The impact of cycle skills training on skills, confidence, attitudes and rates of cycling

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Abstract

Overview: There has been a steady decline in the numbers of children cycling to school over the last few decades in America (Emond & Handy, 2011) and Peters, (2016), UK (Department of Transport, 2013) and Ireland (O'Driscoll, 2015; Woods et al., 2009). Over the same time period, cycling is recognised as the main mode of transport for school children in Denmark (Cooper et al, 2006) and Holland (Wagenbuur, 2011), two countries who have a structured cycle training programme in place for school children. The general fall in cycling levels has also coincided with an increase in childhood obesity with the WHO (2009) listing obesity and lack of physical activity as two of the five leading global risks for mortality.

Confidence (Wegman et a, 2010; Ducheyne et al. 2012; O'Driscoll, 2005; Trapp et al. (2011) and Lorenc et al., 2011) is a key factor in people cycling for transport but there is a lack of research into the impact of cycling training programmes on cycling for active travel, particularly within Ireland. With the evolution of the car as a main form of transport, children and adults attitudes have become less positive due to safety fears with the bike now seen more as a childrens toy than a possible form of transport. There is a lack of research on the impact parental attitudes have towards cycling and how to improve parent and childrens' confidence levels for cycling to be deemed a safe and viable transport option.

Methods: This research was a quasi-experimental study with both intervention and control groups. This involved both quantitative and qualitative data collection from two locations, one with cycling infrastructure and one without. Quantitative data was collected from 631 primary and secondary children from 22 classes over five time periods. The intervention group also received five one hour sessions of cycling training where they were tested on eight cycling skills pre and post training. Qualitative data was collected from 270 primary and secondary school children at five time periods from 10 classes. Focus group discussions also took place with 14 adults over three time periods. Cycling tutors were trained to deliver five cycling sessions and were involved in focus group discussions immediately post training.

Results: The results of this research indicate that on road cycling skills training has a positive impact on improving attitude and confidence levels for children and parents. Children stated cycle skills training improved both confidence levels 'it was fun and improved my confidence'; 'I'm not afraid any more' and also increased cycling frequency 'I cycle more now because of training'. Parents said 'I'd be more confident of them cycling now but it's the environment around them'. This training improved cycling skills dramatically with general cycling skills improving by 62% and road skills by 83%. Children's confidence towards cycling to school increased by 7.5% and there was a

36% reduction in the fear of traffic at twelve months post training. There was a sustained improvement of cycling levels to school which was not affected by gender. Results indicated that the impact of on road training is more significant when delivered to primary school children. A lack of ‘safe’ cycling infrastructure is often cited as a barrier to childrens’ cycling levels. Infrastructure did positively impact cycling levels and confidence, but on road cycling confidence and childrens’ cycling levels to school were higher in an area with no cycling infrastructure. This suggests that improving cycling skills and confidence through on road cycling training is more effective than providing safe infrastructure.

Conclusion: The study found that improving children and parents’ confidence levels in overcoming fears led to improved attitudes towards cycling and an increase in cycling levels. The delivery of cycling training improves confidence, but other initiatives are also needed to address other children and parent fears, particularly the fear of cars. Providing infrastructure does improve confidence levels, but to increase childrens’ cycling to school levels, on road cycling training is of more importance than providing cycle friendly infrastructure. The funding of a progressive cycle training programme for primary school children could have a more substantial and sustained impact on cycling levels and motorists perception of cyclists than the provisions of cycling infrastructure.

Acknowledgements

‘Life is full of ups and downs, the trick is to enjoy the ups and have the courage during the downs’

As always, thanks to Go Dungarvan and the participating schools and cycling tutors who made this research possible. Thanks to my family for their continued support, and my two daughters, Cerys and Bethan born during this process creating welcomed distractions from study. To my tutor Elaine; thanks for your patience and understanding during my educational and personal rollercoaster that encapsulated this research. And as always thanks to my mother for continuing to be the rock of support she has always been.

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Introduction

Overview

Cycling, for transport or leisure, has many benefits, ranging from improved health to the positive economic impact of less dependence on motorised vehicles. Other benefits include living longer, moving quicker, spending less and being happier (UK All Party Parliamentary Cycling Group, 2013). Lack of physical activity and rising levels of obesity are global problems across the developed world and the World Health Organisation (WHO) lists them as two of the five leading global risks for mortality that are responsible for 16.1% of deaths in high income countries (WHO, 2009). Obesity and physical inactivity are strongly linked and cycling for transport or leisure can increase physical activity and reduce weight. Childhood obesity is a growing problem with almost 20% of UK children aged 10-11 now obese (Sustrans, 2012). In Ireland, 26% of 13 year olds are overweight or obese with girls more likely to be so than boys and weight issues change little between the ages of 9 and 13 as found in the Growing Up in Ireland report (ESRI, 2012)

According to Emond and Handy (2011), in 1969 87% of all trips to school in the US of less than one mile were made by foot or bicycle. This percentage had dropped to 55% by 2001. In 2009, only 13% of children in the USA were walking or cycling to school (Peters, 2016). In the UK, two thirds of short trips (<2km) involving children are made by car but only 3% by bicycle (Department of Transport, 2013).

In Ireland, the numbers of children cycling to school have also declined considerably in the last few decades. The percentage of primary school children cycling to school fell from 4.2% in 1986 to 0.2% in 2011 with 61% of 5-12 year olds being driven to school. In secondary schools, rates of cycling to school fell from 15% in 1986 to 2% in 2011 (92% of whom are male). In 1991 more than 22,400 Irish children cycled to primary school; by 2011 it was just over 6,200 (Ó Tuama, 2015). In Dublin between 1991 and 2002, there was an 18% increase in car journeys and a 17% decrease in people cycling (O'Driscoll, 2005). There was also a 546% increase in the number of secondary students using the

car (as a driver/passenger) as their main form of school transport (CSO, 2014). In addition, four out of ten children were driven to school that lived, at most, two kilometres from school (Dublin Transport Office, 2007). Figure 1 below shows the transport modes for primary school children in Ireland between 2006 and 2011

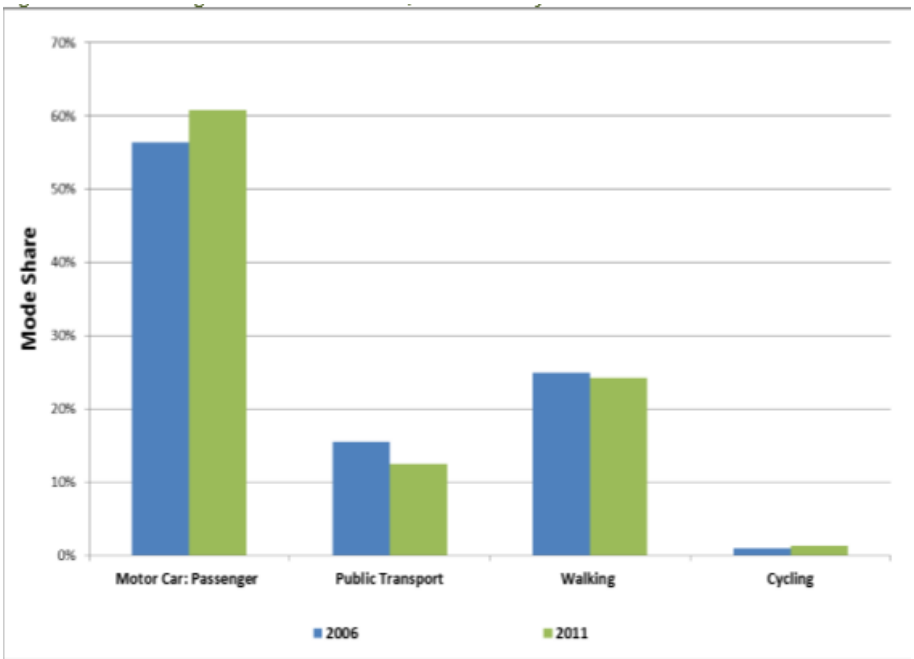


Figure 1. Transport modes for primary school children in Ireland between 2006 and 2011.Source: Green Schools Travel programme report 2015

The statistics for teenagers cycling in Dublin city and county are slightly higher. Woods, Nelson, O'Gorman, Foley and Moyna (2009) surveyed 4013 participants in the Greater Dublin Area between 2003 and 2005 and found that 32% walked and 5% regularly cycled to school. This varied by gender with almost ten times more boys (9.4%) than girls (1%) cycling consistently (Woods et al, 2009). Primary school figures show only 2% of Irish primary school children cycling to school (Dublin Transport Office, 2007). Waterford was below the national average for cycling among primary (0.2%) and secondary (0.58%) school children (CSO, 2012). American research also found that girls were less likely to cycle than boys and that the likelihood of cycling to school

decreased with age (Emond & Handy, 2011). Figure 2 shows transport modes to education in Dublin in 2002 and 2006.

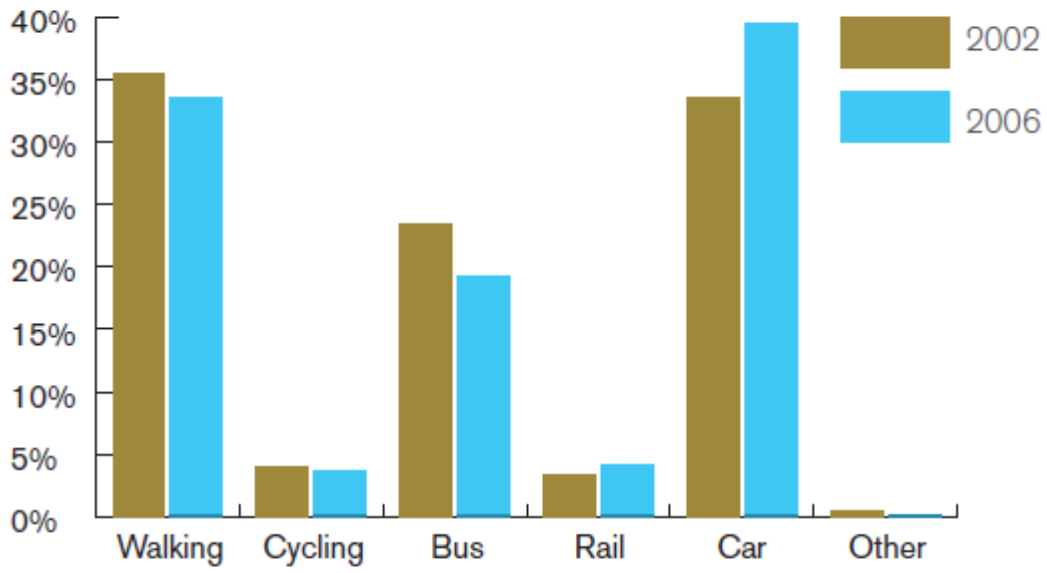


Figure 2. Mode of travel to education – 2002 Vs 2006 (DTO, 2007)

Numbers cycling to school are far higher in European countries: 65.5% of Danish teenagers cycled to school in 2006 (Cooper, Wedderkopp, Wang, Anderson, Froberg, Page, 2006). In Holland, 75% of secondary school children cycle to school, and this rises to 84% for those who live within 5km (Wagenbuur, 2011). Over 30% of car trips made in Europe cover less than 3km and 50% cover less than 5 km (WHO, 2006). According to Sustrans (2008), people spend 8% less time walking and cycling than they did a decade ago. In Ireland, the CSO National Travel Survey (2014) found that 74.4% of people travel by car with an average journey distance of 14.6km. 19% of all journeys were less than 2km, and, despite the apparent resurgence of cycling, only 1.6% of these journeys were by bicycle compared to 51% using a car.

In Ireland, the current transport policy (Smarter Travel) aims to ensure that 10% of all journeys by 2020 are made by bike (Department of Transport, 2009). Dublin saw a 53%

(21,255 bikes) increase in the amount of people cycling between 2011 and 2013 (Russell, 2015). Figure 3 highlights the annual increase in cyclists in Dublin city centre. However, this coincided with the implementation of the Dublin bike scheme and more bike friendly infrastructural changes in the city centre. City bikes are now available in Limerick, Cork and Galway but not available in the rest of the country. The Copenhagen index, a comprehensive inventory that ranks the top twenty bicycle-friendly cities from a list of 122 cities, ranks Dublin 15th, falling from 9th in 2011 and 11th in 2013 (Anderson, 2015).

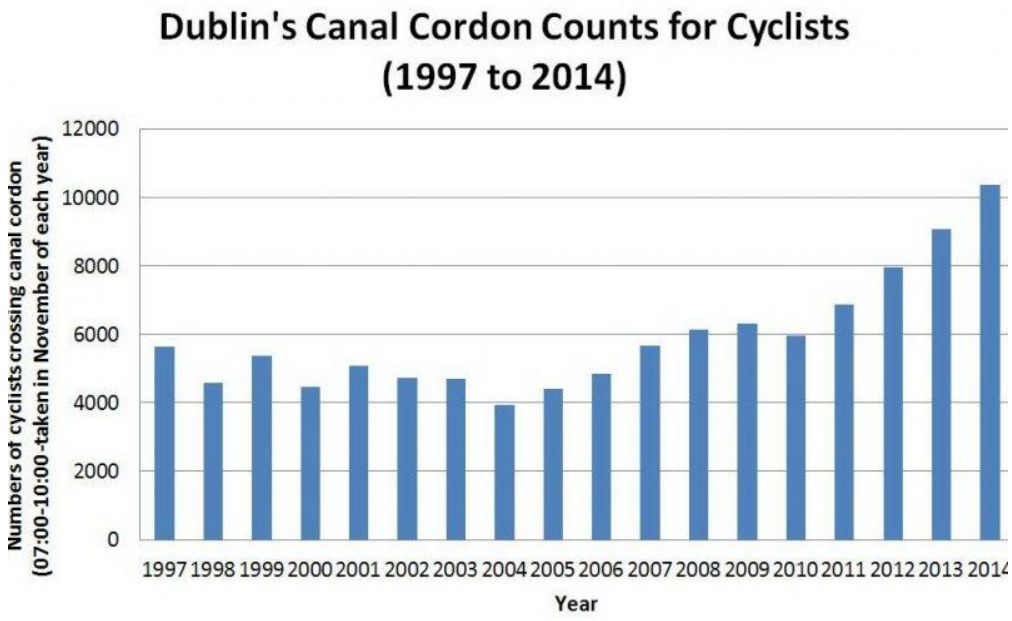


Figure 3.cycle count for Canal Cordon, Dublin (National Transport Authority, 2015)

Figure 4 below shows the annual, average kilometres cycled in 15 EU countries and across the USA. Figure 5 shows the percentage of population aged 15 years and above who have a BMI of over 30. Four of the top ranked nations for cycling are in the top seven for lowest levels of adult obesity, thus highlighting the link between national obesity levels and national cycling levels. However, whilst childhood obesity levels remain low in these five countries (between 15-20%), childhood obesity in Italy is more

than double this at 35% (OECD, 2014). Interestingly, Ireland's adult obesity rate is well above the OECD33 average at 23%, but the child obesity rate is below the average.

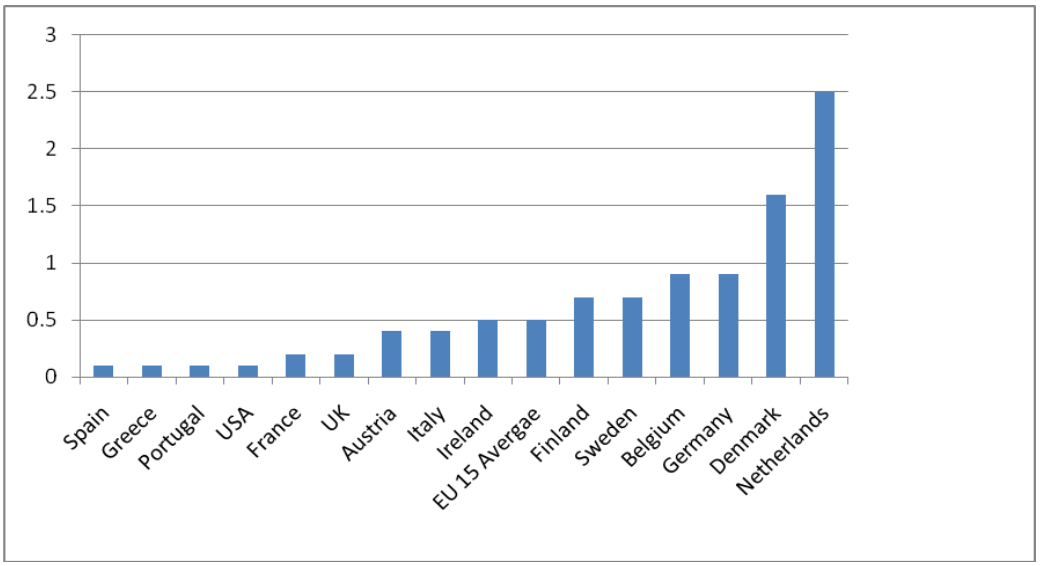


Figure 4. Kilometers cycled per inhabitant per day in some European Countries and the USA (cited in Wegman 2010 from Pucher and Buehler, 2008)

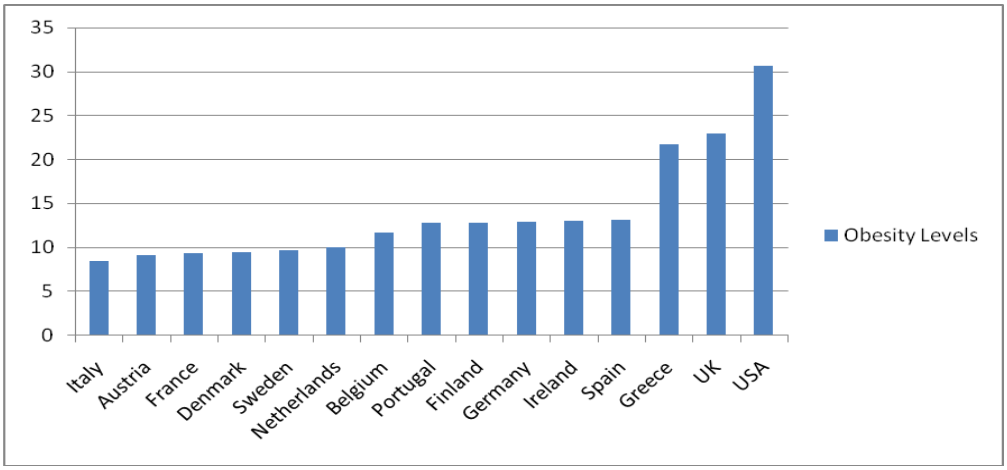


Figure 5. Percentage of population aged 15 years and over who have a BMI of over 30 (OECD, 2014).

Why are cycling rates higher in mainland Europe?

As previously mentioned, levels of cycling are far higher in some European countries, notably Holland and Denmark, but it wasn't always so. In the 1960's, the car was threatening to replace the bike in main Danish cities. Effective city planning focused on giving equal space to cars, bicycles, pedestrians and public transport. This led to the installation of cycle infrastructure to ensure cycling was safe (e.g. segregated cycle lanes and plentiful, secure, covered cycle parking) to make cycling more appealing than driving. Denmark, like many other European countries had a desire to improve health and combat climate change, and with supportive advertisement campaigns, cycling was used as a way to achieve this (Ruby, 2015).

Wagenbur (2013) details how Holland had always been a cycle friendly nation despite original poor cycling infrastructre including poor cycling surfaces that were not connected and stopped at junctions. However, between 1948 and 1970, Dutch citizens experienced a 222% increase in wealth that lead to the car being a symbol of wealth. Cities were unable to cope with traffic volumes, fatalities rose, and there were mass public cycling protests from Dutch citizens about child safety (there were 400 child cycling fatalities in 1971). The public 'stop the child murder' campaign changed political policies to favour pedestrian and cycing activity over motorised transportwith car free Sundays established and proving successful. An effect of this success led to the planning and building of safe cycling infrastructure with public policy operting a 'build it and they will come' mantra. The 1973 oil crisis, which saw a huge loss of wealth, assisted this behavioural change process as cars were no longer affordable which made cycling more attractive. The effect of theseprotests and consequent policy changes has meant that in the Netherlands there were only 14 deaths among children aged 14 and under in 2010.

The problems that faced Denmark (Ruby, 2015) and Holland in the 1960's (Wagenbur, 2013) are not dissimilar to those facing Ireland (Wegman et al, 2010). In Ireland, failure to curb traffic growth has led to dangerous road conditions for pedestrians, cyclists and children at play. The resulting safety concerns among parents have negatively

impacted on cycling levels. Figure 6 shows that while progress in reducing cyclist road fatalities has been made, there is room for improvement– of the twelve deaths in 2014, ten were a direct result of crashes with motorised vehicles (RSA, 2015). However neither the RSA or gardai record the number of 'near misses', accidents involving minor injuries, and/or or bike damage only, all of which reinforce the perception of cycling as a dangerous activity.

Is Cycling Safe ?

As with any kind of sport or physical activity, cycling poses risk of injury, but recent studies show that the health benefits of cycling far exceed the health risks (Active Living Research, 2013). Shephard (2008), Wegman, Zhang and, Dijkstra (2010) and Pucher, Dill, Handy (2010) note that the more people who cycle, the lower the injury rates and the greater the perception that cycling is safe. Data from the European Road Safety Observatory (2015) show that 48% of fatalities in 2013 were among vulnerable road users (pedestrians, cyclists, motorcycles and mopeds). Figure 6 below shows cycling fatalities in Ireland from 1990 to2014.

However, the fall in the number of children cycling to school in Ireland occurred despite the introduction of safety measures such as cycle lanes. It isn't necessarily that cycling is unsafe; it is the behaviour of other road users, particularly the speed of motorists that makes it so. Wegman et al (2010) from his peer reviewed research on cyclists safety suggested cyclists have a high risk of being in a accident with traffic as roads are designed from a cars perspective and, more notably, designed with roundabouts and T junctions to reduce the speed of motorised vehicles. Shayler, Ferguson and Rowell (1993) reviewed the relative costs of cycling as a mode of transport compared with cars taking into account health and financial costs but also accident and environmental damage costs. They found that it isn't that cycling is an unsafe mode of transport, but that the behaviour of motorised transport makes cycling dangerous. Shayler et al. recommended that policies needed to ensure more equitable provision for cyclists in future transport policies.

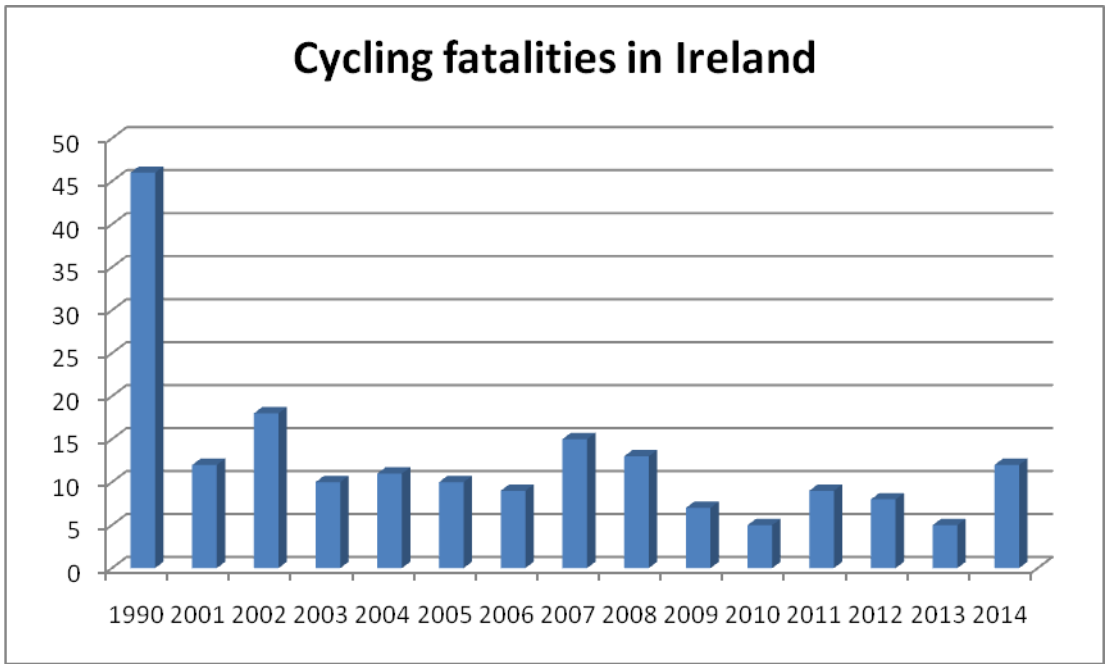


Figure 6. Cycling fatalities in Ireland 1990-2014 (RSA, 2015)

Sustainable transport policy in Ireland

Smarter Travel is the transport policy for Ireland, setting a vision of a sustainable travel and transport system that can be achieved as set out in the National Cycling Policy Framework (2009). Before Smarter Travel, there was no coherent or national policy or guidance. A key aim of Smarter Travel is to have 10% of people commuting by bike by 2020 (Department of Transport, 2009). The Department of Transport stated "through the Smarter Travel 2009-2020 transport policy will hopefully see Irish children cycling as much as their Danish and Dutch counterparts. Smarter travel aims to achieve population-level modal shifts away from car transport towards more sustainable modes such as walking and cycling, particularly for trips of fewer than 4km" (DOT, 2009).

In 2010 the Irish government launched a National Competition for Smarter Travel Areas. In February 2012 the local authorities of Limerick City and County, County Waterford and County Mayo were announced as the winners and were awarded total funding of €21.7 million over a 5-year period to promote cycling and walking, the use of public transport and less car travel. Funding was allocated for infrastructure change, but also

accompanying behavioural change (Smarter Travel: A Sustainable Transport Future, 2009).

Dungarvan in County Waterford was awarded €7.2 million, under the name 'Go Dungarvan'. It aimed to implement a behavioural campaign to create a modal shift away from the car through a combination of personal, workplace and school travel planning, infrastructural improvements. This also included the provision of cycling skills training in schools, which was the basis for this research.

Go Dungarvan

When Dungarvan were awarded funding to become a Smarter Travel demonstration town in 2012, a proportion of funding was ring fenced for behavioural change measures and, in particular, cycling. This included initiatives to increase cycling levels, but also to deliver cycling training to schools to increase cycling to school levels. Therefore it was necessary to review the existing cycle training programme internationally in order to develop a programme for the Go Dungarvan intervention.

Baseline data from the Go Dungarvan project, collected and reported by An Taisce (2013), before any intervention began showed that 4.5% of students currently cycled to school. This figure is in line with research by Woods et al (2009) but higher than suggested by the CSO 2002. Table 7 below shows the specific percentages at baseline for walking and cycling to school in Dungarvan for the Dungarvan secondary schools involved in this research. The lowest percentage of 1.6% was found in an all girl's school whereas in the all boys school 5.3% regularly cycled to school.

Secondary school	Walk %	Cycle %	Total %	% students living less than 5km from school
St Augustine's (mixed)	4.7	5.3	10	55.4
Ard Scoil (all girls)	14.3	1.6	15.9	56.3
CBS (all boys)	20.2	5.3	25.5	58.8
Coláiste Cathail Naofa (mixed)	25.7	8.9	34.6	55.5

Table 1. Baseline Dungarvan Secondary School (age 12-18) student travel modes (An Taisce, 2013)

This data shows that secondary school boys were more than twice as likely to cycle to school as girls, but just as likely in national schools. Six percent of boys' cycle to school compared to 2.6% of girls. This is higher than national figures that show that 2.2% of 13-18 year olds cycle (CSO, 2012)

The baseline Dungarvan research also showed that for 53.8% of students travel time to school is 10 minutes or less and that 56.2% of secondary students live within 5km of their school, which is a realistic distance for cycling (Nelson et al., 2009). Thirty six percent of students expressed a preference for cycling over other modes of transport to school. National data shows an average journey time of 15 minutes and 1% of school children cycling to school (Woods et al, 2010). As Dungarvan has an average travel time of 10 minutes or less and 4.5% of students cycling, it could be positively influenced by behavioural change measures. In addition, the numbers who can cycle to school on a cycle path (8.5%) and with cycle parking (8.4%) are higher than the national average (An Taisce, 2013)

Current cycling training programmes in Ireland

A number of cycling training programmes and active travel programmes that encourage cycling have been delivered internationally as outlined in appendix 1.

Cycling Training in Ireland

At the time of planning this research and delivering the intervention training, there was no agreed National standard of cycle skills training in Ireland designed to educate individual adults or children about rules of the road and give them the skills and practical experience to allow them to cycle safely and effectively on roads. Since then, Cycling Ireland, the National Governing Body for cycling training has developed a new standard called 'Cycle Right' for children, based on the UK Bikeability programme. Pilot tutor training took place in the summer of 2016.

Cycling Ireland is the National Governing Body of cycling and is responsible for the development of leisure and competitive cycling. They coordinate and deliver training programmes in line with Coaching Irelands framework. They currently deliver off road cycling training and skills based training to take place on school yards.

An Taisce are a government body who are responsible for developing environmental campaigns and awareness. This includes some cycling training education but only for beginner adults. Independent cycle tutors, who are not affiliated to any organisation, deliver their own cycle training skills programme on a for-profit basis with varying levels of experience and qualifications. Some trainers have Bikeability but qualifications of providers vary and is not monitored or standardised by Cycling Ireland. In addition, a typical independent cycling tutor training would be delivered by one and sometimes two instructors to about 15 children. Training programmes would mainly teach cycling skills off road (in a playground) though some tutors include on-road sessions with older children. This is not monitored or standardised. Appendix 2 lists the cycling training available from recognised organisations in Ireland.

Of the current Irish cycling training programmes, only the Cycle Right programme delivers both cycling skills and on-road cycle training with low pupil: teacher ratios. The Cycle Right programme is eight hours in duration with on road component comprising of the final two hours of Cycle Right training with a ratio of 1:6. This on road component is up to the discretion of the tutor, In the UK, Bikeability (on which Cycle Right is based) is the national standard in cycle skills training. It is delivered free of charge by local authorities, has a large number of accredited cycling instructors and a government subsidy per child of £40. In Ireland, none of the cycling training courses listed are currently viable as national programmes as they do not have enough trained/qualified cycling tutors to a progressive programme that is delivered mainly on-road and there is no plan in place to achieve this.

LITERATURE REVIEW

Introduction

The benefits to the population of cycling for transport have been well documented. The greatest benefits of a shift from motorised transport to walking and cycling were increases in physical activity and a reduction in road traffic injuries (Woodcock, Givoni and Scott-Morgan 2013). Active transport is also consistently related to obesity: the higher the levels of active transport the lower the levels of obesity (Gordon-Larsen, Nelson and Beam, 2005; Bassett, Pucher, Buehler, Thompson and Crouter 2008).Research in the Netherlands shows that riding a bike for one hour a day increases life expectancy by six months compared to those people who do not cycle and concludes that cycling prevents 6500 deaths per annum (Fishman, Schepers, Kamphuis, 2015). De Hartog, Boogaard, Nijland and Hoek (2010) found the effects of a modal shift from driving to using a bike led to a 3-14 month increase in life expectancy. This was partly due to the reduced effects of polluted air (0.8-40 days lost) and partly from an increased risk of traffic collisions (5-9 days lost), they concluded that the health benefits of cycling outweigh the risks.

Among children, research has found that those who are active for thirty minutes per day, achievable for most by transport to and from school, are fitter, more alert, have better academic performance and report greater enjoyment of school (Evenson, Ballard, Lee, Ammerman, 2009). Sustrans (2012) also notes that active travel to school makes children more alert and ready to face the school day than if they arrived in a car. However, as noted in the previous chapter, cycling levels in Ireland are declining (CSO, 2014; DTO, 2007; Nelson, et al. 2008). There are many reasons for this which research has found to be the key determinants of cycling levels among children: parental fear of road traffic accidents (O'Keeffe & O'Beirne, 2014; Pooley ,Horton, Scheldeman, Mullen, Jones, Tight, Jopson & Chisholm, 2013; Nasrudin and Rahim, 2013); negative perceptions of the local infrastructure (Timperio, Crawford, Telford, Salmon, 2004); unpleasant road environments (McMillan, 2007; Daniels, Nuyts and Wets, 2008); distance from destination (McDonald, 2008; Vernez, Moudon, Lee, Cheadle, Cheza,

Johnson, Schmid and Weather, 2005; Lang, Collins and Kearns, 2011; Trapp, Giles-Conti, Christian, Bulsara, Timperio, McCormack and Villaneuva, 2011); low cycling confidence levels of children (Ducheyne, De Bourdeaudhuij, Spittaels and Cardon 2012; O'Driscoll, 2005; Lang, Collins and Kearns, 2011; Lorenc, Brunton, Oliver, Oliver and Oakley 2008); lack of cycling training and skills (Goodman, van Sluijs and Oglivie, 2016; Ducheyne, De Bourdeaudhuij, Lenoir and Cardon, 2014; Johnson, Frearson and Hewson, 2015; Savill, Bryan-Brown and Harland 1996; Preston 1979) and the delivery of an effective cycling skills training programme (Richmond, Zhang, Stover, Howard and Macarthur, 2014; Ducheyne, De Bourdeaudhuij, Lenoir and Cardon, 2014; Macarthur, Parkin, Sidky and Wallace, 1998; Rush, 2014. The research into each area of concern will be oultined in turn.

