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Comparison of Road Safety Behaviour of Rented Dublin Bike Users With That of Owner Cyclists

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Bsc in Environmental Health

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Abstract

Cycling is a unique way of travelling and exercising. The Irish Heart Foundation recommends thirty minutes of exercise most days in the week to maintain a healthy heart (IHF, 2008). The introduction of the Dublin-bike scheme by Dublin city Council in connection with JCDecaux on the 13th of September 2009 has encouraged and allowed more people to cycle around the city of Dublin. Since their introduction, Dublin-bikes have grown rapidly in popularity. By the 31st of December 2009 24,016 people had subscribed to the scheme (Dublin City Council, 2009). On the 16th of August 2010, The Irish Times published that the one millionth journey had been taken on a Dublin-bike (Caollaí, É.Ó., 2010). As the Dublin-bike does not issue its users with any form of personal protective equipment (PPE), it is left up to the user to choose if they see the need for their use. Note that between the years 2002 to 2006 there were 427 collisions involving cyclists reported to the Gardaí in Dublin City, of which 11 were fatal (Tracey Solicitors, 2010)

The aims and objectives of this study are to: i) carry out observational studies of safety equipment used by both categories of cyclists (Dublin-bike users and owner cyclists); ii) investigate the factors inhibiting use of PPE; iii) investigate sensory awareness/preparedness among cyclists; iv) assess cyclists' road positioning; v) assess communication between cyclists and other traffic; and vi) assess the responsiveness of cyclists to the behaviour of pedestrians and other vehicles.

At the start of this project all Dublin bike stations were identified. Questionnaires were handed out at St. Stephens Green East, St. Stephens Green south, Exchequer Street, and Cathal Brugha Street. The streets chosen for surveying owner cyclists were O'Connell Street, Nassau Street, and the area on the Red Line Luas tracks between Abbey Street and Heuston station.

It was found that the age profile for cyclists in Dublin City is 18-30 years old. Dublin-bike users cycle daily with a distance of less than 3 km, they never use a helmet or High Visibility Clothing (HVC); they do not want helmets as a legal requirement and know lights are a legal requirement after dark, they never listen to an MP3-player while cycling and they feel fine while cycling. Owner cyclists travel daily with a distance of less than 3 km, they never use a helmet or HVC, they do not want helmets as a legal requirement and know lights are a legal requirement after dark, they never listen to an MP3-player while cycling, and they feel fine while cycling.

In terms of good road safety practice, the following trends were observed. Helmet usage increased with increasing distance travelled and people who use helmets would like to see them made legal. If a helmet is used while cycling then HVC is likely to be used as well. Furthermore, the further the distance travelled the more confidence the person had. Younger age groups are more likely to use HVC and males are more likely to wear a helmet then females.

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I would also like to acknowledge my supervisor Greg Burke and thank him for his support in this project.

Declaration

I hereby certify that this material, which I now submit in part fulfilment of the requirement for the award of the BSc (Environmental Health) is entirely my own work and has not been taken from the work of others save and to the extent such work has been cited and acknowledged within the text of my own work.

Signed: ___________________

Candidate

Date: ___________________

Abbreviations

BHF: British Heart Foundation

HVC: High Visibility Clothing

IHF: Irish Heart Foundation

MP3 player: is a consumer electronic device that stores, organizes and plays digital audio files.

NCT: National Car Testing service

PASW 18: Statistics software

PPE: Personal Protective Equipment

RoSPA: Royal Society for the Prevention of Accidents

RSA: Road Safety Authority

TFL: Transport for London

I. Introduction

1. *Health Benefits of Cycling*

Cycling is a unique way of travelling. Not only does the cyclist get from A to B but they also receive exercise. The Irish Heart Foundation (IHF) recommend thirty minutes of exercise most days in the week (IHF, 2008) and The British Heart Foundation (BHF) recommends thirty minutes of exercise five days a week for a person to keep their heart healthy and to prevent coronary heart disease or heart attacks (BHF, 2009). Exercise or aerobic activity also helps to maintain weight, and may even help people to lose some weight.

Aerobic activity also helps strengthen muscles and bones, gives you more energy, helps you sleep and gives one a sense of well being (IHF, 2008). Aerobic activity is physical exercise which uses the heart, lungs and large muscles over a period of time. The IHF recommend that a person who wants to improve their aerobic activity should cycle or walk to work. The BHF (2009) state that about one in every five cases of coronary heart disease in developed countries is due to physical inactivity, and about seven out of ten women and six out of ten men in the U.K. are not active enough to protect them against coronary heart disease. Cycling to work or the shops for instance can improve people's health and is relatively cheap, simple and hassle free.

Cycling also involves no parking fee, allows the user to avoid traffic jams on the Quays of Dublin city, for example, by allowing the cyclist to cycle on car free roads such as along the Luas red line tracks from James' to the city centre. Cycling also releases no CO_2 into the atmosphere (unlike cars and buses), requires no road tax, no insurance, no NCT, no need for any form of licence and is convenient as the cyclist can leave their bike right outside their destination. Cars produce an average of 0.3 kg of CO_2 per km travelled. Cycling 10 km each way to work instead of driving saves an average of 1.3 tonnes of greenhouse gas emissions each year (dublincitycycling, 2010).

In a study by Hendriksen. J.M. *et al*. (2010), it was shown that the more often people cycle to work and the longer the distance travelled, the lower the absenteeism at work. This not only means that an employee who cycles will be more healthy then their non cycling counter parts but it also works out finically favourable for employers.

2. ***Dublin City Cycling***

Dublin City Council appointed Ireland's first Cycling Officer in January 2009. The aim of this position is to increase cycling rates in the city by 50% while at the same time trying to reduce accident rates (DCC, 2009a).

In 1998 Dublin City Council produced the first Road Safety Plan in the country and the objective of this plan was to improve road user behaviour and reduce road collisions in the Dublin City Council area. Between 1998 and 2007 there was a 51% reduction in fatal or serious collisions and a 64% reduction in minor collisions in the City Council area (DCC, 2009b). According to the Road Safety Authority, Ireland is placed eighth of all European Union countries with a fatal collision rate of 78 fatalities per million population (DCC, 2009b).

In 2009 Dublin City Council published their third Road Safety Plan 2009-2012. This plan is focused on Education, Enforcement, Engineering and Evaluation. It is hoped that this plan though its Education and Enforcement goals will achieve significant behavioural changes in cyclists and motorist with the expectation of reduced collisions and casualties (DCC, 2009b).

3. Dublin-bike Scheme

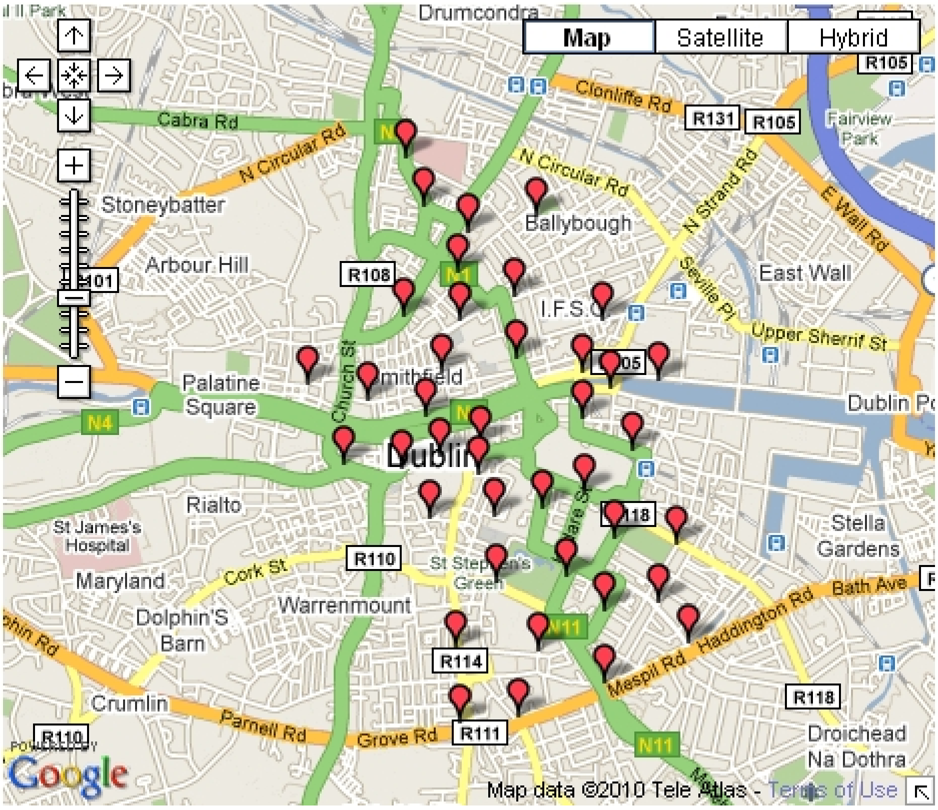


Figure 1.01: Dublinbike Station Map taken from Dublinbike.ie (2010).

The introduction of the Dublin-bike scheme by Dublin city Council in connection with JCDecaux on the 13th of September 2009 has encouraged and allowed more people to cycle around the city of Dublin, mostly for free, and has introduced a new group of people onto the main roads of Dublin City who may have never cycled on a street or may have not cycled in years. This presents a potential safety concern for these cyclists and other road users.

Since their introduction, Dublin-bikes have grown rapidly in popularity. By the 31st of December 2009 24,016 people had subscribed to the scheme (Dublin City Council, 2009). On the 16th of August 2010, The Irish Times published that the one millionth journey had been taken on a Dublin-bike (Caollaí, É.Ó,. 2010). This is a substantial achievement given that the scheme was only eight months in operation at the time of publication.

Dublin-bike users differ from owner cyclists as they do not own the bike and they may decide on the spur of the moment if they want to cycle or not. Dublin-bike is also convenient in many aspects as the person does not own the bike so the cost and maintenance is taken care of. Also the majority of trips are less than half an hour long and therefore are free for the user. Dublin-bikes are designed for quick, short journeys at the convenience of the user. It is for this reason I decided that it would be interesting to monitor the use of Personal Protection Equipment (PPE), reasons why they may not use PPE, road positioning, communication with other road users (i.e. hand signals), responsiveness to other traffic and sensor awareness and then to take these findings and compare them to owner cyclists.

Dublin-bike does not issue its users with any form of PPE. Instead, it is left up to the user to choose if they see the need for their use. Concerns were raised during the introduction of the London rental bike scheme operated by Transport for London. The main problems raised in the article *Campaigners Demand Boris bike Helmets* published in the Environmental Health News magazine on the 8.10.2010 was that helmets were not provided to users. However, if helmets are not the right size for your head they are ineffective and if they are dropped at any point they become ineffective. A further concern was raised about the possibility of spreading head lice and fungal scalp infections resulting in hair and skin loss. Transport for London (TFL) believes that forcing users to wear their own helmets will kill off the spontaneity essential to a successful scheme. TFL says despite a 117% increase in cycle journeys on London's roads in the last decade the number of people killed or seriously injured has fallen by a quarter. The accident campaign group RoSPA says it is not possible for hire schemes to provide safe hire helmets stating 'We believe it is the individual's responsibility, not that of the hire scheme'.

4. Legislation

Speeding occurs in all motorised countries (Elvik, 2010). Reducing speed limits is seen as effective way to protect road users. Dublin City Council introduced the new Special Speed Limit Bye-Law at their meeting on 5th October 2009, which introduced a 30 kph speed limit in the city centre.

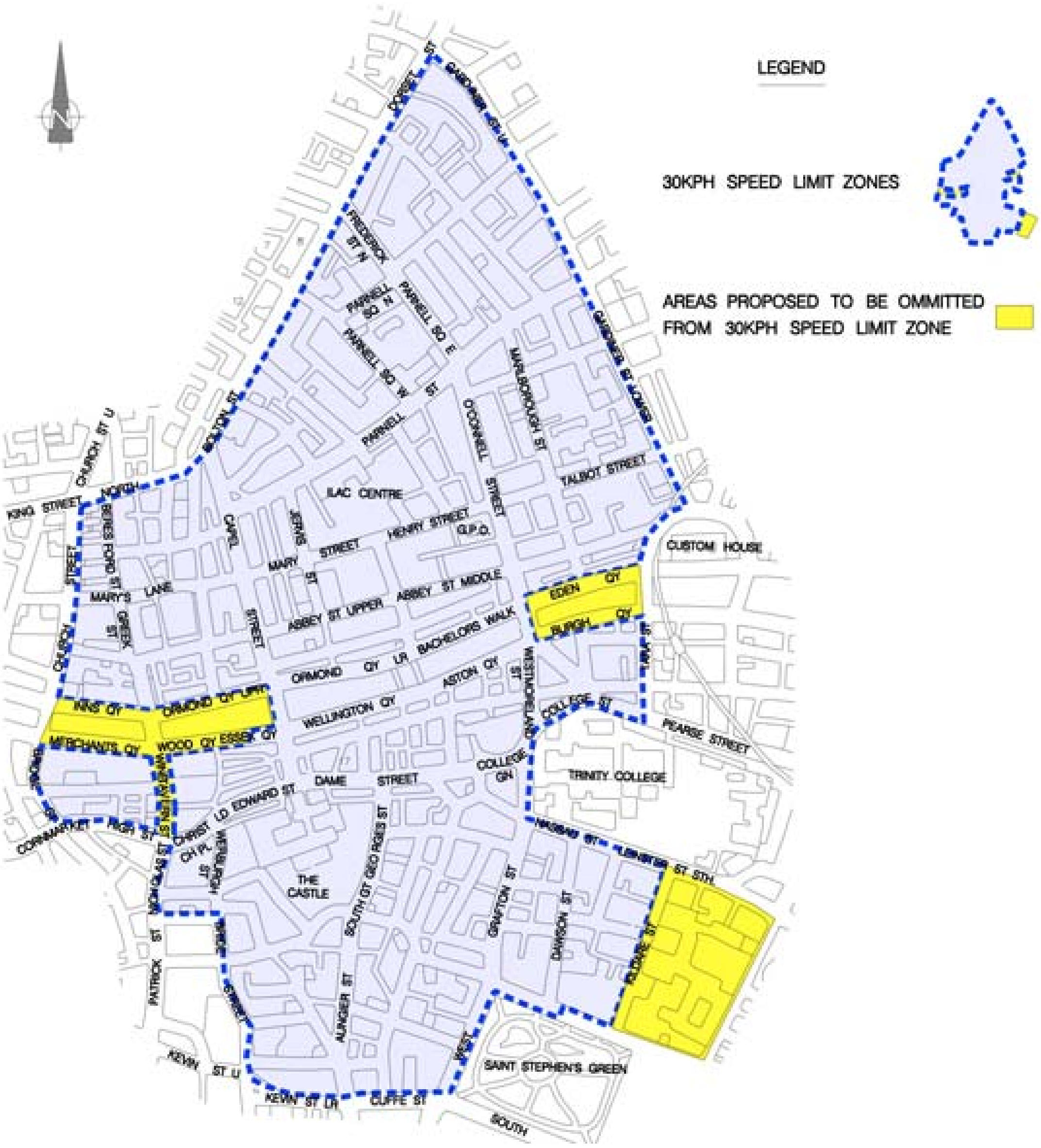


Figure 1.02: Map showing the 30 kph zone in Dublin City Centre, DCC 2010.

This speed limit Bye-Law was introduced on the 31st of January 2010 and was subjected to a six month review which occurred in June 2010. The Bye-Law remains in effect.

Legislation has been introduced in New Zealand and Australia as a means to protect cyclist safety, by mainly making helmet usage mandatory but as discussed in section ***8.2*** studies have shown that this can have an effect on reducing the amount of people who cycle, especially children. Legislation can be used to make people safer on roads, for cyclists, pedestrians and other motorists. However, not all laws are welcomed or liked.

5. *Urban Road Safety*

5.1. Accidents

According to the RoSPA (2009) the most common causes of cyclist accidents are:

- Cyclist and motorist going straight ahead.
- Cyclist turning right from a major road onto a minor road.
- Motorist emerging across path of cyclist.
- Motorist turning into path of cyclist.
- Cyclist riding into the path of a motor vehicle, riding off the pavement.
- Cyclist overtaking.

In the 2007 Road Safety Authority Collision Facts, driver error was identified as a contributory factor in 82% of all collisions (RSA, 2008).

Between the years 2002 to 2006 there were 427 collisions involving cyclists reported to the Gardaí in Dublin City, of which 11 were fatal (Tracey Solicitors, 2010). The number of Pedal Cyclists injured in Ireland between the years 1998 to 2008 was on average 114 people. This represents 3.5% of all road fatalities between 1998 and 2008. In the same period 355 cyclists were injured (RSA, 2010). A total of 70% of all cycle collisions involved cars, right-turning cars accounted for 20% of accidents, left turning vehicles were involved in 12% of accidents, 15% of accidents were caused by a vehicle overtaking a cyclist or changing lanes, and 14% of accidents were caused by doors opening of vehicles, with November 2009 found to be the worst month for collisions (Tracey Solicitors, 2010).

In the United States of America approximately 580,000 people are treated annually in emergency departments for injuries sustained in bicycle accidents in the United States, of which 900 cyclists die (Rosenkranz, 2002). Cycling accidents are more common in the summer months with 69% occurring between June and September (Rosenkranz, 2002).

In Aertsens study in 2010, it was shown that of 219 accidents, 49 involved material damage, 104 involved injury limited to a bruise or cramp, and 66 involved a more serious acute body injury. Some of the respondents studied reported positive consequences of the accident with 58% indicating that afterwards they were riding more carefully, 16% indicated they were wearing helmets, 11% indicated they were wearing reflective clothing more often, 5% took better care of the safety of the bike, and 14% changed towards a safer route. The accident also had some consequences for relatives of the respondents, with 21% of the respondents indicating that relatives were more concerned when the respondent went cycling. In 5% of the cases relatives are now more careful when using the bike themselves, e.g. by wearing protective clothes.

5.2. Injuries and Deaths

In March 2010 the Road Safety Authority of Ireland released a report entitled Pedal Cyclist Road Deaths 1998-2008. In this report were the following findings:

a) 30% of the cyclists were killed in county Dublin,
b) 22% of the cyclists were killed in Dublin City,
c) 30% of the cyclists were killed during the evening rush hour (4pm - 6pm),
d) 34% of the cyclists were killed during the months (July, August and September), 79% of the cyclists killed were male,
e) 22% of the cyclists killed were aged 16 or under, and
f) 65% of the cyclists' serious injuries occurred on rural roads (i.e. roads with a speed limit of more than 60 km/h).

The fact that 22% of cyclists were killed in Dublin city outlines the safety concerns around Dublin bike cyclists and regular cyclists as from these statistics Dublin city seems to be the unsafe place to cycle for its size. In Dublin between the years 1998-2007, 13% of fatalities and 10% of injured persons were pedal cyclists. This is a high percentage of accidents with cyclists when you consider that cyclists only represent 5% of the overall traffic volume (DCC, 2000b).

The RoSPA (2009) also state that most cycling accidents happen in urban areas where most cycling takes place. Researchers have estimated that about 500 bicycle related fatalities and 151,000 non-fatal head injuries would be prevented each year if every bicycle rider wore a helmet (Thompsom *et al*., 2002).

Bicyclists aged 55 and over are more likely to be fatally injured when they are in bicycle–motor vehicle accidents than younger age groups. This may be due to their greater fragility due to age and various medical conditions (including osteoporosis and atherosclerosis) more common in older adults that will increase the probability of fatal and severe injuries in older adult bicyclists in an accident (Kim. J *et al*., 2006).

5.3. Look-but-failed-to-see-accidents on roads

The pattern of these accidents is that the driver approaches the give-way line at a low speed and often stops. The driver then decides to start without having realised that a bicycle is very close. Suddenly the bicycle is either right in front of the car or the bicycle runs onto the car just when the car has started to move (Herslund, 2002).

The factors that may cause these accidents, as proposed by Herslund (2002) may be:

a) The difference in function of central sight versus peripheral sight. When a driver wants to see and identify an object, he or she routinely moves the eyes, so that the object projects onto the centre of the retina. If the situation gets complex the car driver uses a lot of their mental capacity on processing input from the central sight, which can cause relevant information from the peripheral field of vision not be perceived, e.g., the presence of cyclists.

b) The change of visual search strategy, as car drivers get more experienced. Experienced drivers use another search strategy than inexperienced drivers, who typically start their visual search of the traffic scene nearby. An experienced driver, however, will start the visual scanning further ahead in the middle of the traffic scene, and therefore the experienced driver needs more time to detect cyclists and pedestrians, who are often nearby. Furthermore, experienced drivers may develop shorter search times and may extract from the traffic scenes only minimal information based on expectancies about what they are likely to see.

c) Experienced car drivers may also unconsciously concentrate on the locations where other cars usually are. The driver sees other cars as a danger to them and if they make an incorrect estimation of their proximity they consider themselves in danger so may overlook bicycles as a bicycle might not be seen as the same risk to the driver. This could be a factor in accidents where bicycles are overlooked.

Only 11% of car drivers that had hit a cyclist on a crossroads said that they had actually seen the cyclist, and 68% of cyclists said they saw the approaching car but assumed it would respect their right of way (Bíl. M. *et al*., 2010).

Night time cycling is two–five times more dangerous than cycling in daylight and 40% of bicyclist fatalities occur during the hours of darkness (Kwan *et al*., 2004).

6. Preventing Accidents

6.1. Engineering

6.1.1. Cycle lanes

Cycle lanes are used on many Irish roads and are seen as a good way to keep cyclists safe on the road. However, motorists often wrongly assume that the presence of a cycle lane means that the remaining parts of the carriageway will be free of cycle traffic (Parkin. J *et al*., 2009).

