in the index of multiple deprivation. Whilst the sampling procedure followed in this project was necessary to provide detailed and rich data on families' experiences of cycling, there is strong merit in broadening this focus in the future to explore alternate perspectives to family cycling, and understand more about the motivations and barriers to family cycling in a wider range of family contexts.

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