Determinants of Children's Cycling Levels

Low Cycling Skills Confidence for Children

Cycling safety is one of the major barriers to cycling to school. Increasing cycling skills and cycling confidence can lead to increased safety levels. To increase confidence levels for cycling to school and in general, it is vital to ensure that individuals have the necessary skills to deal with road situations. Research shows that children who have received cycling training are more likely to ride on public roads and, consequently, to cycle to school, and are less likely to have an accident (ROSPA, 1992).

Research shows that a perceived lack of safety and lack of confidence are major barriers to cycling for transport (Lang et al, 2011). Research published by Wegman et al. (2010), Ducheyne et al. (2012), O'Driscoll (2005), Trapp et al. (2011) and Lorenc et al. (2011) show that cycling confidence is a key determinant of cycling for transport. In addition, Rissel and Watkins (2014), Wells, Downing and Bennett (1979) and Goodman, van Sluijs and Oglivie (2016) show that cycling training can have a positive impact on cycling confidence. Goodwin (2013) in his parliamentary report in the UK stated that better training at an early age will also train future car drivers to acknowledge cyclists and could have a long term impact on driver-cyclist safety.

Savill, Bryan-Brown and Harland (1996) examined whether cycle training schemes lead to improved safer cycling skills and knowledge for 1,974 children in the UK. Children completed a quiz about the Highway Code, and their ability to perform cycling manoeuvres at a 'T' junction was assessed. They found that children who had received formal cycle training tuition were more likely to be rated as 'safe' when performing cycling manoeuvres than the untrained children.

Preston (1979) investigated the impact of cycle skills training on accident rates in the UK. Preston used questionnaires for children to complete about their cycle training and accidents. Preston found that children who failed their cycling proficiency test had much higher accident rates than other children. Boys aged 10 and 11 years who had been trained and passed the cycling proficiency test had slightly lower accident rates than other boys, but this did not apply to girls.

Parental confidence is an important factor in cycling frequency as found by Lang et al. (2011). Parents were asked for barriers for their children to cycle and identified worries surrounding road safety and traffic congestion, but did state their child's cycling competency to actively travel to school of greater importance. Darlington (1976) examined the effects of cycling training on 10-12 year olds and their likelihood of being involved in an accident in Hereford and Worcester in the UK. Darlington found that school children who had received no cycle training were three to four times more likely to have an accident than trained cyclists. Darlington stated as a result of training, 97% of parents had confidence in their children to cycle on their own. However, McMillan (2007) found that only 0.1% of adults surveyed deemed cycle training important.

Ducheyne et al. (2012) found that children whose parents perceived them to have a good cycling skill level were more likely to cycle to school. They also found that parents who also encouraged their children to cycle to school were also more likely to use cycling as an active form of transport themselves.

There is very little research that makes the link between cycling skills training and cycling frequency. O'Driscoll (2005) when researching the 'safe routes to school'

programme found that cycle skills training was provided to students in two out of six schemes. Fifth and sixth class children (10 – 11 years of age) received training in bike-handling skills in the schoolyard and traffic awareness training on roads. Both areas saw cycling to school increase, one from school from 0% to 9% between 1997 and 2001. However, this figure had dropped to 6% by 2004, highlighting a need for possible refresher training. O'Driscoll recommended that the provision of infrastructure alone does not change travel patterns and that cycling training should be provided by the department of transport. This is currently not available in Ireland. Interestingly, two of the six areas did not initiate the programme at all due to local opposition to parking controls. This highlights the need for schemes to have cooperation with target groups and the importance of engaging with stakeholders.

The UK Department for Transport (2012) examined the level of cycling to school since the introduction of the Bikeability cycle training scheme in England during 2006/07.Bikeability is the national standard for cycling skills training in the UK, delivered over three stages in UK schools (see appendix 1). This analysis compared local authorities who had implemented the cycling training scheme with those who had not. While there were small increases in the number of secondary school age children cycling to school between 2006 and 2011, there was also a small decline in the proportion of primary school children cycling to school in participating local authorities. Overall the research indicated the Bikeability training was positively associated with higher levels of cycling to school.

Johnson, Frearson & Hewson (2015) reviewed existing research surrounding cycle training for children. They examined results from the UK 2014 CensusAtSchool and 1345 9-10 year olds from 25 primary schools who completed the 2014 Bikeability School Travel Survey to explore experiences and perceptions of cycling and cycle training from a child's perspective. They also used questionnaires through random sampling for 1745 11-13 year olds who had received Bikeability training. Johnson et al found that cycle training was associated with children who cycle more, are more confident and enjoy cycling.

In contrast, Goodman, van Sluijs & Ogilvie (2016) used information from 3,316 10-11 year olds from the Millennium Cohort study in the UK to compare cycling levels between children whose school had received Bikeability training and those who had not at two time periods. They found that offering free cycling training did encourage children to complete cycling training. However, there was no evidence to show that completion of cycling training led to an increase in cycling frequency or an increase in the likelihood of cycling independently without an adult. The levels of children cycling once a week was the same for both control and intervention group showing no impact.

The type of cycling training can also impact cycling as a form of active travel. Wells, Downing and Bennett (1979) compared the impact of the type of cycling training delivered to 8-10 year olds regarding cycling proficiency. They found that children who received cycle training entirely on roads showed significant improvements compared to those whose training was entirely off road, in school playgrounds. However, this study concluded that younger children's (8 years) skill and confidence levels were not as developed as older children's (10 years) as a result of training.

Research from Johnson et al. (2015), Ducheyne et al. (2012) and Ducheyne et al. (2014) suggests on road cycling skills training is vital in increasing confidence and cycling levels. Wagenbuur (2011) suggests that children should experience traffic situations at a younger age to break down the fear of the road, as in some European countries such as the Netherlands and Denmark. In Ireland it is recommended that no child younger than 12 should ride a bicycle in any traffic (Road Safety Authority, 2013), a recommendation could impact the development of a fear of cycling as behaviours are usually more effective when learnt at a young age.

Vanwolleghe, Van Dyke, De Meester, De Bourdeaudhuij, Cardon & Gheysen (2016) researched childrens transport choices from the final year of primary school (11 years) compared to the second year of secondary school (13 years). They conducted a questionnaire with 313 children in Flanders, Belgium. They found that it is necessary to promote different possibilities at primary school for children to use active transport when going to secondary school. In this study, the level of children cycling increased from

primary school (44%) to secondary school (58%). This agrees with Wagenbuur (2011) in suggesting that the earlier travel behaviours are formed, the greater influecne they have.

Richmond, Zhang, Stover, Howard & Macarthur (2014) researched 25 evaluations of cycling training programmes involving children. They all wanted to determine the effectiveness of bicycle skills training programmes in reducing bicycle-related injuries in children and youth. Some evaluations reviewed show that cycling training led to significant improvements in cycling behaviour (especially for on-road training) and knowledge. However, they concluded that whilst cycling educational and skills training programmes can increase knowledge of cycling safety, they do not necessarily translate into a decrease in injury rate, improved bicycle handling ability or attitudes to cycling.

Macarthur, Parkin, Sidky & Walace (1998) researched 141 primary school children from six schools in Canada to evaluate the effectiveness of a cycling skills training programme. Baseline assessments on cycling skills were made with follow up evaluations post three months. This programme focussed on playground instruction by qualified instructors on bicycle handling skills and they concluded that a brief skills training programme is not effective in improving safe cycling behaviour, knowledge or attitudes of participants.

The positive impact on cycling skills training on confidence and skill levels was also evident in children's cycling training for 9-10 year olds in Belgium. Ducheyne, De Bourdeaudhuij, Lenoir and Cardon (2014) used a cycling skills test pre, post and five months post training in addition with paretnal questionnaires at the same time points to establish parental attitudes and cycling behaviour. The study had two aims: 1. to evaluate the short and longer term effects of cycle training on children's cycling skills; 2. to examine the effects of cycle training, with and without parental involvement, on levels of cycling to school and on parental attitudes towards cycling. Cycle skills training consisted of four progressive forty five minute training sessions focusing firstly on skills, and then on road training. This training was delivered to 94 children in total with 25 children receieving four 45 minute training sessions in a child only session and 34 children plus parents receiving

similar training. There were 35 children in the control cohort. Ducheyne et al. found cycling skills training had a significant effect on children's cycling skills and improvements were not affected by gender. They also found that these improvements were significantly greater between pre training and immediately post training than pre and post five months, potentially suggesting training needs to be repeated to maintain the positive impact. They found no effect on cycling levels to school or parental attitudes as result of cycling training.

Rush (2014) evaluated the effectiveness of five "Safe Routes to School" programmes in the USA at reducing the crash rate and improving the safety of children and youth cyclists aged between 7-15 years. Each school delivered bicycle education. Rush used crash assessment data comparing bicycle crash rates for pre and post delivery of cycling training. Rush analysed cycling to school rates with four of the five schools reporting increased levels and suggested on-road training is more effective than theoretical, off-road training.

Rissel and Watkins (2014) surveyed 4145 adult participants who completed the AustCycle programme, a community based cycling skills training programme with 10% providing BMI data. AustCycle is a programme where trained coaches teach community members basic bike handling skills specifically for the community where they live. Rissel and Watkins (2014) recommended the roll out of cycling skills programme to increase skills, frequency and confidence. Rissel and Watkins found that cycling skills and confidence improved after training among adults and also increase cycling frequency. Cycling frequency increased from baseline (38%) to post three months (82%) but dropped post twelve months (68%). Rissel & Watkins also found that that poor cycling skills can adversely affect cycling confidence and can contribute to poor road safety and recommended the implementation of AustCycle to increase cycle frequency, skills and confidence.

Parents' fears of road traffic accidents

O'Keeffe and O'Beirne (2014) surveyed 2,228 Irish children and young people between the ages of seven and 15 about travel patterns and levels of personal autonomy surrounding travel decisions in 2011. In addition, 1,695 parents completed an accompanying questionnaire about similar issues. Among parents, the most frequently-cited barrier to allowing their children to make journeys on their own is a fear of traffic accidents (NRA, 2014). This is most prominent among parents living in rural areas, and rural children are most likely to be chauffeured to school regardless of distance. O'Keeffee and O'Beirne found that children's attitudes differed from their parents. Worry about traffic was negligible and more were concerned about dogs when they were out and about. Teenage children also report few concerns about travelling alone but conversely, their single greatest concern is that they could be kidnapped.

Timperio et al. (2004) recruited 919 10-12 year olds from 19 Australian schools. These children completed questionnaires about their perceptions of traffic, strangers, road safety and their perceptions of their parent's views on these issues. Parents also completed questionnaires about active travel options to school. Parents stated that heavy traffic, no lights or crossings, children having to cross several roads and limited public transport were associated with a lower likelihood of children walking or cycling.

Mammen, Faulkner, Buliung and Lay (2012) researched the declining prevalence of Active School Transportation (AST) in Toronto, Canada. They used data from 1016 parents who completed a self reporting questionnaire regarding parent's perceptions of safety and positive attitudes towards AST. The motive for research was to explore the differences between households where children travelled independently to school and those where children were escorted. Findings revealed that unescorted children were significantly older, more likely to live within one kilometer from school, and their parents chose to reside in the current neighborhood in order for their child to walk to/from school. The parents of the escorted children worried significantly more about strangers and bullies approaching their child as well as the traffic volume around school. Mammen

et al. suggested the focus should be on the development and sustainability of non-infrastructure focused programmes to alleviate parental safety concerns.

Ghekiere, Van Cauwenberg, Mertens, Clarys, de Geus, Cardon, Nasar, Salmon, De Bourdeaudhuij & Deforche (2015) recruited 350 fifth and sixth grade student and parents from Flanders, Belgium to assess cycle friendly environments. By using a web base questionnaire, they found that the degree of separation from a road traffic environment and lower speed limits had the largest effect on parents.

Ducheyne, De Bourdeaudhuij, Spittaels and Cardon (2012) surveyed 850 parents of children aged 8-10 years of age in Belgium who lived within 3km of school. They found that parents who perceived their children to have good cycling skills were more likely to cycle to school. In addition, children with parents who encourage them to cycle to school were less likely to never cycle to school. Children were more likely to always cycle to school if neighborhood traffic was perceived as safe by their parents. In the US McMillan (2007) researched travel modes to school and what influenced these choices. They asked parents what would encourage school children to cycle more. The top three answers were provision of cycle tracks (34%), secure cycle parking (25%) and improved road safety (20%).

Parental confidence to allow their children to cycle for transport is an important determinant of active transport. Parental concerns about children's safety (O'Keeffe & O'Beirne, 2014; Pooley et al, 2013) have led to a fear of children cycling on roads. Lorenc, Brunton, Oliver, Oliver and Oakley (2008) conducted a systematic review of sixteen studies on the public's views of walking and cycling in the UK that examined the views of children, young people and parents in the UK about walking and cycling. They found a culture of car use that stemmed from a fear and dislike of local environments and from parents that prioritised their child's safety over their development of independence. They concluded that a key reason that children do not cycle anymore was parent's fears about dangerous traffic and children's lack of cycling ability.

Ducheyne et al. (2012) found that children with high levels of independent mobility and whose parents perceived that they had good cycling skills were more likely to cycle to

school. Children who had friends who cycled were more likely to use cycling as a form of transport. Parents who encouraged their children to cycle to school were also more likely to use cycling as an active form of transport themselves. Concerns about traffic volumes and speed had a significant negative impact on levels of cycling to school. However, if parents perceived this traffic as safe it had no effect. They concluded that "creating a positive attitude of parents towards cycling to school and teaching children the basic cycling skills are important strategies when promoting cycling to school among children living within 3.0km distance" (page 150).

McMillan (2007) examined the influence infrastructure design on travel behaviours to school and the influence of urban and rural active travel infrastructure on children's travel behaviour in the USA using parental questionnaire analysis. McMillan found that children were less likely to walk or cycle if caregivers reported that driving was more convenient. In addition, parents highlighted fears of neighbourhood and traffic safety, stating they were of higher importance than perceived infrastructure safety. These results support the theory that travel connectivity through cycle paths and walkways is important, but other factors influence school travel mode choice such as perceptions of neighbourhood safety, traffic safety and household transportation options.

Yu & Zhu (2016) researched what shapes attitudes and behaviours to walking to school in America. They found that parent's attitudes were significantly related to children's walking to school behaviour. They suggested that the overcoming of parental attitude barriers and increasing their enjoyment of walking was critical in encouraging walking to school. The same could be said for cycling.

Nasrudin and Rahim (2013) distributed 98 questionnaires to parents in Malaysia to determine the factors affecting transport choice. They found that despite parents being aware of the environmental damage of motor vehicles and the positive effects of walking and cycling to school, fears about safety (crime and traffic) and security were the main reasons that discouraged parents from supporting their child's use of asustainable transport mode. Mammen, Faulkner, Buliung and Lay (2012) research with 1016 parents on their attitudes towards active travel concurs with this. They found that

parents reported worries about stranger danger, bullies and traffic volume around the school as a reason for their children not cycling or walking.

Research by O'Driscoll (2005) on safer routes to school found that the provision of infrastructure alone does not change travel patterns and that cycling training should be provided by the Department of Transport.

Distance to destinations

Nelson, Foley, O'Gorman, Moyna and Woods (2008) collected data from 4013 15-17 year olds in post primary schools in Ireland. They found that distance is the most important barrier to active commuting. 90% of adolescents in the study who perceived distance to be a barrier lived more than 2.5 miles away. The majority of walkers lived within 1.5 miles and cyclists 2.5miles. The researchers deemed that a distance of 2.5 miles is achievable for cyclist and walkers. This study also showed that boys were more likely to actively commute than girls.

McDonald (2008), studied data from the US Department of Transportation's 2001 National Household Travel Survey to analyse factors affecting travel mode choice for elementary and middle school children. McDonald found that distance from school was the biggest influence on travel mode choice. This is supported by Woods et al. (2009) from the "Take PART" study (Physical Activity Research in Teenagers) involving 900 15-17 year olds in Dublin who also found that the further away students live from school, the less likely they are to walk or cycle. Vernez, Moudon, Lee, Cheadle, Cheza, Johnson, Schmid and Weather (2005) collected data from 608 randomly sampled respondents in Washington and found that the distance from a perceived safe cycling facility, such as a bicycle lane, can also have a strong influence on the decision to cycle as a means of transport. Individuals were 20% more likely to cycle if they live within half a mile as opposed to one mile of a cycle lane.

Lang, Collins and Kearns (2011) conducted four focus group sessions with parents in Auckland, New Zealand to examine the factors that influence parent's mode of travel for their children's trip to school where walking and driving were the two main travel

options. They identified that perceived distance and time constraints heavily impacted on travel choice, but road safety, congestion, children's travel competence and children's health and fitness levels were also a factor. Lang et al suggested a variety of interventions to improve walking levels. Similarly Trapp et al. (2011) in their study of travel attitudes for Australian children and parents found that for each kilometer boys lived from school, the odds of cycling reduced. The research concluded that parents must prioritise cycling over driving. This agrees with research by Mammen, Faulkner, Buliung and Lay (2012) that unescorted children were more likely to live within one kilometer from school.

Lang, Collins and Kearns (2011) found parents stated time constraints and distance to be main barriers to active travel. This supports findings made by Lorenc et al (2008) and Trapp et al (2011). Lang et al (2011) concluded that the reasons leading parents to drive are simply the ease of car transportation and recommended a variety of interventions were needed to promote active travel.

For children, the use of a bicycle is the only way to cover greater distances at a faster speed and consequently, most children prefer cycling rather than walking (Shephard, 2008). In Ireland, it is recomended that nobody aged 12 and under should be in a traffic environment, but at the same time it is also illegal to cycle on a footpath (RSA, 2013). This is a barrier to alleviating initial road safety fears and also hinders the chances of greater numbers cycling to provide a safer environment (Horton et al., 2007).

The road environment: traffic speed and volume

One of the most common problems for cyclists is that the modern traffic system is designed for car users rather than cyclists or pedestrians. This means less direct cycle routes, greater traffic speeds and volumes and increased safety concerns for cyclists. Bicycle fatalities made up 6.8% of deaths in the EU but only 2% within Ireland (ERSO, 2012). The good news is cycling fatality rates fell most in Ireland and Denmark between 1996 and 2005 (ERSO, 2008). In Ireland, as figure 2 (RSA, 2015) shows, there has been a dramatic decrease in cycling fatalities since 1990 from 45 fatalities to only five

fatalities in 2013. Alarmingly though in 2014, this increased to twelve although this decreased to nine fatalities in 2015. Motorised vehicles were invovled in ten of twelve accidents in 2014 and in all five fatalities in 2013 (Ginty, 2015).

In 2013, a total of 12,410 cars were surveyed on the road network in Ireland by the National Roads Authority (2014). Of those surveyed, 43% (5345) were travelling on urban roads, and 57% (7065) on rural roads. The survey measured car free speed, that is, the speed at which drivers choose to travel when unconstrained by road geometry (e.g. sharp bends), weather conditions (e.g. rain), or traffic conditions (e.g. congestion or road works). The results showed that 22% of all cars observed on rural roads were speeding, that is driving at a speed greater than posted speed limit, and 61% of all cars observed on urban roads were speeding. More worryingly, between 41-53% of motorists deem it acceptable to break the speed limit by 10kph (RSA, 2015).

Horton, Rose and Cox (2007) conducted a peer review on the social perceptions of cycling over time including competitive cycling, cycling as a means of affordable transport, cycling for fitness and cycling as a mode of transport. Horton et al. compared cycling levels across major cities and concluded that the greater the number of cyclists on the road, the greater the safety. Similarly, the fewer cyclists, the greater the risk to individual cyclists. Jacobsen, Raciopp and Rutter (2009) examined the impact of traffic on levels of walking and cycling by reviewing medical, public health, city planning and traffic engineering literature. They found that the real and perceived risk imposed by traffic discourages walking and cycling. Greater traffic volumes and speed lead to lower levels of walking and cycling. Jacobsen et al concluded that interventions to reduce traffic speed and volume are likely to promote walking and cycling and could also result in public health gains.

Pooley et al. (2013) examined the experience of walking and cycling in four English towns (Leeds, Leicester, Worcester and Lancaster) as part of an EPSRC-funded project that used multiple research methods. 15,000 homes received postal questionnaires and 80 household interviews were conducted. Results found that perceived traffic danger is a significant deterrent to cycle use and walking and cycling is not seen as a normal way

to travel. Similarly, in Brazil, Segadilha and Sanches (2014) surveyed 65 cyclists, who used a bike for commuting, about the factors that may affect their route choice. They found that motor vehicle speed, volume of motor vehicles and street lighting were the main contributing factors.

Neighbourhood design and bicycle lanes

Carver, Timperio and Crawford (2008) collected data in Melbourne, Australia as part of the Children Living in Active Neighbourhoods (CLAN) longitudinal study. They examined the impact of the physical environment on children's physical activity levels in Australia. Parents of 188 8 and 9 year olds reported on walking and cycling to local destinations with 346 13-15 year olds self reporting. They found no association between road environment variables and children's likelihood of walking/cycling frequently. They found that adolescent girls whose travel route included greater numbers of traffic/pedestrian lights were more likely to walk/cycle than those whose neighbourhoods had fewer traffic lights. Carver et al. concluded that the road environment influences physical activity among youth in different ways, according to age group, sex and type of physical activity.

Trapp, Giles-Conti, Christian, Bulsara, Timperio, McCormack and Villaneuva (2011) researched 1197 children and parents from 25 Australian primary schools on travel habits and attitudes. The research cohort was located in both high and low walkable neighbourhoods with children keeping a one week travel diary and both parents and children completing a questionnaire on travel habits. Trapp et al. found that for boys, neighbourhoods with high connectivity and low motorised traffic resulted in a fivefold increase in the frequency of cycling but this was not found for girls.

Trapp et al. (2010), in their research for travel habits and attitudes of primary school children in Australia identified the importance of providing a safe cycle network. The provision of cycle lanes that were connecting schools and town centres were the main influence on parents and children. Dill and Carr (2003) in their analysis of the US Census 2000 of 35 large U.S. cities found that 'each additional mile of bike lane per square mile was associated with about a 1% increase in the share of workers

commuting by bicycle.' Buehler and Pucher (2012) found that among 90 of the largest 100 American cities from the 2008 census report, those with 10 percent or more of bike lanes or paths had about 2 to 3% more daily bicycle commuters than those with less bike lanes and paths. Likewise, Wardlaw (2014) analysed cycling rates over time and gender differences for cycling saftey and the effects of infrastructure on cycling rates in the Netherlands and UK since 1950. He suggested that 'separated bicycle tracks generally produce fewer and less severe crashes in their linear sections so are much safer', whilst separate cycle lanes take cyclists away from the danger of traffic.

Ghekiere, Van Cauwenberg, Mertens, de Geus, Clarys, Cardon, Salmon, De Bourdeaudhuij & Deforche (2014) recruited 35 children (10-12 years) for ride along interviews to random destinations in Flanders, Belgium. They found that children suggested visibility and the separation from traffic as key aspects for improving cycling frequency. The width and surface of cycle facilities to allow children to cycle next to each other so it was more enjoyable was also mentioned.

Pucher and Buehler (2008) found, when analysing the success of the Netherlands, Germany and Denmark as cycling nations, that the key to achieving high levels of cycling appears to be the provision of separate cycling facilities along heavily travelled roads and at intersections, combined with traffic calming of most residential neighbourhoods. In addition, extensive cycling rights of way in the Netherlands, Denmark, and Germany are complemented by ample bike parking and integration of bikes on public transport. These measures, coupled with a comprehensive traffic education and training of both cyclists and motorists creates a positive attitude towards cycling and cycling safety. A variety of promotional events in addition to education and access also generate enthusiasm and wide public support for cycling'. However, the use of separated cycle lanes/paths is not possible in most established towns and cities in Ireland without extensive road widening and, therefore, removing the adjoining buildings. It could be achieved by removing or restricting car access and on street parking in town and city centres. According to Pucher and Buehler, Denmark and the Netherlands identified the importance of bike friendly city planning, particularly road

widening and, as a result, have enjoyed some of the highest cycling rates in the EU over the past few decades. The Dutch network of cycle tracks and routes increased from 9,000 kilometres in the mid 1970s to 29,000 kilometers currently. This coincided with a fall in cyclist fatality rate of 67% in the same period (Wardlaw, 2014). In Denmark, Odense has 545 kilometers of separated cycle paths, and just 1,000 kilometers of streets (Peters, 2016).

However, Ducheyne, De Bourdeaudhuij, Spittaels and Cardon (2012) surveyed 850 parents of children aged 8-10 years of age in Belgium who lived within 3km of school. The survey asked parents about personal, family, behavioural, cognitive, social and physical environmental factors related to the cycling behaviour of their children to find out why some children always cycled and others did not. They concluded that the contribution of the physical environment is limited and highlighted the fact that interventions for increasing cycling to school should not focus solely on the physical environment.

Indeed, building cycling infrastructure does not always guarantee an increase in cycling levels. Auchtapt (2013) reviewed new cycling towns in the UK such as Milton Keynes, Stevenage, and Livingston. The cycling network of Stevenage was built post war to a high standard, yet cycle use is low at 3% of commuter trips. Auchtapt states “The real reason is that the town of Stevenage didn't tackle car use. The car still remained the easiest way to get from A to B, and planners had only focused on one aspect of cycling by improving infrastructure.” This reinforces the idea that a coordinated package of infrastructure provisions, promotional programs, and transportation policies unique to each city can succeed at significantly raising cycling levels.

Increasing cycling rates

Improving skills

There has been little research on the impact of cycling skills training on active travel. In Ireland, due to the lack of structure surrounding cycling training initiatives, this is particularly evident. The Irish Green Schools Travel (GST) programme aims to promote

more active means of travel. This includes the promotion of cycling but does not involve specific cycling skills training. Between 2006 and 2011, 539 primary schools including 109,839 primary pupils took part in the GST programme. This accounts for 17% of all primary schools and 21% of Irish primary students. Schools who implemented the GST saw cycling mode share increase from 0.9% in 2006 to 1.3% in 2011 in the 5-12 year old age cohort. Interestingly there was reduction in walking as a form of active travel from 24.9% to 24.3%. However, the counties fewest schools taking part in the programme actually saw the largest increase in walking or cycling. The report (Department of Transport and Tourism, 2015) also states that schools that did not received GST support are as much as or more likely than those involved in the programme to record positive sustainable modal shift patterns. It could be said that the GST programme is not effective in increasing numbers of children cycling to school.

An Taisce (2013) conducted research on cycling numbers as some schools within Dungarvan had received cycling training previously as part of the Go Dungarvan intervention. The percentage that now cycle (8.1%) is higher than national average. This suggests cycling training has a positive impact on levels of cycling as an active form of transport. There is a need for more research into this area, particularly research with larger samples, longitudinal follow ups and in Ireland.

In the Danish city Odense, a programme called CycleScore is used to increase cycling levels post cycling training. The programme uses an electronic checkpoint to give students a lottery ticket every time they ride by which students can win prizes such as bike accessories or T-shirts. Since 2014, bike trips have increased 28% and 7% of children who used to get a ride in a car to school now bike instead (Peters, 2016). This suggests that training with follow up incentives can lead to an increase in cycling as a form of active travel.

In 2015, 24 Postgraduate students completing the Participation in Policy and Planning course at the University of Edinburgh conducted a group project to explore barriers to cycling, potential ways to increase cycling, and how barriers can be overcome with a Cycle Friendly Campus Award. The research group engaged students and staff in focus

groups discussions to answer the following question: ‘how do we encourage more students to take up cycling’. The University wanted to create a cycling culture, similar to Cambridge University where cycling is normalised. The resulting report (Acton et al, 2015) gave three recommendations that focused, primarily on behavioural change: 1: raising awareness of existing infrastructure through mass participation events. 2: overcoming fear and building up confidence. 3: providing opportunities to take up cycling.

The 2011 Census in the UK showed a 37% increase in bicycles on the road between 2001 and 2011 in Cambridge. The University of Cambridge itself has incredibly high cycle rates with 50% of Cambridge residents using their bike at least once a week (Laker, 2011). These figures have a lot to do with the University’s promotion of cycling. Undergraduates at Cambridge are not allowed a vehicle, unless they receive special permission so forcing students to cycle. This is assisted by the University increasing cycling infrastructure where possible which strengthens the “cycling culture” that already exists at the University.

Ghekiere et al, (2014) found that to increase the level of cycling in the 10-12 year age group, parental perceptions of traffic safety needed to be addressed They suggested inviting cycling infrastructure e.g. wide, good surface etc which would encourage parents to cycle with their children to various destinations to allow them to have confidence in their children to then cycle independently at an older age.

Venwolleghem et al, (2016) also found the promotion of cycling as part of the home-school trip at a young age ensured a positive attitude towards cycling which continued in secondary school aged children. The suggestion of providing safe neighborhoods combined with programmes for parents can increase cycling skills.

Goodman, Sahlqvist & Ogilvie (2014) researched the impact of traffic free cycling routes in the UK on 1796 adults. They found that living near this infrastructure did not lead to increased levels of physical activity in year one, but did in year two, suggesting

behavioral changes takes time. Whilst this is for adults, the same could be said for children.

Improving the road environment

Wegman, Zhang and Djysktra (2010) reviewed the research on road safety problems and why cyclists are considered “vulnerable road users”. They concluded that as the number of cyclists increases, the number of fatalities may also increase but not at the same level. Wegman et al. (2010) suggested there is strong evidence that well designed bicycle facilities and physically separated cycle lane networks can lead to reduced risks for cyclists and have a positive impact on safety. Their research also suggests that reducing the speed of motorists can improve cyclist safety.

Wegman, Zhang and Dijkstra (2010) found that the number of cycling fatalities halved in Holland from 1988-2009. Holland created a safe system approach for cycling that involved : 1 preventing possible encounters between cars and bicycles and reducing the speed of motorised vehicles where the possibility exists of cars and cyclists converging. Wegman et al. found a positive correlation between increased numbers of cyclists and increased safety. Between 1988-2009 the number of kilometers travelled by cyclists increased by 30% This supports Horton et al’s (2007) and Wagenbuur (2011) suggestion that with more cyclists on the road comes greater safety.

The Dutch Institute for Road Safety Research (SWOV, 1994) and the Transport Research Laboratory (2011) in the UK concluded that road cycle lanes improved safety on direct links but increased crash rates at junctions. Their overall effect on safety therefore is neutral. Wardlaw (2014) also suggests that separating cars and bicycles creates a problem as drivers don’t have to think about cyclists; “the increased risk at junctions is most likely due to the separation, which leads drivers to be less aware of cyclists.” (page 247)

Daniels, Nuyts and Wets (2008) conducted a before and after observational study on 91 roundabouts in Belgium to assess the impact on the amount of cyclists crashes. This study found that the introduction of roundabouts actually increased the rate of bicycle

injury crashes. Roundabouts constructed in built up areas led to an increase of 48% in the number of accidents involving cyclists. Interestingly, roundabouts with cycle lanes led to more collisions/crashes than other design types.

Ghekire et al, (2015) found that the road environment played a part in both children's and parents likelihood of cycling. Parents highlighted the speed limit and degree of separation with motorised traffic as the main contributors to children cycling. Children however stated that the evenness of the cycle path and the speed limit were the main variables to them cycling frequently. Ghekire et al concluded that interventions aiming to improve the built environment in order to increase cycling for transport may benefit from changes in micro environmental factors rather than large scale changes.

Conclusion and Rationale

Children's physical activity levels are declining (WHO, 2009) and overweight and obesity levels are rising. There has also been an increase in the amount of children being driven to school between 1986 and 2011. The benefits of active travel to school are well known (Woods et al, 2009) through increased fitness levels and concentration levels. It is recommended that children should complete 60 minutes of exercise a day and cycling for active travel can help reach this, reduce obesity levels and reduce car travel and congestion. Research suggests that 5km is an acceptable distance for children to cycle. There is a substantial percentage of children whose commute to school is within this distance. However, studies show that most children living within this radius still do not use cycling as a form of active travel.

While road infrastructure improvements can reduce the fear of traffic and improve safety, children and parent research has found that a lack of cycling skills confidence in on-road based situations is a major barrier to cycling for transport. Although infrastructural change can assist with increased confidence levels, it is not practical for Ireland to have a segregated cycling infrastructure nationwide due to cost and lack of space for road widening. Therefore, behavioural change programmes, which also focus

on giving children the necessary road based skills and experience of these in traffic situations are vital.

Cycling skills training has a positive impact on cycling confidence for children and parents. Research suggests that on road training has the greatest impact on confidence and consequently cycling levels. Research supports the delivery of cycling training to primary school aged children to improve confidence, leading to more positive attitude towards cycling and sustained cycling levels for children.