UK guidance suggests that cycle lanes should be 2 m wide on busy roads or where traffic is travelling in excess of 40 mph (64 kph), but that 1.5 m lanes may generally be acceptable on roads with a 30 mph speed limit. However, when traffic passed cyclists who where in cycle lanes it was found that motorists were passing too close to cyclists (Parkin. J *et al*., 2009). Drivers provide greater passing distances to cyclists on stretches of road without cycle lanes; cycle lanes therefore do not appear to provide greater space for cyclists in all conditions (Parkin. J *et al*., 2009).

6.1.2. Reducing Speed Limit

Speeding occurs in all motorised countries, however when road users were asked what was their main concern while using roads, speeding was not one of them (Elvik, 2010). In accidents involving unprotected road users and large vehicles, it is often the sheer dimensions and design of the vehicles that cause fatalities; accidents need not happen at a high impact speed to become fatal (Elvik, 2010).

In October 2009, Dublin City Council introduced a new Bye-Law which reduced the speed limit on certain streets in the City centre to 30 kph in an attempt to reduce accidents in the centre and to protect cyclists.

6.2. Behaviour

6.2.1. Education and Training

Road user behavioural changes are necessary to help reduce and prevent road collisions. This can be partly achieved through awareness programmes of education, training, publicity and promotion (DCC, 2009b).

In the United Kingdom, children receive cycle training in primary school under the education curriculum. On the 7th October 1947 the first Cycling Proficiency Test took place at RoSPA Road Safety Congress, and now between 200,000 and 250,000 children receive some kind of cycle training each year (RoSPA, 2001). The Royal Society of Prevention of Accidents carried out their own study of the education programme they provide. They found that:

a) A control group of children who had not been trained had 3 to 4 times as many casualties as the trained group.
b) Trained children may be three times less likely to become a casualty than those who had not been trained.

c) The training improved the children's cycling behaviour. The trained children had a better general knowledge of cycling than the untrained children.
d) Children who had been trained on cycling awareness courses generally performed better than those trained on an instruction-based course.
e) Practical training on its own and in conjunction with theoretical work significantly improved the children's cycling performance, and the improvement was still apparent after 3 months.
f) A training course is as good as those who deliver it, and the training of cycling instructors and tutors varies widely, and very often consists of a novice instructor observing an experienced one for a short time.

In the Republic of Ireland no such training programmes existed until 2009 when Dublin city Council rolled out a programme called 'BIKE START' - an integrated cycling training programme to primary schools in September which offers the highest level of training in Europe (DCC, 2009a). Also, the Dublin City Council introduced an adult cycle safety programme (DCC, 2009a). However, this is only available in the Dublin City Council area, the rest of the country leaves cycle training to be provided by parents, other family members and friends.

If the findings of the RoSPA hold true then a similar system introduced here nationally would help prevent injuries occruing in young cyclists and adult cyclists as the training would be used throughout their life.

6.2.2. Bicycle Maintenance

The cost of buying and maintaining a bike is approximately 1% of the cost of buying and maintaining a car (dublincitycycling, 2010). One of the most crucial aspects of bicycle maintenance is ensuring that brakes are suitable for the bike and that they fit properly. Brakes should ideally be tested regularly.

6.2.3. Signalling

When at a junction on a road it is important that cyclists use the correct hand signals to inform other road users of their intention to turn left or right or go straight ahead.

If these signals are not correct and clear to the other road users the cyclist is in danger of having an accident due to lack of communication to other road users.

6.3. Personal Protection Equipment (PPE)

6.3.1. Use of Lights, Helmets and High Visibility Clothing in the reduction of accidents.

To prevent accidents occurring, cyclists are encouraged to use lights, helmets which fit properly, and high visibility clothing. These three factors are referred to as Personnel Protection Equipment or P.P.E.

Lights front and back are required by law after dark in Ireland. Lights are important for cyclists as they allow motorists to see the cyclist in the dark especially if this is the only form of visibility aid the cyclist is using.

However, neither helmets nor high visibility clothing are required by law. Whether all should be made legal has caused some major debates in accident prevention studies. The major debate centres on the usefulness of helmets and would make them a legal requirement to actually make a difference to cyclist safety.

PPE is very important when it comes to preventing and reducing accidents involving cyclists and other road users. The use of high visibility clothing is proving to be a factor in look-but-failed-to-see-accidents and should be used more often by cyclists. Helmets have also been shown to reduce head injuries to cyclists. However, debate still exists whether they should be used or not.

Even though helmets are effective for all cyclists they are not always properly used. For example, they can be worn in a poor position on the head and hence helmet design can possibly be improved to reduce improper use. Nevertheless, helmets decrease the probability of fatal injury and possible or no injury and can protect against serious injuries, head injury and brain injury, and, as a result, the probability of fatal injury decreases with their use (Kim. J *et al*., 2006).

Helmet usage is related to other factors: for example, helmet usage rates usually relate to the amount of time spent riding a bicycle each year and helmet use in rural areas is lower than in urban areas (Kim. J *et al*., 2006).

Bicycle helmets reduce the risk of serious head and facial injury if used correctly, and there are two forms of such injuries: skull injuries and brain injuries (Kweon. Y *et al*., 2010). Typical skull injuries can heal relatively quickly, but brain injuries can lead to permanent disability and head injuries account for about 70% of bicycle-related hospital admissions and of fatal bicycle traffic crashes, and if all children aged 4–15 wore helmets, 39,000–45,000 head injuries in traffic crashes would be prevented annually in the United States (Kweon. Y *et al*., 2010).

A considerable portion of bicycle crashes results in head injuries and helmet use is the single most effective preventive measure to reduce head injuries and fatalities resulting from bicycle crashes, increasing helmet use would make a significant improvement in bicycle safety for all ages (Kweon. Y *et al*., 2010).

The use of high visibility clothing is also important. The ability of drivers to respond in time is greater when cyclists or pedestrians make use of visibility aids, and drivers are four times more likely to blame visibility factors on accidents or near misses involving cyclists (Wood *et al*., 2008). Wood *et al* (2008) looked at 99 crashes and found 63 of these accidents were reported as being the result of the driver not seeing the cyclist in time to avoid a collision with 95% of the drivers surveyed agreed that cyclists need to wear reflective clothing in low light environments, but only 72% of the cyclists agreed. Drivers consider reflective vests to be more visible than do cyclists at night and in the day, and drivers are more likely than cyclists to attribute the crash to the poor visibility of the cyclist, while cyclists believe that they are visible at more than twice the distance estimated by a driver under the same circumstances (Wood *et al*., 2008).

Fluorescent clothing is a useful visibility aid in the daytime as it converts the wavelength of light in the ultra-violet range, thus leading to an overall increase in reflective visible light, however fluorescent clothing is considerably reduced at night as street lighting contains less UV light that does sunlight (Wood *et al*., 2008).

6.3.2. MP3 usage and the effects of music tempo on vehicular control.

A study by Brosky (2002) demonstrated that accelerated music tempo may cause motorists to demonstrate significantly more high risk behaviour while driving. This study by Brosky (2002) also showed that driving while listening to fast tempo music not only caused a high number of collisions and disregarded red lights, but significantly increased vehicular shifting or weaving. Based on these findings, it is also thought that listening to music while cycling may interfere with the cyclist's sensory awareness, i.e., the ability to hear other road users and sounds. High levels of sensory awareness are necessary for safe road behaviour, including avoiding collisions, etc. Furthermore, as Brosky (2002) has shown for motorists, listening to music may similarly impair a cyclist's decision-making skills which can lead to high-risk road behaviour.

6.3.3. Determinates of Bicycle Helmet Use

As a cyclist increases in age the probability of wearing a helmet decreases; however this changes when the cyclist reaches around the age of 46 years of age (Ritter. N *et al*., 2010). Individuals with a college diploma have a higher probability of helmet use, as do individuals who ride on a weekly or monthly basis, also the presence of a higher income and the presence of children both increase helmet usage and men are more likely to regularly use a helmet than women (Ritter. N *et al*., 2010).

Important studies which can deter cyclists from wearing helmets are the findings of Walker. I. (2006). In his study he found that:

a) Drivers frequently believe bicyclists wearing helmets are more serious, sensible and predictable road-users than bicyclists without helmets.
b) Drivers left more space for what they thought was a woman.

c) The further out into the road the experimenter cycled, the less space he received from overtaking vehicles.
d) A rider is more likely to experience particularly tight passing events when wearing a helmet.
e) Drivers of buses and heavy goods vehicles passed the rider much closer than other drivers.
f) Buses and heavy goods vehicles take much longer to pass a bicyclist than shorter vehicles. This means to pass safely, a driver must encroach onto the oncoming traffic lane for a long period.

Closer overtaking could be the result of drivers believing helmeted riders to be more serious and experienced and so less likely to act erratically and motorists make assumptions about bicyclists' behaviours based on a brief visual assessment of their likely experience levels, also female cyclists are given more space from motorists while over taking because females are seen as more frail and are less predictable then male riders (Walker. I., 2006).

6.3.4. The Helmet Law Debate

Although the effectiveness of helmets is preventing head injuries in cyclists are well documented there has been a paucity of research on other injury prevention measures that may prove to be as effective as helmets (Hagel *et al*., 2007). In bike only crashes when the rear wheel skids, common impact sites are legs, hips, arms or shoulders; bareheaded cyclists rarely hit their heads in minor crashes; head on collision with a vehicle travelling more than 80 km/h is likely to cause death or serious head injury, irrespective of helmet wearing (Robinson *et al*., 2006).

Helmet wearers are more likely to ride in parks, playgrounds or bicycle paths then streets, obey traffic laws, wear fluorescent clothing and use lights at night, and helmet laws discourage children more than adults (Robinson. D.L., 2006). Bareheaded cyclists rarely hit their heads in minor crashes and that a head on collision with a vehicle travelling more than 80 km/h is likely to cause death or serious head injury, irrespective of helmet wearing (Robinson. D.L., 2006).

Any legislation (including helmet laws) should not be enacted unless the benefits can be shown to exceed the costs and that helmet legislation should be evaluated in terms of the effect on cycle-use, injury rates per km cycled, and changes in percentages of hospitalised cyclists with head and brain injuries (Robinson. D.L., 2006).

Helmeted cyclists spent an average of 5.7 days in the hospital with a mean of 1.1 days in the Intensive Care and that those without helmets averaged 6.0 days in the hospital with a mean of 0.7 days in the Intensive Care Unit, most cyclists suffered orthopaedic injuries and 75% of head injured patients were without helmets, (Rosenkranz *et al*., 2003).

6.3.5. Evidence from New Zealand

As of January 1st 1994, all cyclists in New Zealand are required to wear a standard approved cycle helmet for all on-road cycling. Helmet wearing significantly reduces head injuries to cyclists in all age groups and the helmet law was an effective strategy to increase helmet wearing; it is also estimated that the helmet law averted 139 head injuries over a 3-year period (Scuffham. P *et al*., 2000). This shows that helmet laws can be an effective mechanism to increase helmet wearing and prevent head injuries.

7. Aims and Objectives of this Study

The aims and objectives of this study are to:

a) Observe studies of safety equipment used by both categories of cyclists.
b) Investigate the factors inhibiting use of PPE.
c) Investigate sensory awareness/preparedness among cyclists.
d) Assess their road positioning
e) Assess their communication with other traffic.
f) Assess the responsiveness of cyclists to the behaviour of pedestrians and other vehicles.

II. Methodology

1. *Survey locations*

The first thing at the start of this project was to identify all the Dublin bike stations and assess which ones would be the busiest so as to allow for more efficient completion of questionnaires. St. Stephens Green East, St. Stephens Green south, Exchequer Street and Cathal Brugha Street were chosen as the best stations from general observations carried out.

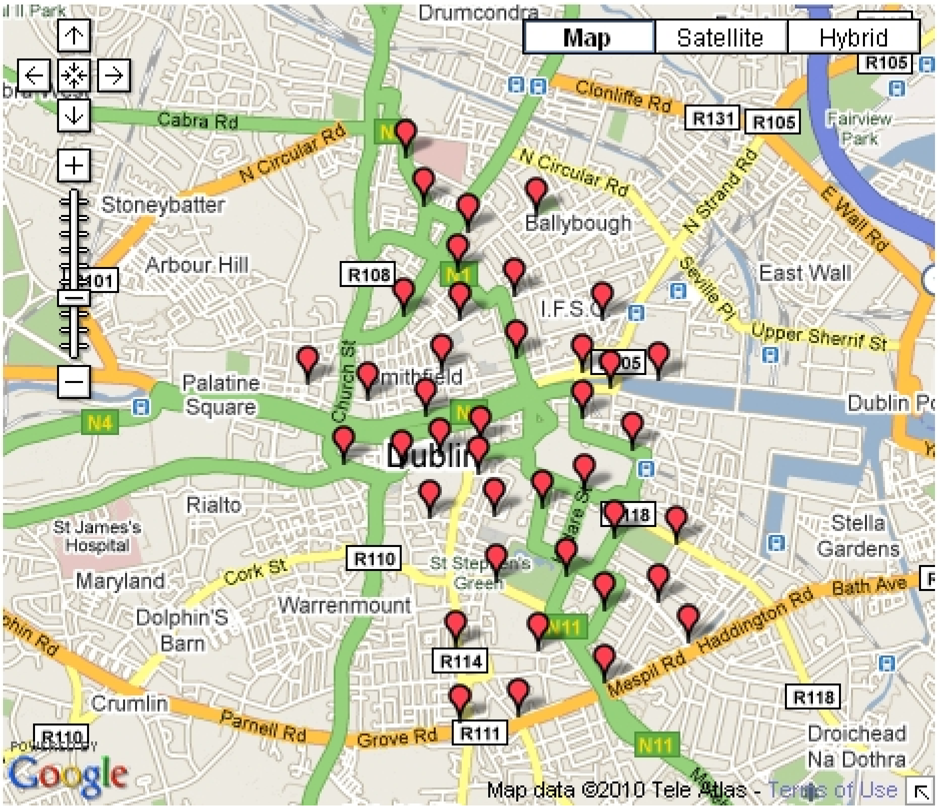


Figure 2.01: Dublinbike Station Map taken from Dublinbike.ie (2010).

The streets chosen for owner cyclists were O'Connell Street, Nassau Street, and the area on the Red Line Luas tracks between Abbey Street and Heuston station. The Red Line Luas track is usually quite busy with regular cyclists as it is a major route into town but does not bring cyclists onto the quays where there is extremely heavy traffic. The majority of questionnaires were completed near Nassau Street due to the prevalence of cyclist traffic around Trinity College Dublin by students and lecturers.

2. *Questionnaire design*

After choosing where the questionnaires and observations would be carried out, the next step was to select the variables to be monitored. Initially, the project plan was to observe:

- Helmet usage.
- High visibility clothing usage.
- Load carried.
- Whether the load is being carried appropriately.

However, after carrying out literature research it was decided to add more aspects to this list as the original handful of criteria would not generate sufficient data to analyse in the project. It was decided that the questionnaire should also seek information about:

a. The sex of the cyclists to see if there was a difference between male and female cyclists.

b. The age of the cyclists to see if age is an additional factor in cycling/road behaviour.

c. How often the cyclist would cycle, i.e., daily, weekly, etc.

d. The reasons behind limited or no use of Personal Protection Equipment (PPE) such as a helmet, high visibility clothing, and lights.

In a study of the effects of music tempo on simulated driving performance and vehicular control, Brodsky (2002) showed that music can interfere with sensory awareness in drivers. This research project also investigates if this finding could be transferred to cyclists. After much discussion before starting the surveys, it was decided that the findings of Brodsky (2002) may indeed be applied to cyclists, as operating a bicycle while listening to music would be very similar to operating a car while listening to music. Based on this, the question "do you listen to MP3 players and if you do use them did you know this could affect your sensory analysis" was added.

A copy of the questionnaire was sent to my supervisor on the 12th April 2010, changes were made and two more questions added. These were:

a. What was their distance of commute?

b. How do you feel while cycling? As in ‘do you feel confident while cycling?’

After choosing which questions should be asked, the format of the questionnaire had to be examined as did the order in which the questions would be asked. There was also a problem with the sensory analysis question as the phrasing was complicated (question 14). By the 4th May the main questions of the questionnaire were finished yet the phrasing of question 14 had yet to be corrected and the order of the questions still required work. During June the order of the questions was decided on and a copy was sent to my supervisor for approval. Six pilot questionnaires were given to people who cycle.

3. Pilot questionnaires

On the 1st July the six trial questionnaires were gathered. The pilot group were asked to write down any issues that they had with the questionnaire. It emerged that question 14 raised problems, which was expected, but this issue was fixed by a suggestion form one of the respondents which allowed the question to be easily understood. Other minor recommendations or adjustments were also added. It was during this pilot survey that the question “Do you think helmets should be a legal requirement?” arose. This may have arisen due to the recent legislation in Northern Ireland requiring all cyclists to wear helmets. This law already exists in Australia and New Zealand. This extra question was added, under the helmet usage question. This modified copy of the questionnaire was again sent to my supervisor. The finished questionnaire was used as it had the same questions as before but in a more comprehensive manner. In mid-July the first of the questionnaires were handed out at Dublinbike stands.

4. Dublin bike users surveys

It was decided that Dublin bike users would be the first to be surveyed as these cyclists have to stop to remove and return a bike. This action allowed for a greater chance to get their attention easily to carry out the questionnaire. Also, the questionnaires where started in the summer, with the hope the good weather would increase the chances of finding more users. A different station was chosen each week and was focused on for the whole week. However, some days could be very quiet, for instance if it rained no one would be willing to do the questionnaire so overall the surveys took longer than expected. By the end of August fifty surveys were completed by Dublin bike users. This number represents 0.2% of the overall population of Dublin bikes. If time had allowed it would of been preferred to get more questionnaires done to increase my sample size, but due to the large number of people who use Dublin bikes, getting data on a large percentage of the users would be problematic due to time constraints.

For Dublin bike users the idea was to arrive at the designated Dublin bike station at different times each visit, and by standing near the bike stand, but not too close as some people may be put off by having a person standing around the stand. People were approached while they were queuing to take a bike or when they were returning a bike. Throughout the study it was maintained that if someone did not want to complete a questionnaire that they would be left alone to carry out their business at the stand.

5. *Owner cyclist surveys*

For owner cyclists, bike stands where people would leave their bike were identified. People were approached as they would be leaving or returning to their bike and were asked to complete the questionnaire. The original plan was to stop cyclists at traffic lights but it was found that this could be problematic as lights could change and this could cause a road safety issue. Also, many cyclists would be in too much of a hurry to take the questionnaire.

The same amount of questionnaires were carried out for each group so that the results are easily comparable and the study valid.

6. *Observation survey I: road positioning and hand signals*

After the cyclist surveys were carried out, a complementary observation survey was completed on road positioning, hand signal usage, presence of helmets and high visibility clothing. This part of the data collection was carried out by standing at the lights at a major junction in the City Centre, and making a series of observations on cyclists as they approach the lights. The Junction of Lower Lesson Street and St. Stephens Green was chosen. The reason this spot was chosen was because it was thought this would be an appropriate place to carry out the observational study at this as this junction is also in-between the Dublinbike stand at St. Stephens Green East and St. Stephens Green south. This allowed the observational survey to be carried out easily on both users at the same time. Hand signals and road positioning were noted as either being right or wrong. The use of helmets and high visibility clothing were noted as either present or not. This was done for all four options by placing a "tick" or an "x" in the relevant column of survey. The type of cyclist was also noted using the abbreviations "DB" (Dublin bike) and "O" (Owner cyclist). Fifty Dublinbike users and fifty owner cyclists were observed.

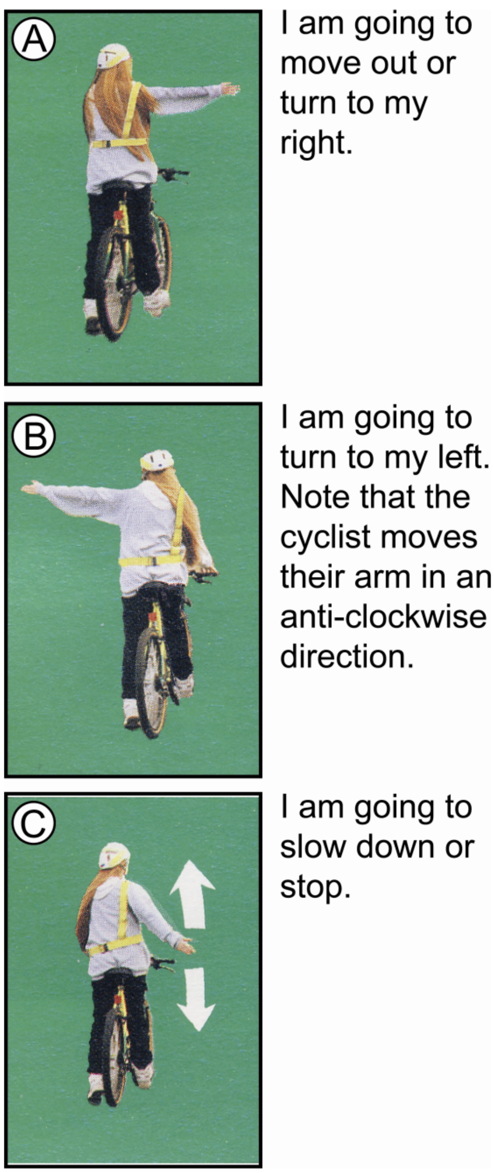


Figure 2.02: Hand signals to be given by cyclists to other traffic. (A) Cyclist turning right, (B) cyclist turning left, and (C) cyclist slowing down or stopping. Adapted after the rules of the road handbook, issued by the Department of the Environment (1995).

7. *Observation Survey II: Photographs*

During the observational study the potential to photograph cyclists making right hand turns was introduced. This would not only allow for the gathering of statistical data from the study but also give the potential of photographic evidence to support findings made. To carry out the observational study, an observation point was set up at the traffic light island at the junction of St. Stephens Green East and St. Stephens Green south and photographs of cyclists making right hand turns were taken.

