Arnold, Laurence (1997) *Comparing the utility of the Theory of Planned Behaviour and the Health Belief Model in understanding and promoting the use of protective helmets among school-age cyclists.* Doctor of Philosophy (PhD) thesis, University of Kent.

Comparing the Utility of the Theory of Planned Behaviour and the Health Belief Model in Understanding and Promoting the use of Protective Helmets among School–Age Cyclists

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Thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in the Faculty of Social Sciences at the University of Kent and Canterbury

September 1997

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Abstract

The thesis set out to compare the Health Belief Model (Rosenstock, 1966, 1974) and Theory of Planned Behaviour (Ajzen, 1985, 1991) in terms of their usefulness in understanding and predicting health behaviour and their ability to guide the construction of effective behaviour change interventions. The models were used to investigate the beliefs associated with the use of protective helmets amongst school–age cyclists in order to design and evaluate an intervention aimed at promoting the use of helmets by students while cycling to and from school. To aid comparison, the Health Belief Model (HBM) included a measure of behavioural intention mediating between beliefs and behaviour.

In the first of two prospective studies, the models successfully predicted helmet use amongst a sample of teenage boys while cycling to and from school and identified beliefs discriminating between helmet users and non–users. A second longitudinal study limited the influence of past behaviour by predicting helmet use among secondary school girls and boys from beliefs assessed at Junior school before they began cycling to and from school. These studies confirmed the predictive utility of the models and showed the Theory of Planned Behaviour (TPB) superior to the HBM in terms of predictive power, conceptual strengths and sufficiency. The third study, used the beliefs identified as most salient by the TPB to inform a persuasive intervention based upon the Elaboration Likelihood Model of Persuasion (Petty and Cacioppo, 1986), intended to promote the use of helmets. A series of persuasive messages, presented to non–helmeted cyclists, succeeded in promoting positive beliefs and intentions *vis–á–vis* helmet use while cycling to and from school and brought about a 25% increase in helmet use. Both effects were sustained over time. This programme of research confirmed the explanatory power of the TPB for predicting health behaviour.

Acknowledgements

First and foremost I should like to extend my gratitude to two people who provided invaluable support, encouragement and guidance over a number of years and without whom the research would not have been possible. In particular, I should like to thank Lyn Quine for her supervision and for bringing her considerable research experience and enthusiasm to bear on some seemingly intractable problems. I am also extremely grateful to Derek Rutter, for the advice he has given over the years and for his critical appraisal of final drafts. In addition, I should like to acknowledge the kind co-operation of the Teaching staff at the participating schools who kindly allowed their students to take part in the research studies and who, in helping to arrange these, took on extra work themselves. Lastly, there are the children themselves whose willingness to help (and humour) made the research not only possible, but also enjoyable.

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INTRODUCTION

OVERVIEW

This thesis is concerned with examining and comparing the Health Belief Model (Rosenstock, 1966, 1974a, 1974b) and the Theory of Planned Behaviour (Ajzen, 1985, 1991; Ajzen and Madden, 1986) in terms of their usefulness in understanding and predicting helmet use amongst school–age cyclists. The models were used to investigate the beliefs associated with the use or non–use of protective helmets and compared on the basis of their conceptual strengths, predictive ability and sufficiency. In addition, because as Fishbein (1993) argues, the ultimate test or utility of these types of model rests upon their ability to guide the construction of effective behaviour change interventions, the models were used to identify a set of salient beliefs associated with helmet use in order to design and evaluate an intervention aimed at promoting the use of helmets by children while cycling to and from school.

To achieve these objectives, two prospective studies were conducted. The first of these studies, which focused upon the beliefs and behaviour of school boys who cycle to and from senior school, confirmed the predictive ability of the models and identified beliefs associated with helmet use amongst young cyclists which discriminated between helmet users and non–users. The second study was able to circumvent the influence of past behaviour by assessing the beliefs of children at junior school before they began cycling to school. In this way, it was possible to identify beliefs associated with cyclists initial decisions to wear or not wear a helmet while cycling to and from school. This second study included school girls as well as boys.

In the third study, the beliefs identified as most salient were then used to inform a persuasive intervention based upon the Elaboration Likelihood Model of Persuasion (Petty and Cacioppo, 1981; 1986a, 1986b), a cognitive model which aims to effect lasting attitude change. A series of persuasive messages were presented to non-helmet wearing cyclists in an attempt to promote a favourable evaluation of helmet use sustained over time. It was expected that this belief change would manifest itself in positive intentions *vis-á-vis* helmet use while cycling to and from school and lead to the uptake of helmet wearing. The success or failure of this intervention would then serve as an objective test of the models and validate or undermine the claims that they can be used to understand health behaviours.