There is a deficit of research on the impact of children's cycling confidence levels on their levels of cycling for transport, cycling confidence; safety perceptions and attitudes towards cycling for transport. There has been research to prove that cycling training positively impacts cycling levels in Australia, USA and Canada and the Netherlands and Denmark have high number of children cycling. In order to promote cycling skills training for active transport, there is a need for cycling skills research in Ireland that is based on Irish problems surrounding infrastructure and parents and children's attitudes towards cycling. Woods et al (2009) highlighted distance and time as being the greatest barriers to walking and cycling; this research did not focus solely on cycling and was conducted before the intervention of smarter travel programmes. We need to know more about children and parents perceived barriers in order to trial relevant strategies and training to overcome them.

This research aims to measure the impact, if any, of cycling training for children and parents. This research will also assess the impact on infrastructure on cycling behaviour. It also hopes to identify barriers for children and parents for cycling and potential solutions to improve cycling confidence and cycling levels and how to improve general attitudes towards cycling. The main research questions are listed below

- What is the impact of cycling skills training on cycling levels, cycling skills, cycling confidence and attitudes to cycling and how does this vary by gender and age.
- What is the impact of cycling skills training on parental confidence in the child's cycling ability?

- Are cycling levels after cycle skills training impacted by the presence or absence of infrastructure

METHODOLOGY

Research Design

The research was a mixed-method, quasi experimental, follow up study, with intervention and control groups, and was conducted in Dungarvan and Tramore, Co. Waterford. In Dungarvan, schools were seeing infrastructure developments for active transport during the research period. Schools in Tramore were included where no infrastructure developments were taking place. This was to assess the impact of infrastructure on children's attitudes to cycling and confidence levels.

Data was collected from three sources: parents, students and cycling tutors; using three data collection tools: questionnaires, cycling skills test and qualitative focus group discussions. All data was collected pre-intervention, immediately post-intervention and at one, six and twelve months after the intervention.

Schools from both Dungarvan and Tramore were included in the intervention group. The intervention group received cycling skills training in November 2013. The control group did not receive the intervention until May 2014. Data was collected from both areas between October 2013 and November 2014.

Study population and sample selection

The study population comprised 631 children (470 primary, 161 secondary) and eight parents. This involved a total of 22 3rd and 4th classes from five primary schools and 2nd years from three Dungarvan secondary schools. This population included both genders from both single sex and mixed gender schools.

Three primary schools, Abbeyside, Scoil Gharbhain, St Marys, (eight classes) and three secondary schools, Ard Scoil na nDeise, Christian Brothers School, St Augustine's (six classes) were located in Dungarvan. Two primary schools, Glór na Mara and Holy Cross (eight classes) were located in Tramore.

The Dungarvan schools selected were located within the Go Dungarvan geographical radius. Through my work with Waterford Sports Partnership and Go Dungarvan, I had previously delivered active travel programmes in each of these schools, which meant positive working relationships had been established. This allowed easy access to students, school principals, teachers and parents.

Third and fourth classes in primary schools were chosen because they were the only classes capable of cycling on the road that had not yet received cycling training. Fifth and 6th classes in Dungarvan primary schools had received cycling skills training previously. In secondary schools, 1st years had already received cycling training the

previous year from Go Dungarvan. Research suggests behavioural change is easier to implement with younger children. This was supported by the results of the pilot study, where 2nd years, at the end of the academic year, suggested they were too old for cycling skills training. Therefore 2nd year students were used for the research.

Ten, short, semi-structured, whole-class, focus group discussions were held with primary and secondary school children, from intervention and control groups, over a mix of occasions pre and post (immediately, six and 12 months post) a 5-week cycle skills training course. Data was collected from seven primary school classes, a mix of 3rd and 4th school classes including an all girls group (St Marys) and mixed gender groups in Dungarvan and Tramore. Three secondary school classes, comprising two mixed gender and one all girls class, were also included. These classes were randomly selected. In total 270 children took part: 106 boys, 164 girls, 155 children aged 8-10yrs and 115 children aged 13-14yrs. Cycling training was conducted for parents and students together for fourth class parents and students in Abbeyside, Dungarvan and third class in Glor Na Mara, Tramore. Nine students and eight parents took part in Abbeyside with twelve students and parents taking part in Glor Na Mara. Focus group discussions lasted between seven and 16 minutes. Fourteen parents also took part in three separate focus groups following parent/adult-specific cycle training pre, immediately post and post six months. The topics covered were attitudes to cycling in general, cycling confidence, cycling safety, and barriers to cycling to school. Discussions centred around reactions to images of children on bikes in various road situations (e.g. roundabouts; with and without traffic).

Time			wk 1	wk 2	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 12	Wk 34	Wk 34	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 52	Wk 52
INTERVENTION	TRAMORE	PRIMARY	Pre Q	FG x 1	CS tests	CS t'g	CS t'g	CS t'g	CS t'g	CS tests	Post Q	Post 1 Q	Post 6 Q	FG x 1							Post 12 Q	FG x 1
		SECONDARY																				
	DUNGARVAN	PRIMARY	Pre Q	FG x 2	CS tests	CS t'g	CS t'g	CS t'g	CS t'g	CS tests	Post Q	Post 1 Q	Post 6 Q	FG x 2							Post 12 Q	FG x 2
		SECONDARY	Pre Q	FG x 2	CS tests	CS t'g	CS t'g	CS t'g	CS t'g	CS tests	Post Q	Post 1 Q	Post 6 Q	FG x 2							Post 12 Q	FG x 2
CONTROL	TRAMORE	PRIMARY	Pre Q	FG x 2							Post Q	Post 1 Q	Post 6 Q	FG x 2	CS tests	CS t'g	CS t'g	CS t'g	CS t'g	CS tests	Post 12 Q	FG x 2
		SECONDARY																				
	DUNGARVAN	PRIMARY	Pre Q	FG x 1							Post Q	Post 1 Q	Post 6 Q	FG x 1	CS tests	CS t'g	CS t'g	CS t'g	CS t'g	CS tests	Post 12 Q	FG x 1
		SECONDARY	Pre Q	FG x 2							Post Q	Post 1 Q	Post 6 Q	FG x 2	CS tests	CS t'g	CS t'g	CS t'g	CS t'g	CS tests	Post 12 Q	FG x 2
ADULTS	PARENTS										FG x 14		FG x 14								FG x 14	
	TUTORS										FG x 12											

Intervention

The intervention comprised of cycling skills training, delivered in five one hour sessions. I wrote this cycle skills training as part of my job with Go Dungarvan, based on my critical assessment of existing training schemes (see literature review page 21). Before the training, each class received a brief introduction to what was covered in the course and were shown, and given, a bike maintenance checklist. The first training session included a cycling skills assessment (appendix 3) and yard based skills training. The training progressed to covering the four main skills of pedalling, signalling, cornering and braking as outlined by Cycling Ireland in their Sprocket Rocket programme. After basic skills development, the training focussed on increasing understanding of road based situations such as roundabouts and T junctions, firstly on the yard, then progressing to actual road based situations. Participants also gained experience of cycle paths and roads and how to cycle in a group and in traffic and were retested on the cycling skills assessment. The course content can be seen in appendix 4. All participants received a bike maintenance template prior to training.

The training was delivered weekly, on a Thursday, to all groups by the same cycling tutors each week. Six tutors worked with a maximum of 30 students at a time to keep within Cycling Ireland's recommended teaching ratio of 1:6 for road cycling. The cycling skills tutors were recruited from students doing post leaving certificate, Sport, Exercise and Coaching course, in Coláiste Chathail Naofa in Dungarvan. Twenty four students received Cycling Ireland, Sprocket Rocket tutor training in September 2013 to become cycling tutors for this intervention. In addition, they also received one day tutor training that the author wrote and delivered with Cycling Ireland (appendix 5).

Data Collection measures

Data was collected from three sources: 1. questionnaires, 2. cycling skills test and 3. qualitative focus group discussions. Both qualitative and quantitative data was collected pre-intervention, immediately post-intervention and at one, six and twelve months after the intervention. Cycling Skills tests were carried out by the same tutors during the first and last of the five sessions. All measures were thoroughly piloted beforehand. This is outlined below.

Child's Questionnaire

The 30 item questionnaire was used to assess cycling rates and travel habits (background information), cycling confidence and attitudes to cycling (appendix 6).

1: Background information

Questions on gender, travel habits to school and outside of school, distance to walk to school, bike ownership including parental bike ownership and cycling to school frequency were asked. The questionnaire was constructed by the researcher taking into account previous questionnaires from Stone & Gosling (2008) and Pooley et al (2011).

Answer formats were a mixture of multiple choice answers such as 'how long does it take you to walk to school' with four options being given, and closed yes/no answers such as 'do you own a bike you can cycle' and 'have you cycled on the road in the last seven days'. As a result of the pilot study and of recommendations of the ethics committee, pictures were used for the questionnaires.

2: Cycling confidence

These questions measured participant's perceived confidence levels in different cycling scenarios such as a cycle path, cycle lane, road, near cars, on a roundabout and a T junction, each with pictorial examples. Participants rated themselves on a graded confidence scale from 'I've never tried it' to 'really confident'.

3: Attitudes towards cycling

The questions for cycling attitudes were derived from the issues that arose during the pilot study focus group discussions. Participants indicated whether or not twelve statements were 'true for me' or 'not true for me'. Statements included 'cycling is fun', 'it is safe to cycle to school on my own', 'the grown ups at home don't want me to cycle to school on my own', 'I cycle in any weather' and 'cycle lanes make me feel safer'.

Parent Questionnaire

A similar questionnaire was given to parents and can be seen in appendix 7. Parents were asked to complete answers for themselves, but also their cycling confidence levels for their child.

Cycling Skills Test

A cycling skills test was written to assess individual's skill levels to measure improvement post training. This was thoroughly piloted.

Participants were assessed at the start of the first session and the final part of session five on eight separate skill measures listed below. These eight measures were adapted from skills assessed in Cycling Ireland Sprocket Rocket programme and also from Illinois cycle safety programme. For each test, participants were awarded a mark between 0-5 for competency by the cycling instructors up to a maximum mark of 40. The eight skills assessed are listed below:-

1. Mounting/Dismounting bike
2. Cycling in a straight line
3. Cycling in a figure of 8
4. Slow Cycling
5. Emergency Stop
6. Signalling
7. Approach and cycling a T Junction
8. Approach and cycling a roundabout

Focus group discussions

Children

Focus group discussions covered similar topics to those measured in the questionnaire: attitudes towards cycling in general and for active transport, and cycling confidence in different road settings. Barriers to cycling to school, and perceptions of parents' feelings about them cycling in various settings were also discussed. The topic guide used for this discussion was a guide as each group's answers were organic (appendix 8)

Parents

In addition to the children's topic guide, discussions concentrated more on parent's attitudes towards their own child's safety on a bike in different scenarios and for active transport. Parents were also asked to compare the difference in cycling as a form of active travel to when they were in school. The topic guide for this discussion can be seen in Appendix 9.

Cycle Tutors

After intervention, I held a focus group discussion with all cycling tutors immediately post training (appendix 10). Cycling tutors were asked about course duration, tutor training, catering for all abilities, resources, skills assessments, impact of skills training on participants and any changes they would make in the future.

Bike Parking Monitoring

From October 2013 to November 2014, the numbers of bikes parked in each school in Dungarvan was recorded when a member of the Go Dungarvan team visited a school (appendix 11). This data included the days of cycling skills training. The weather conditions on the day and any events that we happening at the time (e.g. cycling training; bike week) were also recorded.

Pilot Study

The aim of the pilot study was to do a trial run of the intervention and test the suitability and comprehensibility of the questionnaire, cycling skills training, skills tests and focus group topic guide. The pilot study was conducted in May 2013 and consisted of 70 participants. There was one second year class in a mixed gender secondary school, Coláiste Chathail Naofa (n=18) and two fifth classes in primary school, one mixed gender, Scoil Gharbhain (n=27) and one all female class, St Mary's (n=25).These classes had already received basic cycling skills training (Cycling Ireland's 'Sprocket Rocket' training) in November 2012, and were chosen from three schools in Dungarvan. Questionnaires were given to all 70 participants' pre and post training. Focus group discussion took place with one primary and one secondary school group immediately post training.

The eighteen-question questionnaire (appendix 12) was handed out to the three pilot classes' pre and post cycling skills training.

One parent of each of the participant's was also asked to complete a twenty nine item questionnaire. Unfortunately, there was a very low response rate of 11/78. Parents were then contacted by letter, which was given to their children, and given a further questionnaire to find out the reason why they could not participate in training (appendix 13).

From piloting the questionnaire I found the following:

- There was confusion regarding travel habits, in question 2. It was decided information would only be sought about travel from school and other places rather than from a wider variety of places: school, shop, friends, sports.
- Question 3 needed to be reworded to ask only if an adult, rather than both parents in the house owned a bike in recognition of the fact that not all children lived with a parent(s).
- Question four needed to ask if a bike had been bought in the last six months rather than the past three years as the children struggled with the recall from three years ago. In addition, this allowed me to see if the intervention had a short term impact on bike ownership
- There was not enough information about participant's attitudes towards cycling, either in the questionnaire or in the focus group topic guide. Twelve cycling attitude questions were therefore added to the questionnaire. In addition, because of the on-going infrastructural improvements Dungarvan, it was decided to ask about the impact of cycle lanes on children's attitudes towards cycling.
- The cycling confidence questions had smiley face () pictures beside each answer option. These were removed as it was felt that they biased answers in favour of the smiley face answers.

- The cycling confidence section was cut from eight to six questions to remove repetition, and pictures were added as illustrations, to assist participants in identifying a cycle path, roundabout etc.
- Only 11/78 parents returned parental questionnaires. To increase parental response rates, children would be given a short presentation about cycling skills training and told, afterwards, that cycle skills training would only be given once a parental questionnaire was completed. It was also decided to conduct focus group sessions with parents of children in the intervention group.

From piloting the skills test I found the following:

- To improve consistency, and reduce measurement bias, it was decided that the same tutor would mark the same skill 'stations' pre and post test.
- It was decided that the cycle skills test would be administered in two separate groups as it took too long to test the whole group together.
- The delivery of the sessions needed to be altered to allow for a more active start to each session that avoided children waiting around being inactive

From piloting the focus group I found the following:-

- The topic guide would not be used as answers were focussed on the pictures given rather than an organic conversation. These pictures were incorporated into the final questionnaire as illustrations of cycle paths, roundabouts etc.

For the pilot study, this information was gained using a questionnaire. The response rate for questionnaires was good, but some information was inaccurate due to a time delay for some tutors in completing the questionnaire so focus group discussion was used.

From piloting the cycle skills training intervention I found the following:

- As not all children had bikes, bikes would be provided for those who did not have them or could not transport them to school, in order to maximise the time each participant spent cycling.
- Children's knowledge of bike maintenance was limited. Therefore tutor training would include some bike maintenance training for use in cycling skills delivery.
- Tutor training would include how to coach a child who cannot cycle at all.
- Tutors needed some 'real-life' cycle-coaching experience before delivering the five hours of training in the 'intervention' schools – the tutors were from a coaching background but were non cyclists. Therefore, I arranged for them to deliver Sprocket Rocket training to a children's group.
- The training day content was altered. From tutor feedback and focus group feedback from children, more time being spent on bike maintenance,

roundabouts and T junctions. Less time was taken on coaching theory and warm ups to accommodate this.

Data Collection Procedures

All primary and secondary participants received a fifteen minute presentation about cycling in October 2013. During this delivery, parental consent forms and questionnaires were given to students. This was to increase enthusiasm for engagement with the cycling skills training intervention and improve the return rate for parent questionnaires.

1. Questionnaires

Consent was gained from school principals (appendix 14) and parents (appendix 15) one month before the intervention began. Data was collected from both control and intervention groups during class time. Prior to the first round of data collection, all participants were given a brief introduction to the nature and purpose of the research before being given the questionnaire to fill out themselves. The researcher went through each question with the whole group and answered any questions. This took twenty minutes in total and questionnaires were collected once completed. The room layout was not changed from their school seating plan. This procedure was repeated for all five data collection sessions.

In the primary schools, the questionnaire was given out on the same day of the week for all five data collection times in order that answers for behaviour 'in the last seven days' were consistent across those five times – this was not possible in secondary schools, however, due to time constraints on classes and teacher availability. Questionnaires were collected from all schools in the same week, for all five data collection times.

2. Focus group discussions with children

Focus group discussions took place directly after primary school children had completed their questionnaires, using the 'normal' classroom layout. This was recorded on a dictaphone. The length of the discussions varied from seven to 14 minutes. For primary school groups, focus group discussions took place on the same day of the week, for all five data collection times.

While I also aimed to conduct focus group discussion with all secondary school children at all five data collection times on the same day of the week, class timetables did not allow for this to occur as students, an issue not faced in primary schools. As a result, a focus group discussion was not held with the control group in St Augustine's or the intervention group in Ard Scoil na nDeise post six months.

3. Focus group discussions with parents

The parents of two of the primary school classes for the intervention groups were offered free cycle skills training with their children. These parents were asked via letter pre training to participate in focus group discussions. Parents of both intervention groups were contacted and reminded via text to attend a focus group discussion fifteen minutes prior to cycle skills training. Data was collected from the parents of the Abbeyside parent and child groups' pre, post and post twelve months. No parents from Glór Na Mara took part in focus group discussions as they did not turn up. Data was collected post six and twelve months from parents of other children of the intervention school.

These discussions were recorded on a dictaphone. For each data collection point, the same room and room layout was used. Focus group discussions ranged in length from nine to 35 minutes.

4. Focus group discussions with cycle skills training tutors

Focus group discussion took place with cycling tutors immediately after the final cycling skills session. These discussions took place in a classroom in each of the schools and, as with the other groups, these discussions were recorded on a dictaphone and ranged in length from 10 minutes to 18 minutes.

5. Cycling skills test

All twenty two classes received a cycling skills test before and after the five weeks of training, in order to assess their cycling competency in eight skill areas. The skills test took place in the school yard. As the size of the yard was different in all eight schools, discussion between the researcher and tutors regarding the appropriate set up of the yard in each location. The testing took approximately fifteen minutes.

Tutors had been trained to conduct the cycling skills test as part of their tutor training and had practiced this with their peers as part of this training. The scoring system was discussed and tutors were given a handout sheet identifying what constituted a score at each level between 0-5. The same tutors were responsible for testing in the same school and for the same skill pre and post training. One tutor from the group recorded all of the data on an excel spreadsheet immediately post testing.

Data Analysis: Quantitative data

The measures were defined or scored as follows:

- Cycling behaviour was defined as cycling to school 'ever', or 'in the last seven days'.
- Cycling confidence: six questions, each measured on a scale of 0-3, were totalled to give a maximum possible score of 18

- Road based confidence: four questions, each measured on a scale of 0-3, were totalled to give a maximum possible score of 12.
- Attitude to cycling: 12 questions, each measured with yes/no, were totalled to give a maximum possible score of 12
- Cycling skills tests: each of the eight skills were marked from 1-5 (1. unsafe, 2. limited control, 3. satisfactory, 4. good control and 5. excellent. These were totalled to give a maximum possible score of 40.

Analysis of all quantitative data was carried out using SPSS version 22. The alpha (probability) level was set at .05. The analysis used to answer the research questions is outlined below under the following four research question groupings: 1: Impact of cycling training on cycling skills levels; 2: Impact of cycling training on confidence levels for children and parents; 3: The impact of cycling skills training on children and parents attitudes; 4: The impact of cycling skills training on cycling as a form of active travel. All four of these questions analysed the difference between age, gender and location

Impact on confidence and attitude levels

Mean scores for total attitude and cycling confidence were generated for each data collection time, for the intervention and control groups separately and by age and gender for the intervention and control groups separately. Frequencies (%) were also generated for specific attitude questions: 'grown ups don't want me to cycle to school', 'is it safe to cycle to school' and 'are you afraid of traffic'.

General linear model repeated measures was used to compare total attitude and total confidence scores, separately, across the five collection points, by age, gender and control/intervention group.

Importance of infrastructure on cycling frequency

Frequencies (%) were generated for the following questions: 'traffic makes me afraid of cycling', 'more cycle lanes would make me feel safer' and ‘how do you feel cycling on an off road/on-road cycle path (two questions). Cross-tabulated frequencies (%) were produced for those that had cycled in the last seven days was used to compare those who had cycled to school in the last seven days from Dungarvan (new infrastructure installed) with those from Tramore (no new infrastructure) on whether or not they believed that ‘traffic makes me afraid of cycling’.

Impact of cycling skills training on cycling as a mode of transport

Frequency scores (%) were created for ‘cycling to school in the last seven days’ and ‘ever cycled to school' for the control/intervention groups at all time points

A paired T test was also used to see if the impact had been greater according to gender and age at all time points.

Data Analysis: Qualitative Data

The focus group transcripts were analysed using thematic content analysis. Common themes were identified and recorded in tabular format separately for parents, tutors and children, in Microsoft word. Themes for the data were analysed through listening to transcripts repeatedly. Once a theme was identified, all example comments were placed in a table with the age and gender of the participant. The similarity between groups was then analysed and placed in a written summary. This analysis was then linked to each of the research questions and used to agree/disagree with the statistical data. This data also gave an insight into possible solutions for active travel from children, parents and schools which assisted in the recommendations section. The information collected from qualitative data was guided by the researcher and themes to cover, was primarily led by the respondents. This meant that in some groups, such as parents, issues such as helmet safety was discussed. This data enabled a more in depth analysis of the questionnaire results, particularly with the children's groups.

Ethical considerations

As the research involved working with children, school and parental consent was required. Ethical clearance was granted by the ethics committee of Waterford Institute of Technology in September 2013. Consent to carry out the research was given by each school principal (appendix 17) following a face to face meeting to explain the research in September 2013. Passive consent (appendix 18) was obtained from all parents, which meant that only if parents declined consent, data was not collected. However, this did not occur in any school. All participants were informed they were not obliged to take part in the study, that their identity would remain anonymous and that all data would be treated confidentially.

RESULTS

Quantitative: Questionnaires and Cycle Skills Tests

Sample

A total of 631 participants completed questionnaires during the twelve month intervention and follow-up periods: 603 pre, 575 post, 571 post 1 month, 571 post 6 months and 567 post 12 months. Of these, 328 were in the intervention group and 303 in the control group; 304 (162 intervention) were male and 327 (166 intervention) female; 393 (196 intervention) were based in Dungarvan and 238 (132 intervention) in Tramore. Figure 1 below shows the age profile of the sample size by location and Figure 2 shows the age profile of the control and intervention groups. Table 1 below shows the levels of bike ownership, parental bike ownership and the number who had already received cycle skills training, by age, gender and location. Also shown is the perceived (self-reported) length of time needed to walk to school.

A total of 511 of these 631 participants completed cycling skills tests. Of these, 236 were male and 275 female; 312 were based in Dungarvan and 199 in Tramore; 236 were aged 8-9yrs, 203 9-10 years and 72 aged 13-14 years.

Figure 1. Sample age profile location

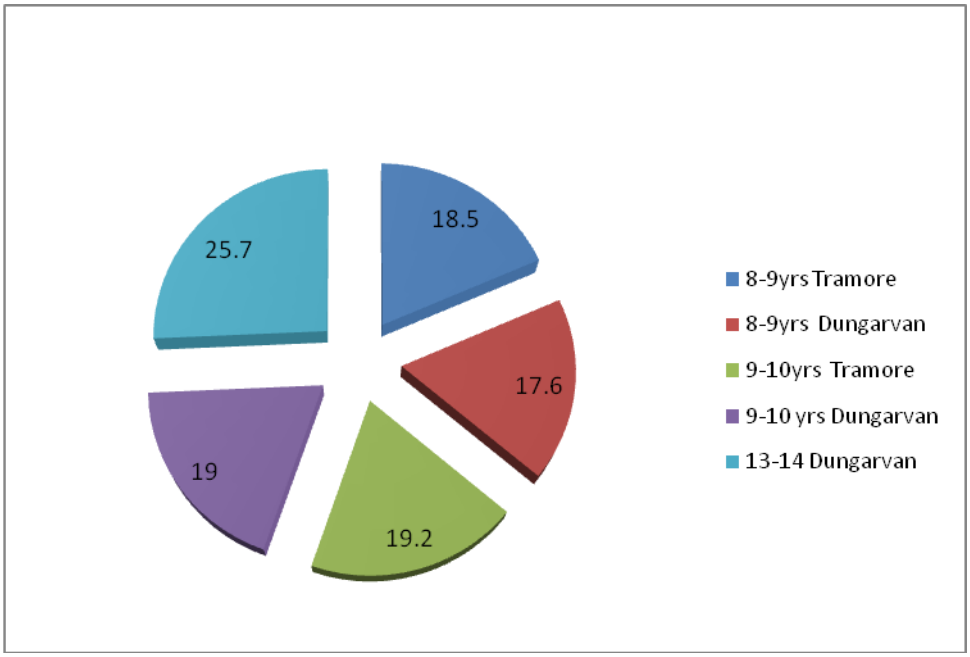


Figure 2. Age profile of the control and intervention groups

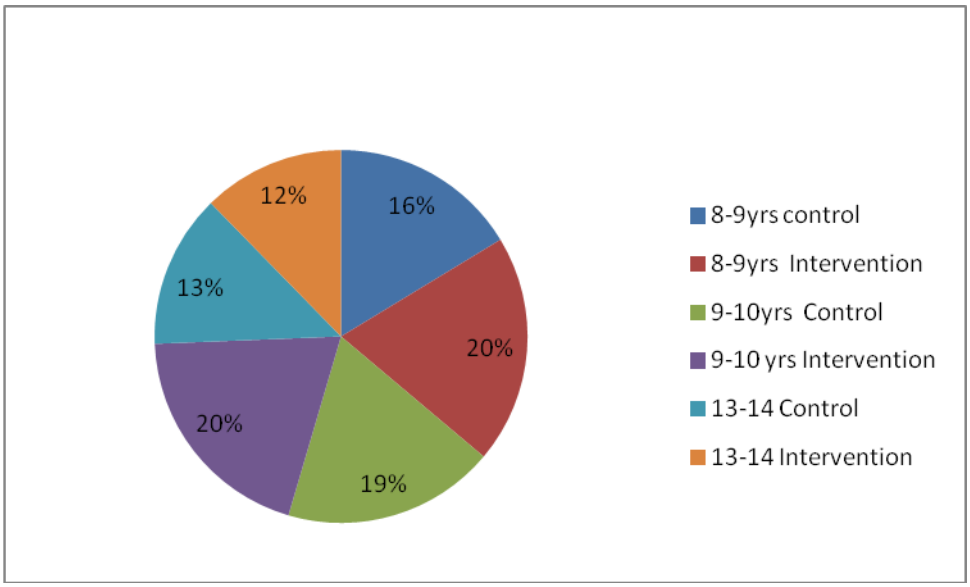


Table 1. Sample bike ownership levels, prior cycle skills training and perceived distance to school, by age, gender and location.

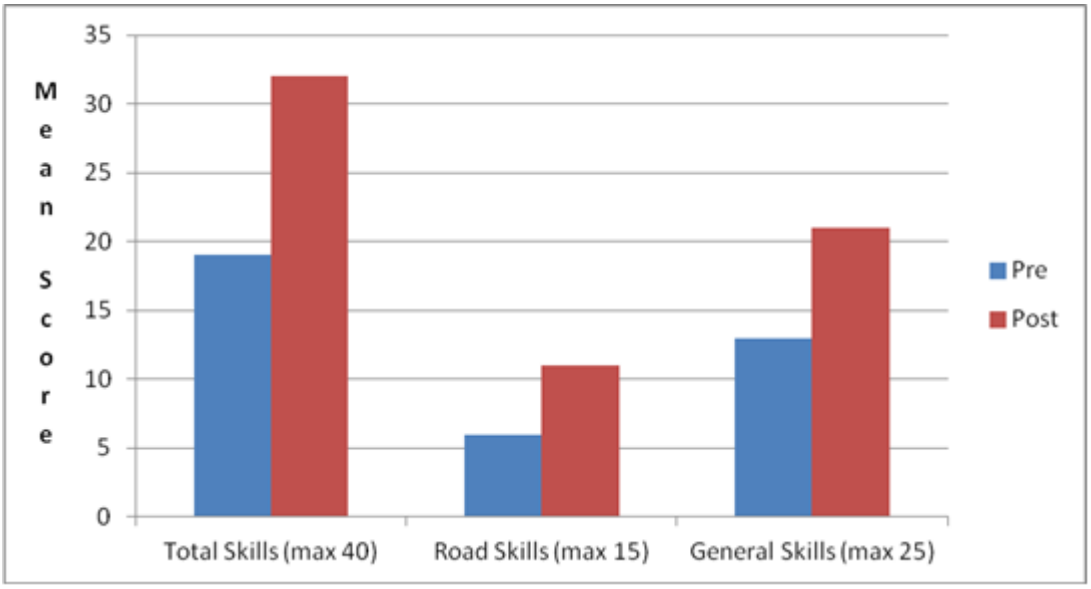
Group	Own Bike?	Parent own bike?	Prior cycle training?	Perceived time to get to school			
				0-5min	6-10min	11-20min	20+
ALL	80.80%	67.30%	12%	21.10%	27.40%	22.60%	29.00%
Control	86.30%	67.50%	9.60%	20.90%	23.30%	25.00%	30.80%
Intervention	75.60%	67.20%	15.80%	21.20%	31.20%	20.30%	27.30%
Boys	83.00%	70.50%	12.20%	20.50%	9.20%	26.10%	30.20%
Girls	78.70%	64.40%	13.30%	21.60%	25.70%	24.80%	27.90%
Tramore	79.50%	62.90%	9.80%	22.80%	39.30%	25.00%	12.90%
Dungarvan*	84.80%	71.90%	0.00%	26.80%	24.60%	21.00%	27.70%
8-9 years	83.80%	67.00%	0.90%	26.10%	29.80%	29.60%	17.40%
9-10 years	80.40%	67.80%	8.80%	23.50%	33.90%	19.60%	23.00%
13-14 years	76.80%	67.10%	35.50%	10.30%	14.20%	2.20%	54.20%

**Note: sample excludes Dungarvan secondary school to allow comparison with Tramore where no secondary school was sampled*

Cycling Training and Skill Levels

Figure 3 below shows mean total score for pre and post total scores for all eight cycling skills tests (minimum=0, maximum=40). The total score comprising five general bike handling skills (minimum=0, maximum=25) and three road based skills (minimum=0, maximum=15).

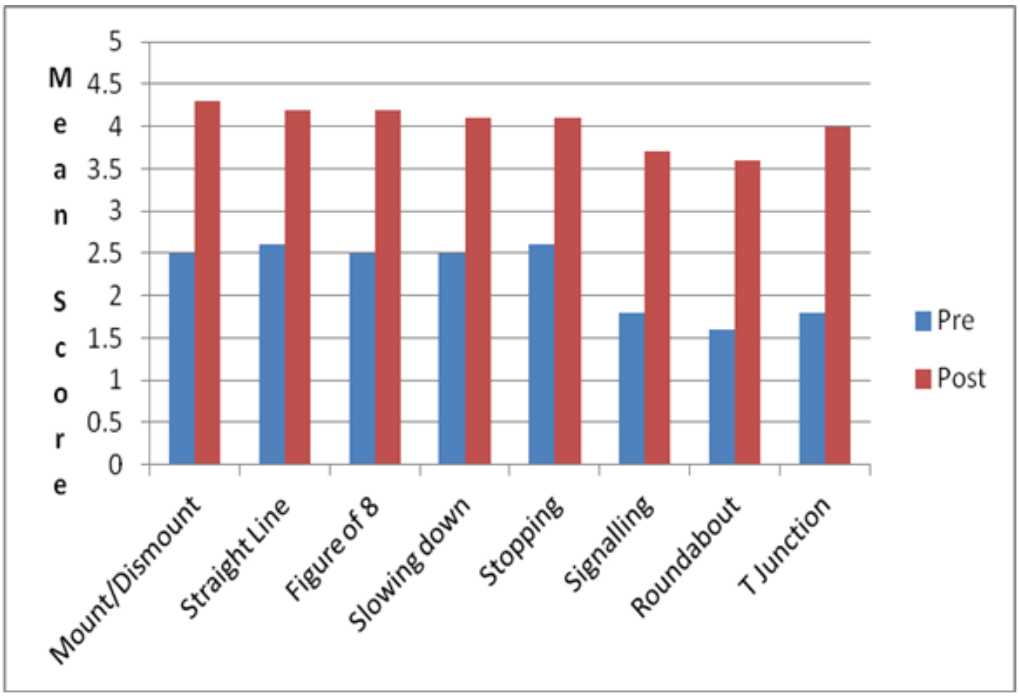
Figure 3. Total Cycling skill scores



There was a significant increase in total cycling skills scores between the pre and post training tests (F=4802.575; df=1; p= .00) and the for the general skills (F=3546.146; df=1; p= .00) and road skills (F=1621.470; df=1; p= .00) separately.

Figure 4 shows mean scores for all eight skills; roundabouts and signaling had the lowest scores. Skills were given a score between 0 (lowest) to 5 (highest) and pre intervention skills were poor across all eight skills (Mean=2.4663; SD=.16).