8. *Statistical significance of the surveys*

According to the CSO Press Release "Ireland, North and South: a Statistical Profile 2003 Chapter 7, Transport and Tourism" (CSO 2003), 34,250 people cycle to work. By surveying 50 of these people I would generate statistics for 0.145% of the total cycling population. Dublinbike have 37,000 full time subscribers (Irish Times, 2010b) by surveying 50 of these I would generate information for 0.135% of their users. If 100 questionnaires of each group were done, I'd gather 0.29% of the regular cyclists and 0.27% of the Dublinbike users. However, due to time constraints, this was not possible.

9. *Data analysis*

By the end of October all questionnaires for each group were completed and the observational study was also completed. The next task was to input all this information into Microsoft Excel so it could be transferred into PASW 18.

The data was inputted into Microsoft Excel in the form of numbers, i.e.: 1 for yes, 2 for no. This means that any spelling errors cannot occur and that PASW 18 can analysed the data correctly. Once in PASW 18 the numbered entries were given values and labels. Once complete the data was analysed in crosstabs to give information on different interactions between data; for example: Age and Helmet usage. The information was also analysed in frequencies to give percentages for every question. This was done for Dublin-bike data and owner cyclist data. The observational data was also analysed in this way. The observational data was mainly analysed to show comparisons between Dublin-bike cyclists and owner cyclists. All this data is available in the results chapter.

When doing the analysis for Owner cyclists and Dublin-bike cyclists it was decided to gather all the frequency statistics and to gather the following cross tabulation statistics:

1. Distance/Helmet (Q4/Q5)
2. Helmet/Helmet legal (Q5/Q7)
3. Helmet/HVC (Q5/Q8)
4. Lights/Lights legal (Q10/Q12)
5. Helmet/Feelings (Q5/Q15)
6. HVC/Feelings (Q8/Q15)
7. Feelings/Distance (Q15/Q4)
8. MP3/Attiude Change (Q13/Q14)
9. Age/Helmet ` (Q2/Q5)
10. Age/HVC (Q2/Q8)
11. Age/Lights (Q2/Q10)
12. Age/MP3 (Q2/Q13)
13. Gender/Helmet (Q1/Q5)
14. Gender/ HVC (Q1/Q8)
15. Gender/Lights (Q1/Q10)
16. Gender/MP3 (Q1/Q13)
17. How often cycle/Helmet (Q3/Q5)
18. How often cycle/HVC (Q3/Q8)
19. How often cycle/Lights (Q3/Q10)

However with the Dublin-bike statistics it was decided to leave out cross tabulations Lights/lights legal, Age/Lights, Gender/Lights and How often cycle/lights as these questions could not be answered by Dublin-bike users as all Dublin-bikes are equipped with lights that turn on once the bike leaves the stand.

III.Results

1. *Owner cyclist data*

Fifty owner cyclists were surveyed. Of all the people surveyed who were owner cyclists the following frequencies were found:

- 46% were Male, 54% were Female.

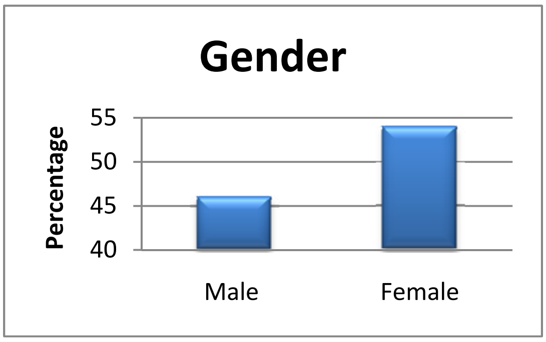


Figure 3.01: Owner cyclist gender frequency.

- 62% were 18-30 years old, 12% were 31-40 years old, 12% were 41-50 years old and 2% were 51+.

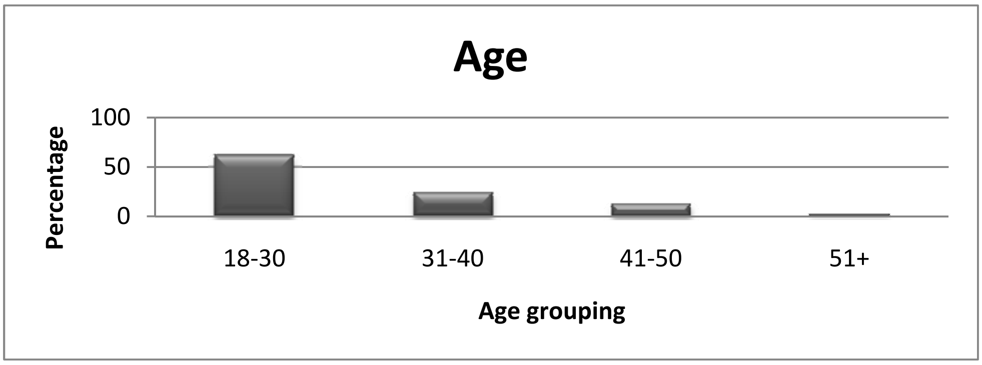


Figure 3.02: Owner cyclist age frequency.

- 28% cycled daily, 14% cycled most days, cycled twice a week 18%, 8% cycled weekly and 32% cycled occasionally.

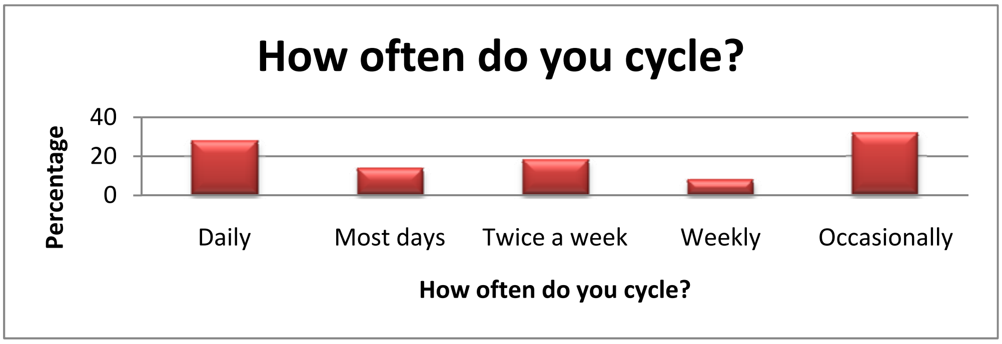


Figure 3.03: Owner cyclist usage frequency.

- 44% travelled less then 3Km, 38% travelled 3-5Km, 12% travelled 5-10Km and 6% travelled more then 10Km.

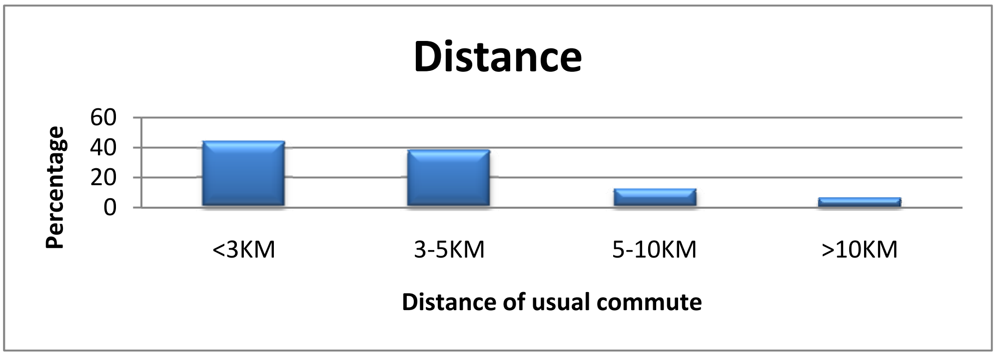


Figure 3.04: Owner cyclist distance travelled frequency.

- 48% said they never wore a helmet, 12% said they rarely wore a helmet, 10% sometimes said they wore a helmet, 12% usually wore a helmet and 18% always wore a helmet.

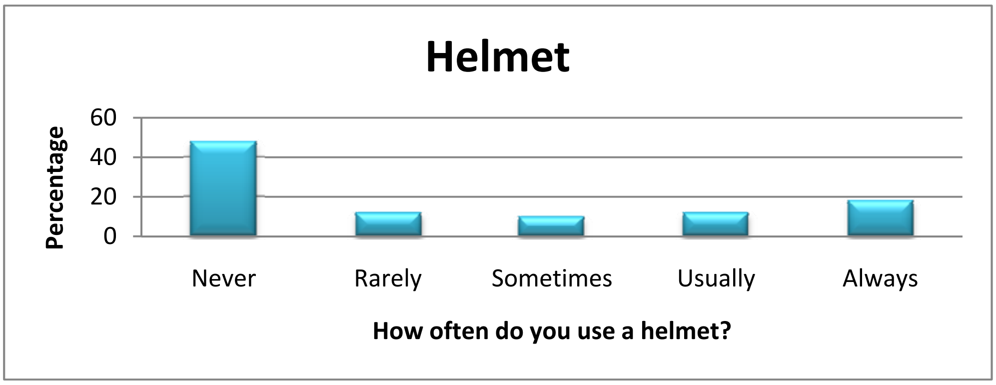


Figure 3.05: Owner cyclist helmet usage frequency.

- 36% said the reason they didn't wear a helmet was because they didn't have one, 22% said other with 2% saying it was unfashionable.

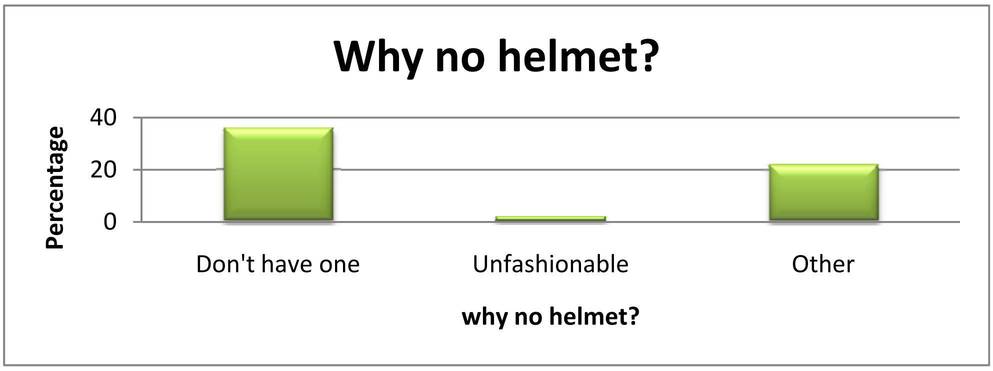


Figure 3.06: Owner cyclist's reasons for not wearing a helmet.

- 46% of people said they think helmets should be legal while 54% they shouldn't.

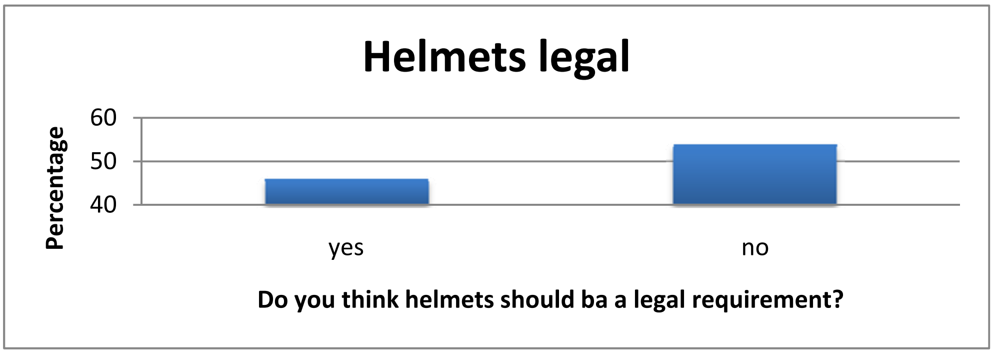


Figure 3.07: Owner cyclist's opinion on helmet legislation.

- 32% said they never used HVC, 22% rarely, 22% sometimes, 16% usually and 8% always.

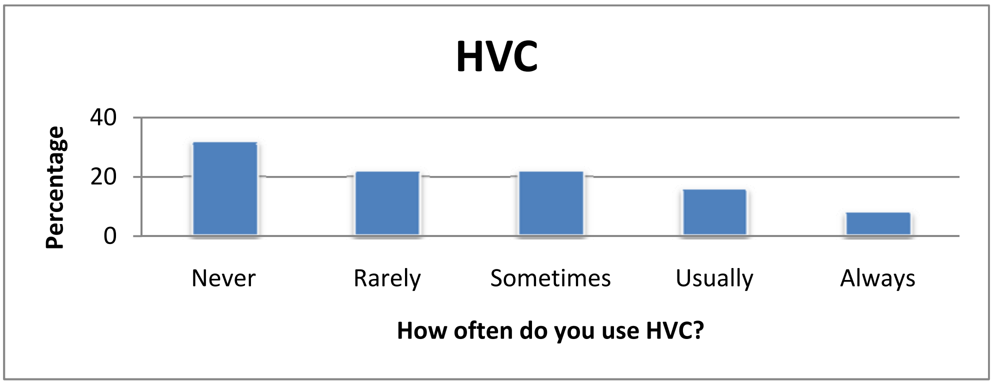


Figure 3.08: Owner cyclist HVC usage.

- 28% said they don’t have HVC, 10% said they’d feel silly wearing HVC, 16% said other. A lot of the other verbally said they would only use HVC during the winter as they felt there was no need during the summer months.

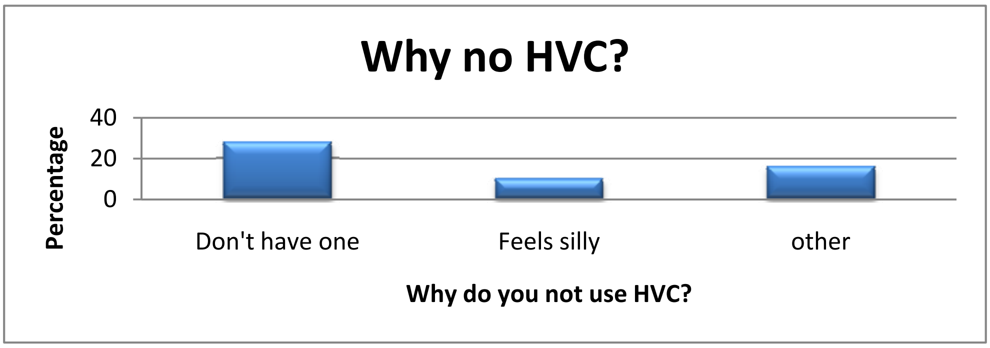


Figure 3.09: Owner cyclist’s reasons for not wearing HVC.

- 16% said they never use lights, 10% said they rarely use lights,14% said they sometimes use lights, 4% usually used lights and 54% said they always used lights.

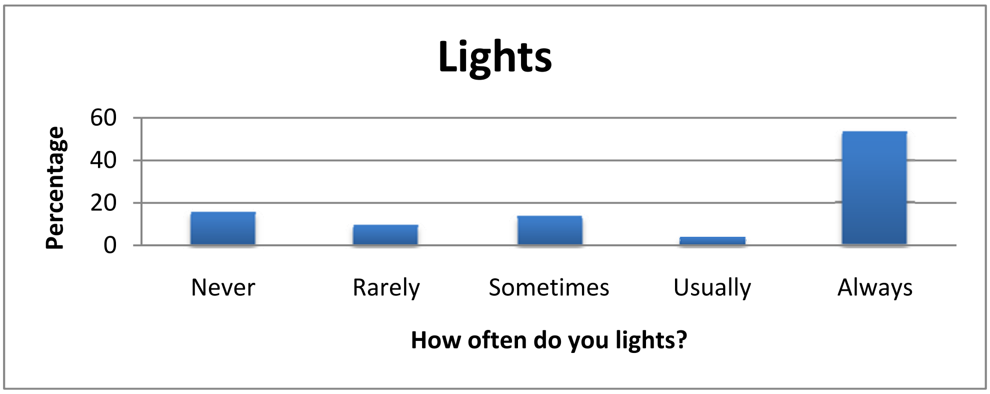


Figure 3.10: Owner cyclist light usage.

- Of the people who never or rarely used lights 18% said they did not have them, 4% found them too expensive and 6% said other.

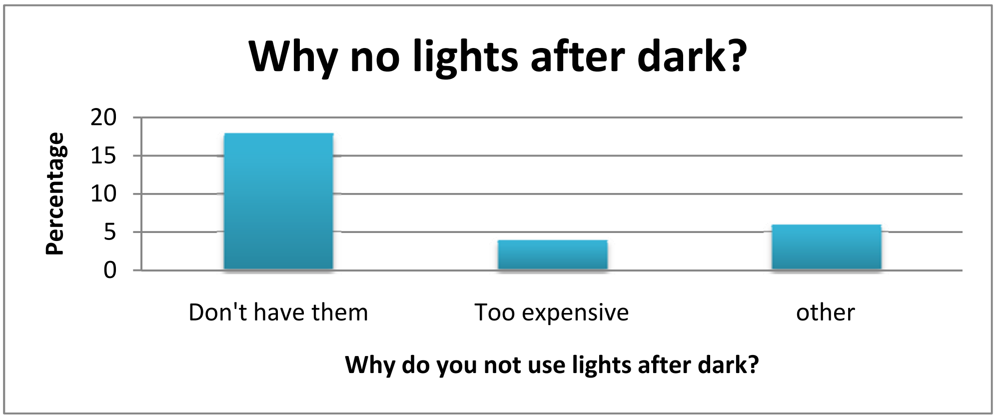


Figure 3.11: Owner cyclist's reasons for not using lights after dark.

- 58% of people surveyed knew lights were a legal requirement after dark and 42% did not know.

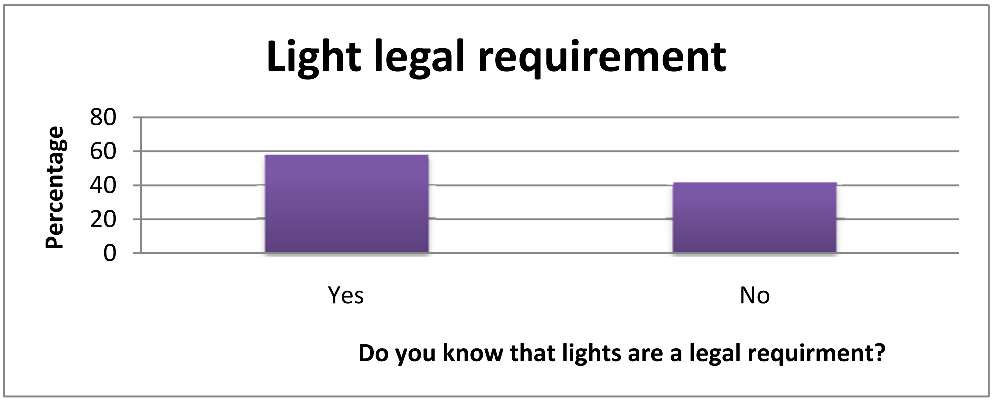


Figure 3.12: Owner cyclist's opinions on light legislation.

- 56% said they never listened to MP3 players, 12% rarely listened to MP3 players, 12% sometimes did, 10% usually did and 4% always listened to MP3 players.

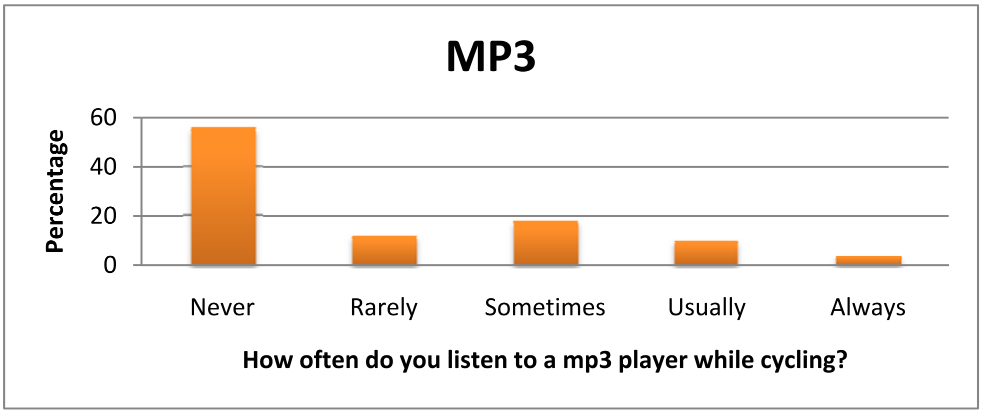


Figure 3.13: Owner cyclist MP3 player usage.

- Of those who listened to MP3 players 24% knew it changed their behaviour on the road, and 30% did not.

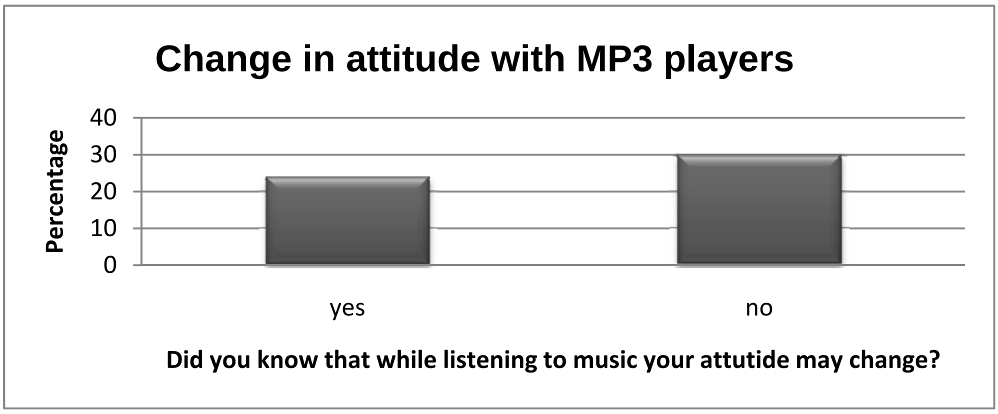


Figure 3.14: Owner cyclist's awareness of changing attitudes while using MP3 players.