PRINCIPLES GUIDING THE RESEARCH

The research was guided throughout by the belief that to understand and promote helmet use amongst school-age cyclists, we should focus on school-related bicycling and helmet use, that is, the behaviour of children cycling to and from school as opposed to their behaviour during recreational cycling. This belief was based upon a review of previous epidemiological, investigative and applied research which shows that such a distinction is valid and that school-related cycling is implicated more in accident and casualty statistics concerning young cyclists than play cycling. Such an approach distinguishes the research presented in this thesis from many previous attempts to investigate and/or promote helmet use amongst young cyclists since these make no formal distinction between types of cycling. The research also differs from much of the previous research in this area in that few researchers have used a social psychological approach to investigate helmet use and of those who have, many failed to adopt a theory driven model to help identify the beliefs and attitudes associated with children's behaviour.

Nevertheless, there is considerable evidence to support this behavioural domain as being a suitable test of the Health Belief Model and Theory of Planned Behaviour. In the first case, a small number of researchers have successfully applied the models to understanding helmet use amongst young cyclists (e.g. Otis, Lesage, Godin, Brown, Farley and Lambert, 1992; Witte, Stokols, Ituarte and Shneider, 1993; Arnold and Quine, 1994; Sissons–Joshi, Beckett and MacFarlane, 1994). Secondly, both models have been applied to the investigation of other road user behaviours including health protective actions such as the use of seat belts (e.g. Foss, 1985; Stasson and Fishbein, 1990; Budd, North and Spencer, 1984; Richard, Dedobbeleer, Champagne and Potvin, 1994; Rutter, Quine and Chesham, 1995). Thirdly, both models have been widely used to investigate a variety of preventive health behaviours: It is argued here that the wearing of protective helmets by school children can be conceptualised as a preventive health behaviour since children are motivated to wear helmets through a desire to obtain the positive behavioural and normative outcomes associated with their use. With these considerations in mind, the research reported in this thesis set out to identify the beliefs underlying helmet use, determine their importance and then to use the most salient to mount a persuasive intervention intended to change the beliefs and behaviour of non–helmeted cyclists. This would provide a comprehensive test of the two models.

OUTLINE OF THE THESIS

Chapter One sets out the background to the research by examining the issue of helmet use and reviewing and comparing the models. The chapter begins by examining the accident and casualty rates for child and adolescent cyclists and the evidence for and against the efficacy of helmet use as a preventive health measure. It also briefly describes previous attempts to understand and promote helmet use among schoolchildren (with reference to their theoretical underpinning)[1] and discusses the utility of using social psychological models – in particular, the Health Belief Model (op. cit.) and the Theory of Planned Behaviour (op. cit.) – for this purpose. After this, two alternative health behaviour models – the Health Action Process Approach (Schwarzer, 1992) and Protection Motivation Theory (Rogers, 1975) are described and reasons given for their exclusion. There follows a review of the Health Belief Model (op. cit.) and then the Theory of Planned Behaviour (op. cit.) describing also its theoretical origins in the earlier Theory of Reasoned Action (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). Lastly, the differences and similarities between these models are described and some important issues arising from comparative studies reviewed. This includes an examination of a strategy commonly used (and adopted in the research reported here) to limit the differences between the models.

Chapter Two presents the first study, in which the Theory of Planned Behaviour and the Health Belief Model are used, in the context of a within–subjects prospective study, to identify the beliefs associated with helmet use amongst 180 adolescent male cyclists and to predict their use of protective helmets. The chapter includes a review of relevant social psychological investigations into cyclists behaviour and attitudes towards helmet use, and compares the performance of those studies which adopt a theory–driven approach to those which do not. The reasons for sampling school boys only for this study are discussed.

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[1] A more detailed examination of previous attempts to promote helmet use, whether by school–based intervention, or community–wide campaign, is presented in chapter 4 since these are relevant to the intervention presented in that chapter.

Chapter Three presents the findings of a second, longitudinal, study which examined the predictive ability of the models over an extended time period and set out to limit the effects of past or prior behaviour on outcome behaviour. The study was thus conducted in response to the findings of the previous study and as well as addressing the issue of past behaviour examined several other issues. The most important of these was to investigate the beliefs and behaviour of schoolgirls as well as schoolboys thus extending the research beyond its original premise. The study involved 387 junior school boys and girls (aged 11) about to undergo cycle proficiency training who expressed an interest in cycling to and from senior school. These schoolchildren were then seen a year later at their respective senior schools. The chapter begins with a short review of previous longitudinal studies which have also used the Health Belief Model and/or the Theory of Reasoned Action or the Theory of Planned Behaviour to investigate health beliefs and behaviour and discusses extending the research to include schoolgirls as well as schoolboys and the measures taken to validate this.