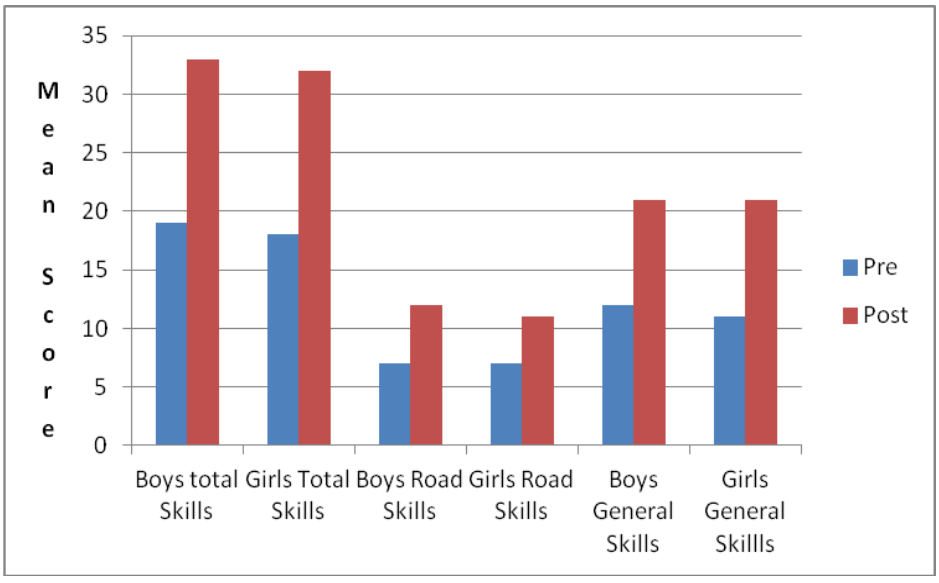
Figure 4. Eight cycling skill scores



Gender Differences

Figure 5 below shows mean total score for pre and post scores for all cycling skills (minimum=0, maximum=40), general skills (minimum=0, maximum=25) and road-based skills (minimum=0, maximum=15) for each gender.

Figure 5. Total cycling skill scores by gender, pre and post intervention



There was a no significant gender difference between the total scores at pre or at post (F=3.589; df=1; p=.0890). Figure 6 and 7 below shows the eight separate skill level scores for boys and girls. When each skill is considered separately, there was

no significant gender difference in the general skills, but boys scores were significantly higher for the three road-based skills, pre-training (F=4.17, df=1,517, p=.04), and for the roundabout skill, post training (F=6.96, df=1,511, p=.00).

Figure 6. Eight cycle skill scores for boys

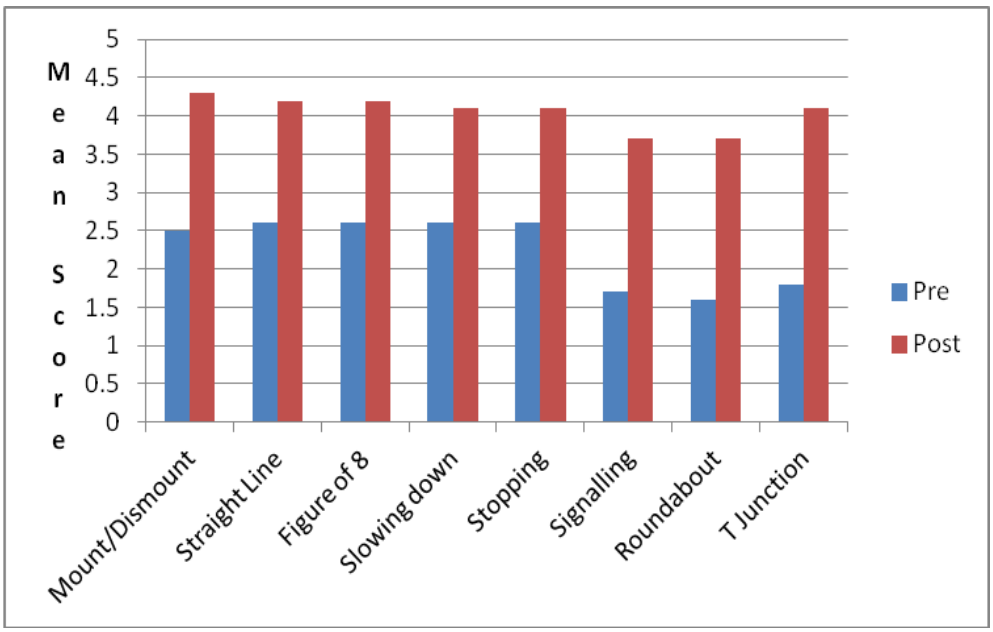
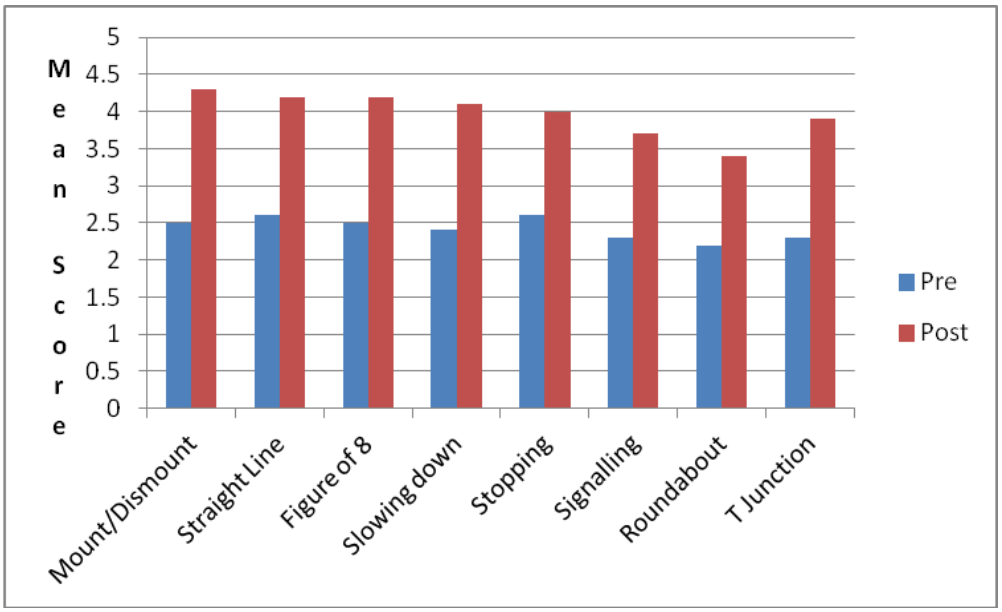


Figure 7. Eight cycle skill scores for girls

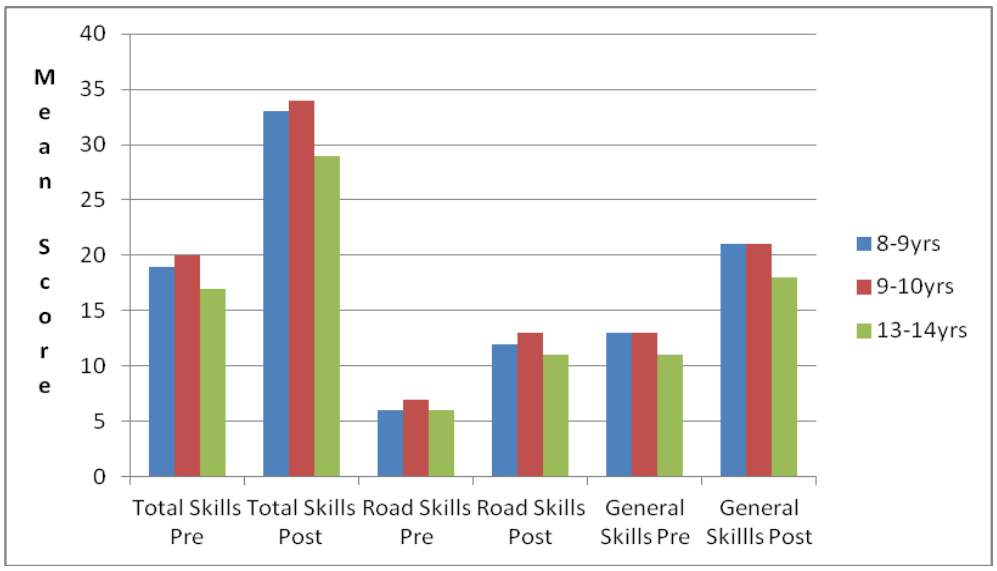


Age Differences

Figure 8 below shows mean total score pre and post for all cycling skills by age group. There was a large increase in total cycling skills scores, generic and road-based, between pre and post for all ages. There was no significant difference between ages (F=.127; df=1; p=.722). However, primary school children's skill

scores for all areas were significantly higher pre and post than secondary school children's scores (F=18.72; df=2,500; p=.00). Primary school children's skill levels also increased to a greater extent than secondary school children's.

Figure 8. Cycle skill scores by age



Cycling Confidence Levels and Cycling Skills Training

Table 2 shows mean cycling confidence score (minimum=0, maximum=18), by control and intervention groups, pre training and at four points post training. There was an increase in confidence score for both control and intervention groups over time but the intervention groups reported significantly higher scores at each time point post-intervention than the control groups (F=31.515; df=4; p= 0.00). The intervention groups reported an increase in confidence immediately post intervention, which dropped slightly over the next six months, before increasing to the highest level post 12 months. There was a significant difference between the pre score and each of these post scores (F = 66.839, df=4; p=.00) While the control group's scores also increased over time, only the increase from pre to 6 months post is significant (F=16.532, df=0, p=.00).

Table 2. Mean cycling confidence score by group

	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Control	9.27	9.87	10.13	10.30	11.76*
Intervention	9.36	13.11	12.92	12.64	13.14

**Note: control group had received cycling training at this point*

Gender Differences

Table 3 shows the confidence levels by gender for the intervention and control groups. Confidence levels among the intervention group were much higher for boys than girls at baseline and across all time periods (F= 84.116; df=3; p=.00). There was a significant increase from pre to post-intervention that was maintained across the five re-test times, for girls and boys (F= 67.317; df=4; p=.00). Among the control group, confidence scores were also significantly higher for boys across all time periods (F= 2.995; df=3; p=.00) and the scores also increased incrementally over time to post 6 months. There was a significant difference between girls control and intervention groups (F=19.165; df=3; p= 0.00) and similarly for boys (F=24.423; df=4; p=.00) over time. There was no significant difference for gender when comparing primary school children (F= .682; df=3; p=.563).

Table 3. Mean confidence score for group by gender

	N	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Intervention Girls	166	7.98	12.11	11.97	11.32	12.07
Intervention Boys	162	10.85	14.10	13.85	13.99	14.21
Control Girls	161	7.42	8.30	8.85	9.04	n/a
Control Boys	142	11.35	11.63	11.67	11.77	n/a

Table 4 shows the mean confidence scores for road based cycling activities (road, near cars, T-junction, roundabouts) for the intervention and control groups (minimum=0, maximum=12). In the intervention group, boys display higher overall confidence at all time periods than girls, but girl's scores increase by more from pre intervention to six months. There is a significant difference between each time period for boys and girls, a significant difference over time (F= 115.221; df=4; p= 0.00) and a significant gender difference (F= 1.092; df=4; p=0.036).

Table 4. Mean road activity confidence scores for group by gender

	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Boys Intervention	6.5	9.04	8.71	8.92	9.01
Girls Intervention	4.25	7.42	7.48	6.77	7.31
Boys Control	7.01	7.01	7.09	7.14	8.31*
Girls Control	4.05	4.58	4.98	4.97	6.09*

Note: group had received cycle training at this time period*

Figure 9 highlights the mean scores for confidence cycling on a road for the intervention group (minimum = 0, maximum = 3). This also increased significantly from pre to post 12 months (F=296.096; df= 5; p= 0.00) for both boys and girls (F= 11.59; df= 5; p= 0.00. Boy's scores are higher at each time point.

Figure 9 Mean score for confidence cycling on the road for intervention group by gender

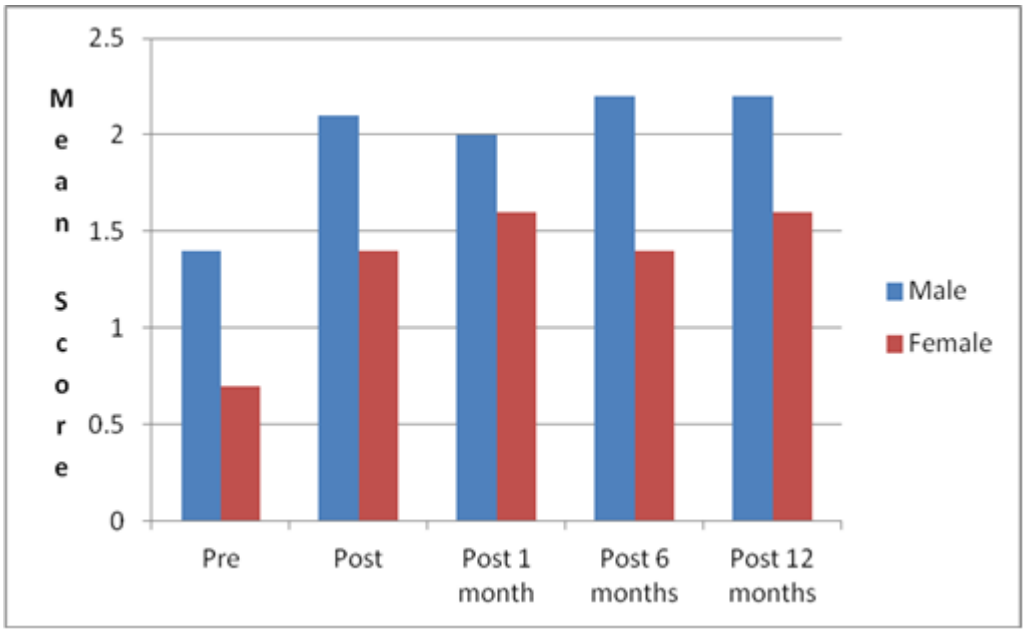
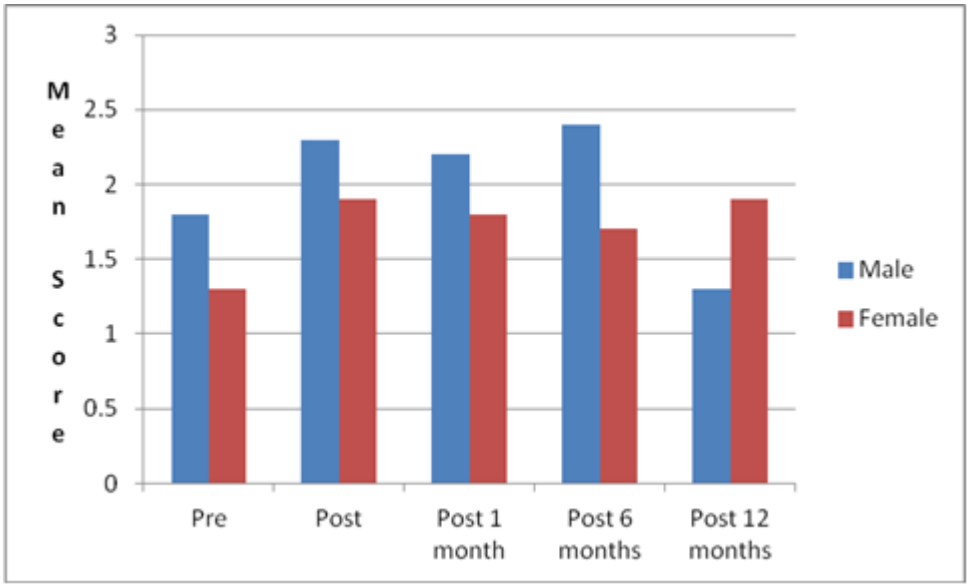


Figure 10 highlights the mean confidence scores for cycling near cars for the intervention group. Confidence increased from pre intervention scores to 12 months

post for both boys and girls. Boy's scores are higher at each time point. There was a significant difference over time (F122.159; df= 4; p= 0.00) and when comparing boys with girls (F= 8.06; df= 4; p= 0.00)

Figure 10 Mean score for cycling near cars for intervention group by gender



Age Differences

Table 5. Mean cycling confidence score for Intervention group by age

	N	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
8-9	125	7.97	12.56	12.00	11.65	12.77
9-10	125	8.83	12.90	12.97	12.65	12.89
13-14	78	12.39	14.38	14.32	14.19	14.14

Table 5 displays the mean cycling confidence scores for the intervention group according to age. There was a significant difference in scores by age (F =5.056; df=8; p=.00) and time (F=105.059; df= 4; p=.00). Scores were higher among secondary school children than among those from primary schools and scores generally increased from pre to post training and then stayed the same, or similar over the following year. Primary school children's confidence levels increased to a greater extent than secondary school.

There was no significant gender difference between 8-9 year olds (F=.649; df= 4; p=0.628), 9-10 year olds (F=.261; df=4; p=0.902) or 13-14 year olds (F=.351; df=4; p=0.842).

Tables 6, 7 and 8 show road based confidence skills for all ages (minimum score = 0, maximum score = 3). These tables show that road based confidence levels increased with age. All scores are significantly higher 12 months post intervention, compared to pre intervention for 8-9 year olds (F=115.221; df=4; p=.00), 9-10 year olds (F=54.348; df=4; p=.00) and 12-13 year olds (F= 11.921; df=4; p=.00). Roundabout and T junction scores increased post intervention but fell to below this level 12 months later. Primary school children were least confident cycling on roads. Secondary school children were least confident cycling on roundabouts.

Table 6. Mean road confidence scores for intervention group 8-9 year olds

	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Cycle cars	1.16	1.92	1.87	1.89	2.09
Cycle on road	0.82	1.55	1.55	1.54	1.78
Roundabouts	1.19	2.23	2.07	1.90	2.05
T Junctions	1.23	2.24	2.02	1.95	2.06

Table 7. Mean road confidence scores for Intervention group 9-10 year olds

	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Cycle cars	1.47	2.09	2.09	2.10	2.15
Cycle on road	0.98	1.74	1.85	1.77	1.83
Roundabouts	1.17	2.11	2.09	1.94	1.93
T Junctions	1.33	2.08	2.11	2.00	2.05

Table 8. Mean road confidence scores for Intervention group 13-14 year olds

	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Cycle cars	2.16	2.40	2.27	2.22	2.34
Cycle on road	1.80	2.15	2.21	2.11	2.08
Roundabouts	1.61	2.14	2.64	2.10	2.07
T Junctions	1.85	2.33	2.34	2.34	2.32

Figure 11 and 12 show reported cycling on the road confidence scores for both intervention and control groups, by age. This was significantly higher among the older group, in both intervention and control groups (F=476; df=8; p=0.00; F=5.374; df=2; p=0.05) and at each time point (F=38.671; df=4; p=.00).

Figure 11 Mean confidence score for cycling on the road for Intervention group by age

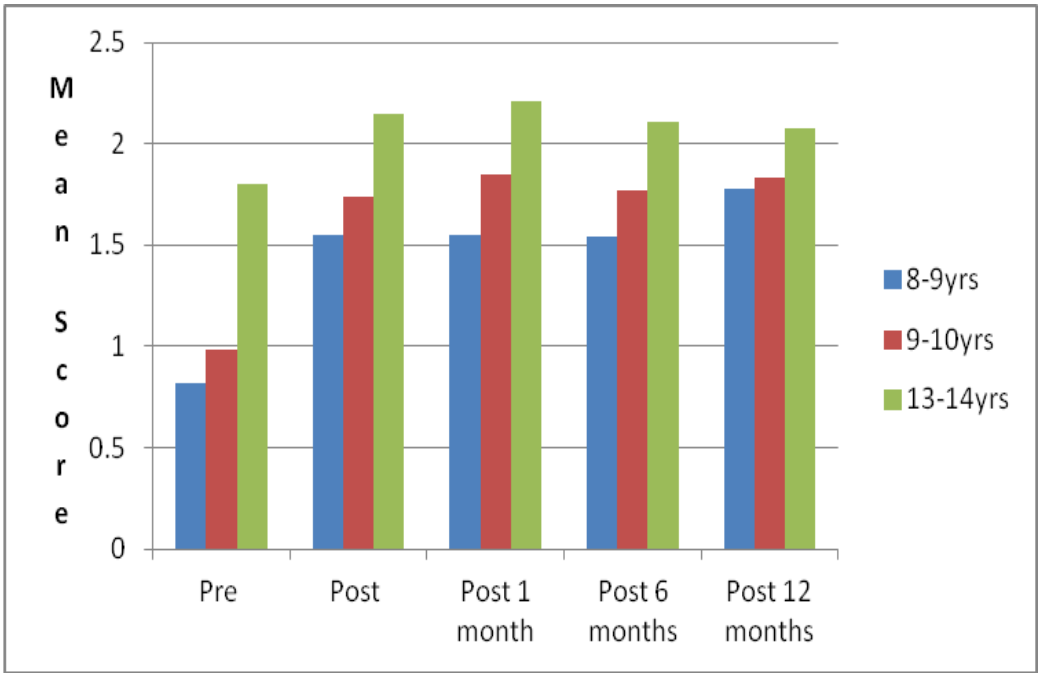


Figure 12 Mean confidence score for cycling on the road for Control group by age

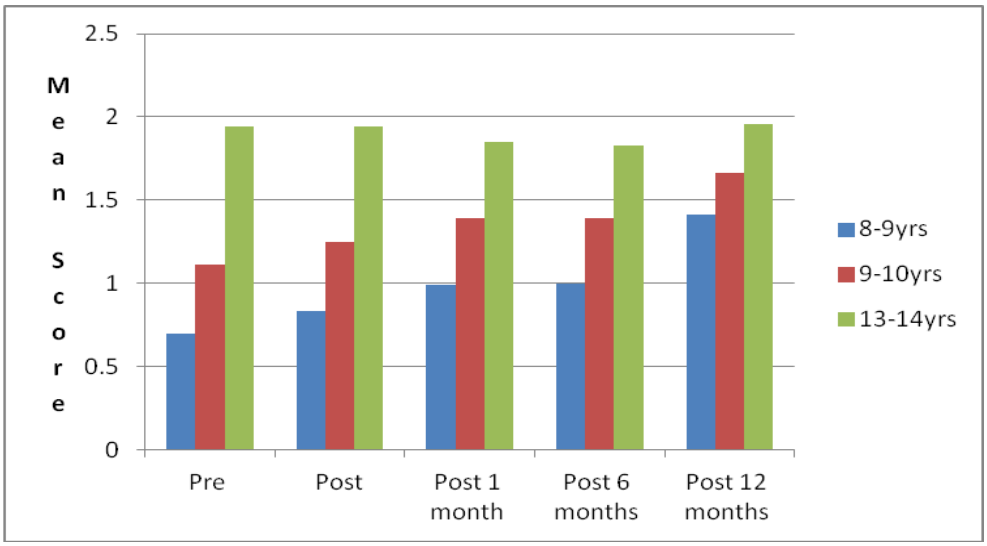
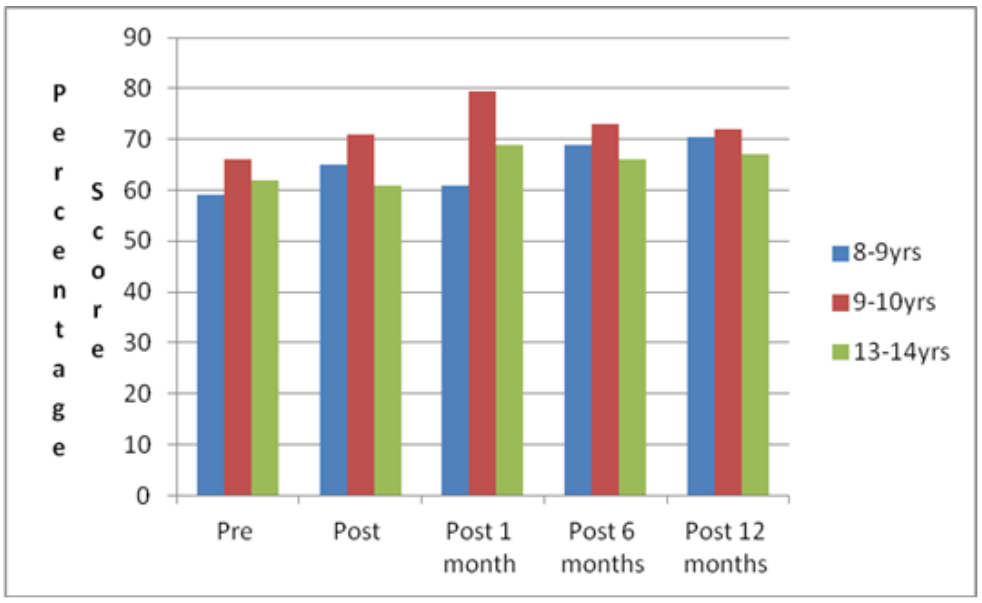


Figure 13 shows the confidence levels of the intervention group for feeling safe cycling to school. Confidence levels are highest amongst 9-10 year olds. There is a significant difference between groups at one month post only (F=4.766; df=2; p=0.05). There is significant difference for 8-9 year olds at post six and post 12 months when compared with pre test scores (F=62.451; df=4; p= .00 etc.). For 9-10 year olds there is only a significant difference between pre and post 1 month. There is no significant difference over time for secondary students (13-14yrs).

Figure 13 Confidence levels for cycling to school for Intervention group by age



Cycling Training and Rates of Cycling

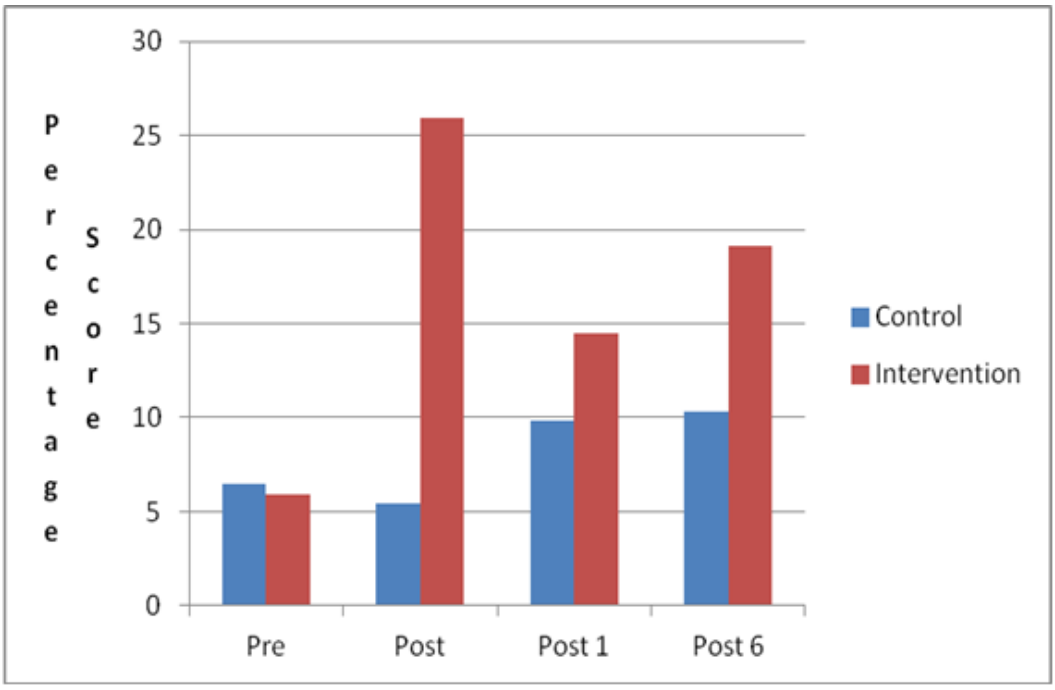
Table 9 shows the percentages of children who had ever cycled to school from intervention and control groups. The amount of children cycling to school increased in both groups but this was significant greater among the intervention groups only at post 1 month (F= 7.036; df=1; p=.08) and post 6 months (F=5.929; df=1; p=.15).

Table 9. Ever cycled to school by group

Group	Pre %	Post %	Post 1mth %	Post 6mths %
Control	53.3	57.3	59.5	62.5
Intervention	50	59.4	69.2	70.9

Figure 14 illustrates the percentage of children cycling to school within the last seven days across four time periods. Numbers who had ever cycled to school, post training, were significantly higher among the intervention group, at all time periods compared with pre scores (F=11.789; df=4; p=0.00). There was also a significant difference between control and intervention groups over time (F=4.936; df=4; p=0.001).

Figure 14 - Percentage of children cycling to school in the last seven days by group



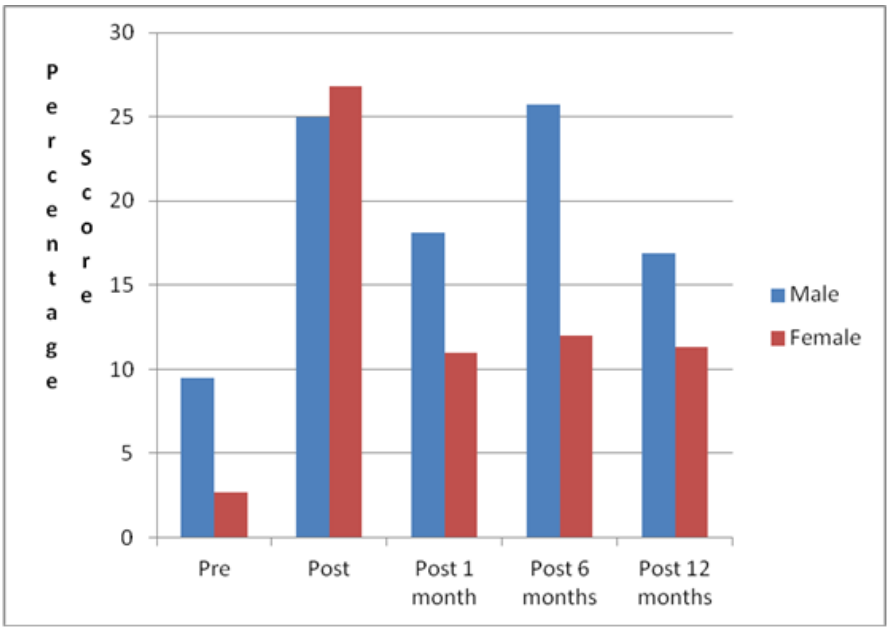
Gender Differences

Table 10 shows the percentage of children who normally cycle to school alone, or with friends/family by gender, for the intervention group. The table highlights that males are about twice as likely to cycle to school alone, or with friends/family than females, at each time point.

Table 10. Percentage who normally cycle to school alone, or with friends/family by gender, for Intervention group

Gender	Pre %	Post %	Post 1mth %	Post 6mths %
	Yes	Yes	Yes	Yes
Male	17.5	25.1	22.1	19.2
Female	7.8	13.2	10.3	10

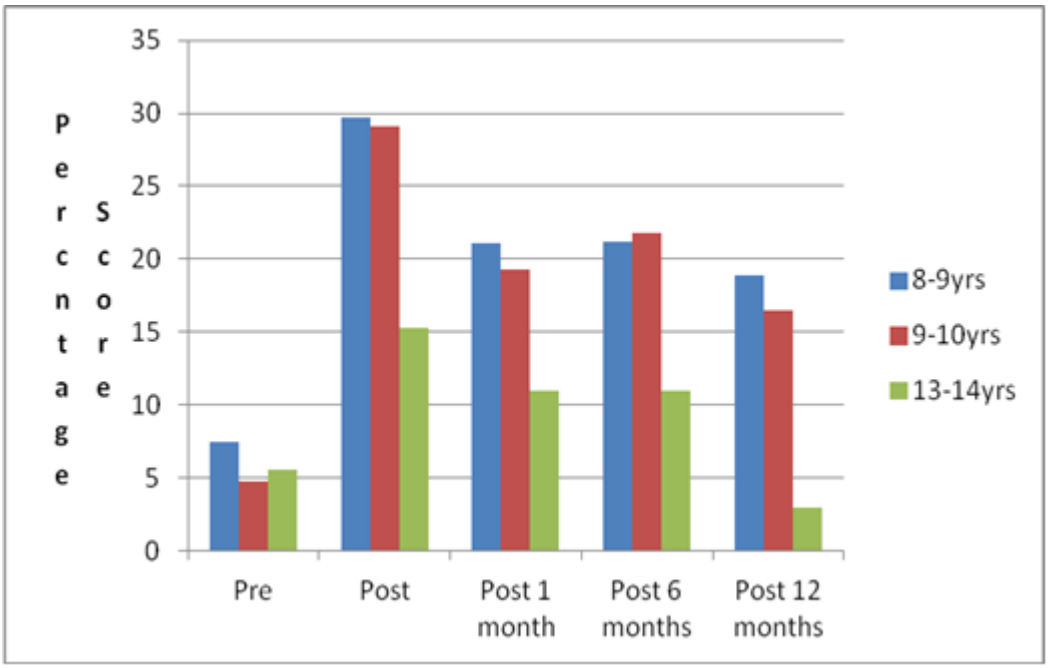
Figure 15 illustrates the percentage of children in the intervention group cycling to school in the last seven days at five time points. There is a large increase post intervention and levels remained above pre training levels at all time periods. Girls cycling levels increased more than boys immediately post intervention but also fell quicker, suggesting cycling training had a more immediate impact on girls but a more sustained impact on boys. There is a significant difference over time (F=177.38; df=4; p=.00) and by gender (F=4.635; df=4; p=.001). Figure 15 - Percentage of children cycling to school in the last seven days for Intervention group by gender



Age Differences

Figure 16 illustrates the percentage of children in the intervention group cycling to school in the last seven days by age group. There was a significant difference over time (F=15.521; df=4; p=.00) and by age (F=464.000; df=8; p=.028). The increases were greatest among primary school children. Their reported rates of cycling to school increased dramatically immediately post training and scores remained nearly three times higher than pre scores at post 12 months. There was no overall significant difference over time for secondary school children (F2.480; df=4; p.055) with cycling rates post twelve months being lower than pre test cycling rates. However, there was a significant difference between cycling rates pre and immediately post training (F=2.64 df=1, p=.01).