- 24% said they felt confident on the road, 30% said they felt fine, 18% said they felt alright on the road, 24% said they felt slightly scared and 4% felt terrified while cycling.

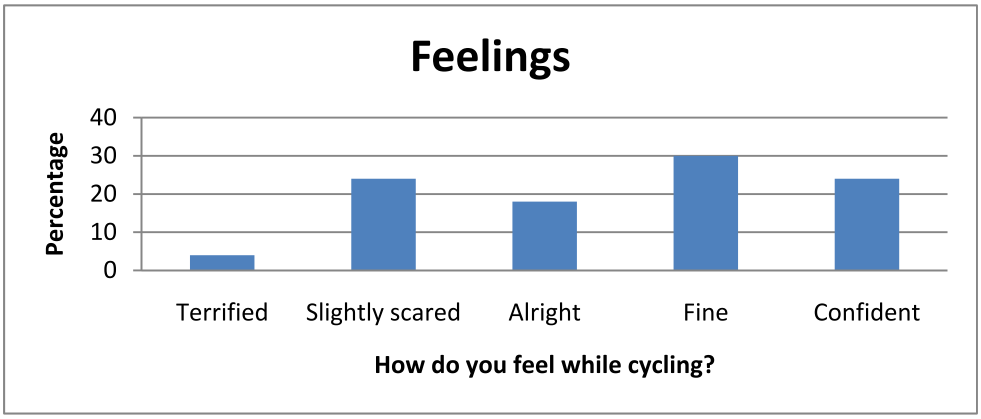
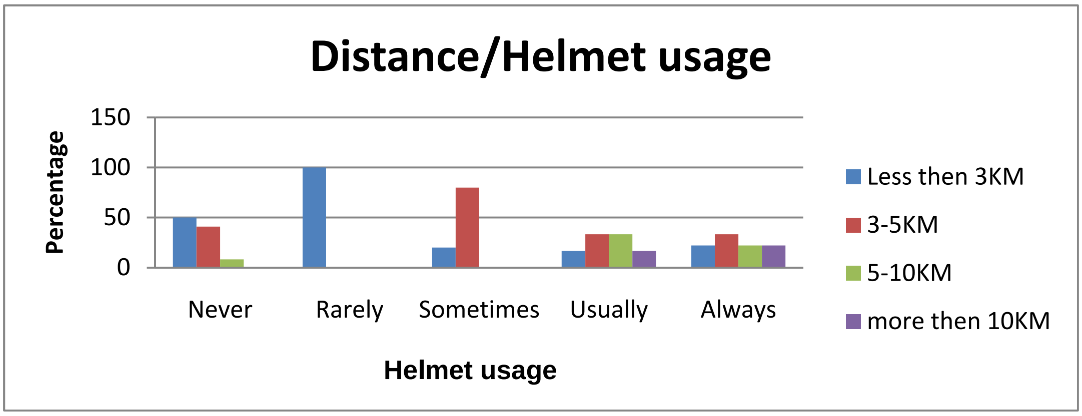


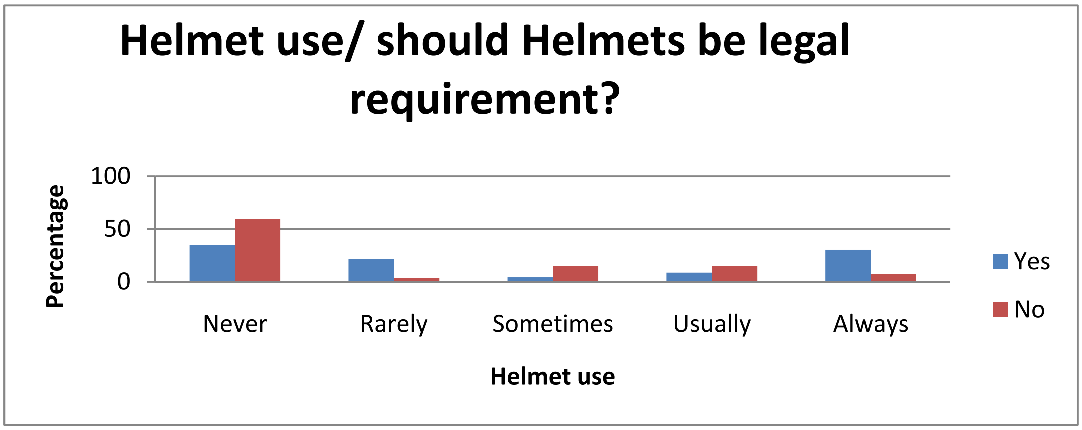
Figure 3.15: Owner cyclist's feelings while cycling.

The following 5 statistically significant cross tabulations were found out of 19 cross tabulations carried out:



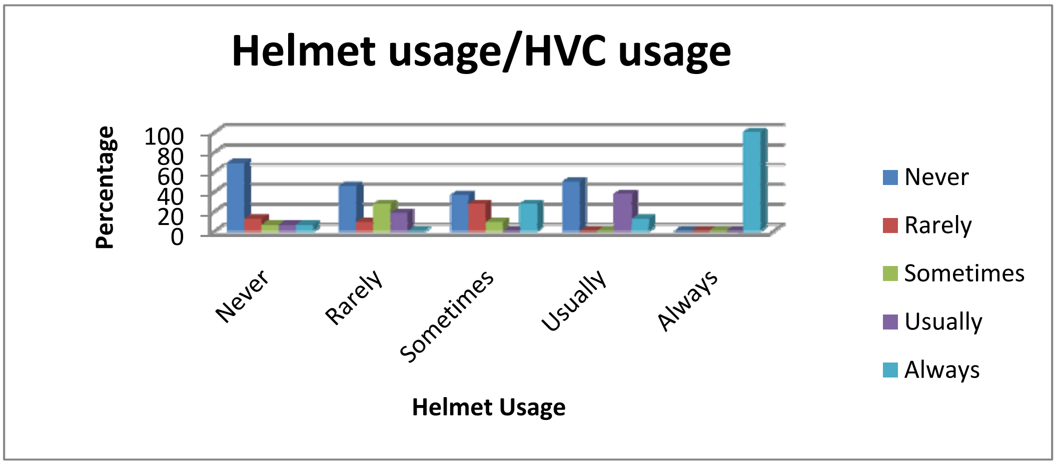
sig 0.022

Figure 3.16: Distance travelled and helmet usage data versus percentage of owner cyclists. Distance data is represented using various colours shown on the right hand side.



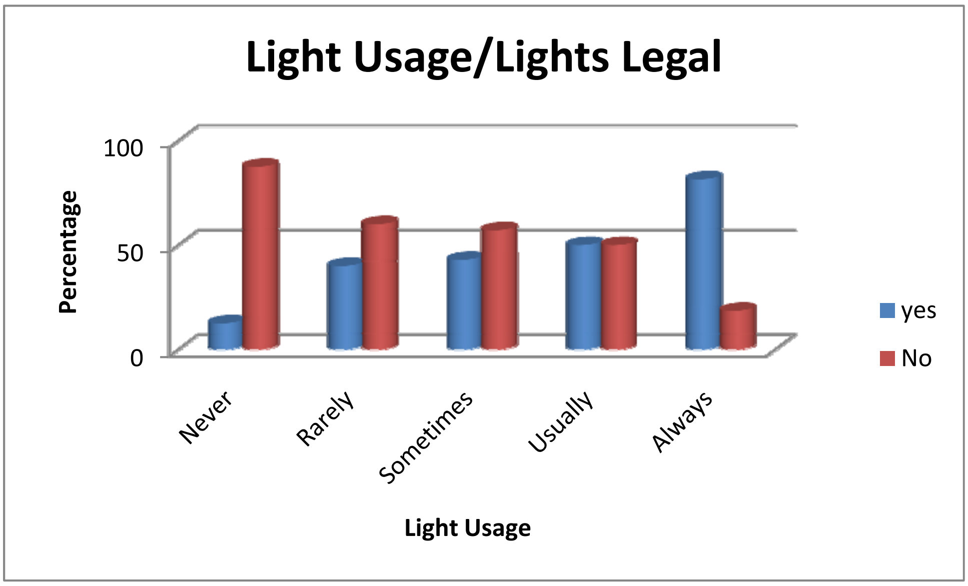
sig 0.035

Figure 3.17: Helmet use and opinions of helmet legislation versus percentage of owner cyclists. Opinion data concerning helmet legislation is represented using the colours shown on the right hand side.



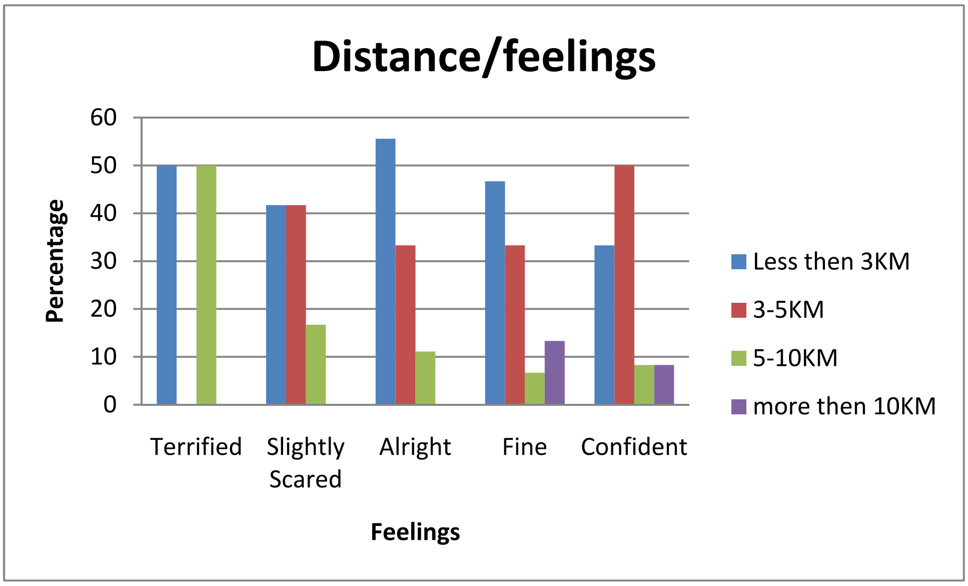
sig 0.002

Figure 3.18: Helmet use and HVC usage data versus percentage of owner cyclists. HVC usage data is represented using the colours shown on the right hand side.



sig 0.008

Figure 3.19: Light use and awareness of light legislation versus percentage of owner cyclists. Awareness of light legislation data is represented using the colours shown on the right hand side.



sig 0.001

Figure 3.20: Distance and feelings while cycling data versus percentage of owner cyclists. Distance data is represented using the colours shown on the right hand side.

1. Dublin-bike Data

Fifty Dublin-bike cyclists were surveyed. Of all the people surveyed who were Dublin-bike cyclists the following frequencies were found:

- 68% surveyed were male, 32% were female.

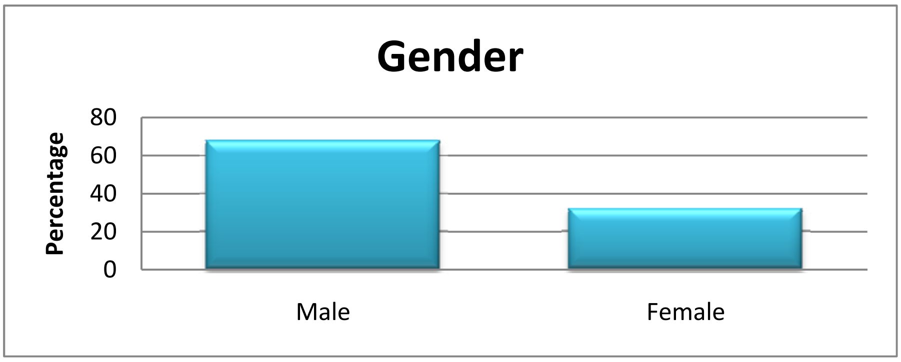


Figure 3.21: Dublin bike user gender frequency.

- 46% were 18-30 years old, 44% were 31-40 years old, 8% were 41-50 years old and 2% were 51+ years old.

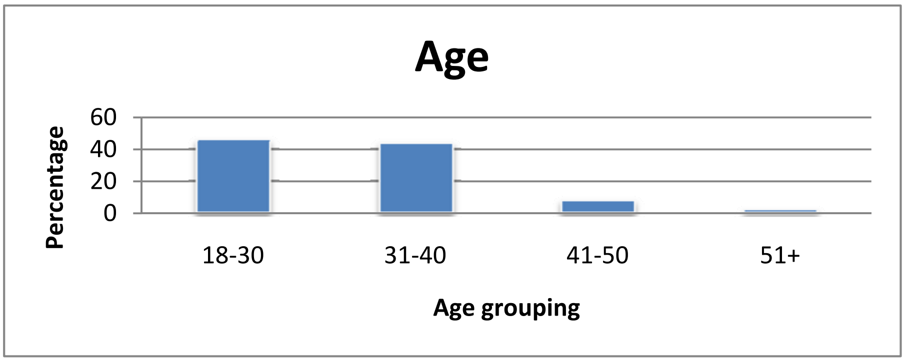


Figure 3.22: Dublin bike user age frequency.

- 56% cycled daily, 18% cycled most days, 18% cycled twice a week, 6% cycled weekly and 2% cycled occasionally.

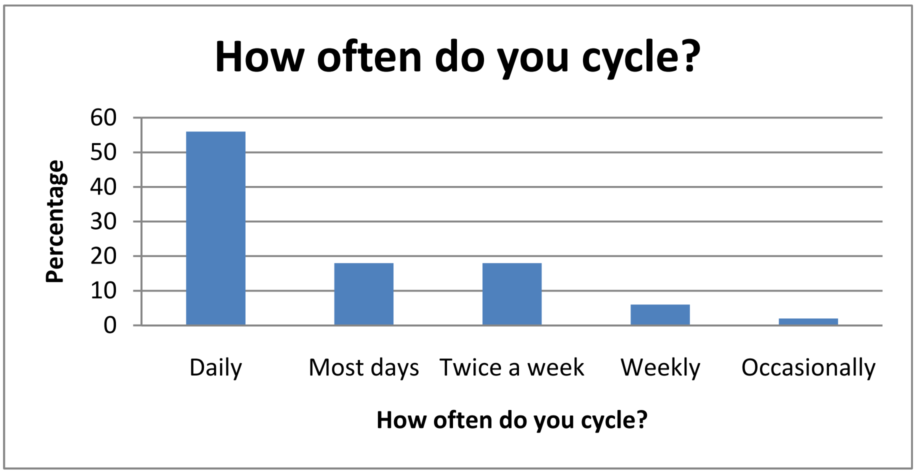


Figure 3.23: Dublin bike user usage frequency.

- 82% travelled less then 3KM, 14% travelled 3-5Km, 4% travelled 5-10KM.

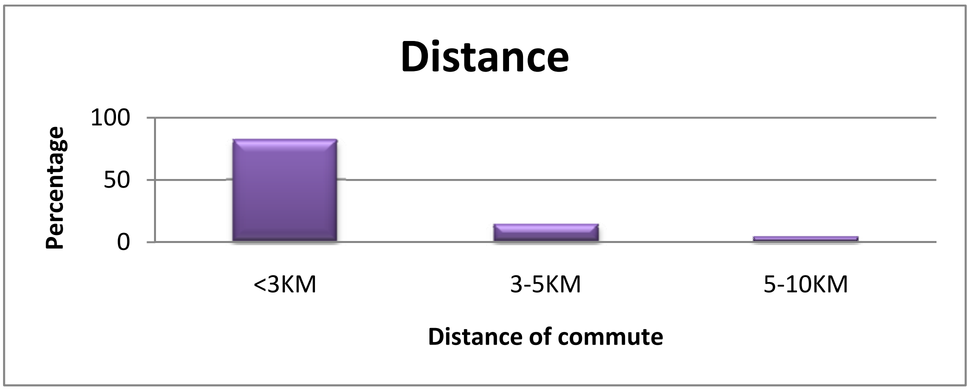


Figure 3.24: Dublin bike user distance travelled frequency.

- 80% never wore a helmet, 12% rarely wore a helmet. 2% sometimes wore a helmet, 2% usually wore a helmet and 4% always wore a helmet.

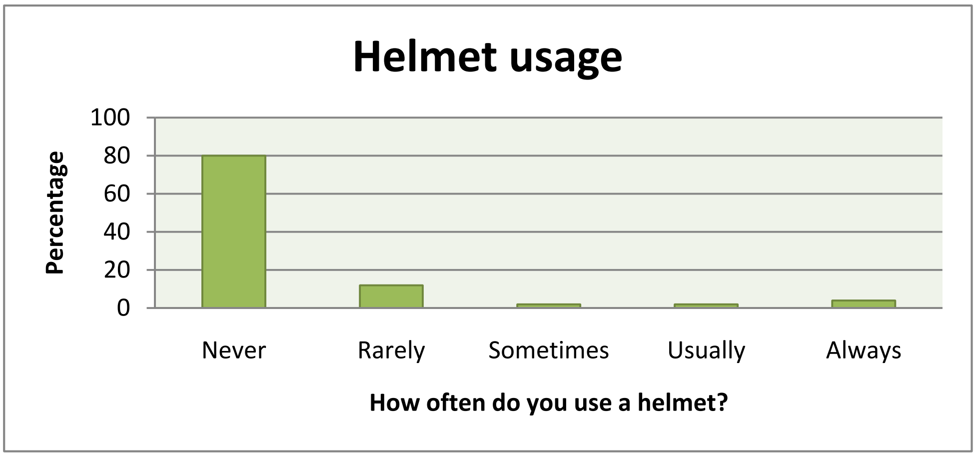


Figure 3.25: Dublin bike user helmet usage frequency.

- 56% said the reason they didn't wear a helmet was that they did not have one, 4% thought it was unfashionable and 30% said other.

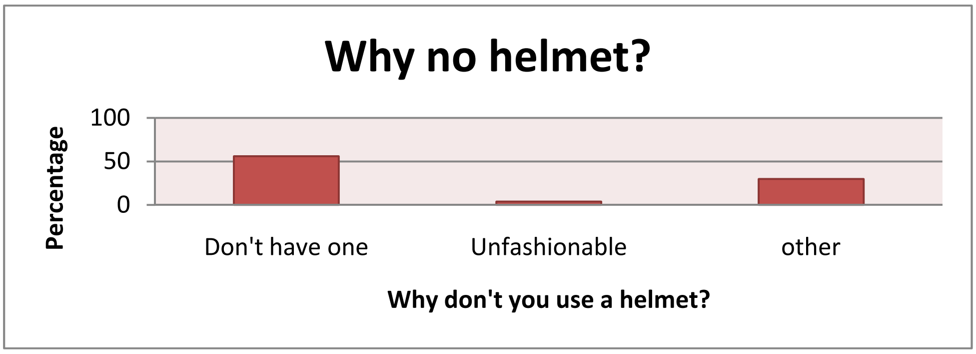


Figure 3.26: Reasons for not using a helmet among Dublin Bike users.

- 48% thought helmets should be legal and 52% said helmets should not be legal.

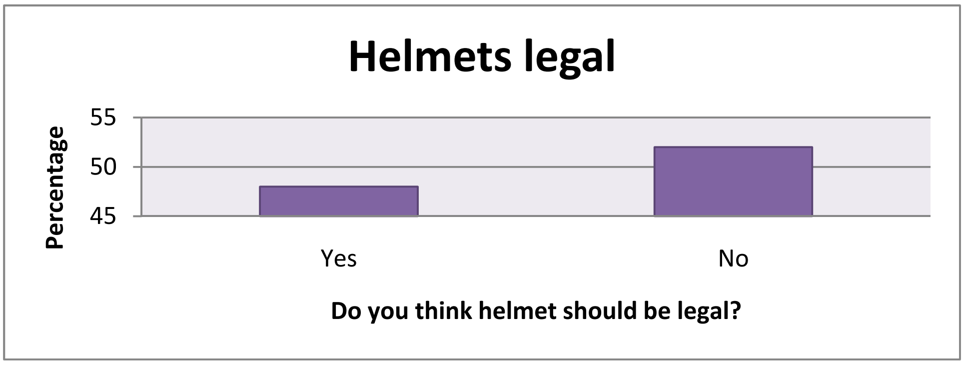


Figure 3.27: Opinions concerning helmet legislation among Dublin Bike users.

- 66% never wore HVC, 10% rarely wore HVC, 18% sometimes wore HVC, 2% usually wore HVC and 4% always wore HVC.

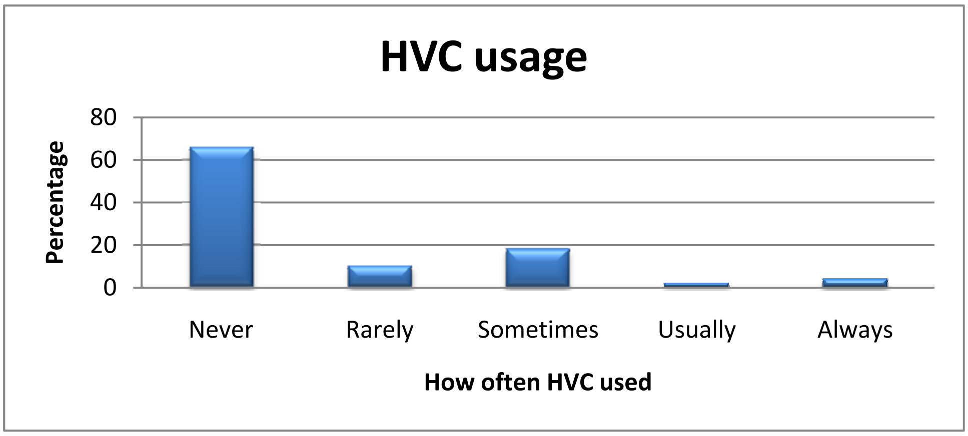


Figure 3.28: Frequency of HVC usage among Dublin Bike users.