Chapter Four reports the development and subsequent testing of a persuasive intervention intended to promote helmet use amongst schoolchildren. This was based upon the Elaboration Likelihood Model of Persuasion of Petty and Cacioppo (1986) and used the salient beliefs identified in the first two studies as being most strongly associated with outcome behaviour. The chapter begins with a critique of previous attempts to promote helmet use amongst young cyclists with reference to their conceptual and methodological rationale. This first evaluates campaigns which have claimed success and in particular, examines their methodology and suitability for use in the United Kingdom, and then examines studies which have failed or only achieved modest success with reference to their conceptual underpinning. This critique is followed by a review of the Elaboration Likelihood Model of Persuasion and how its postulates and principles can be adapted to promote helmet use amongst young cyclists. The study itself is preceded by an extended method section which explains how the specific beliefs used to inform the persuasive messages were chosen and shows in detail the medium used to present the individual persuasive messages.

Chapter 5 provides an overview of the research findings and discusses their theoretical and practical implications. The chapter begins with a brief review of the performance of the Health Belief Model and the Theory of Planned Behaviour in each of the empirical studies before examining the specific implications for the models. This appraisal evaluates first the Health Belief Model and then the Theory of Planned Behaviour with reference to their ability to identify salient beliefs associated with a given behaviour. The chapter ends by examining some methodological issues relating to the intervention before discussing the implications of the research for interventions designed to promote helmet use amongst young cyclists.

CHAPTER 1: BACKGROUND TO THE INVESTIGATION

ACCIDENT AND CASUALTY RATES FOR CHILD AND ADOLESCENT CYCLISTS

The size of the problem

In 1996, a total of 24, 534 cyclists were injured in road traffic accidents (RTA's) in the United Kingdom. Of these, 2,819 were aged between 8 and 11, 4,201 between 12 and 15, and 2,603 between 16 and 19; 423 of the 8–11 year–olds, 639 of the 12 – 15 year olds, and 365 of the 16 – 19 year olds were seriously injured or killed. (Department of Transport Casualty report, 1996). From these figures it can be seen that the casualty rate is highest amongst cyclists aged between 12–15 years of age although an earlier survey by Jones (1989) for the Department of Transport shows that casualty rates per 100,000 population doubles when children first enter school, rises again for the children of middle school and is higher still for senior age groups (see also Thomas, Acton, Nixon, Battistutta, Pitt and Clark, 1994). This is consistent with research in America (e.g. Stutts, Williamson, Whitley and Sheldon, 1990; Gerberich, Parker and Dudzik, 1994; Weiss, 1994), Australia (e.g. Nixon, Clacher, Pearn and Corcoran, 1987; Hoque, 1990), New Zealand (e.g. McKenna, Borman and Fleming, 1984; Moyes, Trustin, McCallum, Pringle and Eastwood, 1990; Collins, Langley and Marshall, 1993) and Canada (e.g. Cushman, Down, MacMillan and Waclawik, 1990; Rouke, 1994) showing cyclists, aged between 10 and 15 years to be 'disproportionally represented in bicycle accidents' (Stutts et al, op. cit.). In other words, the vulnerability of young cyclists and their involvement in bicycle–related accidents is not confined to the United Kingdom (UK). Furthermore, they are also over–represented in fatality statistics (see for example, Sage, Cairns, Koelmayer and

Smeerton, 1985; Nixon et al, 1987; Hoque, 1990; Collins et al, 1993; Cooke, Margolius and Cadden, 1993).

There is also evidence that casualty rates for pedal cyclists are under–reported. In the UK, a study for the department of Transport found that 68 per cent of a sample of pedal cycle casualties at a hospital were injured in accidents that had not been reported to the Police. Though all *fatal* accidents were reported, 61 per cent of accidents resulting in serious injury and 74 per cent of those resulting in slight injury were not (Mills, 1989). This supports an earlier study (Bull and Roberts, 1973) which also found substantial under–reporting of bicycle accidents. More recently, Maimaris, Summers, Browning and Palmer (1994) estimated from the rate of under–reporting in Cambridgeshire that there are as many as 90,000 bicycle related injuries in Britain each year. These findings are consistent with rates of (under)reporting around the world (see for example, Langley, Silva and Williams, 1987; Morrison and Kjellstrom, 1987; Agran, Castillo and Winn, 1990; Harris, 1990; Stutts et al, 1990; Spaite, Murphy, Criss, Valenzuela and Meislin, 1991). Cross and Fisher (1977) estimate that half of such unreported accidents are injury producing.