Figure 16 - Percentage of children cycling to school in the last seven days for Intervention group by age



Attitude and Cycling Skills Training

Table 11 shows mean attitude scores (minimum=0, maximum=12) for control and intervention groups. Attitudes were slightly more positive amongst the intervention groups, compared to the control groups, at all time periods (F=4.475; df= 4; p=.001). There was improvement in attitude over time for both groups but differences were significant only between pre scores and all post time periods (F=21.867; df = 4; p=.000). There was a significant statistical difference over time (F=14.884; df=4 p.000) for the intervention group.

Table 11. Mean attitude score by group (Max score 12)

	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Control	7.89	7.93	7.98	8.39	8.7*
Intervention	8.25	8.57	8.89	8.84	8.96

*Note: control group had received cycling training prior to this result

Gender Differences

Table 12 shows attitude scores by gender, for the intervention group. Boys and girls attitudes are more positive at 12 months post intervention than they were before it. There is a significant difference over time (F=14.599; df=4; p=0.00). Boys have a significantly more positive attitude towards cycling than girls across all time periods. At all time periods there is a significant difference between girls and boys from pre score (F= 14.029; df=1; p=.00) to post 12 months (F= 33.642; df=1; p=.00).

Table 12. Mean attitude score for intervention group by gender

	N	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Girls	166	7.83	8.01	8.42	8.19	8.28
Boys	162	8.71	9.13	9.36	9.50	9.63

Figure 17 Mean attitude score for intervention group by age and gender

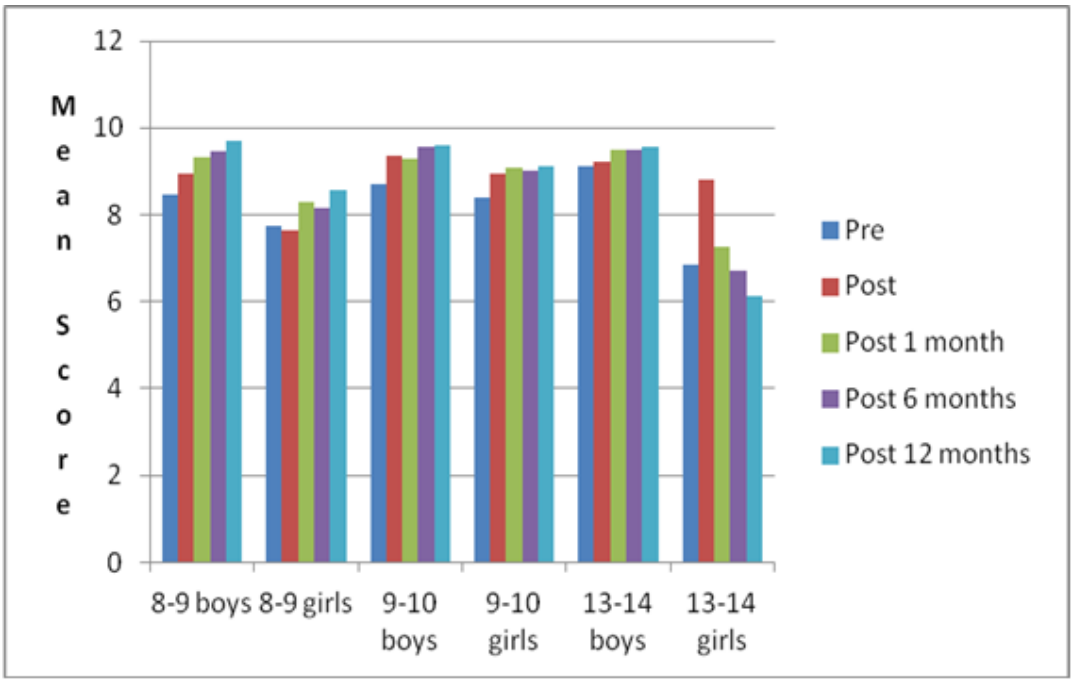


Figure 17 above shows how attitude varies by gender and age together. Overall, boys have a significantly more positive attitude towards cycling than girls of the same age – though this difference was not significant for the 9-10 age group (F=.883; df=4; p=.478). Boys, aged 8-9 showed the most positive attitudes of all at the post-12months stage, while girls, aged 13-14, showed the least positive attitude of all, also at the post 12 months stage.

Age

Table 13 below shows mean attitude scores by age group for the total sample. There was no consistent, significant, difference between primary and secondary school age groups over time (F=.842; df=8; p=0.00). There was an improvement in attitude scores among primary school childrens attitudes tended to improve at each time point, while that of secondary children decreased slightly.

Table 13. Mean attitude score by age group for total sample

	N	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
8-9	208	7.96	8.06	8.55	8.61	9.10
9-10	241	8.21	8.70	8.76	9.06	9.25
13-14	128	8.05	7.97	7.91	8.03	7.87

Table 14 below shows the mean attitude scores of the intervention group, overtime, mirrored those of both groups together, with only the primary school scores consistently increasing over time (F=14.800; df=4; p=.00).

Table 14. Mean attitude score for Intervention by age

	N	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
8-9	125	8.16	8.38	8.92	8.91	9.19
9-10	125	8.50	9.10	9.17	9.23	9.31
13-14	78	8.01	8.01	8.40	8.16	8.01

Cycling Skills Training and Parents Perceived Attitudes towards Cycling

Table 15. Children's attitude scores on the impact on weather and traffic (% agreeing)

n = 347	Group	Pre %	Post %	Post 1mth %	Post 6mths %	Post 12mths %*
Cycle any weather	**Intervention**	48.2	54.5	54.5	51.9	53.2
Cycle any weather	**Control**	39.4	40.8	39.2	42.5	43.8
Afraid of traffic	**Intervention**	32.8	23.0	20.8	19.8	19.9
Afraid of traffic	**Control**	35.3	33.2	33.6	22.3	22.5

*note: control group had received cycling training prior to this result

Table 15 shows the children who would cycle in any weather and who were afraid of traffic, in the control and intervention groups. The intervention groups fear of traffic diminished significantly over time (F= 4.839; df=4; p= 0.001). Willingness to cycle in any weather improved somewhat following training but there was no significant difference over time (F= .745; df= 4; p= 0.581), and no significant difference between control and intervention groups (F=1.495; df=3; p=.214).

Table 16 shows children's beliefs about their parents' attitudes to them cycling. Among the intervention group, there was no change in the belief that parents didn't want them to cycle. There was a significant difference between control and intervention groups for feeing safe to cycle to school (F=3.968; df=3, p=.08)

Table 16. Children's beliefs about their parents' attitudes towards cycling safety (% agreeing)

n = 347	Group	Pre%	Post%	Post 1mth%	Post 6mths%	Post 12mths%
Grownups don't want me to cycle	**Intervention**	**37.3**	**41.1**	**39.6**	**37.4**	**37.9**
Grownups don't want me to cycle	**Control**	**43.5**	**48.5**	**50.6**	**44.3**	**35.2***
Safe to cycle school on my own	**Intervention**	**63.7**	**67.8**	**70.1**	**70.4**	**71.8**
Safe cycle school	**Control**	**62.9**	**58.8**	**49.8**	**59.3**	**65.9***

*note: control group had received cycling training prior to this result

Gender Differences

Table 17 shows the percentage of children who answered yes to specific attitude questions for the intervention group. Overall, boys' scores were higher than girls at all time periods and improved over time. Girls' scores improved initially (immediately post and post one month post), then gradually fell, but, overall, remained above pre test scores for all with the exception of the 'grown-ups don't want me to cycle' question.

There was a significant difference between all time periods, compared to pre scores, for both boys and girls in their positive attitude to cycling in traffic (F= 4.448; df=4; p= 0.00). There was also a significant gender difference in fear of traffic (F=6.935; df=4; p=.00) but no significant gender difference in confidence in cycling to school. (F=1.318; df=4; p=.238). Boys are more likely to cycle in any weather than girls and this improved over time, while girls' stayed the same. There is only a significant difference between boys and girls at post 1 month (F= 12.956; df=1; p=.00), post 6 months (F=9.731; df=1; p=.02) and post 12 months (F= 13.727; df=1; p=.00)

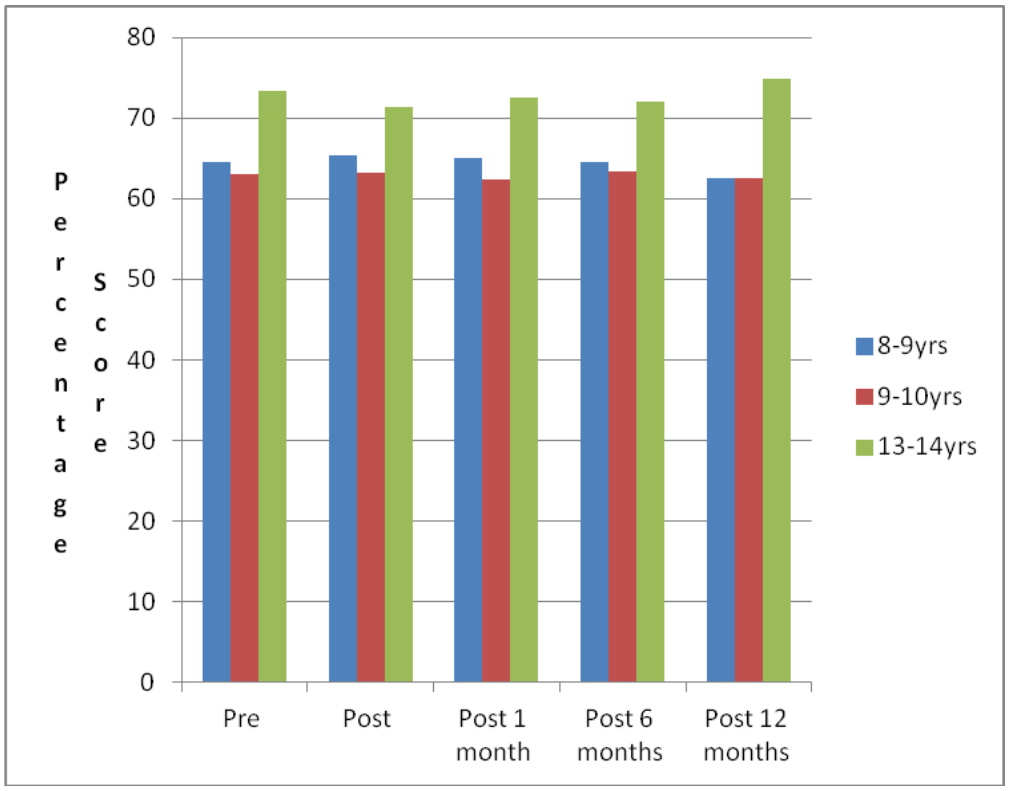
Table 17. Selected attitude scores by gender for intervention groups (% agreeing)

	Gender	Pre	Post	Post 1mth	Post 6mths	Post 12mths
Grownups don't want me to cycle	Boys	34.7	33.1	35.5	27	29.1
Grownups don't want me to cycle	Girls	39.8	49.0	43.8	47.7	46.7
Safe cycle school	Boys	70.7	77.1	78.5	82.4	85.4
Safe cycle school	Girls	57.1	58.6	64.7	58.4	58.0
Afraid of traffic	Boys	22.7	15.3	17.4	12.8	13.2
Afraid of traffic	Girls	42.2	30.8	24.2	26.7	26.7
Cycle any weather	Boys	53.3	61.1	64.5	60.8	63.6
Cycle any weather	Girls	43.5	47.8	44.4	43*	42.7

Age Differences

Figure 18 shows childrens perceptions of their parents' confidence in them cycling to school, by age and time. Secondary school childrens parents became slightly more confident over time period while primary school parents confidence either stayed the same of decreased. There is no significant difference over time (F= .090; df=4; p= .985) or between groups (F= .905; df=8; p=.512).

Figure 18. Children's perceptions of their parents' confidence in them cycling to school, for Intervention groups, by age and time (% agreeing)

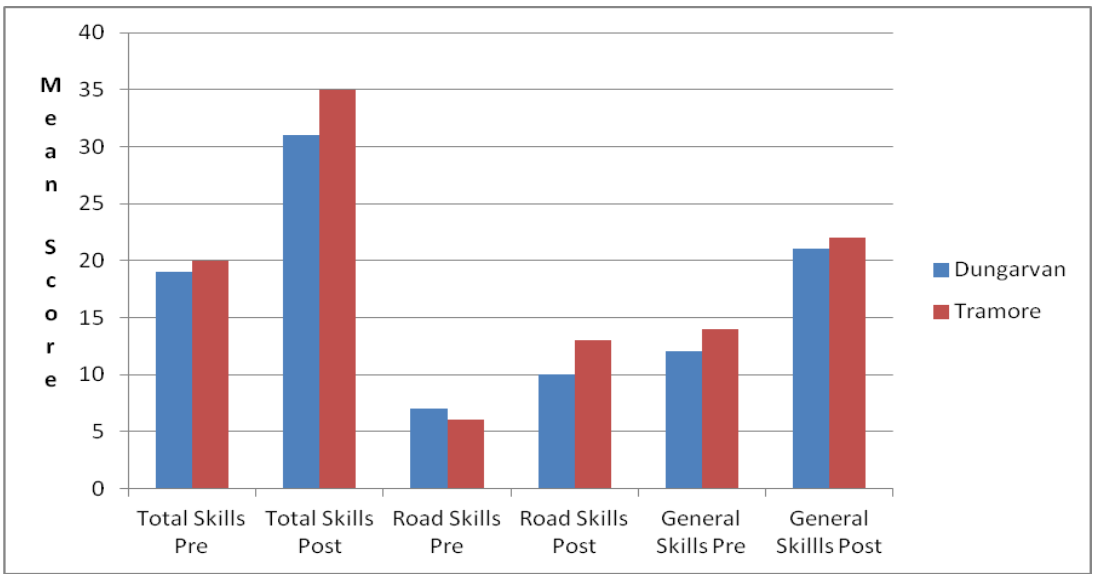


Impact of Infrastructure

Cycling Skills

Figure 19 below shows mean total scores for primary school children for pre and post scores for all cycling skills by location - Dungarvan and Tramore.

Figure 19. Cycling skill scores by location



There was significant difference by location in pre and post scores for total cycling skills (F=122.210; df=1; p= .00), road skills (F=433; df=1; p= .00) and generic skills (F=16.666; df=1; p= .00). Tramore participants had slightly higher scores pre intervention for total skills and general skills while Dungarvan had higher road based skill levels. Scores increased by a greater amount in Tramore as a result of training, particularly road based skills, and these were greater than Dungarvan post intervention.

Confidence

Table 18 shows the mean confidence scores for the intervention group by location for primary school children only. There is a significant difference between location (F=5.302; df=4; p=.00). As described above, scores increased immediately post training and generally remained similar for the following 12 months with Tramore children.

Table 18. Mean total confidence score for Intervention by location for Primary schools only (there is no secondary school data for Tramore)

	N	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Tramore	132	8.13	13.22	13.02	12.63	12.70
Dungarvan	118	8.23	12.51	12.31	11.67	12.77

Table 19 shows the mean confidence scores for road based cycling activities (road, near cars, t junction, roundabouts), for both intervention and control groups by location. Tramore scores were significantly higher than Dungarvan scores at each time point (F= 5.539; df=4; p= 0.00). There was a large increase in road confidence scores for both locations immediately post intervention. Confidence scores fell gradually from one month post intervention to twelve months but remained above pre score levels with a significant difference over time (F= 65.914; df=4; p= 0.00).

Table 19. Mean road confidence scores for intervention group by location

	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Dungarvan	4.47	7.13	6.98	6.79	7.91
Tramore	4.86	8.75	8.56	8.16	8.00

Attitude towards cycling

Table 20 shows the percentage of primary school children who answered yes to specific attitude questions for the intervention group in Dungarvan and Tramore. As outlined previously, environmental interventions such as cycle lanes and traffic calming were in place in Dungarvan but not in Tramore.

Dungarvan students were more likely to think it safe to cycle to school and were less afraid of traffic, pre training, than Tramore students. However, the percentage believing it was safe to cycle to school in Tramore was higher than those in Dungarvan by 12 months post – there was no significant difference by location ($F=237$; $df=4$ $p=.257$). There was also no significant location difference, over time, in children's beliefs about whether their parents wanted them to cycle ($F=.853$; $df=4$; $p= 0.494$) or between location ($F=.558$; $df=4$; $p= 0.653$). Children became more confident over time ($F= 5.814$; $df=4$; $p=.00$) to cycle around traffic but there was no significant difference by location ($F=.753$; $df=4$; $p=.557$). Children's willingness to cycle in any weather improved slightly, but there was no significant difference over time ($F= 2.267$; $df=4$; $p=.064$) with no significant difference between locations ($F= 1.685$; $df=4$; $p=.155$)

Table 20. Selected percentage attitude scores by location for Intervention

n = 250	Location	Pre	Post	Post 1mth	Post 6mths	Post 12mths
Cycle any weather	Tramore	52	55	52	54.9	56.8
Cycle any weather	Dungarvan	44.2	57.5	58.2	44.1	50.5
Afraid of traffic	Tramore	39	25	23.2	18.9	20.8
Afraid of traffic	Dungarvan	34.5	22.1	18.2	18.4	15.2
Grownups don't want me to cycle	Tramore	42.3	46.5	44	40.2	37.6
Grownups don't want me to cycle	Dungarvan	38.1	44.2	40.9	40.2	41
Safe cycle school	Tramore	58.5	64.3	64	71.3	74.4
Safe cycle school	Dungarvan	69	74.3	78.2	71.6	71.4

Table 21 shows primary school attitude scores by location for control and intervention groups (there was no secondary school intervention group in Dungarvan with whom to compare). As outlined previously, environmental interventions such as cycle lanes and traffic calming were in place in Dungarvan but not in Tramore. Attitudes were more positive in all groups at 12 months post training than they were pre-training.

Attitude scores increased for both control and intervention groups in both areas with higher scores for both groups in Tramore at post 6 and 12 months with a significant difference between locations ($F= 11.799$; $df=3$; $p=.00$). Attitudes towards cycling became more positive over time ($F= 20.577$; $df=3$; $p=.00$) for both control and intervention groups in both locations.

In Dungarvan, there was a significant difference over time for both groups (F= 2.720; df=3; p=.044) and also a significant difference between control and intervention groups (F= 5.668; df=3; p=.001). In Tramore, there was a significant difference over time for both groups (F= 28.513; df=3; p=.00) but no significant difference between control or intervention gourd (F=2.122; df=3; p=.099)

Both control groups were impacted by peers with a significant difference between pre and immediately post training in Dungarvan (F=47.699; df=1; p=.00) and Tramore (F= 42.207; df=1; p=.00). Tramore attitude levels rose at each time point with Dungarvan scores falling immediately post training. There is a significant difference between the two locations (F= 9.079; df= 3; p=.00).

Table 21. Mean total attitude score for primary school children by location

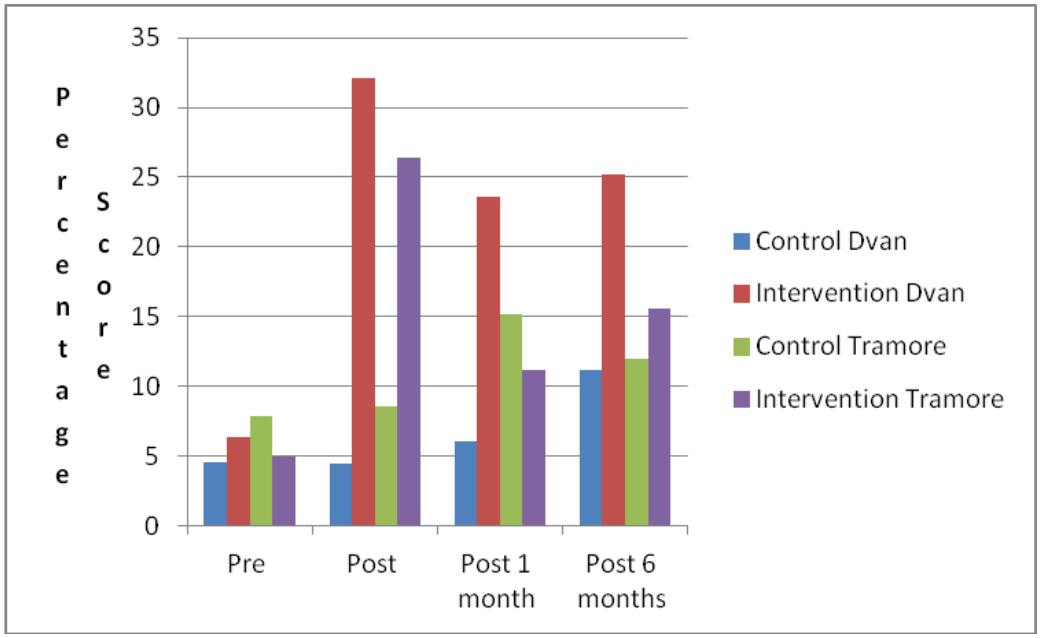
	N	Pre Mean	Post Mean	Post 1mth mean	Post 6mths mean	Post 12mths mean
Dungarvan Intervention	118	8.16	8.89	9.15	8.90	9.15
Dungarvan Control	113	8.04	8.92	8.10	8.26	9.03*
Tramore Intervention	132	8.49	8.60	8.94	9.21	9.33
Tramore Control	106	7.58	7.94	8.28	8.89	9.42*

Note: control group had received cycling training prior to this result*

Cycling for active travel

Figure 20 illustrates the percentage of primary school children cycling to school in the last seven days by location, for intervention and control groups. Cycling levels increased from pre to post 6 months for all groups. Children living in Dungarvan had higher levels of cycling to school than those living in Tramore. Whist Dungarvan children reported more cycling in the past seven days at each measurement time than those in Tramore, this difference was not significant between locations (F=.670; df=4; p=.670). There was a significant difference between the control and intervention groups (F= 8.253; df=4; p=0.00) To recap, environmental interventions such as cycle lanes and traffic calming were in place in Dungarvan but not in Tramore.

Figure 20 - Percentage of children cycling to school in the last seven days by location for Primary schools only (there is no secondary school data for Tramore)



RESULTS OF FOCUS GROUP DISCUSSIONS

Sample

Two hundred and seventy children (106 boys, 154 girls) children from both primary and secondary schools took part in ten, short, semi-structured, whole-class, focus group discussions.

Table 1 below gives details of the numbers and gender from each school – 127 (62 boys, 65 girls) were from the control group and 143 (44 boys, 99 girls) from the intervention group. All focus group discussions[1] took place before and after (immediately, six and 12 months after) the 5-week cycle skills training course. Fourteen parents (4 male, 10 female) were also interviewed three times: immediately post training, and at six and twelve months later. In addition, twelve cycling tutors were interviewed once only, immediately after they had delivered the training.

Table 1. Sample characteristics

School Name & Type	Control/ Intervention	School Type/Class	Males	Females
Holy Cross (Primary)	Control	Mixed 4th class	14	12
CBS (Secondary)	Control	Boys 2nd year	24	0
Ard Scoil (Secondary)	Control	Girls 2nd year	0	26
Glor Na Mara (Primary)	Control	Mixed 4th class	14	15
Scoil Gharbhain (Primary)	Control	Mixed 3rd	10	12
Abbeyside (Primary)	Intervention	Mixed 4th class	14	16
Ard Scoil (Secondary)	Intervention	Girls 2nd year	0	26
St Augustine's (Secondary)	Intervention	Mixed 2nd year	14	15
St Marys (Primary)	Intervention	Girls 4th class	0	29
Holy Cross (Primary)	Intervention	Mixed 3rd class	16	13
			Total =106	Total =164

Tables 2 and 3 below give an overview of the opinions expressed on cycling in general, cycling for transport and the cycle skills training during the focus group discussions with children and parents.

[1] There is no 12month, post-intervention data for St. Augustine's, mixed 2nd yr., secondary school group.

Table 2. Themes from discussions with children

Themes	Sample Quote
Cycling in general	'good exercise', 'fun', 'I hate cycling', 'makes you get short distances faster', 'fine but it's too much hard work in the morning'
Cycling as a form of transport	
School/Work	'too early in the morning', 'quicker than walking', 'save money', 'too far away', parents won't let me', 'my sister wont cycle with me and I'm not allowed to cycle on my own'
Distance/Time	'15 minutes suitable distance', '¾ km', '4km is suitable', '4km is too far'
Parents	'my dad likes cycling so he wants me to follow in his footsteps', 'I'm too young to cycle on my own', 'my parents feel nervous about me cycling', 'think I live too far away', 'they feel better as I used to be wobbly' 'before cycle training my mum wouldn't let me, but after cycle training she does'
Weather	'too slippery in the rain', 'my parents will only let me cycle if it is dry', 'if you cycle in the wet you may get sick'
Incentives	'More cycle lanes', 'wasn't raining', 'live closer', 'no cars on the road', 'family cycle with me', 'make a cycle path to school', 'don't make us wear helmets'
Environment	'better for the world', 'better for pollution'
Cycling Training	
Confidence	'need training to improve my confidence', 'I cycle more now because of training', 'It made us more confident as there aren't any cycle lanes by my house', 'it was fun and improved my confidence' 'I like cycling now' also road based situations, 'I feel more confident on roundabouts'
Participating in training	'it was good fun', 'best bit going out on the road', 'I learned lots', 'I had fun whilst learning'
Impact	'made me more confident as there aren't any cycle lanes by my house', 'feel more confident on roundabouts', 'now prefer to cycle on the road rather than the track', 'I like cycling now', 'I feel more confident with cars on the road', 'before cycle training I wouldn't go on the road as I was scared of cars, now I know what to do so I cycle', 'I'm not afraid anymore'
Worries when cycling	'I'm scared a bus won't be able to see me', 'I don't like roundabouts as cars are coming from more than one direction', 'I can't take my hand off the handlebars so I would fall off and get hit by a bus'
Infrastructure	'cycle lanes are good as cars can't go on them', 'I like going on

	a cycle lane as you can talk to the person beside you', 'I feel nervous on the road'
Motorists	'cars worry me on the road', 'cars go too fast',
Cycle lanes	'I feel safer on a cycle lane as there are more bikes and no cars',
Safety	
Helmets	'helmets are safe as they protect your head', 'helmets mess up your hair', 'they make my head look big', 'helmets hurt my head', 'if I was going a long way I would wear a helmet'

Table 3. Themes from interviews with parents

Themes	Sample Quote
Cycling in general	
	'I cycled as a child', 'I didn't cycle as a child but when I had my first child I cycled with him until he was 8', 'I remember my childhood cycling and it wasn't a hassle. If I can find a way of this for my children then great',
Cycling as a form of transport	
School/work	'I feel panicky on a bike as to cycle into work I had to travel busy roads', 'I have a fear for everything to overcome, I've no idea why I have this fear as I loved being on a bike as a child'
Child cycling to school	'time in the morning is very tough trying to drop off children at different locations', 'they are far less concerned than us, they aren't worried at all', 'the fact that I have been cycling has definitely been an influence on my children'
Distance/Time	
Parents attitudes towards their child	'I'd be more confident of them cycling now but it's the environment around them. I would feel more confident if they cycled in a group', 'I have a child who has since become a driver and since he cycled he is more aware of cyclists and that has ensured he has become a better driver', 'One of my issues is that I live six miles out I have to organise a bike to be brought in the car and for it then to be dismantled to facilitate to school. If I was living in any way closer they would be cycling to school every day.'
Incentives	'A bike depot would have a huge impact. The facility of having the bike isn't then such a burden and you can cycle as it is made easy', 'a drop off where parent can drop off school bags into school', 'cycle passports would be great for children like they have in Holland', 'making cycle awareness part of the driving test would ensure that motorist are safer and give parent

	more confidence', 'adverts in cinemas would help to tell all youngsters about rod safety', 'a park and ride with bike and parents can drop off school bags in school'
Environment	'there's a lot more freedom on a bike',
Cycling Training	
Confidence	'I was petrified, but after doing the course I absolutely love it', 'confidence is a big thing, my child is confident now of cycling in traffic and on roundabouts and T Junctions and that's the biggest difference. This has meant that I am now more confident',
Participating in training	'I found what was good from the training was the doubling up and single file so you are aware of other road users',
Impact	'I'm not there yet but I will get there, I just need more experience and confidence on a bike', 'the training has made my child more confident and aware of other road users', 'I came with nothing and didn't have a clue but the best learning was the positivity I received from you and the tutors', 'I'm much more observant now as a driver of cyclists, you know what they are going to do, they have to turn right, can they stay on the left hand side they have to move in and be a car and I didn't realise that', 'It absolutely made me more observant as a car driver and I would be saying to car drivers just get on a bike. I really think that if you were to get 50% of drivers to get on a bike, even do a programme for one day, go on a bike and they can see how it looks from a cyclists point of view',
Worries when cycling	
Infrastructure	'I would cycle on the track as I'm only getting used to cycling again', 'the road surface is terrible and the roads are bumpy with pot holes and everything', 'the fact Dungarvan is flat means it is easy to cycle which is the biggest assistance', 'I would have concerns on roundabouts and on junctions', We try to avoid roundabouts and T junctions', 'I'm probably doing the wrong thing but I take my children on the cycle path the whole way so I can avoid roundabouts'
Motorists	'drivers don't slow down', 'the roads are very busy, there is so much traffic even with good roads that is just safer on a cycle path', 'visibility is good on roads but the road users using the roads come right up behind you, pull out and are beeping, their behaviour is off putting', 'car users just don't take any notice of cyclists', 'I would be happy for my eldest son to cycle but not my young daughter. It's not the cycling ability of me or my children or in some cases road condition, but it's actually the behaviour

	of other road users', 'you can tell from the people who are driving who the cyclist are and how they overtake you', 'The road surface is terrible and the roads are bumpy with pot holes and everything and then road users coming along beeping at you when you're going down a hill, round a bend, you have cars coming at you and cars beeping at you, they would drive you mad. I got so used to it, this part of the road is my part of the road and if you don't like it then tough luck and I've just got more confident after a while well feck me if they can't take it'
Cycle lanes	'nothing would prevent me cycling on the roads but I would naturally take the cycle path rather than going on the road as it seems common sense', 'you need to be less switched on in the cycle path as there are less dangers', 'the cycle lane paths are ideal as there is no fear of anything happening to my children', 'having a cycle lane is a wonderful idea. However, the more cyclists that are on the road and more visible then the more normal it will become and drivers will become more aware of cyclists which will increase safety',
Dangers	Often they will cycle alone and my worry then is not stranger danger, but if they have an accident when on the bike without another vehicle being involved then they are on their own',
Other aspects	'the bag is the biggest thing, if my eldest son had a smaller school bag he would be cycling to school all the time', 'there is an issue about the amount of books they have to carry',
Safety	
Helmets	'I have older children who would cycle five miles into town, helmets are an issue. I have insisted on them but it is becoming more difficult with hair styles etc',

Cycling in general

Responses indicated a positive attitude towards cycling and cycling was good for your health: *'good exercise', 'fun', 'get away from parents', 'better for pollution', 'better for our world'* (Holy Cross School, Tramore). Primary schools students were overwhelmingly positive that cycling was fun, better/faster than walking, an easier way to travel and a good way to get fresh air. In contrast, secondary school girls from the all girls' school were mixed in their responses, with nearly half indicating they *"hated cycling"* (girl, Ard Scoil); girls from a mixed secondary school did not display the same levels of negativity. Secondary school pupils also felt that cycling was a more difficult way to travel to school than by car; this was not mentioned in primary schools: *"cycling takes too long in the morning"* (boy, CBS), *"[it's] fine but it's too much hard work in the morning"* (girl, Ard Scoil). Parents were generally positive

towards cycling in general, although they highlighted the belief that it is now much more difficult and dangerous to cycle than when they were young.