- Of the people who said they rarely or never use HVC, 36% said they didn't have any, 4% said they were unfashionable, 2% said they were too expensive, 10% said they felt silly, and 12% said other. I also was told verbally that the main reason they were not using HVC when I asked them was that it was the summer and they felt they had no need for it.

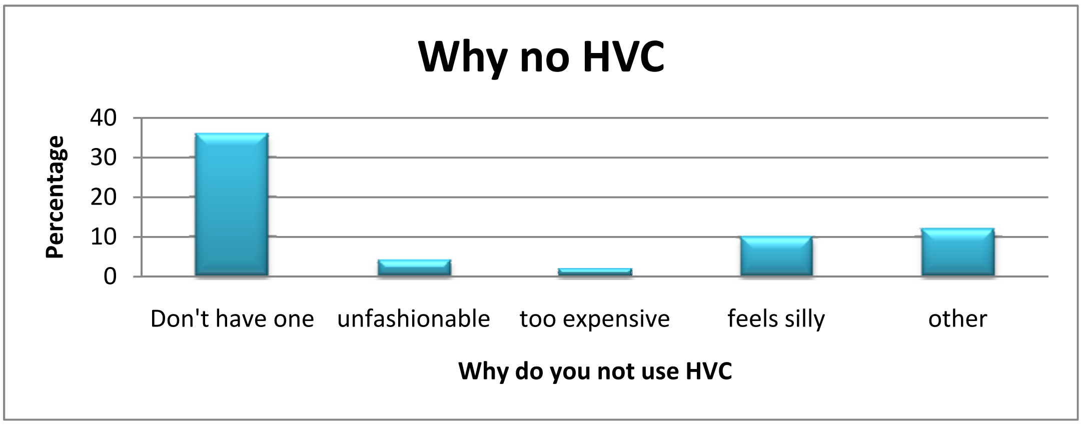


Figure 3.29: Reasons for lack of HVC usage among Dublin Bike users.

- 70% said they knew lights were a legal requirement and 20% said they did not.

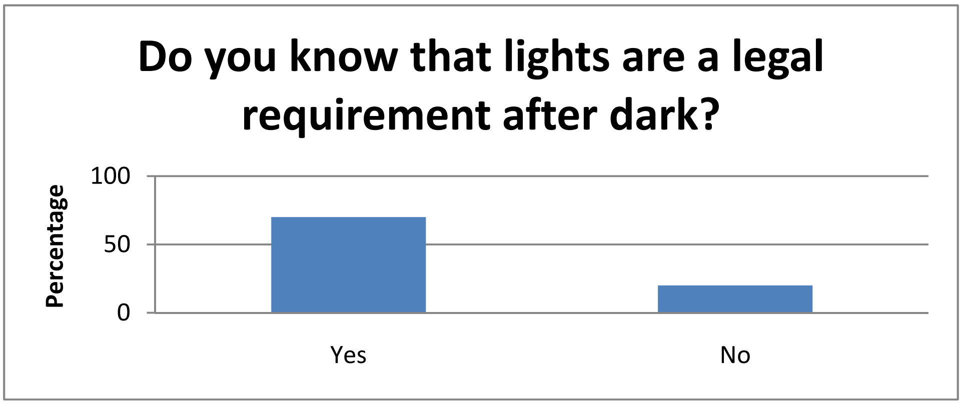


Figure 3.30: Awareness of light legislation among Dublin Bike users.

- 60% said they never use a MP3 player, 16% rarely, 6% said sometimes, 6% usually and 12% said they always use a MP3 player.

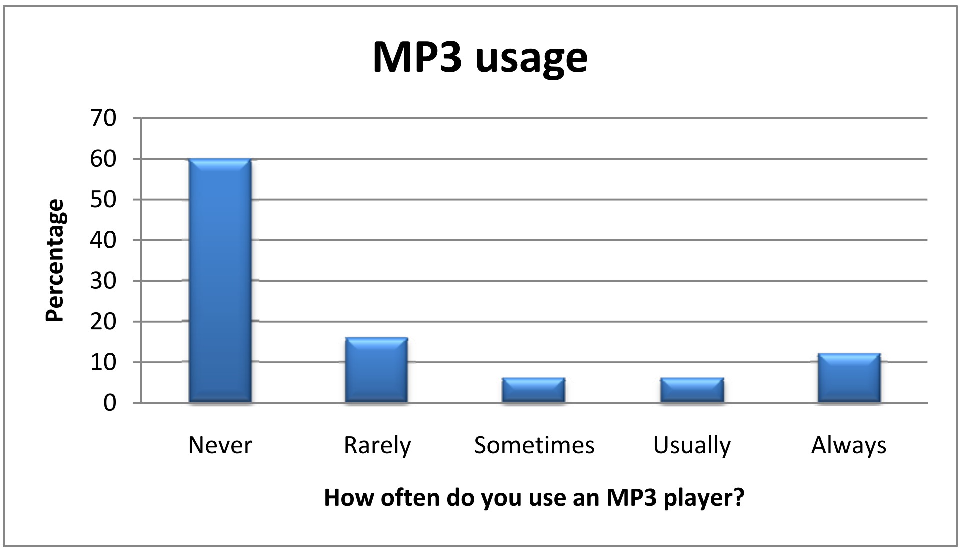


Figure 3.31: Frequency of MP3 usage among Dublin Bike users.

- Of the people who said they usually or always listened to a MP3 player, 22% said they knew your attitude changed when listening to a MP3 player and 16% said they did not.

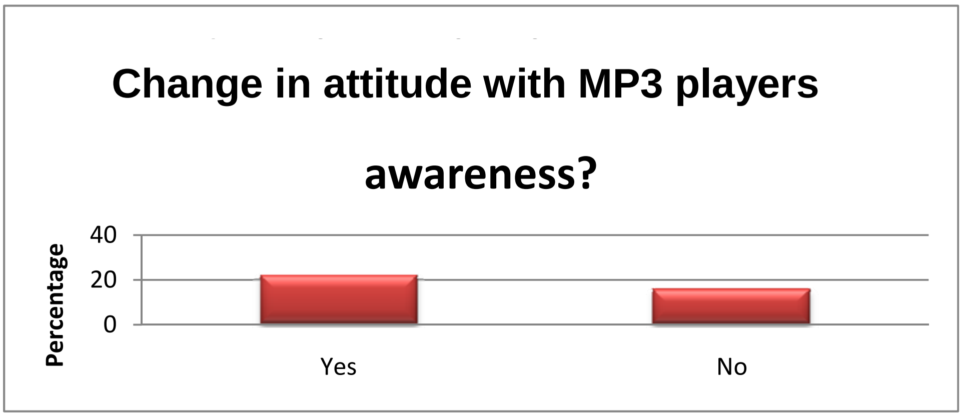


Figure 3.32: Awareness of changes in attitude while using an MP3 player among Dublin Bike users.

- Of the people surveyed, 18% felt slightly scared, 22% felt alright, 34% felt fine and 26% felt confident.

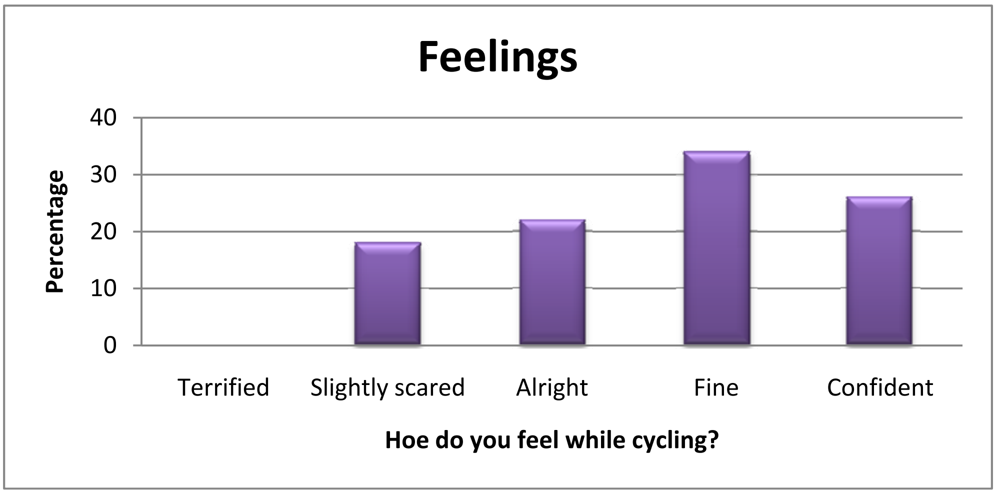
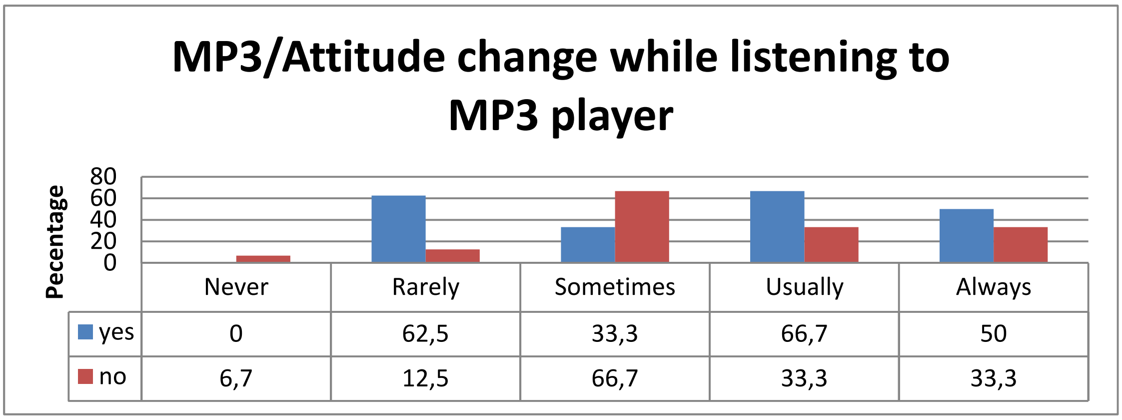


Figure 3.33: Feelings while cycling among Dublin Bike users.

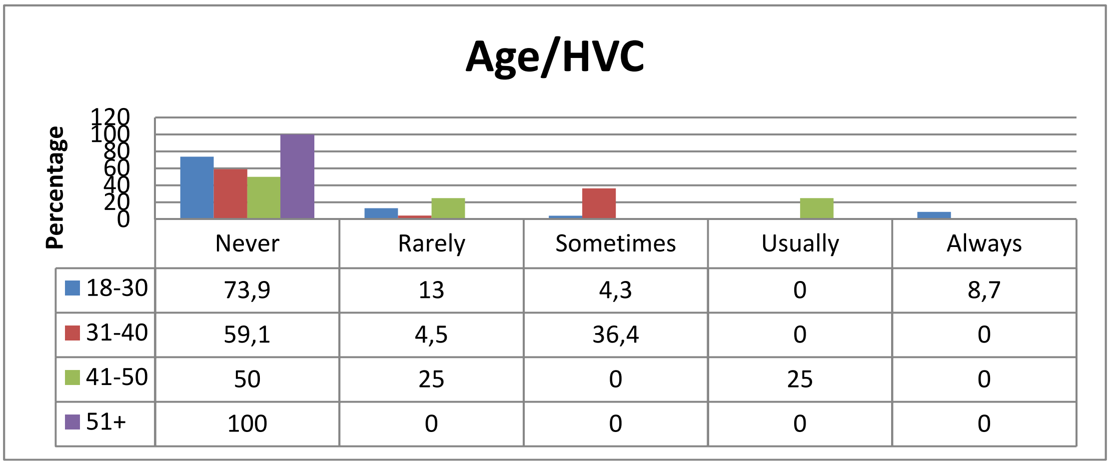
The following 3 statistically significant cross tabulations out of 15 were:



	Never	Rarely	Sometimes	Usually	Always
yes	0	62,5	33,3	66,7	50
no	6,7	12,5	66,7	33,3	33,3

sig: 0.000

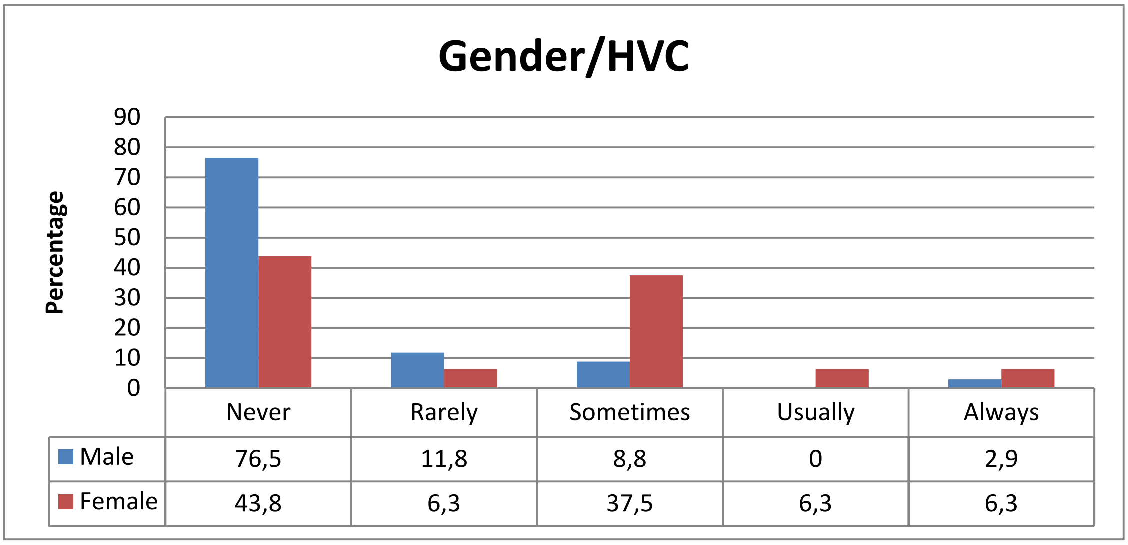
Figure 3.34: MP3 usage and attitude change awareness while using an MP3 player versus percentage of Dublin bike users. Attitude awareness data is represented using the colours shown on the left hand side.



	Never	Rarely	Sometimes	Usually	Always
18-30	73,9	13	4,3	0	8,7
31-40	59,1	4,5	36,4	0	0
41-50	50	25	0	25	0
51+	100	0	0	0	0

sig 0.021

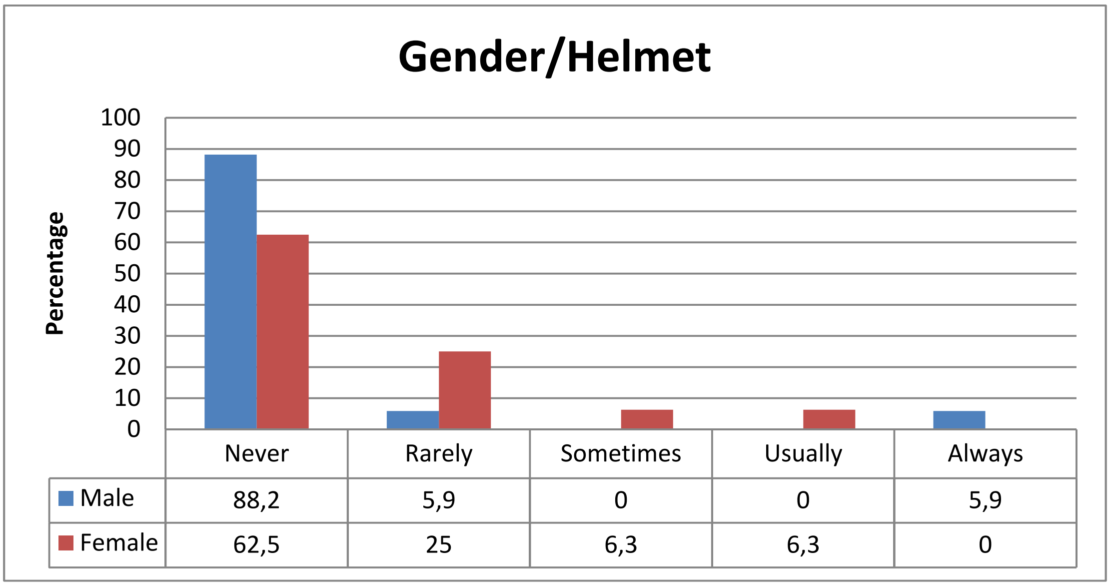
Figure 3.35: Age and HVC usage data versus percentage of Dublin bike users. Age data is represented using the colours shown on the left hand side.



sig: 0.005

Figure 3.36: Gender and HVC usage data versus percentage of Dublin bike users. Gender data is represented using the colours shown on the left hand side.

However, Gender/Helmet cross tabulation was found to not be significant but there is evidence of a close relationship between the two.



Sig: 0.052

Figure 3.37: Gender and helmet usage data versus percentage of Dublin bike users. Gender data is represented using the colours shown on the left hand side.

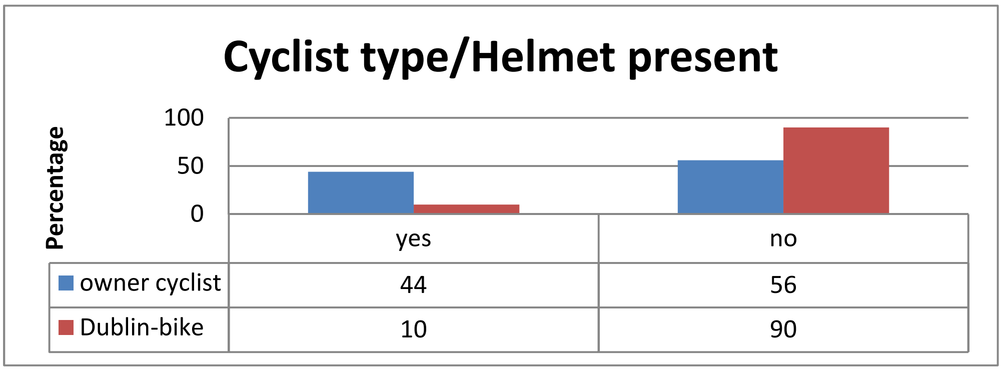
3. Observational Data

Of the 50 Dublin-biker users and 50 owner cyclists observed the following frequencies were noted:

- 34% used correct hand signals and 66% did not. 56% used correct road positioning when taking a right turn and 44% did not.
- 32% used HVC and 68% did not.
- 27% wore a helmet and 73% did not.

4 significant cross tabulations were found out of ten cross tabulations carried out. These were:

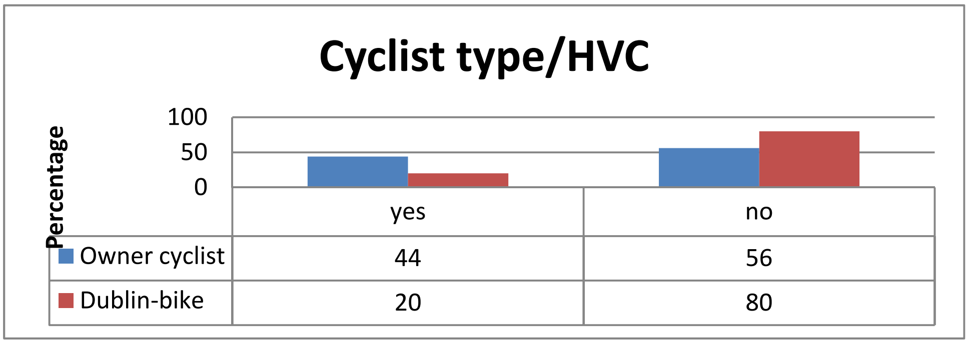
- Cyclist type/Helmet usage



Sig: 0.000

Figure 3.38: Cyclist type and helmet usage data versus percentage of bike users. Cyclist type is represented using the colours shown on the left hand side.

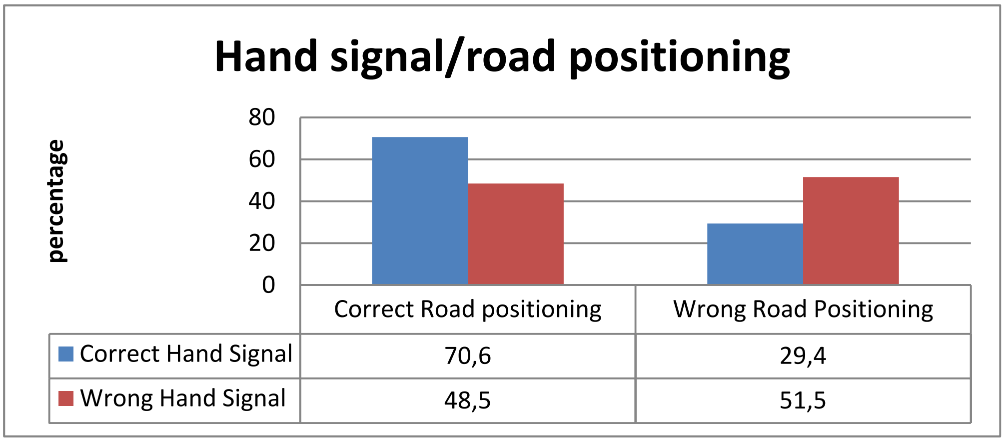
- Cyclist type/HVC



Sig: 0.010

Figure 3.39: Cyclist type and HVC usage data versus percentage of bike users. Cyclist type is represented using the colours shown on the left hand side.