Research indicates that child and adolescent cycling accidents are 'school related' – that is, they occur on weekdays on journeys to or from school. In the UK, child pedal cyclist casualties over the age of ten have been shown to have a morning peak between 8 am and 9 am, and an afternoon peak from 3 pm to 8 pm depending upon age (Taylor, 1989). In New Zealand, Langley et al (1987, p. 144) found a disproportionate amount of cycling injuries and fatalities to occur between 7 am and 9 am (24%), and between 3 pm and 5 pm (29%) – see also Begg, Langley and Chalmers (1991). Hoque (1990) reports similar figures in Australia where child–cyclists (aged 5-17) were 'over–involved' in accidents between 8 and 9 am, and 3 and 4 pm and accounted for

57% of all day-time fatalities. Furthermore, fatal bicycle accidents had a pronounced peak between 8 and 9 am with the 5–17 year age group being involved in 65% of all accidents (ibid., p.10).

In addition, more boys are injured than girls in these accidents. In 1994, of the 1,445 cyclists aged between 8 and 19 who were 'killed or seriously injured' on British roads, 1,194 were boys as opposed to 250 girls – a casualty ratio of 4.8:1 (Department of Transport Casualty Report, 1995). Again, this is consistent with other research showing between 60 and 70 per cent of injured child cyclists to be male (see Stutts et al, 1990; Collins et al, 1993; Largo and Thacher–Renshaw, 1993; Thomas et al, 1994; Towner, Jarvis, Walsh and Aynsley–Green, 1994). Jones (1989), who found the accident rate for boy cyclists to be over six times that for girls, suggests that this discrepancy might reflect boys greater enthusiasm for cycling. However, Preston (1980), who controlled for the gender differences in bicycle usage, found that boys still had twice as many accidents as girls.

The consequences of bicycle accidents

There is ample evidence that cyclists often suffer serious head injuries. Nakayama, Gardner and Rogers (1990) found that 61.9% of 372 children hospitalised after bicycle–related accidents had head injuries. Twelve died and over 33% had persistent disabilities beyond time of discharge (see also, Gerberich et al, 1994). A study of cycling accidents by Wood and Milne (1986) found that head injuries constituted 33% of reported injuries and accounted for 80% of fatalities. McDermot and Klug (1982) examined the pattern of injuries between motor cyclists (who wore helmets) and pedal cyclists (who did not): 'The incidence of concussion, fractured base and vault of skull, and of inter–crânial trauma was significantly higher in pedal cyclists than motorcyclists' (see also Simpson, Unwin and Nelson, 1988; McKenna et al, 1984; McDermot, 1992). Largo and Thacher–Renshaw (1993) found head injury to be the most common injury amongst 103 young cyclists hospitalised after bicycle–related accidents. Of the sample, 103, 30.1% suffered intercranial injury and 5.8%, skull fracture.

In addition to the accident and injury data, there appears to be a greater likelihood of bicyclists sustaining head injury in bicycle–motor collisions (Gilbert and McCarthy, 1994; Maimaris et al, 1994) and also a greater injury severity (Silverberg, Meer, Silvinger, Gross and Feldman, 1992; Largo and Thacher–Renshaw, 1993). Collins et al, (1993) found the most severe injuries among 1500 cyclists were those sustained in collision with a motor vehicle; these accounted for 209 of the 238 fatalities with head injuries associated with 60% of the deaths. Cooke et al (1993) found that 47 cycling *fatalities* out of a total of 64 involved bicycle–motor collisions while Atkinson and Hurst (1993) found that collisions between cyclists and motor vehicles account for about 85% of cyclist fatalities. All of the deaths in a study by Simpson et al (1988) and 87% of those in a study by Nixon et al (1987) occurred after cycling accidents involving a motor vehicle and perhaps more worrying is the finding that many such accidents occur on urban roads (where many schools are located). Maimaris, et al (1994) for example, found that on urban roads the incidence of head injuries sustained in accidents involving motor vehicles is significantly higher (18%) than in accidents not involving motor vehicles (7%). The authors conclude that motor vehicle accidents involving cyclists are more serious than might be expected from urban speed limits and that the head is more vulnerable when cyclists collide with motor vehicles than when they fall off their bicycle (p.1539). There is also an association with age with Simpson and Mineiro (1992) reporting the proportion of cycle accidents of all severities in which motor vehicles were involved rising from 13% for the 0–

10 age group to 28% for those aged 11–15. Spaite et al (1991), Silverberg et al (1992) and Gerberich et al (1994) report similar findings.