Cycling to school/work

Overall responses indicated a positive shift towards using cycling as a form of transport over time. Primary school children were positive about cycling as a form of transport (*"quicker than walking"*, boy, Abbeyside), although parental permission was an issue (*"parents won't let me"*, girl, Abbeyside, girl Glor Na Mara; *"I'm not allowed"* boy, Holy Cross). In contrast, secondary school children seemed to use many excuses such as *"too early in the morning"* (boy, CBS), *"too far away"* (boy, CBS) and *"I just don't want to; I hate cycling"* (girl, Ard Scoil). In the all girls' schools, a number of girls mentioned *"my parents won't let me".*

None of the parents interviewed cycled to work. They mentioned lack of time as one of the main reasons: *"Time in the morning is very tough - trying to drop off children at different locations"* (parent, Abbeyside)

Distance, Time and Weather

Reponses indicated that children's perception of time and distance vastly vary. General consensus was that 15 minutes is a suitable time to cycle to school. However, when asked how far they could cycle in 15 minutes, answers ranged from *"3/4km to 15km"* (CBS), *"500 metres to 2.5km"* (Abbeyside 4th class) and *"2-4km"* (Holy Cross 4th class).

The weather impacted on children's attitudes to cycling in two ways. First, children were concerned about reduced safety: *"too slippery in the rain"* (Holy Cross 4th class). Second, poor weather negatively affected their parents' attitudes: *"my parents will only let me cycle in the dry"* (boy, Abbeyside) and *"if you cycle in the wet you may get sick"* (girl, St Mary's)

Weather wasn't mentioned at all by parents, but distance was a barrier (*"one of my issues is that I live six miles out I have to organise a bike to be brought in the car and for it then to be dismantled to facilitate to school. If I was living in any way closer they would be cycling to school every day',* parent, Abbeyside).

Children cycling to school

Reponses indicated a marked difference between primary and secondary schools in the reasons given for not cycling to school. Pre training, primary schools reasons mainly centred on fear *("there are dangerous/bad people* (girl, Glor Na Mara), *"somebody has been killed on the road where I cycle"* (boy, Holy Cross) and lack of permission from parents "my mum gets nervous" (Holy Cross, boy), *"I'm too young to cycle on my own"* (boy, Abbeyside). Pre training no parents would allow their children to cycle in Abbeyside 4th class (this was on a wet day) – though half would

(15/30) in the Holy Cross School. Post training 13/29 parents in Abbeyside would let their child cycle and 21/30 in Holy Cross.

Among secondary school children, the most common reasons for not cycling to school centred on the children's own lack of motivation ("*too lazy*" boy, CBS; "*too early in the morning*", girl, Ard Scoil), and only girls stated that *"parents won't let me"* (girl, Ard Scoil). Some boys in CBS, felt it was *"too far"* but also *"too close*" but no boy mentioned anything to do with safety concerns. In contrast, girls from the Ard Scoil secondary school regularly mentioned that cycling to school was *"too dangerous", "dangerous due to a big bend in the road"; "loads of cars parked on the cycle path".* Only one group, secondary school girls group (Ard Scoil) mentioned the size or weight of school bags as a barrier, unprompted by the researcher. When prompted, Glór Na Mara school also agreed (22/29) that it was an issue.

Parents acknowledged that children's confidence levels for cycling were higher than theirs: "*they are far less worried than us, they aren't worried at all"* (parent, Abbeyside) and age was a factor *"I would be happy with my eldest son but not my young daughter. It's not the cycling ability of me or my children or in some case the road conditions, but it's actually the behaviour of road users."* Parents felt more comfortable post cycling training: *"I'd be more confident of them cycling now but it's the environment around them. I would feel more confident if they cycled in a group."* (parent, Ard Scoil) Parents also identified their own positive childhood experiences as an influence*: "I remember my childhood cycling and it wasn't a hassle. If I can find a way of this for my children then great" (parent, Abbeyside)* and *"the fact that I have been cycling has definitely been an influence on my children"* (parent, CBS).

Incentives to cycle

The vast majority of answers centred on three main issues. The first concerned infrastructure: *"more cycle lanes"* (boy, Abbeyside), *"less roundabouts"* (girl, Abbeyside), "have a cycle lane straight from my house to school" (boy, Holy Cross). The second concerned the need to make cycling safer: "*make the roads bigger"* (girl, Ard Scoil), *"if there were no cars on the road I would cycle"* (girl, Ard Scoil). The last concerned a desire for some form of reward: *"new bike"* (boy, CBS), *"pay us"* (girl, St Mary's), *"free ipad"* (girl, Ard Scoil). Distance was also mentioned *("live closer")* but only by primary school children. *"Less homework"* was also mentioned in the Ard Scoil (secondary girl's school).

Parents' main concern was the need to minimise the danger from motorists: *"making cycle awareness part of the driving test would ensure that motorist are safer and give parent more confidence"* (parent, Abbeyside). One parent (Abbeyside) suggested a *"bike depot so I can get a loan of a bike"*. Others mentioned the need to reduce school bag weight and/or size.

"Maybe an app where children cycling for sat navs in cars, that it says that there is a cyclist head to warn them." (parent, CBS)

"Motorists need visual signs on the road as the eejit on the road may not have seen a national campaign or gone to the cinema" (parent, Ard Scoil)

"Making cycle awareness part of the driving test would then ensure that motorists are safer and give parents more confidence" (parent, Abbeyside)

"The bag is the biggest thing. If my oldest had a smaller school bag he would be cycling to school all the time." (parent, Ard Scoil)

Cycle Training confidence

A substantial number of children found that training improved confidence: *"it was fun and improved my confidence", (*girl, St Marys); *"I feel more confident on roundabouts"* (boy, Holy Cross); "made me more confident as there aren't any cycle lanes by my house" (boy, Abbeyside). This had a positive impact on the frequency that children cycled, *"I cycle more now because of training" (*girl, St Marys) and thoughts about cycling *"I like cycling now"* (girl, Holy Cross) *"I'm not afraid anymore"* (St Marys girl). Interestingly, most (21/30) primary school girls in St Marys said they needed cycle training, while only 7/15 boys in Abbeyside felt they did, suggesting boys are more confident. Secondary school children were also less inclined to think they needed cycling training: only 3/28 boys from CBS and 5/29 girls from the Ard Scoil said they needed cycle training to improve their confidence.

Parents who took part in cycle training increased their confidence levels: *"I was petrified, but after doing the course I absolutely love it"* (parent, Abbeyside) *"I'm not there yet but I will get there, I just need more experience and confidence on a bike"* (parent, Ard Scoil). This also impacted on parent's confidence in their children: *"confidence is a big thing, my child is confident now of cycling in traffic and on roundabouts and T Junctions and that's the biggest difference. This has meant that I am now more confident"* (parent, Ard Scoil)

Training participation and impact

The vast majority of children enjoyed participating in training, and, due to the active nature of training, learnt valuable skills: *"I had fun whilst learning"* (boy, Holy Cross). With nearly half of the cycling training taking place on the road, initial traffic worries seemed to be alleviated: *"best bit was going out on the road*" (girl, St Mary's);

Overall, responses suggested participation had a positive impact on children cycling on the road: *"I cycle more now because of training"* (girl, Holy Cross), *"we now go and cycle to school together" (boy, Holy Cross) "before cycle training I wouldn't go on the road as I was scared of cars, now I know what to do so I cycle"* (girl, Holy Cross); and *"I feel more confident with cars on the road"* (boy, Abbeyside). Children

also said *"my parents will now let me cycle to school after having cycling training"* (boy, Holy Cross).

Parents who took part in children/parent training commented "*I came with nothing and didn't have a clue but the best learning was the positivity I received from you and the tutors"* (parent, Abbeyside). There was awareness from parents of the impact of the training on their children *"the training has made my child more confident and aware of other road users"* (parent, Abbeyside). The training also impacted upon the awareness of cyclist from a drivers perspective *"I'm much more observant now as a driver of cyclists, you know what they are going to do, they have to turn right, can they stay on the left hand side they have to move in and be a car and I didn't realise that" (parent, CBS), "It absolutely made me more observant as a car driver and I would be saying to car drivers just get on a bike. I really think that if you were to get 50% of drivers to get on a bike, even do a programme for one day, go on a bike and they can see how it looks from a cyclist's point of view"* (parent, Ard Scoil).

Cycling concerns and Infrastructure impact

The two underlying themes for children before the cycling training were fear of traffic (*"I'm scared a bus won't be able to see me"*, boy, Abbeyside; *"I feel safer on a cycle lane as there are more bikes and no cars",* girl, Ard Scoil) and fear of road infrastructure (*"I don't like roundabouts as cars are coming from more than one direction"*, girl, St Marys). After the training, attitudes positively changed for traffic *("made me more confident as there aren't any cycle lanes by my house",* girl, Abbeyside; *"now prefer to cycle on the road rather than the track"*, girl, St Marys) and also for road infrastructure (*"feel more confident on roundabouts"*, girl, Ard Scoil).

Parents' fears mirrored their children's: *"I would have concerns on roundabouts and on junctions" (parent, Abbeyside); "we try to avoid roundabouts and T junctions" (parent, Abbeyside); "It's not the cycling ability of me or my children or in some cases road condition, but it's actually the behaviour of other road users" (*parent, *Ard Scoil).* Interestingly, one parent suggested cycling could have a positive impact on driver behaviour: *"I have a child who has since become a driver and since he cycled he is more aware of cyclists and that has ensured he has become a better driver"* (parent, Abbeyside). Parents also mentioned other concerns, such as road conditions (*"the road surface is terrible and the roads are bumpy with pot holes and everything*", parent, CBS) and also cycling alone (*"often they will cycle alone and my worry then is not stranger danger, but if they have an accident when on the bike without another vehicle being involved then they are on their own"*, parent, Abbeyside).

Parents also believed that cycle paths require less concentration *("you need to be less switched on in the cycle path as there are less dangers"*, parent, CBS) and decrease the chances of accidents (*"the cycle lane paths are ideal as there is no fear*

of anything happening to my children", parent, Abbeyside). The majority of parents felt that cycling on the road was important as not everywhere had infrastructure, but they still preferred cycle paths: *"nothing would prevent me cycling on the roads but I would naturally take the cycle path rather than going on the road as it seems common sense"* (parent, CBS); *"I'm probably doing the wrong thing but I take my children on the cycle path the whole way so I can avoid roundabouts"* (parent, Abbeyside). Parents, expressed concern about motorists (*"car users just don't take any notice of cyclists"*, parent, Abbeyside; *"road users coming along beeping at you when you're going down a hill, round a bend, you have cars coming at you and cars beeping at you, they would drive you mad. I got so used to it, this part of the road is my part of the road and if you don't like it then tough luck and I've just got more confident after a while well feck me if they can't take it"*, parent, Ard Scoil).) and suggested ways of improving this: *"It absolutely made me more observant as a car driver and I would be saying to car drivers just get on a bike! I really think that if you were to get 50% of drivers to get on a bike, even do a programme for one day, go on a bike and they can see how it looks from a cyclists point of view"* (parent, Ard Scoil).

Cycling skills tutors views

Table 4 below gives an overview of the themes discussed by the cycling tutors, after they had delivered the training. These differed from parent and child focus group discussions as they focus only on the perceived impact of the cycle training, the structure of the sessions and children's skill levels.

Table 4. Themes from interviews with cycle skills tutors

Themes	Sample Quote
Evaluation of cycling training programme	- The thing I liked is it actually does teach them how to cycle a bike and how to cycle on the road. You think how you can teach them to cycle on the road as everyone knows it and there are a lot of basics that they don't know and you see them on the road.' - Yesterday I saw a fella cycling on the road properly with a helmet and if I'd have seen him a few days ago he would have been on the pavement with no helmet on. - I think we've got the age group right. I think with fourth class it is the age group as if they are older they tend not to listen and they think they know it but they don't know it. - The secondary school children have no interest; they are too cool for school. They think they know everything, especially if they see us as we were in school with them last year.

	- It is teaching them, they are learning a lot from it, a lot of them cycle bikes anyway and they didn't have the knowledge. Even if they only take a few small things like roundabouts or look and signal that's something.
Cycling for active travel	
Cycling skill levels	- Secondary school children skills were generally useless, absolutely useless. They are poorer than what you think it should be. - The secondary school children are worse than primary school as they think they know it. Difference with it is with primary school if they would cycle home, they take it into consideration where the secondary schools kids think they know how to do it anyway. - Most can do braking and cornering pretty well. - When we did it outside its handy if we can do it on the board first as it shows them. We drew up primary and secondary position and put it on the board so we showed them and they knew when they get there. - Theory session is a good thing.
Cycling skill levels post training	- There is a big improvement in there cycling skills. They pick up on small things like feathering for brakes and have picked it up quite quickly. - Everything we do on the yard is transferred to the road. When the lads did the drills on the yard and we take them out on the road so they are more confident. - I saw a massive improvement in Tramore from the start to the end it was just massive.
Traffic management ability	- The weakest area is roundabouts and signalling. - Signalling is a problem especially for roundabouts. - They're ok on T junctions but on roundabouts some of them were terrible.
Impact of training on road cycling ability	- First day they are very nervous but when we had them in single file and cars are coming along they are telling each other what to do. - Today they were brilliant (third session) a lot better than before, they are very good. - They've grown in confidence when they are cycling on the road rather than the yard. - First day I wouldn't have brought half of them anywhere near a road, but by the end I would have had no problem. Things like pairs cycling and switching into single file, stuff like that, their knowledge of being on the

	road is a massive improvement from start to finish. - You see a lot more kids out on the cycle paths since the training, even without their parents. - Things like pairs cycling and switching into single file, stuff like that, their knowledge of being on the road saw a massive improvement from start to finish. - They've grown in confidence when they are cycling on the road rather than the yard. - They get plenty of time on the road which is the main thing. That's what we want them to learn and they are now safe on the road. - Something is always going to happen it's just with the helmet on its safer; you'd wear a helmet for GAA.
Programme development	- When we did the CBS you could see how many bikes they broke how bad they were. All they do is skid and tyres popping although they were there as well to mess. Break them into smaller groups it may be easier. - I think practicing the T junctions and roundabouts in real terms as they don't get to see a car. We went out to a proper quiet roundabout and that was really good

Cycle Training programme/confidence

Cycling tutors observed a difference in skill levels and motivation across the different age groups: *"The secondary school children are worse than primary school as they think they know it", "the cycling skill level of secondary school students was useless, absolutely useless".*

Tutors saw a marked improvement in confidence levels after the cycling training: *"I saw a massive improvement in Tramore from the start to the end, it was just massive. First day I wouldn't have brought half of them anywhere near a road, but by the end I would have no problem."*

The tutors also suggested that the best group to target, for the maximum benefits from cycling training were primary school children: *"the secondary school children have no interest; they are too cool for school. They think they know everything", "I think we've got the age group right. I think with fourth class it is the age group as if they are older they tend not to listen and they think they know it but they don't know it"*.

Training participation and impact

Cycling tutors observed a substantial impact on cycling ability and confidence for training sessions: *"First day they are very nervous but when we had them in single file and cars are coming along they are telling each other what to do".* The tutors also felt that the on-road training part of the intervention had a bigger impact that the yard-based training: "they grow in confidence when they are cycling on the road rather than the yard". *"I saw a massive improvement in Tramore from the start to the end it was just massive"* (Holy Cross tutor).

Road ability improved: *"First day I wouldn't have brought half of them anywhere near a road, but by the end I'd have had no problem. Things like pairs cycling and switching into single file, stuff like that. Their knowledge of being on the road is a massive improvement from start to finish"* (St Marys tutor). Overall, the training they noted a knock on, positive effect on parental confidence *"You see a lot more kids out on the cycle paths since the training, even without their parents."*

The tutors felt that a *"theory session is a good thing"* and helped with road situations, particularly those that students found difficult *"I think practicing the T junctions and roundabouts in real terms as they don't get to see a car. We went out to a proper quiet roundabout and that was really good".* Tutor suggested that utilising different learning methods led to greater understanding *"When we did it outside its handy if we can do it on the board first as it shows them. We drew up primary and secondary position and put it on the board so we showed them and they knew when they get there".*

Cycle skills/Road ability impact

Cycling tutors noted the children's weakest areas: *"the weakest area is roundabouts and signalling"*; *"they're ok on T junctions but on roundabouts some of them were terrible".* They commented about learning the skills in a controlled environment suggested that road based training had a greater impact than yard based *"everything we do on the yard is transferred to the road.* [They] *did the drills on the yard and we take them out on the road so they are more confident"*, *"things like pairs cycling and switching into single file, stuff like that, their knowledge of being on the road saw a massive improvement from start to finish", "they've grown in confidence when they are cycling on the road rather than the yard"*. Tutors felt that the more experience the children had on the road the safer they were: *"they get plenty of time on the road which is the main thing. That's what we want them to learn and they are now safe on the road".*

The qualitative data from parents, children and tutors enabled the following conclusions to be made

- What is the impact of cycling skills training on cycling levels, cycling skills, cycling confidence and attitudes to cycling and how does this vary by gender and age ?

As a direct result of cycling training, children's confidence and attitudes have improved immensely; *'good exercise', 'fun', 'get away from parents', 'better for pollution', 'better for our world'*. This did not vary according to age with primary school children gaining greater impact on confidence than secondary school children. Primary school children's attitudes increased whereas secondary schools children were not as heavily impacted *"cycling takes too long in the morning"* (boy, CBS), *"[it's] fine but it's too much hard work in the morning"* (girl, Ard Scoil).

At primary school level, there was no difference between girls and boys *"I cycle more now because of training"* (girl, Holy Cross), "*we now go and cycle to school together" (boy, Holy Cross) "before cycle training I wouldn't go on the road as I was scared of cars, now I know what to do so I cycle"* (girl, Holy Cross); and *"I feel more confident with cars on the road"* (boy, Abbeyside) but secondary school girls displayed a more negative attitude to cycling. Secondary school girls had a more negative attitude than boys; *"hated cycling"* (girl, Ard Scoil).

- What is the impact of cycling skills training on parental confidence in the child's cycling ability?

Parents saw a huge benefit from cycling skills training and were more confident with their children cycling post cycling training than before, *"I'd be more confident of them cycling now but it's the environment around them. I would feel more confident if they cycled in a group."* (parent, Ard Scoil). Parents acknowledge that cycling training was a key component of increasing cycling skills and made them more comfortable in their child's ability to cycle.

- Are cycling levels after cycle skills training impacted by the presence or absence of infrastructure ?

This was evident pre cycling training for children but improved as result of training *"it was fun and improved my confidence", (*girl, St Marys); *"I feel more confident on roundabouts"* (boy, Holy Cross). This was more of a concern for parents both pre and post cycling training *"It's not the cycling ability of me or my children or in some cases road condition, but it's actually the behaviour of other road users" (*parent, *Ard Scoil).*

DISCUSSION

The purpose of this research was to identify whether cycling skills training had an impact on cycling levels, cycling skills, cycling confidence and attitudes to cycling among children in Dungarvan and Tramore, Co. Waterford and whether this varied by age, gender and location. Overall the findings showed that cycle skills training did have a positive impact on cycling as a mode of transport, children's confidence levels and attitudes towards cycling. This impact was particularly strong in primary school children and equal for boys and girls. Results suggest it takes time for sustained change, and for some variables, such as children's attitude towards cycling and parental confidence levels, additional interventions are needed.

There was a positive attitude towards cycling in primary school children that recognised not only the physical benefits, but also environmental benefits of cycling. Other benefits identified included saving money and time as cycling is quicker than walking. This was less evident in secondary school children, who acknowledge cycling as good exercise, but highlighted the inconvenience of cycling and the lack of time for it when travelling to school. Girls from a single sex school displayed a more negative attitude than their peers in a mixed gender school.

This research found that road based cycling skills training leads to greater confidence and increases the amount of children cycling to school and using cycling as a form of active transport. Peer behaviour also impacted cycling confidence, attitude and levels of cycling even to those who did not receive cycling training. Peer impact is greater for primary school children than secondary school children. Peer behaviour has a much greater immediate impact for secondary school girls than boys. Cycling confidence and cycling levels for girls are strongly age dependant, with secondary school girls' confidence, attitude and levels of cycling all decreasing from pre test scores and primary school girl's scores all increasing. The impact on boy's confidence and attitudes remains over time for all age groups once they have received cycling training. There is a significant impact immediately post training for secondary school girls but this decreases over time. Cycling skills training increased children's confidence for cycling to school, in traffic and on roads but also increased fear in parents to above pre test scores. Parents were especially concerned about

the safety of their child on the road, focusing on the behaviour of other road users more than their child's cycling competency. The provision of cycling infrastructure had no impact on children's confidence or attitude. In fact, it could be argued that the presence of cycling infrastructure had a negative impact on children's road confidence and skill levels but it did increase their use of cycling as a mode of transport. Cycling skills training also had a positive impact on bike ownership levels. A reason for this could be that cycling training took place before Christmas so participants may have asked for bikes as presents.

The results are discussed in more detail below.

Cycling Skills

Cycling skill levels increased significantly for all participants in the study across all eight skill areas. As expected, road based skills e.g. roundabouts, T junctions, cycling on the road, were the weakest skill areas at pre and post training, but there was an improvement as a direct result of training. This shows that road based cycling training has a positive impact on children's road skills. This research also found that children reported improved confidence levels and a greater feeling of safety when cycling in traffic. The importance of cycling skills is highlighted by Rissel and Watkins (2014) who found poor cycling skills can not only adversely affect cycling confidence, but also contribute to poor road safety.

It is important to identify why road based skill levels received the lowest scores and why they instill fear in children. Qualitative discussions highlighted a lack of child and parent confidence in road based situations. The decrease in numbers in children cycling on the road and the ease of car transport as a mode of transport were mentioned in this research as possible reasons. The increase in motorised traffic on the roads and drivers lack of awareness of cyclists has led to a fear culture amongst children and parents. This 'fear' culture for cycling on roads exists nationally as identified by Wardlaw (2014). Giving children the necessary skills and confidence to cycle on the road is important, but it is only one area that needs to be addressed when looking to increase cycling as a mode of transport for children.

Motorist speed was a key factor in the fear culture in children and parents. To overcome this barrier, Wegman et al. (2010) suggests increasing the amount of T junctions and roundabouts on roads to reduce motorists speed. If these suggestions are implemented, the importance for road based cycle training as conducted in this research study is essential due to the increased likelihood of cyclists encountering T junctions and roundabouts when cycling on roads

This research highlights the importance of age to increasing cycling skills to assist in overcoming fears of cycling on the road. Road based skills were slightly higher among secondary school children pre intervention. As a result of cycling skills training their road skills increased marginally. However, primary school children's road skill scores almost doubled and were higher than secondary school levels post training. This suggests that the earlier road based training is delivered, the greater the impact.

Despite secondary school children displaying much higher confidence scores, cycling skills decreased with age. This concurs with Wagenbuur (2011) that children should experience traffic situations at a younger age to break down the fear of the road. This research highlights behaviours have to be learnt in primary school as it is much harder, and potentially too late for behavioural change in secondary schools. However, in Ireland the RSA recommend that no child under the age of 12 should cycle in traffic. This research suggest it is harder to overcome road based fears in secondary school children so to increase the chances of children cycling, this age limit needs to be lowered and road based cycling training should be delivered at a younger age.

It is often stated (Emond & Hanly, 2011; Woods et al., 2009) that gender impacts cycling levels with boys more likely to cycle than girls. This research showed no gender difference in cycling skill levels with boys and girls displaying similar scores for general and road based skill levels at pre and post intervention. Ducheyne, De Bourdaudhuij, Lenoir and Cardon (2014) in their research on primary schools cycling skills in Belgium also found that gender had no influence on cycling skills levels.

Cycle friendly infrastructure can impact children's cycling confidence and frequency levels. This research showed no significant difference between locations for cycling

skills. Interestingly, road based skills were higher pre intervention in Dungarvan (with cycle friendly infrastructure) but higher post intervention in Tramore (without cycle friendly infrastructure). A possible explanation is that while cycling to school increased in both areas, Dungarvan participants had use of cycling infrastructure, where as Tramore students had to cycle on the road, thereby gaining more practice through necessity and consequently gaining more confidence, but further research is needed on this. In an evaluation of an Irish Safe Route to school programme, O'Driscoll (2005) identified that cycling training positively influenced children's cycling levels, but noted that the provision of cycle friendly infrastructure does support this behavioural change. Johnson, Frearson and Hewson (2015) in their research on cycling training in the UK also found that children who received cycling training were more confident, enjoyed cycling and cycled more.

Mammen et al. (2012) suggested parental confidence rather than children's confidence is the main impact on a child cycling. In this study, parents identified fear of traffic as a main issue for children cycling to school (Sustrans, 2014). This fear could be linked to research with the RSA (2015) reporting 41-53% of drivers deem it acceptable to break the speed limit by 10kph.

Parents in this study concurred with McMillan's (2007) findings that the provision of cycle tracks and improved road safety are the main influence on children cycling. This was true pre intervention, but post cycling skills training, children enjoyed road based training and those who did not have cycle lanes near them ended up cycling more. Ducheyne et al. (2012) suggested that parents are more likely to perceive traffic as being safe as a result of cycling skills training. This suggests that cycling skills rather than infrastructure has a more significant impact on the likelihood of children cycling

Whilst children's fear of traffic decreased dramatically as a result of the intervention, interestingly parents' fear of children cycling to school increased immediately post training, potentially as this highlighted a child cycling to school, something that may not have been taken into consideration pre intervention. This study found that cycling levels increased despite parental confidence levels being unaffected. The impact of peer confidence could have led to children cycling in greater numbers as

they perceived an increase in safety. Wegman et al. (2010) and Horton, Rose and Cox (2007). Wegman, Zhang and Dijkstra (2010) and Horton et al. (2007) suggest more cyclists on the road leads to greater safety. This may be true, but in this study parents still seemed to fear traffic so potentially there is an additional intervention needed to overcome this parental fear.

Lorenc et al. (2008) and Ducheyne et al (2012) suggested delivering cycling skills training to primary school children as this promotes positive behaviours and alleviates parental fears as found in this study and for qualitative discussion with parents. However, parental confidence was self reported so the data is open to further investigation. In focus group discussion it was mentioned that confidence for road based situations was an important variable for children with parents stating they are more confident if their children are more confident.

Impact of the Physical Environment

The lack of cycling infrastructure is often cited as one of, if not the main barrier to cycling as a form of active travel. Research was conducted in two areas: Dungarvan and Tramore. Through Smarter Travel funding, Dungarvan had an abundance of off road cycle paths and on road cycle lanes that were well connected with schools and residential areas. Dungarvan as a town is also flat. Tramore did not have any cycle lanes or paths, or any links between residential areas and surrounding schools. In addition, Tramore, particularly around one participating research school, would be deemed hilly.

From qualitative discussion before training, both primary and secondary school children from both locations mentioned cycle lanes as a key factor in increasing cycling safety. This is surprising as Dungarvan children already had access to this infrastructure but still mentioned it was needed to increase cycling levels. Vernez et al. (2005) also found that a lack of infrastructure was highlighted as one of the main reasons for children not cycling. The distance a child had to travel to a cycle lane also had a strong influence on decisions to cycle. These reasons, coupled with a fear of traffic (Trapp et al., 2010) as the main influence on parents and children's travel choices.

Lorenc et al. (2008) suggested the key reason for young people not to cycle anymore is the fear of local environments. Throughout this study parents fears focused on traffic and the dangers of cars. Cycle lanes were championed as the way to overcome this. However, by providing this 'safe' infrastructure, children's cycling skill levels and confidence levels, particularly on the road were adversely affected. In this study, cycling infrastructure led to less children cycling on roads. This was also identified by Carver et al. (2008). This suggests that whilst infrastructure can increase parental and children's confidence levels, the provision of cycling training, and in particular road based cycle training has a greater impact than the building of cycle friendly infrastructure. This research found cycling levels of children in the past seven days increased in both areas, but levels remained higher for a longer period of time in an area with cycling infrastructure. However, this research found cycling confidence levels increased more in areas with no cycling infrastructure. This suggests that the provision of separate cycling infrastructure is important in achieving high cycling levels, as recommended by Pucher and Buehler (2008). In their review of how to make cycling 'irresistible', Dill and Carr also found that more cycle lanes leads to an increase in bicycle commuters. In Ireland however, such infrastructure is only available in a minority of the country. So in order to improve cycling levels for the whole country, increasing road based confidence and skills is essential.

Parents and secondary school children stated that it was too much effort to cycle to school, compared to the ease of getting there by car. Auchtapt (2013) suggested the car still remains the easiest way of getting from A to B and to increase cycling to school levels this needs to be addressed. By making it harder for cars to access school front gates, with the development of cycle lanes and bike friendly infrastructure surrounding schools, could lead to less car journeys and consequently cycling becoming a more viable and time saving alternative. O'Driscoll (2005) researched the front of school environment and found that when pupil access is prioritised over car access, cycling increased. This can also lead to students fitness levels increasing and increased alertness within class (Evenson, Ballard, Lee, Ammerman, 2009).

Parental confidence for cycling to school was higher pre training in Dungarvan, maybe as children had been exposed to cycling from cycling lanes and cycling levels were higher. Post intervention, there was an increase in parental fear in both areas, but over the 12 months parental confidence levels for cycling to school increased in Tramore and decreased in Dungarvan. The fact that Tramore children were forced to cycle on roads as they didn't have cycle lanes could be a contributing factor.

An increase in cycling confidence for children and parents has been linked to an increase in cycling levels. This research found no significant difference in confidence levels at any time point between locations. Confidence levels particularly road based confidence, increased more in Tramore as a result of cycling skills training. This suggests that confidence levels in an area with cycling infrastructure, whilst increasing, does not increase as much as an area without cycling infrastructure. Wardlaw (2015) suggested that separating cars and cyclists creates a problem as cars don't have to think about 'bike'. From this research, the same could be said about cyclists not having to think 'car' if surrounded by cycle lanes and paths.

These research findings promote the idea that infrastructure does assist confidence levels but does not necessarily lead to an increase in cycling for transport levels. The provision of infrastructure alone will not lead to sustained high confidence levels and it is vital for children to learn to cycle on roads to increase cycling levels. Cycling for commuting in the UK is in slow decline, except in a few towns and cities where local authorities are pursuing pro-cycle programmes: notably London, Bristol, Oxford, Cambridge and Brighton (Wardlaw, 2014). This supports the theory that infrastructure is not the key determinant of cycling levels and giving children the skills and confidence to cope with cycling situations will have a more prolonged positive effect on cycling levels. Goodman (2013) found that a programme of promotion, combined with better infrastructure had little effect on UK cycling levels. Carver et al. (2008) found the physical environment had no impact on active travel for Australian primary school children and this research shows confidence and cycling levels increasing in areas with no cycling infrastructure.

In Ireland, the smarter travel initiative focuses on creating a cycling network linking schools, but not all children can avail of this 'safe' cycling infrastructure as they do

not necessarily live close to a cycling lane. This infrastructure can improve confidence but needs to be delivered in conjunction with road based cycling skills training to give children and parents the confidence to cycle in any environment.

Confidence and Attitude Levels

To implement behavioural change, it is important to find out what influences travel choices and how to overcome barriers. High confidence levels and positive attitudes towards cycling increase the likelihood of children cycling. The fear of other road users has a detrimental impact on confidence levels, particularly for primary school children and parents, and decreases the likelihood of children cycling (Shayler, Ferguson and Rowell, 1993; O'Keeffe and O'Beirne, 2014).

McMillan (2007) in his research on the influence of travel infrastructure on children's travel choices found that children's attitudes were influenced by caregivers. If caregivers reported driving as more convenient than walking or cycling, then children's attitudes were likely to follow suit. Quantitative research in this study found that children whose parents cycled for transport or leisure were more likely to have positive attitudes towards cycling.

Qualitative discussions in this research suggested this fear was fuelled by motorists' negative attitudes towards cyclists. If motorists displayed a positive attitude towards cyclists so that cyclists on the road are seen as the norm, children and parents confidence levels would improve.

Age

This research showed cycling skills training has a positive impact on children's confidence levels with confidence scores increasing sharply with age at pre and post intervention. There was a significant and sustained impact on primary school children's confidence but minimal impact for secondary school children. From their research, Goodman, van Sluijs and Oglivie (2016) and Carver et al. (2008) suggested cycling training has the greatest impact when delivered at a young age. Rissel and Watkins (2014) highlighted significant improvements in confidence levels and cycling skills as a result of on road cycling skills training which was also found in this research.

Rodgers et al (2015) found change emerges in children as young as 3 years of age with significant increases in behavioural change for 3 to 5 year olds. This suggests the earlier children are introduced to something; a positive behavioral pattern is learnt. Secondary school students in this study showed short term impacts as result of cycling skills training but stated they thought that cycling to school was more difficult than using a car despite acknowledging the health benefits. This could have been a learnt behaviour due a lack of cycling in primary school and potentially a reason for high cycling levels amongst secondary school children in Denmark, Holland etc where they use a bike as a form of transport at a young age.