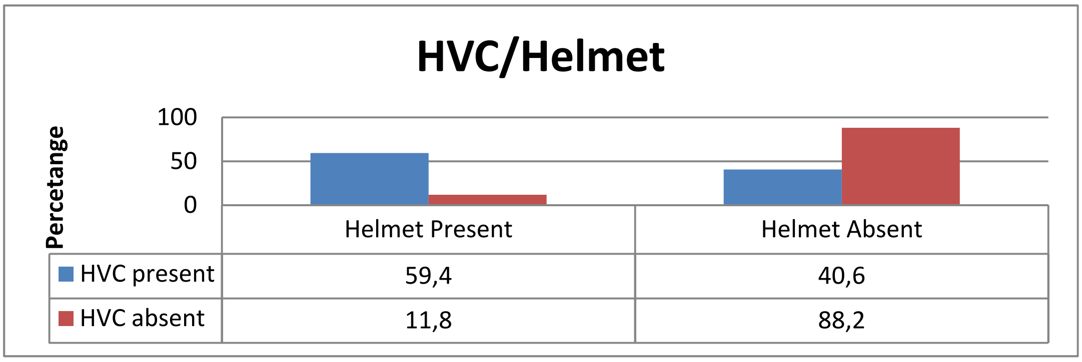
- Hand signal/road positioning



Sig: 0.035

Figure 3.40: Hand signal usage and road positioning data versus percentage of cyclists observed. Road positioning data is represented using the colours shown on the left hand side.

- HVC/Helmet



Sig: 0.000

Figure 3.41: HVC usage and helmet usage data versus percentage of cyclists observed. HVC usage data is represented using the colours shown on the left hand side.

The remaining non-significant findings were:

1. Cyclist type/ Road positioning (Sig: 0.227)
2. Cyclist type/ Hand signal (Sig: 0.673)
3. Hand signal/HVC (Sig: 0.957)
4. Hand signal/Helmet (Sig: 0.180)
5. Road positioning/HVC (Sig: 0.691)
6. Road positioning/Helmet (Sig: 0.191)

4. *Comparison of frequency data between Dublin-bike and Owner cyclists.*

3.1 Gender

	Male	Female
Dublin-bike	68	32
Owner Cyclist	46	54

Table 4.1: Gender distribution data for both groups

3.2 Age

	18-30	31-40	41-50	51+
Dublin-bike	46	44	8	2
Owner Cyclist	62	24	12	2

Table 4.2: Age distribution data for both groups

3.3 How often do you cycle?

	Daily	Twice a week	Most days	Weekly	Occasionally
Dublin-bike	56	18	18	6	2
Owner cyclist	28	18	14	8	32

Table 4.4: Bike use distribution data for both groups

3.4 Distance

	<3KM	3-5KM	5-10KM	>10KM
Dublin-bike	82	14	4	0
Owner cyclist	44	38	12	6

Table 4.5: Distance travelled distribution data for both groups

3.5 Helmet use

	Never	Rarely	Sometimes	Usually	Always
Dublin-bike	80	12	2	2	4
Owner cyclist	48	12	10	12	18

Table 4.6: Helmet usage distribution data for both groups

3.6 Reasons for lack of helmet usage

	Don't have one	Unfashionable	Other
Dublin-bike	56	4	30
Owner cyclist	36	2	22

Table 4.7: Reasons for lack of helmet usage distribution data for both groups

3.7 Do you think helmets should be a legal requirement?

	Yes	No
Dublin-bike	48	52
Owner cyclist	46	54

Table 4.8: Option of helmet legislation distribution data for both groups

3.8 HVC usage

	Never	Rarely	Sometimes	Usually	Always
Dublin-bike	66	10	18	2	4
Owner cyclist	32	22	22	16	8

Table 4.9: HVC usage distribution data for both groups

3.9 Reasons for lack of HVC usage

	Don't have one	Unfashionable	Too expensive	Feels silly	Other
Dublin-bike	36	4	2	10	12
Owner cyclist	28	0	0	10	46

Table 4.10: Reasons for lack of HVC usage distribution data for both groups

4.10 Do you know lights after dark are a legal requirement?

	Yes	No
Dublin-bike	70	20
Owner cyclist	58	42

Table 4.10: Knowledge of light legislation distribution data for both groups

4.11 How often do you use a MP3 Player while cycling?

	Never	Rarely	Sometimes	Usually	Always
Dublin-bike	60	16	6	6	12
Owner cyclist	56	12	18	10	4

Table 4.11: MP3 player usage distribution data for both groups

4.12 Do you experience an attitude change while listening to an MP3 player while cycling?

	Yes	No
Dublin-bike	22	16
Owner cyclist	24	30

Table 4.12: Distribution data concerning awareness of an attitude change while using an MP3 player for both groups.

4.13 How do you feel while cycling?

	Terrified	Slightly scared	Alright	Fine	Confident
Dublin-bike	18	0	22	34	26
Owner cyclist	4	24	18	30	24

Table 4.13: Distribution data concerning feelings while cycling for both groups.

In addition to the above data, a set of observational photos were taken of cyclists approaching a busy junction in Dublin's city centre. Figure 3.42 (below) shows an example of both incorrect and correct road positioning and safety clothing worn by cyclists.

Figure 3.42: Observational photographs of two cyclists at a junction in Dublin's city centre. A: (cyclist highlighted with a red box) note the incorrect road positioning, lack of helmet and HVC. B: (cyclist highlighted with a green box) note the correct road positioning, use of a helmet and HVC.

IV. Discussion

1. ***Owner cyclists:***

5 statistically significant cross tabulations:

1.1 Distance/helmet

It was found that people who travelled less than 3 km where more likely to never or rarely use a helmet. Once the person travelled more than 3 km the likelihood of them using a helmet increased.

This shows that those who spend more time on the road are either more aware of the dangers of the road and the need for helmets or, because of the distance they travel, they are taking cycling more seriously and also taking their safety more seriously.

1.2 Helmet use/should helmets be legal?

It was found that people who never used helmets think that helmets should not be required by law and those who always use a helmet think helmets should be required by law.

This may be because people, who never or rarely use helmets, as seen in 1.2, only travel short distances so they feel no need for a helmet. Helmet use has been shown to be linked to distance travelled. Also, people who always use helmets would not be affected by any helmet obligation legislation as they already wear helmets, whereas people who never or rarely use helmets would feel this would affect them and may even reduce their use of a bicycle.

1.3 Helmet usage/HVC

Those who never or rarely use a helmet are also likely to never or rarely use HVC, where as those who usually or always wear a helmet are more likely to use HVC.

As pointed out in 1.1, the use of a helmet is linked to distance. Therefore a person who wears a helmet is travelling further, may be a more serious cyclist and would take their safety seriously. It would make sense for this type of cyclist to wear HVC. Whereas, those who do not wear helmets are only travelling short distances, are less likely to wear a helmet, and therefore less likely to use HVC.

It should also be noted that this questionnaire was carried out during the summer months (June, July and August). HVC is less likely to be used then as the days are longer and brighter. When being interviewed people indicated verbally to me that they would use HVC in the winter but they felt no need during the summer. Therefore, if this study was carried out during the winter different results may be obtained.

1.4 Light usage/Lights legal

It was found that those who never or rarely used lights after dark did not know they were a legal requirement after dark, whereas those who always use lights after dark knew they were required by law after dark.

These findings are quite worrying. When starting this project it was not expected to find that may people who did not use lights after dark, but to also find that people did not realise this is also required by law shows total lack of understanding of safety and visibility on the road.

1.5 Distance/Feelings

Those who travelled distances over 5 km are more likely to feel fine or confident on the roads then those who travel short distances, less than 5 km.

These short distance travellers are also less likely to use helmets or HVC. Would this group of short distance travellers feel more confident if they used a helmet and/or HVC or is this group made up of people who cycle less often and are not used to cycling. How often do you cycle was asked in the questionnaire but the findings were not significant, so no conclusions can be made. A larger sample size would be required to generate findings, but time constraints have not allowed for this.

Also, due to the fact that this questionnaire was carried out during the summer months (June, July and August), a group of seasonal cyclists who cycle for the summer months due to brighter days and better weather, and who also may have less experience on the roads and therefore feel less comfortable cycling on roads, may been surveyed without knowledge and may have distorted these findings.

2. ***Dublin-bike cyclists:***

3 statistically significant cross tabulations:

2.1 MP3 usage/Attitude change while listening to an MP3 player.

People who never, rarely and sometimes indicated that they noticed no change in attitude while listening to an MP3 player while those who always, usually and sometimes listened to an MP3 player indicated that they noticed an attitude change while cycling. These findings are also highly significant with a significant value of 0.000.

2.2 Age/HVC

Those who never, rarely or sometimes use HVC are more likely to be 31-40 years old and those between 18-30 years old are more likely to always wear HVC than all the other age groups.

This finding was unexpected as it was thought that the younger the cyclist the less likely they were to wear HVC as this is also an established trend in the literature.

2.3 Gender/HVC

Males are more likely than females to never wear HVC, whereas females are more likely than males to always wear HVC. These findings show that gender plays an important role in the use of PPE.

2.4 Gender/Helmet

This was found not to a statistically significant value, but due to the fact that the significance figure is 0.052 it can be assumed there is a relationship between Gender and Helmet usage. Males are more likely to wear a helmet compared to females.

3. Comparison Data.

3.1 Gender

The data shows that males are more likely to use Dublin-bike than females and females are more likely to be owner cyclists.

3.2 Age

Dublin-bike cyclists are more likely to be between 18-40 years of age and owner cyclists are more likely to be between 18-30 years of age. This shows that the age profile of cyclist in the Dublin area is of young adults.

3.3 How often do you cycle?

The majority of Dublin-bike users cycle daily as Dublin-bike is a quick and easy way to get around the city quickly. The majority of owner cyclists cycle daily or twice a week.

3.4 Distance

The majority of Dublin-bike users, 82%, cycle less than 3 km whereas the majority of owner cyclist (44%) cycle less than 3 km, 38% cycle 3-5 km. Owner cyclist are more likely to travel further. This can be tied in with 1.1, the owner cyclist are more likely to travel further so are more likely to use a helmet when compared to Dublin-bike users.

3.5 Helmet use

In total, 80% of Dublin-bike users surveyed said they never use a helmet whereas only 4% said they always do. 48% of owner cyclist said they never use a helmet whereas 18% said they always do. Helmet use may be tied with distance; the further distance travelled the increased likelihood that a helmet is used. However, when distance and helmet use were compared there was found to be no significance.

3.6 Why no helmet?

Both Dublin-bike and owner cyclist's majority said the reason they did not wear a helmet was because they did not have one. Some people for Dublin-bike verbally communicated that they felt it would defeat the purpose of quick and easy bike use. However, according to Rosenkranz *et al*. (2003), helmeted cyclists spent an average of 5.7 days in the hospital with a mean of 1.1 days in the Intensive Care, cyclists without helmets averaged 6.0 days in the hospital with a mean of 0.7 days in the Intensive Care Unit, most cyclists suffered orthopaedic injuries, and 75% of head injured patients were without helmets. This shows the importance of helmets in their role of preventing head injury and no matter what the purpose is of any bike scheme helmets do prevent major head injury.

While a minority of owner cyclists wrote on the questionnaire that they felt safer without one, implying they had heard about the study carried out by Walker. I (2006) by way of leaflet that I was shown by one cyclist who happened to have it on them.

3.7 Do you think helmets should be a legal requirement?

The majority of both groups said no to this, 52% Dublin-bike and 54% owner cyclists said no. However, due to the small percentage difference in the results it may be hard to get conclusive evidence.

3.8 HVC

Dublin-bike users (66%) said they never used any HVC, as do owner cyclist with 32% stating they never use it. Of those who answered sometimes, they informed me verbally that they are more inclined to use HVC during winter months then summer months as with the brighter days they feel no need for it. So assuming this study was carried out in the winter a different finding may be made in relation to HVC.

So, the main reason behind no HVC was that it was the summer. However, as mentioned in the introduction, according to Rosenkranz (2002) 69% of accidents occur in June and September. It was in this period that I conducted my research and I would consider that this evidence against not requiring HVC during the summer.

As mentioned in the introduction:

- 11% of car drivers that had hit a cyclist on a crossroads said that they had actually seen the cyclist, Bíl. M. *et al*. (2010).
- The ability of drivers to respond in time is greater when cyclists or pedestrians make use of visibility aids, and drivers are four times more likely to blame visibility factors on accidents or near misses involving cyclists (Wood *et al*., 2008).
- Drivers consider reflective vests to be more visible than do cyclists at night and in the day (Wood *et al*., 2008).

This research and evidence shows that it is important to wear HVC and cyclists should be informed of this and the general attitude that it is the summer is not really relevant when it comes to being safe and being seen while on the road.

3.9 Why no HVC?

For both groups the main reason was they did not have any. Also as mentioned above in 3.8 the time of year may also be a factor in this response.

3.10 Do you know that lights after dark are a legal requirement?

Shockingly only 58% of owner cyclist knew this while 70% of Dublin-bike users knew this. This finding is concerning as lights are fitted to Dublin-bike bikes and are activated once the bike leaves the bike station at all times of the day so cyclists need not worry about lights. However, owner cyclists need to attach their own lights and if they are not aware it is a legal requirement they may not do it. In spite of this, 54% of owner cyclists said they always use lights.

3.11 How often do you use an MP3 player while cycling?

For both groups the majority said no. This is good, as an MP3 player may interfere with the cyclist's sensory awareness while on busy roads. Although, from my experience of having the questionnaire completed I found that at least one person while filling out the questionnaire said they did not listen to an MP3 player while cycling, however to have them complete the questionnaire they had to turn their MP3 player off. This person then said no to this question, finished the questionnaire then cycled off listening to an MP3 player.

3.12 Do you experience an attitude change while listening to an MP3 player?

The majority of Dublin-bike users said they did (22% yes) while 30% owner cyclists said no.

3.13 How do you feel while cycling?

The majority of people surveyed from both groups felt somewhere between alright and confident. Only 18% of Dublin-bike users felt terrified, while 4% of owner cyclists felt terrified. I feel this reflects how well Dublin city caters for cyclists and that the new 30 km speed limit bye-law may be having a positive and it's intended effect for cyclists.

V. Conclusions and Recommendations

1. ***HVC importance***

The casual attitude that during the summer months HVC is not required is worrying when you consider the findings of Rosenkranz (2002) in which they show that 69% of accidents occur in June and September. This is when this project research was carried out and this would be considered very important for showing that PPE cannot be ignored just because it is the summer.

Cyclists should be informed about the need for HVC all year round and the importance of it by preventing accidents.

2. ***Helmet importance***

The belief that helmets can cause accidents and that cyclists are safer without them was mind blowing. This information was made available to cyclists and was believed by a lot of cyclists surveyed. However, not one cyclist had actually read or was familiar with the study this information was based on. When asked why they believed the information given to them and had they read or researched the study many simply did not answer or repeated their answer.

A study by Walker. I (2006) showed that drivers practice more at risk behaviour around helmeted cyclists than non-helmeted cyclists. The study also showed that drivers exercise more care when the cyclist is female. While this study is important and provides much information it cannot be taken to mean that helmets are useless. Helmets help prevent head injury and are as an important safety feature as HVC. Cyclists should be given advice and information about road safety and the importance of helmets and HVC.

3. ***Training***

According to RoSPA (2001) and as mentioned in Chapter one 6.2.1 cycle training programmes for children because:

- Children who had not been trained had 3 to 4 times as many casualties as the trained group.

- Trained children may be three times less likely to become a casualty than those who had not been trained.
- The training improved the children's cycling behaviour. The trained children had a better general knowledge of cycling than the untrained children.
- Children who had been trained on cycling awareness courses generally performed better than those trained on an instruction-based course.

In Dublin 'BIKE START' was introduced in 2009 by Dublin City Council and was the first Local Authority in Ireland to introduce an integrated cycling training programme. Training is important when it comes to road safety. It would be recommended that this training programme be taught country wide as at the moment it only exists in Dublin City Council area. This is ridiculous when you consider to operate a tractor or to drive a motor bike car or any other vehicle one must pass some form of driver theory test and driving test supervised by the RSA. Yet, as it stands today in Ireland any one can hop on a bike and cycle onto main roads without any form of road safety training. If cyclists receive proper training, cycling related accidents may decrease as cyclists would have a better understanding of the rules of the road.

4. ***Legislation enforcement***

For the 30 km/h limit to be abided by better enforcement of speed limits is required in this zone. Not only will this ensure the limit is kept to it will keep cyclists safer on the roads of the city centre.

While doing this research I found 16% of owner cyclists never used lights after dark and 42% of all the owner cyclists surveyed did not know they were a legal requirement. This finding is concerning given that lights after dark are an important factor in safety and visibility. Also, lights after dark are a legal requirement and if cyclists are not using lights it can be assumed that these cyclists have never been stopped and fined by the Gardaí. This shows lack of proper enforcement on legislation regarding cyclists.

5. ***MP3 and sensory effects on cyclists***

This study took the findings of Brosky (2002) and applied them to cyclists. However, this is not ideal as motor vehicles are more likely cause injury or death to the driver and others when driven dangerously unlike cyclists who, upon becoming involved in an accident, are likely to only injure themselves. MP3 players and their sensory effect on cyclists requires more research then is present at this time to truly see if there is any change in road behaviour and sensory awareness while using an MP3 player.

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Appendices

1. *Appendix 1-Questionnaire*

1. Male ☐ Female ☐

2. Are you:

a. Under 18 years old ☐
b. 18-30 years old ☐
c. 31-40 years old ☐
d. 41-50 years old ☐
e. 51+ years old ☐

3. How often do you cycle:

a. Daily ☐
b. Twice or more a week ☐
c. Most days ☐
d. Weekly ☐
e. Occasionally less than monthly ☐

4. What is the distance of your usual commute?

a. Less then 3Km ☐
b. 3-5Km ☐
c. 5-10km ☐
d. More than 10km ☐

5. **How often** do you use a Helmet?

a. Never ☐
b. Rarely ☐
c. Sometimes ☐
d. Usually ☐
e. Always ☐

6. If you have ticked **"never or rarely"** to **Helmet** in the above question please tick the appropriate boxes that you feel is your reason.

a. Don't have one ☐
b. Unfashionable ☐
c. Too expensive ☐

d. Other______________

7. Do you think Helmets should be made a legal requirement?

Yes ☐ No ☐

8. **How often** do you use High Visibility Clothing?

a. Never ☐
b. Rarely ☐
c. Sometimes ☐
d. Usually ☐
e. Always ☐

9. If you have ticked **"never or rarely"** to **High Visibility Clothing** in the above question please tick the appropriate boxes below that you feel is your reason.

a. Don't have one ☐
b. Unfashionable ☐
c. Too expensive ☐
d. Feels Silly ☐
e. Other______________

10. **How often** do you use Lights after dark (Front and back)?

a. Never ☐
b. Rarely ☐
c. Sometimes ☐
d. Usually ☐
e. Always ☐

11. If you have ticked **"never or rarely"** in the above question please tick the appropriate boxes below that you feel is your reason.

a. Don't have lights ☐
b. Too expensive ☐
c. Batteries ran out ☐
d. Other ______________

12. Do you know that lights front and back of bikes are a legal requirement?

Yes ☐ No ☐

13. Do you listen to MP3 player/music while cycling?

a. Never ☐
b. Rarely ☐
c. Sometimes ☐
d. Usually ☐
e. Always ☐

14. If yes, did you know that studies show that listening to music changes your attitude while cycling?

Yes ☐ No ☐

15. How do you feel when you are cycling?

a. Terrified ☐
b. Slightly scared ☐
c. Alright ☐
d. Fine ☐
e. Confident ☐

2. *Appendix two: Observational Data*

Cyclist type * Hand Signal Crosstabulation

			Hand Signal		Total
			Yes	No	
Cyclist type	Owner cyclist	Count	16	34	50
		% within Cyclist type	32.0%	68.0%	100.0%
	Dublinbike	Count	18	32	50
		% within Cyclist type	36.0%	64.0%	100.0%
Total		Count	34	66	100
		% within Cyclist type	34.0%	66.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.178[a]	1	.673		
Continuity Correction[b]	.045	1	.833		
Likelihood Ratio	.178	1	.673		
Fisher's Exact Test				.833	.417
Linear-by-Linear Association	.176	1	.674		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 17.00.
b. Computed only for a 2x2 table

Cyclist type * Road positioning Crosstabulation

			Road positioning		Total
			Yes	No	
Cyclist type	Owner cyclist	Count	31	19	50
		% within Cyclist type	62.0%	38.0%	100.0%
	Dublinbike	Count	25	25	50
		% within Cyclist type	50.0%	50.0%	100.0%
Total		Count	56	44	100
		% within Cyclist type	56.0%	44.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.461[a]	1	.227		
Continuity Correction[b]	1.015	1	.314		
Likelihood Ratio	1.465	1	.226		
Fisher's Exact Test				.314	.157
Linear-by-Linear Association	1.446	1	.229		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 22.00.
b. Computed only for a 2x2 table

Cyclist type * High vis Crosstabulation

			High vis		Total
			Yes	No	
Cyclist type	Owner cyclist	Count	22	28	50
		% within Cyclist type	44.0%	56.0%	100.0%
	Dublinbike	Count	10	40	50
		% within Cyclist type	20.0%	80.0%	100.0%
Total		Count	32	68	100
		% within Cyclist type	32.0%	68.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.618[a]	1	.010		
Continuity Correction[b]	5.561	1	.018		
Likelihood Ratio	6.741	1	.009		
Fisher's Exact Test				.018	.009
Linear-by-Linear Association	6.551	1	.010		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.00.
b. Computed only for a 2x2 table

Cyclist type * Helmet Crosstabulation

			Helmet		Total
			Yes	No	
Cyclist type	Owner cyclist	Count	22	28	50
		% within Cyclist type	44.0%	56.0%	100.0%
	Dublinbike	Count	5	45	50
		% within Cyclist type	10.0%	90.0%	100.0%
Total		Count	27	73	100
		% within Cyclist type	27.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14.663[a]	1	.000		
Continuity Correction[b]	12.988	1	.000		
Likelihood Ratio	15.550	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	14.516	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.50.
b. Computed only for a 2x2 table