Gender

Gender did not have as much of an impact on cycling confidence levels as suggested in other research (Emond & Handy, 2011; Trapp et al., 2011; Nelson et al., 2008). Overall, cycling skills training has a positive impact on children's confidence levels for both boys and girls. Boys had higher confidence levels than girls, but, girls' confidence levels increased more as a result of cycling skills training than boys' immediately post training. Road based cycling confidence was very low for girls pre intervention but showed a sustained increase over 12 months as a result of training. One primary school student in an all girls school stated she actually liked cycling now post training.

Gender did have an impact on attitudes towards cycling. Boys attitudes were higher than girls' at all time periods but girls' attitude becoming significantly more negative with age. Training had a sustained impact on attitude for boys whereas girls showed an immediate spike but then dipped. In focus group discussions, no secondary school boy mentioned danger as a reason not to cycle to school where as secondary school girls mentioned fear of traffic.

Cycle training

The delivery of on-road cycling skills training assists children in overcoming driver fear (Darlington, 1976). This should also impact future motorist's behaviour as child cyclists will become adult motorists.

To improve cycling confidence and attitude, the tiered approach to cycling skills training which begins in primary school and continues through secondary school should be adopted (Rissel and Watkins, 2014). In this research, older children's confidence levels pre training was very high but there was no significant difference from post training to post 12 months. This could suggest a need for more advanced cycling training for older children to ensure a more positive impact on confidence levels and increasing numbers cycling to school.

Parental Perceptions

Whilst cycling training has positively influenced children's confidence and cycling levels, parental concerns still exist. It is vital to change parental perception in order to increase children's use of the bicycle as a form of active travel. In this research, children were asked to report on their perceptions of their parents' confidence levels.

Immediately post training parent's confidence levels in cycling to school increased for the 8-9 and 9-10 age groups but fell for secondary school children. Parental confidence levels could be linked to cycling levels as cycling to school in the last seven days increased dramatically post training for primary school children and remaining high post six months. Girls parents were more fearful of their child cycling over a sustained period. Parental confidence levels for boys improved from pre training scores to post 12 months with confidence levels of girls parents decreasing.

Barriers to cycling for active travel

Barriers identified by participants during qualitative discussions varied according to age. The main barriers for primary school children are the fear of traffic and parental fear and for secondary school children apathy, distance and school bags. A lack of confidence in primary school children from a lack of exposure to cycling was the main barrier from qualitative discussions. Secondary school children didn't view cycling as a viable option as they didn't cycle in primary school so active travel behaviours had never been learnt at a young age were the main barriers.

Boys in secondary school stated a lack of time in the morning as a barrier to cycling to school, but with further prompting, this was because they thought they had to get out of bed earlier to cycle rather than be driven in a car. Girls did mention weight of

school bags and wearing helmets, but the main reason was that they just didn't want to. Distance was only mentioned in secondary schools (Nelson et al., 2008; McDonald, 2008), although when pressed, participants ability to accurately know the distance they lived from school was poor. Nelson, Foley, O'Gorman, Moyna and Woods (2008) found distance was the most important barrier to active commuting in Irish adolescents. Whilst distance was self reported, 51% of participants in Dungarvan lived within 10 minutes and 61% from Tramore which would seem to refute Nelson et al findings.

Parental fear focused not on the cycling skills of their children, but external variables as the behaviour of other road users (Wegman et al., 2010). Parents stated that children were far less concerned than them but this could support McMillan's (2007) findings that if parents find driving more convenient children were less likely to walk, a point mentioned in focus group analysis, particularly with secondary school children. This identified a bigger problem that parents, as car drivers themselves, would prefer children to use off road cycle lanes where there are no cars. It is not practical that the entire road network of Ireland would have cycle lanes so an alternative solution needs to be found.

While attitudes to cycling were generally positive, children's traffic fears and their parent's fears about cycling in traffic were the biggest barriers to cycling for transport. Even though children felt far more confident post training, as noted by parents, parental views were that current traffic volumes were not safe enough for children to cycle for transport. This highlights the fact that improving confidence and attitudes alone, without sufficient changes in the social (parental perceptions) and physical environments (reduced traffic speeds and volumes) will not lead to significant increases in the numbers cycling for transport. As children get older, the bicycle should become a route to increasing independence, but parental safety concerns can prevent this. Trapp, Giles-Conti, Christian, Bulsara, Timperio, McCormack and Villaneuva (2011) also identified the need for parents to prioritise cycling over driving in order to increase cycling levels, a viewpoint shared by Lorenc et al. (2008).

There was no mention of school bag weight of primary school children but as mentioned previously, this was an issue for secondary school children, particularly girls. Lang, Collins and Kearns (2011) suggested time constraints on parents impacted on children's transport choice. This was mentioned in this study particularly for parents with more than one child and multiple drop offs as it was felt that it wasn't feasible to cycle. The need for multiple drop offs could be necessary as parents are concerned about their childs' cycling proficiency to cycle to school safely which was found in this research. Lang et al. also mentioned that parent's confidence in their child's cycling competency to actively travel to school was of greater importance. However, this research highlights that children's confidence and skill levels are improved through cycling training but parental confidence levels decrease.

Cycling Training Content to increase Children's Cycling Levels

This research found that through a progressive cycling training programme led to increased cycling confidence and skill levels with cycling frequency increases. This was achieved through combining skills in a safe off road environment and finishing with participants experiencing road based situations. This is vital for training future car drivers and, potential future parents to acknowledge cyclists making the roads safe for cyclists, a fact also mentioned by Goodwin (2013). A parent noted that a child, who is now a car driver, was more aware of cyclists and a better driver as he cycled as a child. Goodwin (2013) also suggested better cycling training at an early age will train future car drivers to acknowledge cyclists and could have a long term impact on driver-cyclists safety.

Cycling training had a positive impact on cycling levels; overcoming participants original fears surrounding cars, traffic and road based confidence. McMillan (2007) indicated that parental beliefs about the importance of cycling training were extremely poor. Pre training, participants acknowledged that they generally need training to develop confidence and there was a lot of fear regarding all types of road traffic and speed, potentially from negative media coverage and parental attitudes. This was more prevalent in primary school students than secondary school students although primary school children scored higher on road based skills.

Goodman et al. (2016) found the Bikeability training course had no impact on cycling levels. This could have been due to local infrastructure or distance children lived from school. The UK Bikeability course focuses on road based cycling training and Goodman found that it improved cycling skills as well as confidence and attitude levels. This agrees with research by Downing and Bennett (1979) who suggested that road based training showed significant improvements compared with training off road. Although this research was conducted in 1979 where the fear of traffic could have been less of concern, this is still true.

Woods et al (2009) found Irish boys were more than ten times more likely to cycle than girls. This was also identified by Emond & Hanly (2011) who also suggested that boys were more likely to cycle to school than girls. In this study, boys cycle more frequently than girls, but cycling training had a greater immediate impact on girls than boys for cycling to school with girls cycling levels higher than boys in primary school. But whilst female's scores fell over time, particularly in secondary school, male scores remained consistently higher over time. Interestingly, cycling skills training had a greater impact on secondary school girls who attended a mixed gender school suggesting a correlation to peer influence but this would have to be researched further.

The structure of the training is important with fun, also identified by Ducheyne et al. (2013), and experiencing road based activities being the two most important aspects for primary school children. This had a positive impact on the cycling rates to school but also cycling for leisure. Participants mentioned that they now knew what to do when cycling in traffic. Furthermore, Ducheyne et al. (2014) found that four progressive cycling skills sessions had a significant impact on cycling skills but not on cycling frequency levels. Cycle training in Ducheynes study was delivered entirely off road and potentially highlights increasing cycling skills are vital for confidence but road based scenarios are needed for the use of bike for active travel.

Cycle tutors commented on the lack of cycling skills among the participants pre training, more notably in secondary school children whose skills were very poor. The session content was key in the trainings success. The first session including a skills session in the yard covering road based scenarios which progressed over the next

four sessions to these skills being covered on the road was seen essential. A theory session delivered at the start of training to highlight rules of the road in a fun way was important. The use of quizzes and pictorial examples for practical situations worked well and enabled children to learn through visual, auditory and kinesthetic (VAK) learning styles. Tutors also mentioned children grew more in confidence if they were cycling on the road rather than the yard.

Tutor: child ratio was a key component of success in this programme. No research, with the exception of Goodman et al. (2016) has mentioned the impact of tutor ratios. This study used 6 tutors with a maximum of 30 children allowing for a minimum of a 1:5 ratio, enabling more individual attention and groups to enjoy road cycling. This is something that needs to be looked at to make cycling training feasible for delivery in a school setting (Goodwin, 2013; O'Driscoll, 2005) if cycling training is coordinated by the department of transport.

O'Driscoll (2005) found cycling levels did increase as a result of on road cycling training but suggested that refresher training would be needed to maintain cycling levels. This research suggests the need for cycling skills training to be delivered to primary school children and then progressive refresher training for primary and secondary children to ensure sustained behavioural change.

The cost of cycling training and availability of bikes was mentioned by teachers and parents as a barrier. Goodman, van Sluijs & Ogilvie (2016) found around 55% of all schools in England took part in the Bikeability scheme in 2011/12. There scheme is offered free of charge at an estimated cost of 11 million sterling to the taxpayer. In November 2015, the UK government committed a further 50 million to the scheme until 2020. If this scale of investment was placed here, using the structure of the cycling training course in this study, then Ireland would potentially begin to enjoy the economic and health benefits of cycling as identified by Anderson (2015) and EESC (2011).

This research shows it is vital to ensure cycling training is not only fun, but gives children the experience to cope with different scenarios they can face on an everyday basis. It is also vital to give children these skills at an early age. The

mantra for cycling training follows the ‘tell me I forget, show me I remember, involve me I understand’ teaching philosophy.

In conclusion, this research found the delivery of a progressive cycling skills training programme improved key cycling skills, particularly road based skills. The ability to practice road based skills in a safe, school yard environment is important, but not as important as children experiencing these skills in actual road based situations. Experiencing road based situations increases confidence levels that can enable children and parents to overcome initial road fears in a safe and structured environment. This research showed there was little change in cycling skill levels for secondary school aged children but a signifcant improvement in primary school children. Evidence from this research strongly suggests delivering cycling skills to primary school aged children in order to overcome participant fear. The increase in children’s cycling skills consequently increases the probability of children using a bike as a mode of active travel and creates a positive attitude shift towards cycling on the road.

Positive attitude towards cycling for children should lead to positive attitudes towards cycling in adulthood which can also show economic significance. For the individual, the average cost of a bicycle is more than 30 times less than the average car (EESC, 2011). Studies have shown that for every kilometer cycled, society enjoys a net profit of 23 cents, where as for every kilometer driven by car we suffer a net loss of 16 cents. Research also shows cycling can improve physical and mental health benefits, meaning a fitter workforce with less sick days. This paints a very real economic picture about the impact of small scale investment in cycling skills training and infrastructure can have on future adult travel choices

Limitations

As with all research, this study has limitations. Prior to the study, some participants had already received cycling training, particularly secondary school children with 35.5% indicating previous cycling training compared to 0.9% of 8-9 year olds and 8.8% of 9-10 year olds. The standard, duration or content of this cycle training is not known and if it involved road based cycling.

The ‘control’ group was ‘contaminated’ by seeing the intervention group. Observing peers receive cycling training and the positive impact this had on cycling as a mode of transport could have influenced the peer group. This enabled real data on the direct impact on peers who share the same age, school and travel background, which can be seen as a positive. In addition, Dungarvan schools were part of the Smarter Travel initiative and had received travel interventions pre and during data collection time periods. This included a travel intervention in one of the Dungarvan schools a week prior to post six month data collection.

The research attempted to gain parental opinions through questionnaires delivered home by students. However the response rate was extremely low. This lack of quantitative parental data is a limitation although focus group analysis did allow for some parental opinions to be gathered. In addition, children were asked to give their perceptions of their parents opinions and these may have been inaccurate.

The season could have impacted the data as pre data was collected in October and the post six months data in May; better weather potentially positively influencing cycling levels and attitudes. With five data collection periods, the questionnaire could also have become monotonous, particularly for the control group having to complete this four times before even receiving cycling training.

My role as not only the researcher but the author of the cycling training programme could also be seen as a limitation. I gained close personal relationships with the schools, school teachers and children through the research but also from other active travel programmes as part of my day to day work. This could have led to children and schools being more involved to encourage the class to cycle although this relationship could also be seen as a positive. The positive relationship with the children could also have enabled them to speak more honestly and openly about the impact of training so could also have yielded more depth in their responses. As the author of the training programme, it is sometimes difficult to reflect honestly and accurately on something you have written. This could be a limitation on the content of the cycling skills training that was delivered.

Recommendations

The following are recommendations for research and cycling practice in no particular order of reference

Research

- Further practical research into content and duration for effective cycling skills training to increase levels of cycling as a form of active travel. This needs to take into account the surrounding infrastructure from urban to extremely rural environments
- Further research regarding the most appropriate age to deliver on-road cycling skills training
- Further research into parental attitudes towards cycling, particularly focusing on infrastructure intervention making it harder for cars to park near schools

Cycling Practice

Most of the implementations centre around a school based approach as this ensures all children are afforded the opportunity to receive cycle skills training. The delivery of cycling skills can cover components of both the primary and secondary school curriculum to entice buy in from the department of education, schools and teachers.

- Implement a progressive cycling skills training programme from preschool to primary school. Pre schools/infants to receive balance bike training, skills training from Cycling Irelands 'Sprocket Rocket' training programme for 6-7 year olds and then road based training for 8-10 year olds. This research has suggested that it is too late to influence attitude and behavior change in secondary schools, particularly in girls. Behaviours are learnt at a young age. By delivering cycling skills training on a road at an early age, cycling skill levels and confidence levels will increase with a knock on effect of cycling being used as a form of active transport.
- Link with Green Schools to deliver a Bikeability audit for primary schools prior to cycling training to show various cycle routes that could be used. This can

also occur for 6th class students prior to attending secondary school due to a change of location. Delivering cycling training in the first 3 months of starting secondary school will reinforce cycling as a transport option. This will ensure a short term barrier does not migrate into a long term barrier.

- Discussion with Cycling and Road Safety Authority to look at the current recommendation that no child under 12 should cycle in traffic. This study highlights the need for children to experience positive cycling behaviours in primary school to lead to increased use of the bike as a mode of transport. In secondary schools, this could be too late.

- Parental engagement is important in overcoming the 'car dependency' mentality but extremely difficult. This study tried to engage parents through parent and child cycling training and using the child as the 'carrot' for parents, but this did not work. Schools and authorities need to find a way to spread the cycling message to parents to dispel negativity in a simple and time efficient way. Various methods could be used such as a DVD for each school showing cycle routes to school and giving voice over analysis of dangers and how children can cycle and also educate parents to the many benefits of cycling to school such as increased alertness in class, healthier child, lower risk of disease etc. Infrastructural change by making it less convenient to park near schools and safer and more convenient for bicycles could assist this attitude shift.

- Deliver cycle training to schools but also to youth groups. This training should also implement road based cycling skills training to primary school children but only after successful skill based training.

- Whilst Cycling Irelands 'Cycle Right' training is a welcome addition in theory, the practicalities of delivery need to be addressed. This includes the amount of tutors delivering the course to ensure all students are active all of the time. This training is delivered in school time so needs to be flexible and workable for schools, something which is hard with current school timetables.

- The introduction of a cycling passport, similar to the Dutch system, would be a welcome addition. Fear of traffic and motorist was a common theme and children are all future drivers. Road traffic accidents are on the rise, particularly amongst cars and cyclists. If every child in Ireland received cycle training potentially in years to come this should ensure motorist 'think bike'.

- Place a cycling theory exam on the current driving license theory examination. This will ensure that motorists understand that the road is shared between cars, motorcyclists, pedal cyclists and pedestrians which could improve motorists understanding and attitudes

- There is a lot of good work being delivered currently in schools by An Taisce, Cycling Ireland and Department of Transport. All stakeholders' need to come together and discuss with the Department of Education an appropriate programme that is factored into the school year and development stages of the child.

- As parental fear is one of the main barriers to children cycling, particularly primary school aged, deliver workplace cycling training or cycling awareness training to adults.

- The lack of bikes and transportation of bikes to school is an issue for cycling training. The implementation of affordable cycle hire schemes in towns and cities could assist with this. Long term, discussion with department of transport and local link services for park and ride cycle drop off service could help to overcome the barrier of distance for cycling as a form of active transport.

- A combined infrastructural and behavioural change approach to be taken to increasing cycling levels of children. This needs to be reinforced by further interventions, not only updating cycling skills training with a refresher training, but potentially adapting programmes such as 'beat the street' for cycling or 'cyclescore' in Odense.

- Whilst school bags were only mentioned by students after research prompts, it remains a concern for parents. The introduction of either an ipad learning

system, or simply a USB key for students for homework and class work could alleviate this issue. Other possibilities include a bag drop off for parents in the morning to allow children to cycle to school or a park and ride drop off with parking shelters near the school.

- Active Travel initiatives such as Smarter Travel to focus more on behavioural change programmes, including skill and on road cycling training, rather than infrastructural development. Infrastructure increases confidence of children and parents, but in addition, behavioural change increases skill level and cycling to school rates. As cyclists are future car drivers, in time this could also improve car user's perception and treatment of cyclists on the road.

- Identify means of ensuring cycling training is practical. Cost is not the main barrier, but the availability of bikes through bike ownership or bike transportation for parents are issue that need to be addressed to tackle the issue of cycling to school.

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Appendix One – Current Cycle Training Programmes

Training Programme	Country	Age Group	Overview
Masters on the Bike	Belgium	Primary	Cycling circuit built on a school playground with teacher given skills cards with theoretical exercises. Belgian Road safety deliver practical training
Let's get going	New Zealand	3-5	Five one hour blocks focusing on helmet fit, bike mount dismount, bike safety and basic bike skills.
Introduction to Road cycling	New Zealand	10 year olds	Practical sessions for chidden for both on and off road situations
Bikeability Level 1	UK	8-10	Two hour session. Student: tutor ratio of 1:15 delivered in a traffic-free environment. Basic bike handling skills
Bikeability Level 2	UK	9-11	Six hour programme with Student: tutor ratio of 1:6 delivered on quiet residential streets close to students' home, school or place of work. Learn how to cycle confidently on-road, amongst real traffic.
Bikeability Level 3	UK	11 plus	Two hour programme Student: tutor ratio of 1:3 delivered on roads with larger volumes of traffic travelling at higher speeds. Learn how to negotiate more complex junctions on a route of choice, usually journey to school or

			work
Verkeersexamen	Holland	12 years of age	A multiple choice exam on rules of the road and a practical 6km monitored bike ride though normal traffic.
	Denmark	Kindergarten	Groups of children play games on bicycles or are learning to ride bicycles. Games include catching soap bubbles, pick up coloured balls while cycling, or play fun and adapted cycling games.
Cycle Happy School	Odense, Denmark	5 years	Children taught to ride through streets during school time to improve parents confidence levels
AustCycle	Australia	Adults	Cycling lessons tailored to individual and group needs ranging from beginner through to skills to support riding to work (or transport in general), health, fitness or recreation on the age, skill, attitudes and confidence of the participants, and the environment in which they cycle

Cycling Intervention Name	Country	Age/costs	Overview
Bikes in Schools	New Zealand	5-12 years / Cost: 50,000	Ensures schools are self sufficient for cycling training. Schools are given bikes/helmet, cycle and skills tracks on site, bike storage facility and bike coach

		euro	to teach basic cycling skills
Bike to School	Denmark	4-15	Two week annual campaign with classes all over the country competing to see who can cycle to school most. Every day the number of students arriving on bicycle and how many of them were wearing a helmet is recorded. Each triggers a ticket in a lottery with various prizes. A comprehensive campaign website caters to students, teachers, and parents.
Green Schools Travel Programme	Ireland		Schools assisted with a seven step school travel plan development process by support from a Green schools representative. Schools are awarded a travel flag on completion.
Safe routes to school (Sustrans)	UK	11-16	Implementation of a school travel plan and cycling training for first year students.
Safer Routes to School	Canada	parents	Public agencies offer resources and technical help to schools to develop a package of measures similar to school travel plans. Travel coordinators to assist the school but the onus is on the school community to deliver change
Travelwise Northern Ireland Safer Routes to school	Northern Ireland		Education and awareness materials given by Department of Education. NI Roads service provides support through travel plan coordinator regarding engineering support.

Appendix Two – Irish Cycling Training Programmes

1. Cycling Irelands Sprocket Rocket: A skills based programme for 7-11 year olds delivered over 8-12 weeks that does not include any road based activity. Potential tutors must do one day of training in order to be qualified to deliver the programme.

2. Cycle Right (7-18 year old): A rebranding of the UK national standard for cycle skills training called Bikeability. This is a three tiered progressive programme that includes practical road experience at the discretion of the tutor. Level 1 is eight hours in length including two hours of theory, four hours of yard based skills and two hours of road training. This must be delivered over four days with teacher: pupil ratios for level 1 are 1:15 for theory and yard based and 1:6 for road based activities. Level 2 is three hours of training and is road based with students in road based scenarios. Ratios are1:6 for level 2 (12-14 years of age). Level 3 is three hours in length and trainees plan a complex journey with trainer accompaniment. Ratios are 1:6 and are aimed at children aged 12-18 years of age. Potential tutors must do a five day tutor training programme at a cost of 900 euro for the training. .

3. Cycling Ireland 'Gearing up road and time trial' programme: This 10-12 week programme is aimed at adult competitive cyclists. Tutor training is two days. However, tutors wishing to gain this qualification must also have achieved a Cycling Ireland foundation coaching qualification (1 day tutor training) and Cycling Ireland level one coaching qualification (2 day tutor training).

4. Cycling Ireland's 'Gearing up off road' programme (11 years plus): A 6-8 week programme designed as a follow on from Sprocket Rocket but focused on teaching mountain bike skills. Tutor training for this is two day course but Cycling Ireland foundation and level one coaching qualifications are pre requisites.

5. Cycling Ireland's 'bike for life' programme: This is a 10-12 week programme aimed at people 16 years and above. The programme has three levels (beginner, intermediate and advanced) and the focus is on attaining the fitness to cycle set distances e.g. beginner 10-20km, intermediate 40-60km, advanced 75-150km.

Tutor training for this course is a one day long and tutors must already have a Cycling Ireland foundation coaching qualification (1 day).

6. An Taisce 'Get in Gear': This programme is delivered by An Taisce is aimed at parent beginner cyclists and comprises a 90 minute cycle skills session for adults. It must be delivered on a ratio of one tutor to six adults. A potential tutor needs to be an employee of An Taisce meaning there are very few courses and tutors.

Appendix Three - Cycle Skills Assessment

Participants will complete 8 skills practices on the first and last session of cycling training and will be marked out of 5 for each of these skills practices based on the judges thoughts as outlined below

1 – Unsafe

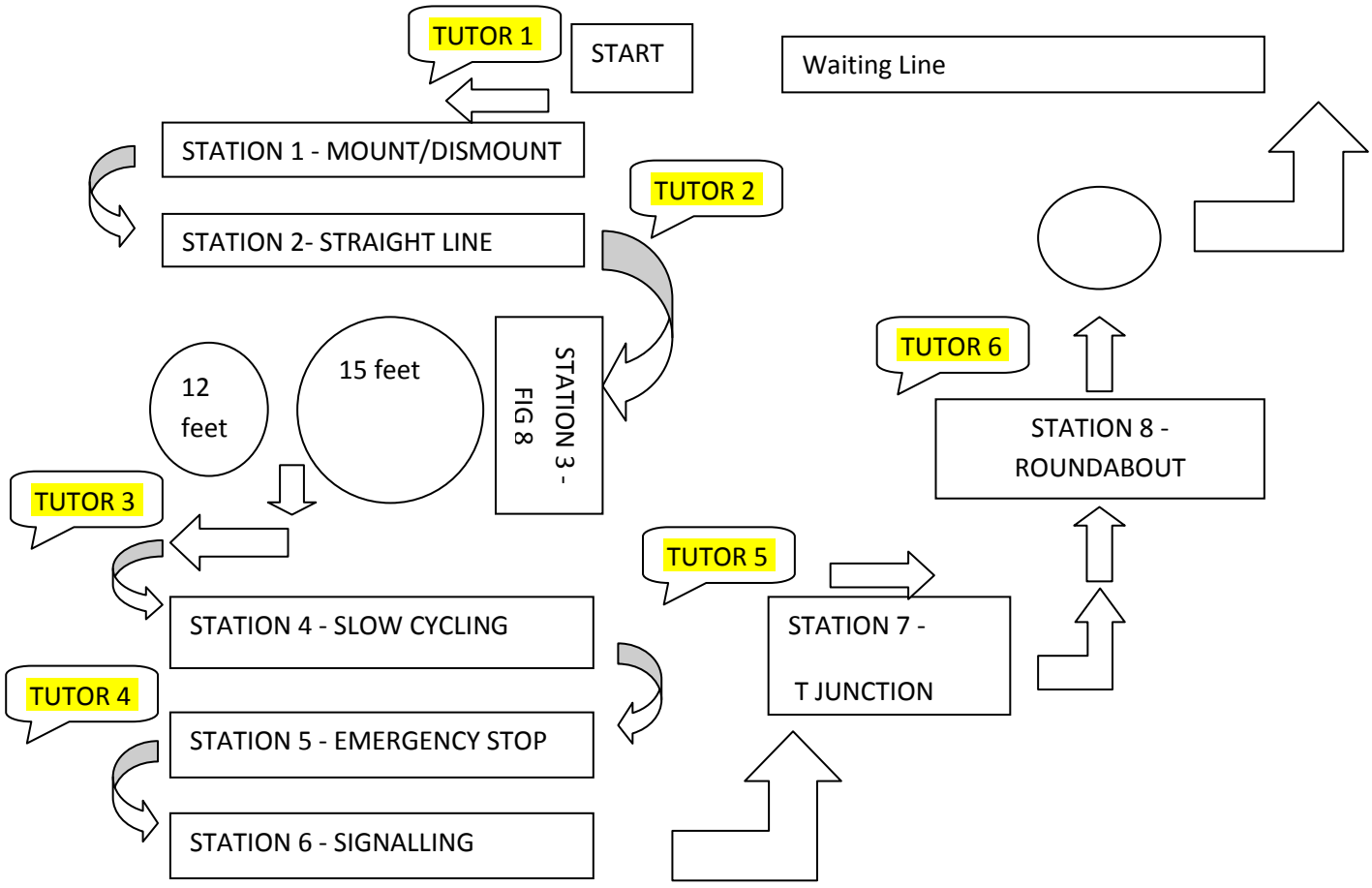
2 – Limited control

3 – Satisfactory

4 – Good control

5 – Excellent

Before participating in any skills challenges, riders are to be asked their confidence levels. The diagram below gives an overview of the yard to complete the skills test along with the 6 tutors. Equipment needed: Chalk/cones and string (6 feet, 7.5 feet)



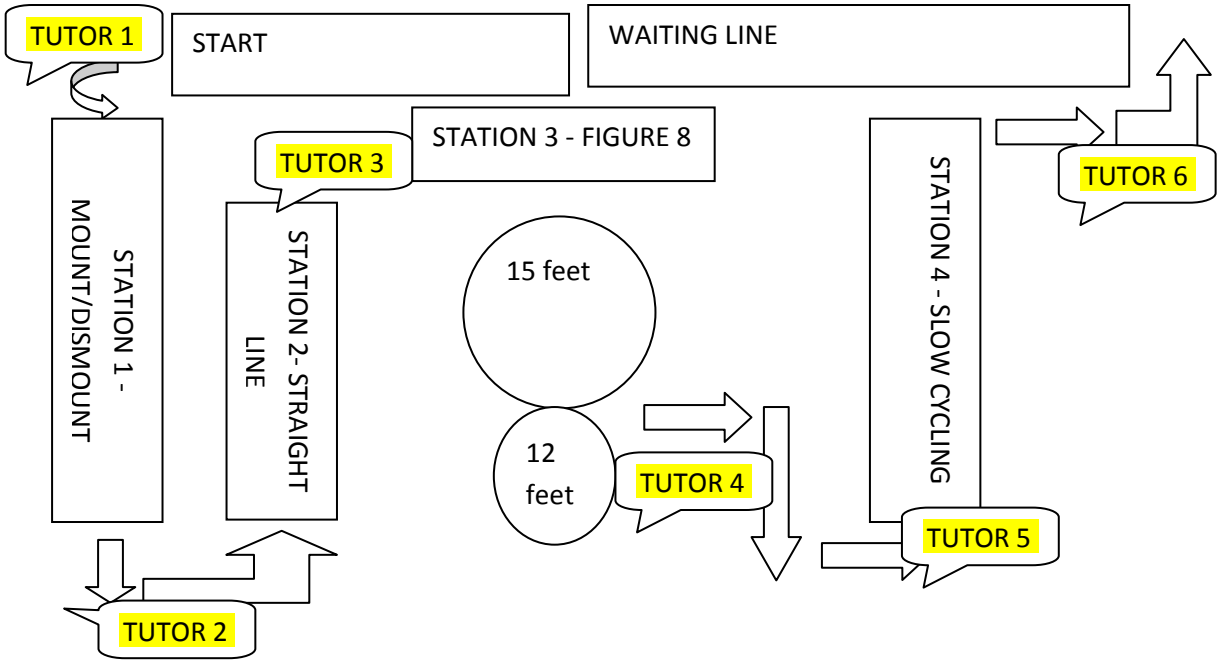
Tutor responsibility for scoring

Tutor 1 - confidence/station 1 Tutor 4 - station 5/station 6
Tutor 2 - station 2/station 3 Tutor 5 - Station 7
Tutor 3 - station 4 Tutor 6 Station 8

SMALLER PLAYGROUNDS

In smaller playgrounds tutors to split this into two sets of four skills as outlined below

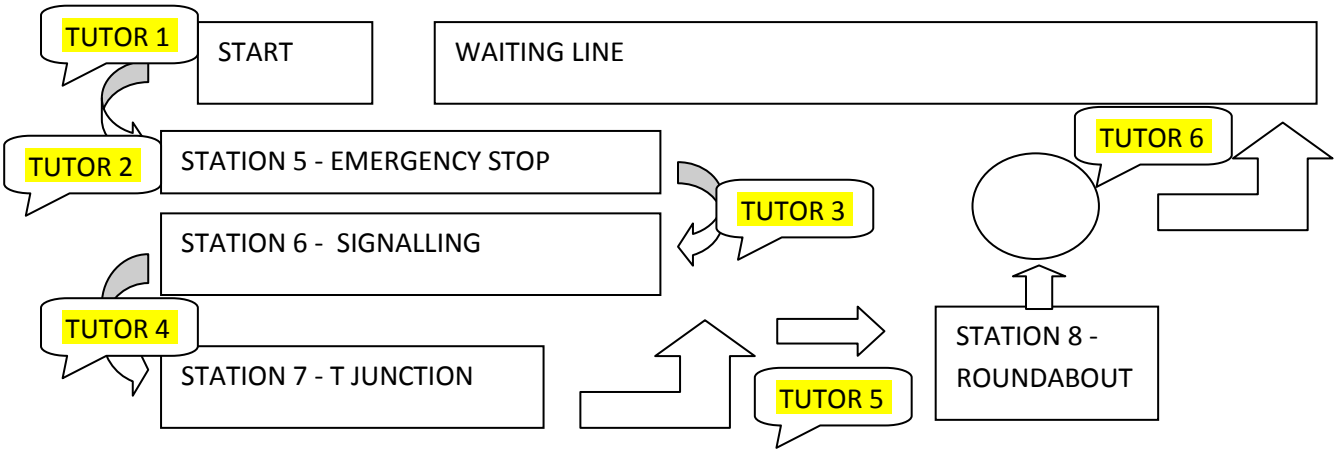
Skills 1-4



Tutor responsibility for scoring

Tutor 1 - confidence Tutor 4 - station 3
Tutor 2 - station 1 Tutor 5 - Station 4
Tutor 3 - station 2 Tutor 6 back of line

Skill 5-8



Tutor responsibility for scoring

Tutor 1 - confidence Tutor 4 - station 7
Tutor 2 - station 5 Tutor 5 - Station 8
Tutor 3 - station 6 Tutor 6 back of line

Appendix Four - Cycle Skills Programme outline

Delivery - each bullet point follows the model of explain, let them have a go, stop, evaluate and coaching points through Q&A, let them have a go. On evaluation, 1/2 of tutors go through coaching points whilst other instructor sets up next practice and introduces.