Hand Signal * Road positioning Crosstabulation

			Road positioning		Total
			Yes	No	
Hand Signal	Yes	Count	24	10	34
		% within Hand Signal	70.6%	29.4%	100.0%
	No	Count	32	34	66
		% within Hand Signal	48.5%	51.5%	100.0%
Total		Count	56	44	100
		% within Hand Signal	56.0%	44.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.449[a]	1	.035		
Continuity Correction[b]	3.598	1	.058		
Likelihood Ratio	4.557	1	.033		
Fisher's Exact Test				.055	.028
Linear-by-Linear Association	4.405	1	.036		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.96.
b. Computed only for a 2x2 table

Hand Signal * High vis Crosstabulation

			High vis		Total
			Yes	No	
Hand Signal	Yes	Count	11	23	34
		% within Hand Signal	32.4%	67.6%	100.0%
	No	Count	21	45	66
		% within Hand Signal	31.8%	68.2%	100.0%
Total		Count	32	68	100
		% within Hand Signal	32.0%	68.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.003[a]	1	.957		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.003	1	.957		
Fisher's Exact Test				1.000	.565
Linear-by-Linear Association	.003	1	.957		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.88.
b. Computed only for a 2x2 table

Hand Signal * Helmet Crosstabulation

			Helmet		Total
			Yes	No	
Hand Signal	Yes	Count	12	22	34
		% within Hand Signal	35.3%	64.7%	100.0%
	No	Count	15	51	66
		% within Hand Signal	22.7%	77.3%	100.0%
Total		Count	27	73	100
		% within Hand Signal	27.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.798[a]	1	.180		
Continuity Correction[b]	1.217	1	.270		
Likelihood Ratio	1.756	1	.185		
Fisher's Exact Test				.235	.135
Linear-by-Linear Association	1.780	1	.182		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.18.
b. Computed only for a 2x2 table

Road positioning * High vis Crosstabulation

			High vis		Total
			Yes	No	
Road positioning	Yes	Count	17	39	56
		% within Road positioning	30.4%	69.6%	100.0%
	No	Count	15	29	44
		% within Road positioning	34.1%	65.9%	100.0%
Total		Count	32	68	100
		% within Road positioning	32.0%	68.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.158[a]	1	.691		
Continuity Correction[b]	.033	1	.856		
Likelihood Ratio	.158	1	.691		
Fisher's Exact Test				.829	.427
Linear-by-Linear Association	.156	1	.693		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.08.

b. Computed only for a 2x2 table

Road positioning * Helmet Crosstabulation

			Helmet		Total
			Yes	No	
Road positioning	Yes	Count	18	38	56
		% within Road positioning	32.1%	67.9%	100.0%
	No	Count	9	35	44
		% within Road positioning	20.5%	79.5%	100.0%
Total		Count	27	73	100
		% within Road positioning	27.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.708[a]	1	.191		
Continuity Correction[b]	1.166	1	.280		
Likelihood Ratio	1.738	1	.187		
Fisher's Exact Test				.257	.140
Linear-by-Linear Association	1.691	1	.193		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.88.

b. Computed only for a 2x2 table

High vis * Helmet Crosstabulation

			Helmet		Total
			Yes	No	
High vis	Yes	Count	19	13	32
		% within High vis	59.4%	40.6%	100.0%
	No	Count	8	60	68
		% within High vis	11.8%	88.2%	100.0%
Total		Count	27	73	100
		% within High vis	27.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	25.025[a]	1	.000		
Continuity Correction[b]	22.668	1	.000		
Likelihood Ratio	24.161	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	24.775	1	.000		
N of Valid Cases	100				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.64.
b. Computed only for a 2x2 table

FRENQUCIES:

Distance * Helmet Crosstabulation

Cyclist type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Owner cyclist	50	50.0	50.0	50.0
	Dublinbike	50	50.0	50.0	100.0
	Total	100	100.0	100.0	

Hand Signal

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	34	34.0	34.0	34.0
	No	66	66.0	66.0	100.0
	Total	100	100.0	100.0	

Road positioning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	56	56.0	56.0	56.0
	No	44	44.0	44.0	100.0
	Total	100	100.0	100.0	

High vis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	32.0	32.0	32.0
	No	68	68.0	68.0	100.0
	Total	100	100.0	100.0	

Helmet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	27	27.0	27.0	27.0
	No	73	73.0	73.0	100.0
	Total	100	100.0	100.0	

			Helmet					
			Never	Rarely	Sometimes	Usually	Always	Total
Distance	Less then 3KM	Count	34	5	1	0	1	41
		% within Distance	82.9%	12.2%	2.4%	.0%	2.4%	100.0%
	3-5KM	Count	4	1	0	1	1	7
		% within Distance	57.1%	14.3%	.0%	14.3%	14.3%	100.0%
	5-10KM	Count	2	0	0	0	0	2
		% within Distance	100.0%	.0%	.0%	.0%	.0%	100.0%
Total		Count	40	6	1	1	2	50
		% within Distance	80.0%	12.0%	2.0%	2.0%	4.0%	100.0%

3. *Appendix three: Dublin-bike data*

CROSSTABS Dublin Bike:

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.416[a]	8	.308
Likelihood Ratio	7.040	8	.532
Linear-by-Linear Association	1.298	1	.255
N of Valid Cases	50		

a. 13 cells (86.7%) have expected count less than 5. The minimum expected count is .04.

Helmet * helmets legal Crosstabulation

			helmets legal		
			Yes	No	Total
Helmet	Never	Count	17	23	40
		% within Helmet	42.5%	57.5%	100.0%
	Rarely	Count	3	3	6
		% within Helmet	50.0%	50.0%	100.0%
	Sometimes	Count	1	0	1
		% within Helmet	100.0%	.0%	100.0%
	Usually	Count	1	0	1
		% within Helmet	100.0%	.0%	100.0%
	Always	Count	2	0	2
		% within Helmet	100.0%	.0%	100.0%
Total		Count	24	26	50
		% within Helmet	48.0%	52.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.828[a]	4	.305
Likelihood Ratio	6.369	4	.173
Linear-by-Linear Association	4.245	1	.039
N of Valid Cases	50		

a. 8 cells (80.0%) have expected count less than 5. The minimum expected count is .48.

Helmet * HVC Crosstabulation

			HVC					Total
			Never	Rarely	Sometimes	Usually	Always	
Helmet	Never	Count	30	3	4	1	2	40
		% within Helmet	75.0%	7.5%	10.0%	2.5%	5.0%	100.0%
	Rarely	Count	2	2	2	0	0	6
		% within Helmet	33.3%	33.3%	33.3%	.0%	.0%	100.0%
	Sometimes	Count	0	0	1	0	0	1
		% within Helmet	.0%	.0%	100.0%	.0%	.0%	100.0%
	Usually	Count	0	0	1	0	0	1
		% within Helmet	.0%	.0%	100.0%	.0%	.0%	100.0%
	Always	Count	1	0	1	0	0	2
		% within Helmet	50.0%	.0%	50.0%	.0%	.0%	100.0%
Total		Count	33	5	9	1	2	50
		% within Helmet	66.0%	10.0%	18.0%	2.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.340[a]	16	.304
Likelihood Ratio	15.476	16	.490
Linear-by-Linear Association	2.334	1	.127
N of Valid Cases	50		

a. 23 cells (92.0%) have expected count less than 5. The minimum expected count is .02.

Helmet * Feelings Crosstabulation

			Feelings				Total
			Slightly scard	Alright	Fine	Confident	
Helmet	Never	Count	7	6	15	12	40
		% within Helmet	17.5%	15.0%	37.5%	30.0%	100.0%
	Rarely	Count	2	4	0	0	6

		% within Helmet	33.3%	66.7%	.0%	.0%	100.0%
	Sometimes	Count	0	0	1	0	1
		% within Helmet	.0%	.0%	100.0%	.0%	100.0%
	Usually	Count	0	1	0	0	1
		% within Helmet	.0%	100.0%	.0%	.0%	100.0%
	Always	Count	0	0	1	1	2
		% within Helmet	.0%	.0%	50.0%	50.0%	100.0%
Total		Count	9	11	17	13	50
		% within Helmet	18.0%	22.0%	34.0%	26.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.992[a]	12	.116
Likelihood Ratio	19.983	12	.067
Linear-by-Linear Association	.017	1	.895
N of Valid Cases	50		

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .18.

HVC * Feelings Crosstabulation

			Feelings				Total
			Slightly scard	Alright	Fine	Confident	
HVC	Never	Count	4	6	13	10	33
		% within HVC	12.1%	18.2%	39.4%	30.3%	100.0%
	Rarely	Count	3	1	0	1	5
		% within HVC	60.0%	20.0%	.0%	20.0%	100.0%
	Sometimes	Count	1	4	2	2	9
		% within HVC	11.1%	44.4%	22.2%	22.2%	100.0%
	Usually	Count	1	0	0	0	1
		% within HVC	100.0%	.0%	.0%	.0%	100.0%
	Always	Count	0	0	2	0	2
		% within HVC	.0%	.0%	100.0%	.0%	100.0%
Total		Count	9	11	17	13	50
		% within HVC	18.0%	22.0%	34.0%	26.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.201[a]	12	.084
Likelihood Ratio	18.026	12	.115
Linear-by-Linear Association	1.261	1	.261
N of Valid Cases	50		

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .18.

Distance * Feelings Crosstabulation

			Feelings				Total
			Slightly scard	Alright	Fine	Confident	
Distance	Less then 3KM	Count	6	8	14	13	41
		% within Distance	14.6%	19.5%	34.1%	31.7%	100.0%
	3-5KM	Count	3	2	2	0	7
		% within Distance	42.9%	28.6%	28.6%	.0%	100.0%
	5-10KM	Count	0	1	1	0	2
		% within Distance	.0%	50.0%	50.0%	.0%	100.0%
Total		Count	9	11	17	13	50
		% within Distance	18.0%	22.0%	34.0%	26.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.052[a]	6	.316
Likelihood Ratio	8.844	6	.183
Linear-by-Linear Association	2.980	1	.084
N of Valid Cases	50		

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .36.

MP3 * Attitude change with MP3 Crosstabulation

			Attitude change with MP3			Total
			Yes	No	99	
MP3	Never	Count	0	2	28	30
		% within MP3	.0%	6.7%	93.3%	100.0%
	Rarely	Count	5	1	2	8
		% within MP3	62.5%	12.5%	25.0%	100.0%
	Sometimes	Count	1	2	0	3
		% within MP3	33.3%	66.7%	.0%	100.0%
	Usually	Count	2	1	0	3
		% within MP3	66.7%	33.3%	.0%	100.0%
	Always	Count	3	2	1	6
		% within MP3	50.0%	33.3%	16.7%	100.0%
Total		Count	11	8	31	50
		% within MP3	22.0%	16.0%	62.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.022[a]	8	.000
Likelihood Ratio	43.395	8	.000
Linear-by-Linear Association	22.563	1	.000
N of Valid Cases	50		

a. 13 cells (86.7%) have expected count less than 5. The minimum expected count is .48.

Age * Helmet Crosstabulation

			Helmet					Total
			Never	Rarely	Sometimes	Usually	Always	
Age	18-30	Count	19	3	0	0	1	23
		% within Age	82.6%	13.0%	.0%	.0%	4.3%	100.0%
	31-40	Count	16	3	1	1	1	22
		% within Age	72.7%	13.6%	4.5%	4.5%	4.5%	100.0%
	41-50	Count	4	0	0	0	0	4
		% within Age	100.0%	.0%	.0%	.0%	.0%	100.0%
	51+	Count	1	0	0	0	0	1
		% within Age	100.0%	.0%	.0%	.0%	.0%	100.0%
Total		Count	40	6	1	1	2	50
		% within Age	80.0%	12.0%	2.0%	2.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.854[a]	12	.986
Likelihood Ratio	5.375	12	.944
Linear-by-Linear Association	.013	1	.909
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .02.

Age * HVC Crosstabulation

			HVC					Total
			Never	Rarely	Sometimes	Usually	Always	
Age	18-30	Count	17	3	1	0	2	23
		% within Age	73.9%	13.0%	4.3%	.0%	8.7%	100.0%
	31-40	Count	13	1	8	0	0	22
		% within Age	59.1%	4.5%	36.4%	.0%	.0%	100.0%
	41-50	Count	2	1	0	1	0	4
		% within Age	50.0%	25.0%	.0%	25.0%	.0%	100.0%
	51+	Count	1	0	0	0	0	1
		% within Age	100.0%	.0%	.0%	.0%	.0%	100.0%
Total		Count	33	5	9	1	2	50
		% within Age	66.0%	10.0%	18.0%	2.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.826[a]	12	.021
Likelihood Ratio	19.113	12	.086
Linear-by-Linear Association	.216	1	.642
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .02.

Age * Lights Crosstabulation

			Lights	Total
			99	
Age	18-30	Count	23	23
		% within Age	100.0%	100.0%
	31-40	Count	22	22
		% within Age	100.0%	100.0%
	41-50	Count	4	4
		% within Age	100.0%	100.0%
	51+	Count	1	1
		% within Age	100.0%	100.0%
Total		Count	50	50
		% within Age	100.0%	100.0%

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	50

a. No statistics are computed because Lights is a constant.

Age * MP3 Crosstabulation

			MP3					Total
			Never	Rarely	Sometimes	Usually	Always	
Age	18-30	Count	11	4	0	3	5	23
		% within Age	47.8%	17.4%	.0%	13.0%	21.7%	100.0%
	31-40	Count	15	3	3	0	1	22
		% within Age	68.2%	13.6%	13.6%	.0%	4.5%	100.0%
	41-50	Count	3	1	0	0	0	4
		% within Age	75.0%	25.0%	.0%	.0%	.0%	100.0%
	51+	Count	1	0	0	0	0	1
		% within Age	100.0%	.0%	.0%	.0%	.0%	100.0%
Total		Count	30	8	3	3	6	50
		% within Age	60.0%	16.0%	6.0%	6.0%	12.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.474[a]	12	.408
Likelihood Ratio	15.393	12	.221
Linear-by-Linear Association	5.046	1	.025
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .06.

Sex * Helmet Crosstabulation

			Helmet					Total
			Never	Rarely	Sometimes	Usually	Always	
Sex	Male	Count	30	2	0	0	2	34
		% within Sex	88.2%	5.9%	.0%	.0%	5.9%	100.0%
	Female	Count	10	4	1	1	0	16
		% within Sex	62.5%	25.0%	6.3%	6.3%	.0%	100.0%
Total		Count	40	6	1	1	2	50
		% within Sex	80.0%	12.0%	2.0%	2.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.406[a]	4	.052
Likelihood Ratio	10.062	4	.039
Linear-by-Linear Association	.877	1	.349
N of Valid Cases	50		

a. 8 cells (80.0%) have expected count less than 5. The minimum expected count is .32.

Sex * HVC Crosstabulation

			HVC					Total
			Never	Rarely	Sometimes	Usually	Always	
Sex	Male	Count	26	4	3	0	1	34
		% within Sex	76.5%	11.8%	8.8%	.0%	2.9%	100.0%
	Female	Count	7	1	6	1	1	16
		% within Sex	43.8%	6.3%	37.5%	6.3%	6.3%	100.0%
Total		Count	33	5	9	1	2	50
		% within Sex	66.0%	10.0%	18.0%	2.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.489[a]	4	.050
Likelihood Ratio	9.347	4	.053
Linear-by-Linear Association	6.362	1	.012
N of Valid Cases	50		

a. 7 cells (70.0%) have expected count less than 5. The minimum expected count is .32.

Sex * Lights Crosstabulation

			Lights	Total
			99	
Sex	Male	Count	34	34
		% within Sex	100.0%	100.0%
	Female	Count	16	16
		% within Sex	100.0%	100.0%
Total		Count	50	50
		% within Sex	100.0%	100.0%

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	50

a. No statistics are computed because Lights is a constant.

Sex * MP3 Crosstabulation

			MP3					
			Never	Rarely	Sometimes	Usually	Always	Total
Sex	Male	Count	20	7	2	1	4	34
		% within Sex	58.8%	20.6%	5.9%	2.9%	11.8%	100.0%
	Female	Count	10	1	1	2	2	16
		% within Sex	62.5%	6.3%	6.3%	12.5%	12.5%	100.0%
Total		Count	30	8	3	3	6	50
		% within Sex	60.0%	16.0%	6.0%	6.0%	12.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.087[a]	4	.543
Likelihood Ratio	3.191	4	.526
Linear-by-Linear Association	.175	1	.676
N of Valid Cases	50		

a. 7 cells (70.0%) have expected count less than 5. The minimum expected count is .96.

How often cycle * Helmet Crosstabulation

			Helmet					Total
			Never	Rarely	Sometimes	Usually	Always	
How often cycle	Daily	Count	23	3	0	0	2	28
		% within How often cycle	82.1%	10.7%	.0%	.0%	7.1%	100.0%
	Twice a week	Count	7	2	0	0	0	9
		% within How often cycle	77.8%	22.2%	.0%	.0%	.0%	100.0%
	most days	Count	6	1	1	1	0	9
		% within How often cycle	66.7%	11.1%	11.1%	11.1%	.0%	100.0%
	Weekly	Count	3	0	0	0	0	3
		% within How often cycle	100.0%	.0%	.0%	.0%	.0%	100.0%
	Occasionally	Count	1	0	0	0	0	1
		% within How often cycle	100.0%	.0%	.0%	.0%	.0%	100.0%
Total		Count	40	6	1	1	2	50
		% within How often cycle	80.0%	12.0%	2.0%	2.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.412[a]	16	.715
Likelihood Ratio	11.228	16	.795
Linear-by-Linear Association	.029	1	.865
N of Valid Cases	50		

a. 22 cells (88.0%) have expected count less than 5. The minimum expected count is .02.

How often cycle * HVC Crosstabulation

			HVC					Total
			Never	Rarely	Sometimes	Usually	Always	
How often cycle	Daily	Count	19	2	5	0	2	28
		% within How often cycle	67.9%	7.1%	17.9%	.0%	7.1%	100.0%
	Twice a week	Count	5	1	2	1	0	9
		% within How often cycle	55.6%	11.1%	22.2%	11.1%	.0%	100.0%
	most days	Count	6	1	2	0	0	9
		% within How often cycle	66.7%	11.1%	22.2%	.0%	.0%	100.0%
	Weekly	Count	2	1	0	0	0	3
		% within How often cycle	66.7%	33.3%	.0%	.0%	.0%	100.0%
	Occasionally	Count	1	0	0	0	0	1
		% within How often cycle	100.0%	.0%	.0%	.0%	.0%	100.0%
Total		Count	33	5	9	1	2	50
		% within How often cycle	66.0%	10.0%	18.0%	2.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.349[a]	16	.898
Likelihood Ratio	9.162	16	.907
Linear-by-Linear Association	.571	1	.450
N of Valid Cases	50		

a. 21 cells (84.0%) have expected count less than 5. The minimum expected count is .02.

How often cycle * Lights Crosstabulation

			Lights	
			99	Total
How often cycle	Daily	Count	28	28
		% within How often cycle	100.0 %	100.0 %
	Twice a week	Count	9	9
		% within How often cycle	100.0 %	100.0 %
	most days	Count	9	9
		% within How often cycle	100.0 %	100.0 %
	Weekly	Count	3	3
		% within How often cycle	100.0 %	100.0 %
	Occasionally	Count	1	1
		% within How often cycle	100.0 %	100.0 %
Total		Count	50	50
		% within How often cycle	100.0 %	100.0 %

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	50

a. No statistics are computed because Lights is a constant.

FREQUENCIES Dublin Bike:

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	34	68.0	68.0	68.0
	Female	16	32.0	32.0	100.0
	Total	50	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	23	46.0	46.0	46.0
	31-40	22	44.0	44.0	90.0
	41-50	4	8.0	8.0	98.0
	51+	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

How often cycle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	28	56.0	56.0	56.0
	Twice a week	9	18.0	18.0	74.0
	most days	9	18.0	18.0	92.0
	Weekly	3	6.0	6.0	98.0
	Occasionally	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

Distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less then 3KM	41	82.0	82.0	82.0
	3-5KM	7	14.0	14.0	96.0
	5-10KM	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

Helmet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	40	80.0	80.0	80.0
	Rarely	6	12.0	12.0	92.0
	Sometimes	1	2.0	2.0	94.0
	Usually	1	2.0	2.0	96.0
	Always	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

Why no helmet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't have one	28	56.0	56.0	56.0
	Unfashionable	2	4.0	4.0	60.0
	Other	15	30.0	30.0	90.0
	99	5	10.0	10.0	100.0
	Total	50	100.0	100.0	

helmets legal

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	48.0	48.0	48.0
	No	26	52.0	52.0	100.0
	Total	50	100.0	100.0	

HVC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	33	66.0	66.0	66.0
	Rarely	5	10.0	10.0	76.0
	Sometimes	9	18.0	18.0	94.0
	Usually	1	2.0	2.0	96.0
	Always	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

Why no HVC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't have one	18	36.0	36.0	36.0
	Unfashionable	2	4.0	4.0	40.0
	Too expensive	1	2.0	2.0	42.0
	Feels silly	5	10.0	10.0	52.0
	Other	6	12.0	12.0	64.0
	99	18	36.0	36.0	100.0
	Total	50	100.0	100.0	

Lights legal requirement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	35	70.0	70.0	70.0
	No	10	20.0	20.0	90.0
	99	5	10.0	10.0	100.0
	Total	50	100.0	100.0	

MP3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	30	60.0	60.0	60.0
	Rarely	8	16.0	16.0	76.0
	Sometimes	3	6.0	6.0	82.0
	Usually	3	6.0	6.0	88.0
	Always	6	12.0	12.0	100.0
	Total	50	100.0	100.0	

Attitude change with MP3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	22.0	22.0	22.0
	No	8	16.0	16.0	38.0
	99	31	62.0	62.0	100.0
	Total	50	100.0	100.0	

Feelings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly scard	9	18.0	18.0	18.0
	Alright	11	22.0	22.0	40.0
	Fine	17	34.0	34.0	74.0
	Confident	13	26.0	26.0	100.0
	Total	50	100.0	100.0	

4. *Appendix four: Owner cyclist data*

CROSSTABS Owner Cyclists:

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.721[a]	12	.022
Likelihood Ratio	25.530	12	.013
Linear-by-Linear Association	9.835	1	.002
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .30.