Week 1

- Bike maintenance including changing tyres, safety quiz (adaptation from An Taisce Dr Bike workshop). One slide on M check and then 7 question quiz on cycle safety.
- Basic skills test on premises with one coach judging one station
- Warm up in groups, all start off their bike and on outside of perimeter, group then on bike and cycle according to tutor instruction e.g. 1-10 speed so 1 is slow, 10 is fast. On whistle, all brake, dismount bike. On whistle again remount (after a number of goes, reinforce coaching points).
- Simple skills practice on school premises including :-
- braking, split into two groups, one group simple 10 metre cycle and brake with no skidding using back break and both breaks, second group cycling a simple circuit around premises, focus on braking when blow whistle
- balance, split into 2 groups, one group slow riding in groups, second group cycle circuit (single file, safe distance) with children cycling on balance board, whistle blows all group must brake (explain safe distance). All start on 5 points, lose point for skidding or overtaking person in front.
- *Possibility of using 10 metre brake practice and cycle circuit for balance depending upon time.*

Week 2

- Warm up including pedal ready position, stationary challenge on whistle
- Basic skill practice on balance, split into two groups, slow bike race and group over balance block. Anytime whistle blows groups stop.
- Basic skills practice on pedalling, two groups first group circular time trial, second group cycling in straight line and looking over left/right shoulder
- Basic skills practice on cornering, one group slalom course including pedalling a mini roundabout, other group a figure of 8 time trial in pairs (slowly and then quickly)
- Set up skills test on 3 areas from skills sheet from first week

Week 3

- Warm up slalom circuit for whole group including balance block and also pole for riders to duck underneath. Also include different speeds, not overtaking, hands of handlebars e.g. right, left, high five tutor. Recap everything learnt in first two weeks.
- Basic practice on cycling in pairs and communication in traffic. One group cycle in pairs around a corner a set distance apart using markers, other group cycle in groups of 6 in pairs with coach commanding speed up slow down. Outside person on command go to front and pull in and everyone shuffle up (begin by showing when walking and use communication)
- Basic practice on cycling and signalling. In two groups, one group cycling in straight line and focus on signalling left/right, other group work on approach to stopping junction and make a right/left hand turn according to tutor (begin not stopping, extend to stopping)
- Skills test for each relating to week one
- In pairs cycle along cycle path from school premises

Week 4

- Warm up, group slalom course, look at cycling in straight line, cycle in pairs on command, stopping (whistle), cycling straight line and signalling left and right, two whistles dismount bike.
- Recap cycling in pairs on school premises
- School premises practice on t junction with signalling, split into two groups, same practice, focus on approach to T Junction and signal. Single file group attempts this and then feedback
- Cycle on cycle path for 10 minutes
- School premises practice on roundabouts from simple circuit set up look at primary/secondary position
- Sample road on school premises including traffic lights, roundabouts, T junctions

Week 5

- Warm up, whole group on a road based scenario including balance block, pole for balance, roundabout, T junction, stop on whistle, dismount, mount, cycle in pairs.
- Traffic lights on school premises (optional)
- T Junctions school premises in pairs, recap last week (optional)
- On road cycling
- Repeat skills test from week one

Appendix Five - One day Tutor Training

Time	Tutor	Activity	Booklet reference
900-915	All	Sign in sheet with name/address/email/phone number and name sticker for each person	
915-930	PJ	Introduction - course content, CI, add on from sprocket rocket, overview Aim of training and overview go through booklet. Look at the IDEA principles Cycle Skills Assessment sheet and sample week one session	
930 - 935	PJ	Road safety quiz delivered to group in teams (PowerPoint slide attached)	Pg 33-34
935 - 1000	PJ	Rory Wyley from Cycling Ireland deliver bike maintenance M check PowerPoint delivered to groups with bike at the front Group then split into smaller groups of 4/5 with one leader asked to demonstrate effective M check for their group	Pg 30-32
1000-1025	PJ	Cycle skills assessment sheet excel/word sheet spoken about to group, scoring explained Individually outside and try the tests in three groups. PJ/HB/DB to act as tutors Six tutors asked to mark and score the test.	23-29
1025-1035	PJ/RO/DB	Groups split into four small groups. One person asked to deliver a warm up for 4 minutes with one progression. Change leaders after 4 minutes. Emphasise for warm up that a skill can be recapped in this situation	2-22
1035-1100	PJ	Group cycle in 3 groups on cycle path to father twomeys	2-22
1100-1115	**BREAK**		
1115-1300	*PJ/HB*	*Split into four groups. Group to deliver session 1, session 2, session 3, session 4*	*2-22*
1300 - 1330	**LUNCH**		
1330–1340	RO/DB	Introduction to cycling in pairs	16-17
1340– 1400	DB/PJ/HB	Discussion on T junctions. DB to lead, each individual to approach a roundabout (set up 2 stations due to size of group). Ask for a few demonstrations from individuals. Feedback to group about coaching skills and safety points. Groups to pair coach (use booklet for coaching points) Demonstration of practice for week 4	18
1400– 1425	DB/PJ/HB	Discussion on roundabouts. DB to lead Practising looking over right shoulder, tutor behind and view fingers being held Each individuals approach roundabout (set up two roundabouts), evaluation Pick volunteers and group feedback Groups to pair coach (use booklet for coaching points) Demonstration of practice of week 4/5	19
1425– 1510	DCC	*Road based training. Cycle in a group*	
1510–1530	PJ	Classroom overview of course and discussion re tutor availability for delivery	Handout

Appendix Six - Cycle Skills One Month Post Questionnaire

Name: _____

School: St Augustine's Class: Teacher:

1: Circle if you are

I am Male

I am Female 

2: How do you normally travel to the places listed below ? ONLY TICK THE BOX THAT YOU DO A LOT

Places			CYCLE WITH FAMILY	CYCLE WITH FRIENDS	
SCHOOL					
OTHER PLACES EG SPORTS, SHOP, FRIENDS HOUSE					

3: How long would it take you to walk to school ?

0-5 minute walk (up to ¼ mile) ☐ 6-10 minute walk (up to ½ mile) ☐

11-20 minute walk (up to 1 mile) ☐ 20 +minute walk (over 1 mile) ☐

4: Please complete the table below and tick the column with your answer

	YES	NO
Do you own a bike that you can cycle		
Does an adult in your house own a bike		
Have you ever had cycling training		

5: Did you get your bike/new bike in the last six months?

Yes ☐ No ☐

6: Have you ever cycled to school?

No ☐ Yes ☐ Yes- in the last seven days ☐

7: If you do cycle to school, do you normally

cycle on your own ☐ cycle with friends ☐

cycle with your parents/family ☐ a mixture of all three ☐

8: Please complete the table below and tick the column with your answer

		YES	NO
Have you cycled on an off road cycle path **in the last seven days** e.g. Railway Track			
Have you cycled on an on road cycle lane on the road **in the last seven days**			
Have you cycled with cars around you **in the last seven days**			

9: Below are some statements about cycling, circle if they are true for you or not

CYCLING STATEMENT		
Cycling is fun …..	TRUE FOR ME	NOT TRUE FOR ME
I don't cycle to school as it is too far……..	TRUE FOR ME	NOT TRUE FOR ME
I cycle in the any weather e.g. rain…….	TRUE FOR ME	NOT TRUE FOR ME
The grownups at home don't want me to cycle to school on my own……..	TRUE FOR ME	NOT TRUE FOR ME
I feel silly on a bike …….	TRUE FOR ME	NOT TRUE FOR ME
Cycling is cool…….	TRUE FOR ME	NOT TRUE FOR ME
It's safe to cycle to school on my own …….	TRUE FOR ME	NOT TRUE FOR ME

Cycling is the fastest way to travel for short journeys…….	TRUE FOR ME	NOT TRUE FOR ME
Traffic makes me afraid of cycling……..	TRUE FOR ME	NOT TRUE FOR ME
More cycle lanes would make me feel safer…	TRUE FOR ME	NOT TRUE FOR ME
My bike may be stolen if parked…….	TRUE FOR ME	NOT TRUE FOR ME
Cycling is becoming more popular…….	TRUE FOR ME	NOT TRUE FOR ME

10: Below are some statements about cycling, circle the box that represents how you feel ?

HOW DO YOU FEEL ABOUT …….					
How do you feel cycling on an off road cycle path e.g. Railway track		I've never done it	Not very confident	I'd feel ok	Really confident
How do you feel cycling on an on road cycle path on a road		I've never done it	Not very confident	I'd feel ok	Really confident
How would you feel cycling near cars		I've never done it	Not very confident	I'd feel ok	Really confident
How do you feel cycling on a big road		I've never done it	Not very confident	I'd feel ok	Really confident

How do you feel cycling through a roundabout		I've never done it	Not very confident	I'd feel ok	Really confident
How do you feel cycling on through a big junction		I've never done it	Not very confident	I'd feel ok	Really confident

Thank you very much for your help in this survey

Appendix Seven – Adult Questionnaire

Why did I receive this?

You were successful in your application to attend cycling training with your child as part of research into the long term effects of cycle skills training on cycling as a form of active transport.

Some Information before you get started

All the information collected will be kept in the strictest confidence, and used for research purposes only. It will not be possible to identify any particular individual in the results.

What do I do when I finish it?

I have provided you with a freepost envelope to return your questionnaire. Alternatively, you can hand the questionnaire in at the beginning of the first session cycling training session on Saturday 25th May at 930 in Abbeyside School.

If you want any further information on the questionnaire or the research study, please contact me at 058 21191 or via email on pjones@waterfordsportspartnership.ie

Kind Regards

Yours sincerely

Peter Jones
Sports Development Officer

Adult Cycle Skills Questionnaire – Pre Questionnaire

Childs School: _____ Childs Name: _____

Childs Class: _____ Your Name: _____

Relationship to child (please circle)

Mother Father Guardian Grandparent Aunt Uncle

1: Are you

Male ☐ Female ☐

2: What forms of travel do you normally use for the following ? Please only tick the box that indicates you travel frequently by this mode of transport.

	WALK	CYCLE	CYCLE WITH FAMILY	CYCLE WITH FRIENDS	CAR	N/A
TAKING CHILDREN TO SCHOOL						
SHOPPING						
WORK						
SPORTS						

3: How far away do you live from work

0-3km ☐ 3-5km ☐

5-10km ☐ 11km+ ☐

4: Please complete the table below and tick the column with your answer

	YES	NO	N/A
Do you own a bike			
Does your wife/husband own a bike			
Have you ever received cycling training			

5: Please complete the table below and tick the column with your answer

	YES	NO
Have you ever cycled to school with your child		
Have you cycled to school with your child in the last seven days		
Have you ever cycled to work		
Have you cycled to work in the last seven days		
Have you cycled on a cycle path in the last seven days		
Have you cycled on a main road in the last seven days		

6: The following questions are about how confident you are cycling. Please tick the relevant box.

	Really confident	I'd feel ok	Not very confident	I've never done it
How would you feel cycling on a cycle path off track e.g. Railway track				
How would you feel *about your child* cycling on a cycle path off track e.g. Railway track				
How would you feel cycling on a cycle path on a road				
How would you feel *about your child* cycling on a cycle path on a road				
How would you feel cycling near cars				
How would you feel *about your child* cycling near cars				
How would you feel cycling on a small road				
How would you feel *about your child* cycling on a small road				
How would you feel cycling on a main road				
How would you feel *about your child* cycling on a main road				
How would you feel cycling a roundabout				
How would you feel *about your child* cycling a roundabout				
How would you feel cycling a T junction				
How would you feel *about your child* cycling a T junction				

Thank you very much for your help in this survey. Please enclose and post in the SAE or bring this to the first cycling training session.

Appendix Eight - Focus Group Children – Topic Guide

	- Welcome and ice breaker
Physical Activity	- What are the benefits of exercise - How does cycling compare to other forms of exercise - What do you think about cycling - What do you like about cycling
Motivation and benefits	- Who has a bike - Does it work? - Who cycled to school today - If yes, why - If not, why not
Barriers	- Would you cycle in cold or wet weather? - What worries you about cycling - What do you think of cars - Are you confident cycling near cars - Are helmets a good thing? - What is your biggest fear for not cycling
Discussion	- Is the route from your house to school safe to cycle - What do your parents feel about cycling - Do your parents cycle
Solutions	- If I could do anything to make you cycle to school, what would it be

Appendix Nine - Focus Group Adults – Topic Guide

	- Welcome and ice breaker
Physical Activity	- How does cycling compare to other forms of exercise - What do you think about cycling - What do you like about cycling - Did you receive cycling training when you were younger
Motivation and benefits	- Did you cycle when you were younger - Did you cycle to school when you were younger
Barriers	- What are your biggest fears for your child cycling - What could be done to overcome these fears
Discussion	- What do you think about cycling - What do you think about your child cycling - Do you think it is safe for your child to cycle to school, if not why not - What should be involved in cycling training for your children - What's your thoughts on helmets - What do you think your child's thoughts are on helmets
Solutions	- If I could do anything to ensure your child cycles to school, what would it be

Appendix Ten - Focus Group Cycling Tutors – Topic Guide

	- Welcome and ice breaker
Programme content	- How did you find the cycling training programme - What were the best bits
Programme impact	- What were the children's skills levels before training - Did training have an impact - Was there a difference according to age - Was there a difference according to gender
Barriers	- As a tutor did you find any of the programme difficult
Discussion	- What were children's road skills like
Development	- What were the best bits of the programme - What would you do to improve the training programme

Appendix Eleven – Bike Park monitoring in Go Dungarvan Schools

School	Date	Number of Bikes	Students In School	% Cycling	Notes
SG	04/10/2013	10	208	4.81%	Dry Day
SG	09/10/2013	15	208	7.21%	Dry Day
SG	10/10/2013	16	208	7.69%	Dry Day
SG	14/11/2013	34	208	16.35%	Dry day, cycle training on
SG	12/12/2013	9	208	4.33%	Wet day
SG	20/12/2013	6	208	2.88%	
SG	20/01/2014	12	208	5.77%	Cold Day
SG	11/02/2014	14	208	6.73%	Cold dry day.
SG	27/02/2014	14	208	6.73%	Dry Day
SG	11/03/2014	21	208	10.10%	Sunny, dry day
SG	18/03/2014	15	208	7.21%	Cold Dry Day
SG	01/04/2014	8	208	3.85%	Overcast day
SG	07/04/2014	8	210	3.81%	Dry Day
SG	30/04/2014	14	208	6.73%	Sunny Day
SG	12/05/2014	23	208	11.06%	W2SW warm dry day
SG	03/06/2014	16	208	7.69%	Sunny Day
SG	11/06/2014	48	208	23.08%	Cycle Training on
SG	13/06/2014	53	208	25.48%	Cycle Training On
SG	16/06/2014	24	208	11.54%	Bike Week
SG	18/06/2014	48	208	23.08%	National Cow Day
SG	19/06/2014	34	208	16.35%	Bike Week
SG	05/09/2014	25	208	12.02%	Clear dry day. Cycle training on.
SG	20/11/2014	40	466	8.58%	Car Free Day, warm and dry
SM	26/09/2013	20	460	4.35%	
SM	07/10/2013	19	460	4.13%	Dry Day
SM	08/10/2013	19	460	4.13%	Dry Day
SM	09/10/2013	20	460	4.35%	Dry Day
SM	10/10/2013	20	460	4.35%	Dry Day
SM	11/10/2013	21	460	4.57%	Dry Day
SM	16/10/2013	1	460	0.22%	Very wet day
SM	07/11/2013	62	460	13.48%	Dry day, cycle training on
SM	12/11/2013	16	460	3.48%	Dry Day
SM	13/11/2013	16	460	3.48%	Dry Day
SM	14/11/2013	68	460	14.78%	Dry day, cycle training on
SM	28/11/2013	63	460	13.70%	Cold dry day, cycle training on
SM	12/12/2013	19	460	4.13%	Wet day
SM	20/01/2014	21	460	4.57%	Cold Day
SM	05/02/2014	3	460	0.65%	Very wet and windy day
SM	13/02/2014	6	460	1.30%	Very Cold Day

SM	18/02/2014	10	460	2.17%	Cold Dry Day
SM	26/02/2014	12	460	2.61%	Dry Sunny Day
SM	28/02/2014	8	460	1.74%	Dry Day
SM	01/04/2014	13	460	2.83%	Overcast day
SM	30/04/2014	15	460	3.26%	Sunny Day
SM	07/05/2014	14	460	3.04%	Warm Day, 4 bikes locked
SM	29/05/2014	29	460	6.30%	Fine Dry Day
SM	06/06/2014	1	460	0.22%	Very Wet day.
SM	09/06/2014	48	460	10.43%	Cycle training on, dry day
SM	11/06/2014	77	460	16.74%	Cycle Training on
SM	13/06/2014	67	460	14.57%	Cycle Training on
SM	16/06/2014	30	460	6.52%	Bike Week
SM	19/06/2014	44	460	9.57%	Bike Week
SM	24/06/2014	30	460	6.52%	Very sunny day
SM	25/06/2014	14	460	3.04%	Wet day
SM	22/09/2014	52	460	11.30%	First day of school, montoring new crossing. 3 parents cycling in with their children.
SM	28/08/2014	10	460	2.17%	Includes 2 scooters
SM	29/08/2014	19	460	4.13%	
SM	05/09/2014	27	460	5.87%	Dry and sunny - includes 2 scooters
SM	10/09/2014	31	460	6.74%	
SM	23/09/2014	26	460	5.65%	Schools Monitoring
SM	24/09/2014	41	460	8.91%	Schools Monitoring
SM	25/09/2014	44	460	9.57%	Schools Monitoring
SM	26/09/2014	33	460	7.17%	Schools Monitoring
SM	29/09/2014	39	460	8.48%	Schools Monitoring
SM	30/09/2014	40	460	8.70%	Schools Monitoring
SM	01/10/2014	38	460	8.26%	Schools Monitoring
SM	02/10/2014	47	460	10.22%	Schools Monitoring
SM	03/10/2014	29	460	6.30%	Schools Monitoring
SM	06/10/2014	35	460	7.61%	Schools Monitoring
SM	07/10/2014	31	460	6.74%	Schools Monitoring
SM	08/10/2014	15	460	3.26%	Schools Monitoring
SM	09/10/2014	25	460	5.43%	Schools Monitoring
SM	10/10/2014	31	460	6.74%	Schools Monitoring
SM	13/10/2014	27	460	5.87%	Schools Monitoring
SM	14/10/2014	31	460	6.74%	Very wet day. Cycle training on
SM	13/11/2014	25	460	5.43%	Clear dry day. Cycle training on.
SM	20/11/2014	61	460	13.26%	Dry overcast day
SM	11/12/2014	54	460	11.74%	Cold Dry Day, cycle training on.
St. Marys	02/10/2013	6	279	2.15%	Plus 1 scooter. Wet day.
St. Marys	15/10/2013	11	279	3.94%	Including 2 Scooters

St. Marys	09/01/2014	19	279	6.81%	Dry Day
St. Marys	10/01/2014	6	279	2.15%	Very wet day
St. Marys	15/01/2014	7	279	2.51%	Dry Day
St. Marys	16/01/2014	7	279	2.51%	Dry Day
St. Marys	20/01/2014	9	279	3.23%	Cold Day
St. Marys	05/03/2014	5	279	1.79%	Dry Day
St. Marys	10/03/2014	7	279	2.51%	Sunny, dry day
St. Marys	14/03/2014	5	279	1.79%	TY Students Gathered Data
St. Marys	21/03/2014	7	279	2.51%	Wet day
St. Marys	21/03/2014	6	279	2.15%	TY Students Gathered Data
St. Marys	28/03/2014	9	279	3.23%	TY Students Gathered Data
St. Marys	08/05/2014	1	279	0.36%	Overcast day, all locked
St. Marys	12/05/2014	16	279	5.73%	W2SW warm dry day
St. Marys	13/05/2014	14	279	5.02%	W2SW Fine day 9 bikes, 5 scooters.
St. Marys	09/06/2014	27	279	9.68%	Cycle training on, dry day
St. Marys	11/06/2014	77	279	27.60%	Cycle Training on
St. Marys	13/06/2014	47	279	16.85%	Cycle training on
St. Marys	16/06/2014	58	279	20.79%	Bike Week
St. Marys	17/06/2014	69	279	24.73%	Bike Week
St. Marys	18/06/2014	83	279	29.75%	Bike Week
St. Marys	19/06/2014	76	279	27.24%	Bike Week
St. Marys	20/06/2014	120	279	43.01%	Bike Week - 5th & 6th class cycle to Clonea
St. Marys	26/06/2014	24	279	8.60%	Wet day
St. Mary's	03/10/2014	7	330	2.12%	Clear dry day. Cycle training on.
St. Mary's	19/11/2014	7	330	2.12%	Clear dry day. Cycle training on.
St. Mary's	20/11/2014	28	330	8.48%	Cold Dry Day
St. Mary's	04/12/2014	23	330	6.97%	Cold Dry Day

Appendix Twelve - Child Cycle Skills Questionnaire

Name: _____ School: St Marys

Class: 5th Class Teacher: Miss Kiely

1: Are you a

Boy ☐ Girl ☐

2: How do you normally travel to different places listed below ? Tick the box that shows the form of transportation you use to get to the different places. ONLY TICK THE BOX THAT YOU DO A LOT

			CYCLE WITH FAMILY	CYCLE WITH FRIENDS	ROLLER BLADING / SKATEBOARD	PARENTS CAR	FRIENDS CAR	BUS
SCHOOL								
SHOP								
FRIENDS HOUSE								
SPORTS								

3: How long would it take you to walk to school ?

0-5 minute walk ☐ 6-10 minute walk ☐

11-20 minute walk ☐ 20minute + walk ☐

4: Please complete the table below and tick the column with your answer

	YES 	NO 
Do you own a bike		
Does your father own a bike		
Does your mother own a bike		
Have you ever received cycle skills training		

5: When did you get your first bike

1-6 months ago ☐ 7-12 months ago ☐ 1-3 years ☐

over 3 years ago ☐ I've never owned a bike ☐

6: Have you ever cycled to school ?

Yes **(go to Q7)** ☐ No **(go to Q9)** ☐

7: Please complete the table below and tick the column with your answer

	YES 	NO 
Have you cycled to school in the last seven days		
Have you cycled on a cycle path in the last seven days		
Have you cycled on a main road in the last seven days		

8: If you cycle to school, do you normally

cycle on your own ☐ cycle with friends ☐

cycle with your parents ☐ a mixture of all t[illegible]e ☐

9: The following questions are about how confident you are cycling. Please tick the relevant box.

	Really confident 	I'd feel ok 	Not very confident 	I've never done it
How would you feel cycling on a cycle path off track e.g. Railway track 				
How would you feel cycling on a cycle path on a road 				
How would you feel cycling near your house				
How would you feel cycling near cars				
How would you feel cycling on a small road				
How would you feel cycling on a big road				
How would you feel cycling a roundabout				
How would you feel cycling a T junction				

Thank you very much for your help in this survey

20th May 2013

Appendix Thirteen – Parent cancellation letter

Dear Parent/Guardian,

Unfortunately as I only received three applications, the proposed FREE cycle training for parents and children of 5th class pupil's due to begin on Saturday 25th May has been cancelled. As you are aware, GoDungarvan are committed to increasing active travel options for all and were covering the cost of this training. It was hoped the training would assist in having a significant long term impact on the cycling skills and cycling confidence of you and your child and assist you with smarter travel choices.

GoDungarvan are still keen to deliver cycle skills training to parents and children as cycle training to a family group is an area which is rarely delivered. It is important for GoDungarvan to establish the reasons why the training did not go ahead for future programmes. I would appreciate it if you could complete the feedback questions *overleaf* to give us some information on how we can ensure we could deliver this training in the future to maximise this effectiveness for you and your child.

This feedback is anonymous and if you have any questions at all please do not hesitate to contact me at 058 21191 or by e-mail pjones@waterfordsportspartnership.ie.

Yours sincerely

_____

Peter Jones

Sports Development Officer

Cycle Skills Training Feedback Form - Please return these to your child class teacher ASAP

1: Do both you and your child own a bike?

Yes ☐ No ☐

2: Would you be interested in *FREE cycling skills training* for parents and children?

Yes ☐ No ☐

3: What time would suit you for a one hour cycle skills session to be delivered with you and your child? (Please tick more than one)

Weekday 800 – 900 ☐ Weekday 1500 - 1600 ☐

Saturday 1000 – 1100 ☐ Saturday 1500 – 1600 ☐

Sunday morning ☐ Sunday afternoon ☐

Midterm break morning ☐ Mid Term break afternoon ☐

4: Would you be able to commit to five one hour sessions?

Yes ☐ No ☐

5: What would be your ideal duration for cycle skills? (Please tick more than one)

5 sessions of 1 hour ☐ 3 sessions of 1 hour ☐

1 sessions of 1 hour ☐ 1 all day session of 5 hour session ☐

6: What is the most suitable delivery of these five one hour session (please tick more than one)

Once a week ☐ More than once a week ☐

Every day during a midterm bre ☐

7: Is there any factor from the list below which would stop you completing a cycle skills training programme

No bike ☐ other family activities ☐

Childminder issues ☐ Other (please state below)

Appendix Fourteen – School Permission Form

Media Permission Form – For Group Leaders of Children/Vulnerable Adults

A child is defined as anybody who is aged 17 years and below

A Vulnerable Adult is defined as a person 18 years of age or older whose ability to perform the normal activities of daily living or to provide for his or her own care or protection is impaired due to a mental, emotional, long term physical, or developmental disability, or dysfunctioning or brain damage, or the infirmities of ageing.

Event/Programme: GoDungarvan Cycle Training Date: November 2013

Go Dungarvan aims to promote and develop active transport choices through programmes such as the pilot cycle skills training. This involves utilising different forms of media to promote our activities. In some of GoDungarvan's programmes/events your group's child/vulnerable adult may be included in photographs or video and we are asking for your permission for the use of images for the promotion of sport and physical activity. This may also include quotations to be used in promotional articles.

GoDungarvan will only use images in accordance with the Irish Sports Council's Code of Ethics for Young People.

I am the Prinicpal of _____

I grant permission for GoDungarvan to use children/vulnerable adult's name/voice/photo on behalf of _____ (designated group) through the following media in accordance with the Code of Ethics for Young People:-

- GoDungarvan/WSP Newsletters, Posters and other printed material Yes No
- Local or National Press Yes No
- Promotional material for the Irish Sports Council/Smarter Travel Yes No
- GoDungarvan/WSP's official website Yes No
- Video footage to be used in promotional presentations Yes No

Name (in block capitals): _____ Signed: _____

Date: _____ Contact Number: _____

Group leaders please visit http://www.webwise.ie and visit publications where you can download documents giving tips, information and advice about internet safety.

Any questions on this document please contact Peter Jones on 058 21191 / 087 7855940

8th October 2013

Appendix Fifteen – Parent Consent

Dear Parent/Guardian,

Your child is invited to participate in the **GoDungarvan Research Cycling Training Programme for third class students** in Holy Cross NS in November/December 2013. This research study is being conducted by GoDungarvan in conjunction with Waterford IT. The aim of the research is to measure the long term impact of cycle skills training on the use of cycling as a form of active transport in Dungarvan.

In order for us to know whether or not cycling training increases cycling levels we need to compare those who get the cycle training straight away (group 1) with those that get it 12 months later (group 2).

This research includes over 390 students and parents involved in cycle skills training in Dungarvan and Tramore (group 1). A further 270 parents and students will be researched this year but only receive training in November 2014 (group 2).

Your child has been randomly selected to be in **GROUP 1** and will receive cycling training in November 2013.

Date	Activity
Oct 2013	Information given and parental permission sought
Oct 2013	Parental Permission letters and bike maintenance checklist collected by class teachers.
Oct 2013	GoDungarvan visit classes to speak with students (questionnaire and group discussion)
Nov/Dec 2013	Cycle skills training delivered to GROUP 1 every Thursday for one hour, for five weeks.
Jan 2014	One month follow up questionnaire with students in class time (group 1 & 2)
Mar 2014	Three month follow up questionnaire with students in class time(group 1 & 2)
June 2014	Six month follow up questionnaire with students in class time(group 1 & 2)
Nov 2014	Cycle skills training delivered to GROUP 2 in school.

What does cycle skills' training involve?

Cycle skills training will be delivered during class time for five weeks by six trained instructors. Each session will be delivered on a Thursday at 900 - 1000 beginning on Thursday 7th November and continuing on 14/11, 21/11, 28/11 and 5/12.

The training will take one hour and take place on the school premises and the surrounding cycle paths and roads. The training will cover the basic skills of cycling, such as balance, braking, cornering and pedalling and a brief outline of the training is attached to this letter.

All instructors have received appropriate training and student:instructor ratios will be no more than 1:6. A bike maintenance check will be carried out by instructors before any training delivery. I have attached the sample checklist to this letter for you to assess the road worthiness of your child's bike prior to training. There is a video which can be viewed at www.godungarvan.ie to assist you in conducting this checklist.

It is compulsory for all students to wear cycle helmets for training. If they do not have their own, GoDungarvan will provide one for training duration.

How much will it cost?

This training is absolutely free. The costs for the cycle skills training, associated research and cycling helmets will be absorbed by GoDungarvan.

What research is being done?

The children will be asked to fill out short questionnaires and participate in short group discussions before and after the cycling training so that we can see if it improves their cycling confidence, cycling behaviour and their thoughts about cycling.

Before cycling training begins, I will distribute a short questionnaire to each child class time and help them to complete it. The questionnaire will include questions about how they get to school, how much cycling they do and their levels of cycling confidence. It will take approximately 10-15 minutes to complete and no names are needed.

After this i will also have group discussions with the children about their cycling confidence, what they think is safe or dangerous about cycling and their thoughts on different cycling scenarios. Again, all information gathered is completely anonymous.

Why should my child be involved?

Cycling is a proven way of increasing children's physical activity levels, reducing their risk of obesity, and enhancing mental and social development by allowing children independence in play and travel.

The cycle skills training will have several benefits for your child: increased physical activity levels, increased cycling confidence and enjoyment of cycling, and the potential to use cycling as a form of transportation to and from school in the future – this can reduce school traffic congestion, save parents money on fuel and reduce pollution and $C0_2$ emissions.

Course content and Timeline

Oct 2013	Parent consent letter and sample bike maintenance checklist returned				
Nov 2013	Short questionnaire and focus group questions completed in school time				
CYCLE SKILLS TRAINING					
Date	***Venue***	**Topics Covered**			
Week 1 – 7/11/13	*School*	Bike maintenance	Skills assessment	Pedal ready position / Bike balance	Effective braking
Week 2 – 14/11/13	*School*	Pedalling skills	Effective cornering/mini	Developing bike balance	Skills assessment

			roundabouts		
Week 3 – 21/11/13	*School/cycle path*	Cycling in straight line/skills	Cycling in pairs	Effective signalling	Cycle on cycle paths
Week 4 – 28/11/13	*School/cycle path*	Recap of skills	Cycling in pairs and signalling	Cycle path	Basic skills for T junctions / roundabouts
Week 5 – 5/12/13	*School/Road*	Recap of skills / junctions / roundabouts	Cycle on road in group	Skills assessment as week one	
Jan 2014	One month follow up questionnaire/group discussion completed in class time				
March 2014	Three month follow up questionnaire/group discussion completed in class time				
June 2014	Six month follow up questionnaire/group discussion completed in class time				

To ensure that your child can avail of this training, please do the following:

- Complete the attached consent form and bike maintenance checklist (visit website for instructions) and return to your child's class teacher **by Thursday October 10th. Children will not be allowed to take part in training without a consent form.**
- **Complete and return the Adult cycle skills questionnaire and return to your child's teacher by Thursday October 10th.**
- Ensure that your child brings a bike and helmet to school for training days. If your child does not have a bike, it is possible for them to share with another student/borrow from GoDungarvan but please inform your class teacher of this beforehand.
- Inform your class teacher if your child does not have a helmet and we will provide a helmet for the programme.
- Ensure your child wears runners and comfortable clothing on training days. In wet weather a waterproof jacket, trousers and towel are needed as cycling will go ahead.

This is an important and exciting opportunity and has the potential to have a significant and long term impact on the cycling skills and cycling confidence of your child. If you have any questions please do not hesitate to contact me at 058 21191 or by e-mail pjones@waterfordsportspartnership.ie

Yours sincerely

Peter Jones

Sports Development Officer

Cycle Skills Training Consent form

This must be returned to the school by 10th October 2013

Name of Child	
School	Holy Cross National School
Class and Teacher	3rd Class
Parent/Guardian Name	
Contact Number	
E-mail	
Childs Medical Conditions e.g. asthma, dyspraxia etc	
Completed Adult cycle skills questionnaire attached to letter	Yes / No

I give my informed consent for my child to participate in the cycle skills training programme and associated research that involves questionnaires and group discussions.

Yes ☐ No ☐

Equipment

It's not necessary to have your own bike or helmet for the programme as we can provide these for the duration of the programme.

	YES	NO
Does your child have their own bike		
Does your child have their own helmet		
Does a parent/guardian own a bike		
Does a parent/guardian own a helmet		
I have completed the bike maintenance checklist on my child's bike on the reverse of this form (check www.godungarvan.ie for assistance)		

Photographs

I understand that photographs will be taken during these sessions and may be used by GoDungarvan and/or Waterford Sports Partnership in their newsletter, website and/or in local newspapers in accordance with the Irish Sports Councils good practice as outlined in the Child Welfare and Good Practice document available at www.irishsportscouncil.ie/Participation/Code_of_Ethics/Code_of_Ethics_Manual/ .

If you have already informed the school you do not want images of your child being used, this information is already on record.

Name: _____Signed: _____ Date: _____

Relationship to participant: _____