Distance * Helmet Crosstabulation

			Helmet					Total
			Never	Rarely	Sometimes	Usually	Always	
Distance	Less then 3KM	Count	12	6	1	1	2	22
		% within Helmet	50.0%	100.0%	20.0%	16.7%	22.2%	44.0%
	3-5KM	Count	10	0	4	2	3	19
		% within Helmet	41.7%	.0%	80.0%	33.3%	33.3%	38.0%
	5-10KM	Count	2	0	0	2	2	6
		% within Helmet	8.3%	.0%	.0%	33.3%	22.2%	12.0%
	more then 10KM	Count	0	0	0	1	2	3
		% within Helmet	.0%	.0%	.0%	16.7%	22.2%	6.0%
Total		Count	24	6	5	6	9	50
		% within Helmet	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.324[a]	4	.035
Likelihood Ratio	10.858	4	.028
Linear-by-Linear Association	2.425	1	.119
N of Valid Cases	50		

a. 8 cells (80.0%) have expected count less than 5. The minimum expected count is 2.30.

Helmet * Helmets legal Crosstabulation

			Helmets legal		Total
			Yes	No	
Helmet	Never	Count	8	16	24
		% within Helmets legal	34.8%	59.3%	48.0%
	Rarely	Count	5	1	6
		% within Helmets legal	21.7%	3.7%	12.0%
	Sometimes	Count	1	4	5
		% within Helmets legal	4.3%	14.8%	10.0%
	Usually	Count	2	4	6
		% within Helmets legal	8.7%	14.8%	12.0%
	Always	Count	7	2	9
		% within Helmets legal	30.4%	7.4%	18.0%
Total		Count	23	27	50
		% within Helmets legal	100.0%	100.0%	100.0%

Helmet * HVC Crosstabulation

			HVC					Total
			Never	Rarely	Sometimes	Usually	Always	
Helmet	Never	Count	11	5	4	4	0	24
		% within HVC	68.8%	45.5%	36.4%	50.0%	.0%	48.0%
	Rarely	Count	2	1	3	0	0	6
		% within HVC	12.5%	9.1%	27.3%	.0%	.0%	12.0%
	Sometimes	Count	1	3	1	0	0	5
		% within HVC	6.3%	27.3%	9.1%	.0%	.0%	10.0%
	Usually	Count	1	2	0	3	0	6
		% within HVC	6.3%	18.2%	.0%	37.5%	.0%	12.0%
	Always	Count	1	0	3	1	4	9
		% within HVC	6.3%	.0%	27.3%	12.5%	100.0%	18.0%
Total		Count	16	11	11	8	4	50
		% within HVC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37.798[a]	16	.002
Likelihood Ratio	35.448	16	.003
Linear-by-Linear Association	10.525	1	.001
N of Valid Cases	50		

a. 22 cells (88.0%) have expected count less than 5. The minimum expected count is .40.

Lights * Lights legal requirement Crosstabulation

			Lights legal requirement		Total
			Yes	No	
Lights	Never	Count	1	7	8
		% within Lights	12.5%	87.5%	100.0%
	Rarely	Count	2	3	5
		% within Lights	40.0%	60.0%	100.0%
	Sometimes	Count	3	4	7
		% within Lights	42.9%	57.1%	100.0%
	Usually	Count	1	1	2
		% within Lights	50.0%	50.0%	100.0%
	Always	Count	22	5	27
		% within Lights	81.5%	18.5%	100.0%
	99	Count	0	1	1
		% within Lights	.0%	100.0%	100.0%
Total		Count	29	21	50
		% within Lights	58.0%	42.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.668[a]	5	.008
Likelihood Ratio	17.063	5	.004
Linear-by-Linear Association	.546	1	.460
N of Valid Cases	50		

a. 10 cells (83.3%) have expected count less than 5. The minimum expected count is .42.

Helmet * Feelings Crosstabulation

			Feelings					Total
			Terrified	Slightly scard	Alright	Fine	Confident	
Helmet	Never	Count	2	3	4	7	8	24
		% within Helmet	8.3%	12.5%	16.7%	29.2%	33.3%	100.0%
	Rarely	Count	0	4	0	2	0	6
		% within Helmet	.0%	66.7%	.0%	33.3%	.0%	100.0%
	Sometimes	Count	0	0	2	2	1	5
		% within Helmet	.0%	.0%	40.0%	40.0%	20.0%	100.0%
	Usually	Count	0	3	0	3	0	6
		% within Helmet	.0%	50.0%	.0%	50.0%	.0%	100.0%
	Always	Count	0	2	3	1	3	9
		% within Helmet	.0%	22.2%	33.3%	11.1%	33.3%	100.0%
Total		Count	2	12	9	15	12	50
		% within Helmet	4.0%	24.0%	18.0%	30.0%	24.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.822[a]	16	.149
Likelihood Ratio	26.685	16	.045
Linear-by-Linear Association	.206	1	.650
N of Valid Cases	50		

a. 22 cells (88.0%) have expected count less than 5. The minimum expected count is .20.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.408[a]	16	.643
Likelihood Ratio	15.635	16	.479
Linear-by-Linear Association	.157	1	.692
N of Valid Cases	50		

a. 25 cells (100.0%) have expected count less than 5. The minimum expected count is .16.

HVC * Feelings Crosstabulation

			Feelings					Total
			Terrified	Slightly scard	Alright	Fine	Confident	
HVC	Never	Count	2	1	4	5	4	16
		% within Feelings	100.0%	8.3%	44.4%	33.3%	33.3%	32.0%
	Rarely	Count	0	4	1	4	2	11
		% within Feelings	.0%	33.3%	11.1%	26.7%	16.7%	22.0%
	Sometimes	Count	0	4	2	4	1	11
		% within Feelings	.0%	33.3%	22.2%	26.7%	8.3%	22.0%
	Usually	Count	0	2	1	2	3	8
		% within Feelings	.0%	16.7%	11.1%	13.3%	25.0%	16.0%
	Always	Count	0	1	1	0	2	4
		% within Feelings	.0%	8.3%	11.1%	.0%	16.7%	8.0%
Total		Count	2	12	9	15	12	50
		% within Feelings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Distance * Feelings Crosstabulation

			Feelings					Total
			Terrified	Slightly scard	Alright	Fine	Confident	
Distance	Less then 3KM	Count	1	5	5	7	4	22
		% within Feelings	50.0%	41.7%	55.6%	46.7%	33.3%	44.0%
	3-5KM	Count	0	5	3	5	6	19
		% within Feelings	.0%	41.7%	33.3%	33.3%	50.0%	38.0%
	5-10KM	Count	1	2	1	1	1	6
		% within Feelings	50.0%	16.7%	11.1%	6.7%	8.3%	12.0%
	more then 10KM	Count	0	0	0	2	1	3
		% within Feelings	.0%	.0%	.0%	13.3%	8.3%	6.0%
Total		Count	2	12	9	15	12	50
		% within Feelings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.057[a]	8	.001
Likelihood Ratio	31.714	8	.000
Linear-by-Linear Association	20.233	1	.000
N of Valid Cases	50		

a. 12 cells (80.0%) have expected count less than 5. The minimum expected count is .48.

MP3 * Attiude change with MP3 Crosstabulation

			Attiude change with MP3			Total
			Yes	No	99	
MP3	Never	Count	4	3	21	28
		% within Attiude change with MP3	33.3%	20.0%	91.3%	56.0%
	Rarely	Count	2	2	2	6
		% within Attiude change with MP3	16.7%	13.3%	8.7%	12.0%
	Sometimes	Count	4	5	0	9
		% within Attiude change with MP3	33.3%	33.3%	.0%	18.0%
	Usually	Count	1	4	0	5
		% within Attiude change with MP3	8.3%	26.7%	.0%	10.0%
	Always	Count	1	1	0	2
		% within Attiude change with MP3	8.3%	6.7%	.0%	4.0%
Total		Count	12	15	23	50
		% within Attiude change with MP3	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.155[a]	1	.694		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.151	1	.698		
Fisher's Exact Test				.697	.490
Linear-by-Linear Association	.152	1	.697		
N of Valid Cases	50				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.52.
b. Computed only for a 2x2 table

Age * Helmet Crosstabulation

			Helmet					Total
			Never	Rarely	Sometimes	Usually	Always	
Age	18-30	Count	16	4	2	5	4	31
		% within Age	51.6%	12.9%	6.5%	16.1%	12.9%	100.0%
	31-40	Count	3	2	3	1	3	12
		% within Age	25.0%	16.7%	25.0%	8.3%	25.0%	100.0%
	41-50	Count	4	0	0	0	2	6
		% within Age	66.7%	.0%	.0%	.0%	33.3%	100.0%
	51+	Count	1	0	0	0	0	1
		% within Age	100.0%	.0%	.0%	.0%	.0%	100.0%
Total		Count	24	6	5	6	9	50
		% within Age	48.0%	12.0%	10.0%	12.0%	18.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.427[a]	12	.579
Likelihood Ratio	12.144	12	.434
Linear-by-Linear Association	.018	1	.892
N of Valid Cases	50		

a. 17 cells (85.0%) have expected count less than 5. The minimum expected count is .10.

Age * HVC Crosstabulation

			HVC					
			Never	Rarely	Sometimes	Usually	Always	Total
Age	18-30	Count	14	6	5	5	1	31
		% within Age	45.2%	19.4%	16.1%	16.1%	3.2%	100.0%
	31-40	Count	1	5	4	0	2	12
		% within Age	8.3%	41.7%	33.3%	.0%	16.7%	100.0%
	41-50	Count	1	0	2	2	1	6
		% within Age	16.7%	.0%	33.3%	33.3%	16.7%	100.0%
	51+	Count	0	0	0	1	0	1
		% within Age	.0%	.0%	.0%	100.0%	.0%	100.0%
Total		Count	16	11	11	8	4	50
		% within Age	32.0%	22.0%	22.0%	16.0%	8.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.154[a]	12	.064
Likelihood Ratio	21.651	12	.042
Linear-by-Linear Association	6.587	1	.010
N of Valid Cases	50		

a. 17 cells (85.0%) have expected count less than 5. The minimum expected count is .08.

Age * Lights Crosstabulation

			Lights						
			Never	Rarely	Sometimes	Usually	Always	99	Total
Age	18-30	Count	7	4	4	0	15	1	31
		% within Age	22.6%	12.9%	12.9%	.0%	48.4%	3.2%	100.0%
	31-40	Count	0	1	2	2	7	0	12
		% within Age	.0%	8.3%	16.7%	16.7%	58.3%	.0%	100.0%
	41-50	Count	1	0	1	0	4	0	6
		% within Age	16.7%	.0%	16.7%	.0%	66.7%	.0%	100.0%
	51+	Count	0	0	0	0	1	0	1
		% within Age	.0%	.0%	.0%	.0%	100.0%	.0%	100.0%
Total		Count	8	5	7	2	27	1	50
		% within Age	16.0%	10.0%	14.0%	4.0%	54.0%	2.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.912[a]	15	.686
Likelihood Ratio	14.343	15	.500
Linear-by-Linear Association	.254	1	.614
N of Valid Cases	50		

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .02.

Age * MP3 Crosstabulation

			MP3					Total
			Never	Rarely	Sometimes	Usually	Always	
Age	18-30	Count	12	4	8	5	2	31
		% within Age	38.7%	12.9%	25.8%	16.1%	6.5%	100.0%
	31-40	Count	10	1	1	0	0	12
		% within Age	83.3%	8.3%	8.3%	.0%	.0%	100.0%
	41-50	Count	5	1	0	0	0	6
		% within Age	83.3%	16.7%	.0%	.0%	.0%	100.0%
	51+	Count	1	0	0	0	0	1
		% within Age	100.0%	.0%	.0%	.0%	.0%	100.0%
Total		Count	28	6	9	5	2	50
		% within Age	56.0%	12.0%	18.0%	10.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.009[a]	12	.445
Likelihood Ratio	15.647	12	.208
Linear-by-Linear Association	8.942	1	.003
N of Valid Cases	50		

a. 17 cells (85.0%) have expected count less than 5. The minimum expected count is .04.

Sex * Helmet Crosstabulation

			Helmet					Total
			Never	Rarely	Sometimes	Usually	Always	
Sex	Male	Count	10	2	4	3	4	23
		% within Sex	43.5%	8.7%	17.4%	13.0%	17.4%	100.0%
	Female	Count	14	4	1	3	5	27
		% within Sex	51.9%	14.8%	3.7%	11.1%	18.5%	100.0%
Total		Count	24	6	5	6	9	50
		% within Sex	48.0%	12.0%	10.0%	12.0%	18.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.943[a]	4	.567
Likelihood Ratio	3.068	4	.547
Linear-by-Linear Association	.245	1	.620
N of Valid Cases	50		

a. 8 cells (80.0%) have expected count less than 5. The minimum expected count is 2.30.

Sex * HVC Crosstabulation

			HVC					Total
			Never	Rarely	Sometimes	Usually	Always	
Sex	Male	Count	7	5	5	4	2	23
		% within Sex	30.4%	21.7%	21.7%	17.4%	8.7%	100.0%
	Female	Count	9	6	6	4	2	27
		% within Sex	33.3%	22.2%	22.2%	14.8%	7.4%	100.0%
Total		Count	16	11	11	8	4	50
		% within Sex	32.0%	22.0%	22.0%	16.0%	8.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.113[a]	4	.998
Likelihood Ratio	.112	4	.998
Linear-by-Linear Association	.094	1	.759
N of Valid Cases	50		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 1.84.

Sex * Lights Crosstabulation

			Lights						Total
			Never	Rarely	Sometimes	Usually	Always	99	
Sex	Male	Count	2	3	4	2	12	0	23
		% within Sex	8.7%	13.0%	17.4%	8.7%	52.2%	.0%	100.0%
	Female	Count	6	2	3	0	15	1	27
		% within Sex	22.2%	7.4%	11.1%	.0%	55.6%	3.7%	100.0%
Total		Count	8	5	7	2	27	1	50
		% within Sex	16.0%	10.0%	14.0%	4.0%	54.0%	2.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.391[a]	5	.370
Likelihood Ratio	6.610	5	.251
Linear-by-Linear Association	.745	1	.388
N of Valid Cases	50		

a. 10 cells (83.3%) have expected count less than 5. The minimum expected count is .46.

Sex * MP3 Crosstabulation

			MP3					Total
			Never	Rarely	Sometimes	Usually	Always	
Sex	Male	Count	12	3	4	2	2	23
		% within Sex	52.2%	13.0%	17.4%	8.7%	8.7%	100.0%
	Female	Count	16	3	5	3	0	27
		% within Sex	59.3%	11.1%	18.5%	11.1%	.0%	100.0%
Total		Count	28	6	9	5	2	50
		% within Sex	56.0%	12.0%	18.0%	10.0%	4.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.579[a]	4	.631
Likelihood Ratio	3.338	4	.503
Linear-by-Linear Association	.602	1	.438
N of Valid Cases	50		

a. 8 cells (80.0%) have expected count less than 5. The minimum expected count is .92.

How often cycle * Helmet Crosstabulation

			Helmet					Total
			Never	Rarely	Sometimes	Usually	Always	
How often cycle	Daily	Count	9	0	0	2	3	14
		% within How often cycle	64.3%	.0%	.0%	14.3%	21.4%	100.0%
	Twice a week	Count	4	0	2	1	2	9
		% within How often cycle	44.4%	.0%	22.2%	11.1%	22.2%	100.0%
	Most days	Count	2	1	2	0	2	7
		% within How often cycle	28.6%	14.3%	28.6%	.0%	28.6%	100.0%
	Weekly	Count	3	0	1	0	0	4
		% within How often cycle	75.0%	.0%	25.0%	.0%	.0%	100.0%
	Occasionally	Count	6	5	0	3	2	16
		% within How often cycle	37.5%	31.3%	.0%	18.8%	12.5%	100.0%
Total		Count	24	6	5	6	9	50
		% within How often cycle	48.0%	12.0%	10.0%	12.0%	18.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.791[a]	16	.150
Likelihood Ratio	26.929	16	.042
Linear-by-Linear Association	.038	1	.846
N of Valid Cases	50		

a. 23 cells (92.0%) have expected count less than 5. The minimum expected count is .40.

How often cycle * HVC Crosstabulation

			HVC					
			Never	Rarely	Sometimes	Usually	Always	Total
How often cycle	Daily	Count	5	1	2	4	2	14
		% within How often cycle	35.7%	7.1%	14.3%	28.6%	14.3%	100.0%
	Twice a week	Count	1	3	1	3	1	9
		% within How often cycle	11.1%	33.3%	11.1%	33.3%	11.1%	100.0%
	Most days	Count	0	3	3	0	1	7
		% within How often cycle	.0%	42.9%	42.9%	.0%	14.3%	100.0%
	Weekly	Count	1	1	2	0	0	4
		% within How often cycle	25.0%	25.0%	50.0%	.0%	.0%	100.0%
	Occasionally	Count	9	3	3	1	0	16
		% within How often cycle	56.3%	18.8%	18.8%	6.3%	.0%	100.0%
Total		Count	16	11	11	8	4	50
		% within How often cycle	32.0%	22.0%	22.0%	16.0%	8.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.216[a]	16	.136
Likelihood Ratio	26.714	16	.045
Linear-by-Linear Association	6.151	1	.013
N of Valid Cases	50		

a. 24 cells (96.0%) have expected count less than 5. The minimum expected count is .32.

How often cycle * Lights Crosstabulation

			Lights					
			Never	Rarely	Sometimes	Usually	Always	99
How often cycle	Daily	Count	1	1	4	0	8	0
		% within How often cycle	7.1%	7.1%	28.6%	.0%	57.1%	.0%
	Twice a week	Count	1	1	1	1	5	0
		% within How often cycle	11.1%	11.1%	11.1%	11.1%	55.6%	.0%
	Most days	Count	1	1	0	1	4	0
		% within How often cycle	14.3%	14.3%	.0%	14.3%	57.1%	.0%
	Weekly	Count	0	0	0	0	3	1
		% within How often cycle	.0%	.0%	.0%	.0%	75.0%	25.0%
	Occasionally	Count	5	2	2	0	7	0
		% within How often cycle	31.3%	12.5%	12.5%	.0%	43.8%	.0%
Total		Count	8	5	7	2	27	1
		% within How often cycle	16.0%	10.0%	14.0%	4.0%	54.0%	2.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.826[a]	20	.208
Likelihood Ratio	20.367	20	.435
Linear-by-Linear Association	.227	1	.633
N of Valid Cases	50		

a. 28 cells (93.3%) have expected count less than 5. The minimum expected count is .08.

FREQUENCIES Owner cyclists:

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	23	46.0	46.0	46.0
	Female	27	54.0	54.0	100.0
	Total	50	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	31	62.0	62.0	62.0
	31-40	12	24.0	24.0	86.0
	41-50	6	12.0	12.0	98.0
	51+	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

How often cycle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Daily	14	28.0	28.0	28.0
	Twice a week	9	18.0	18.0	46.0
	Most days	7	14.0	14.0	60.0
	Weekly	4	8.0	8.0	68.0
	Occasionally	16	32.0	32.0	100.0
	Total	50	100.0	100.0	

Distance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less then 3KM	22	44.0	44.0	44.0
	3-5KM	19	38.0	38.0	82.0
	5-10KM	6	12.0	12.0	94.0
	more then 10KM	3	6.0	6.0	100.0
	Total	50	100.0	100.0	

Helmet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	24	48.0	48.0	48.0
	Rarely	6	12.0	12.0	60.0
	Sometimes	5	10.0	10.0	70.0
	Usually	6	12.0	12.0	82.0
	Always	9	18.0	18.0	100.0
	Total	50	100.0	100.0	

Why no helmet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't have one	18	36.0	36.0	36.0
	Unfashionable	1	2.0	2.0	38.0
	Other	11	22.0	22.0	60.0
	99	20	40.0	40.0	100.0
	Total	50	100.0	100.0	

Helmets legal

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	46.0	46.0	46.0
	No	27	54.0	54.0	100.0
	Total	50	100.0	100.0	

HVC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	16	32.0	32.0	32.0
	Rarely	11	22.0	22.0	54.0
	Sometimes	11	22.0	22.0	76.0
	Usually	8	16.0	16.0	92.0
	Always	4	8.0	8.0	100.0
	Total	50	100.0	100.0	

Why no HVC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't have one	14	28.0	28.0	28.0
	Feels silly	5	10.0	10.0	38.0
	Other	8	16.0	16.0	54.0
	99	23	46.0	46.0	100.0
	Total	50	100.0	100.0	

Lights

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	8	16.0	16.0	16.0
	Rarely	5	10.0	10.0	26.0
	Sometimes	7	14.0	14.0	40.0
	Usually	2	4.0	4.0	44.0
	Always	27	54.0	54.0	98.0
	99	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

Why no lights

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't have lights	9	18.0	18.0	18.0
	Too expensive	2	4.0	4.0	22.0
	Other	3	6.0	6.0	28.0
	99	36	72.0	72.0	100.0
	Total	50	100.0	100.0	

Lights legal requirement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	58.0	58.0	58.0
	No	21	42.0	42.0	100.0
	Total	50	100.0	100.0	

MP3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	28	56.0	56.0	56.0
	Rarely	6	12.0	12.0	68.0
	Sometimes	9	18.0	18.0	86.0
	Usually	5	10.0	10.0	96.0
	Always	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

Attiude change with MP3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	24.0	24.0	24.0
	No	15	30.0	30.0	54.0
	99	23	46.0	46.0	100.0
	Total	50	100.0	100.0	

Feelings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Terrified	2	4.0	4.0	4.0
	Slightly scard	12	24.0	24.0	28.0
	Alright	9	18.0	18.0	46.0
	Fine	15	30.0	30.0	76.0
	Confident	12	24.0	24.0	100.0
	Total	50	100.0	100.0	