The protection offered by safety helmets

It is clear that cyclists need head protection and the idea that cycle helmets will substantially prevent or lessen the severity of head injury finds support from a number of studies. Spaite et al (1991) compared injuries amongst helmeted and non–helmeted cyclists and found significant differences in the frequency and severity of head injury. Stutts et al (1990) found that 10–14% all of the fatally injured cyclists in their survey suffered a head injury, and that none of these wore a helmet (see also Mishra, Banerji and Mohan, 1984). In two separate case control studies of children presenting with bicycle related injuries, Thompson, Rivara and Thompson (1989) and Thomas et al, (1994) found that wearing a helmet reduced the risk of head injury by 85 per cent and 63 per cent respectively. Dorsch, Woodward and Somers (1987) concluded from their survey that hard helmets were nineteen times better than no helmet at all. From a design perspective, Williams (1990, 1991) tested the response of cycle helmets to simulated impacts and also analysed the performance of helmets worn by cyclists involved in accidents. He concluded that both hard shell and expanded polystyrene foam helmets reduce the risk of head injury effectively by dispersing the force of impact. In addition, sharp increases in helmet use have been associated with significant reductions in the rate of serious head injury and fatalities amongst cyclists. Wood and Milne (1988) for example, found a 20% reduction in the incidence of head injury coinciding with an increase in the wearing of safety helmets by cyclists (see also Vulcan, Cameron and Watson, 1992; McDermot, Lane, Brazenor and Debney, 1993; Rivara, Thompson, Thompson, Rogers, Alexander, Felix, and Bergman, 1993; Pitt, Thomas, Nixon, Clark, Battistutta and Acton, 1994).

Rates of helmet use

However, few child cyclists in the UK wear helmets. Towner et al (1994) found that out of 4,015 cyclists, only 4.2. per cent of those aged between 11 and 12 and 1.8 per cent aged between 13 and 14 wore a helmet. Maimaris et al (1994) report that only ten per cent (104 out of 1040) of injured cyclists were wearing a helmet at the time of their accident. Sissons–Joshi et al (1994) found that only 13 per cent of her sample *always* wore a helmet although 47 per cent said they wore one sometimes showing the disparity between ownership and use. Both low user rates and non–use by helmet owners has also been found in other countries. Cushman, Down, MacMillan and Waclawik (1990) report that only 2 per cent of 568 injured child cyclists were wearing a helmet at the time of their accident although 13 per cent claimed to own one. Hu, Wesson, Parkin, Chipman and Spence (1994) report a 22 per cent ownership rate (amongst 707 children) and a 12 per cent user rate. DiGuiseppi, Rivara and Koepsall, (1990) found that only 56 per cent of *helmet owners* actually wore them (see also Weiss, 1986; DiGuiseppi, et al, 1990; Largo and Thacher–Renshaw, 1990; Stutts et al, 1990; Otis et al, 1992; Stevenson and Lennie, 1992). These findings suggest that, since a large proportion of children who do not wear a helmet own one, availability is not a major factor in children's behaviour – a conclusion also arrived at by Jaques (1994) from his study of helmet use amongst young cyclists from affluent American families.

Promoting helmet use

Despite the interest in increasing helmet use amongst young cyclists (see for example, Simpson et al, 1988; Sibert, 1996), no formal school–based promotional attempts have been made in the UK and the only officially sanctioned programme consists of the distribution of educational leaflets and

Government Safety advertisements. There is also a reliance on 'powerful others' such as Road Safety officers who insist upon helmet use during cycle proficiency training at junior school. However, this is difficult to enforce and is no guarantee of helmet ownership or future use, even though the latter is strongly recommended. Although formal campaigns have been mounted in other countries, these have been largely ineffective (see Weiss, 1994 for a review), relying mainly upon education leaflets and lectures and discount schemes to facilitate helmet acquisition (e.g. Pendergrast, Ashworth, DuRant and Litaker, 1992; Towner and Marvel, 1992, Rouke, 1994). Larger, community-wide projects such as the 'Seattle Children's Bicycle Helmet campaign' (DiGuiseppi, Rivara, Koepsall and Polissar, 1989) may not be as successful as they claim (Weiss, 1994) or, where legislation is involved, such as in parts of Australia (see Vulcan, Cameron and Heiman, 1992), have had the unwanted consequence of causing a fall in bicycle usage. Cameron, Vulcan, Finch and Newstead (1994) report a 36 per cent reduction in cycling amongst children in Australia after a law was introduced making helmet use mandatory. Thus there is evidence that forcing cyclists to wear a helmet against their will is counter-productive in that children may simply stop cycling if they have no choice but to comply with an unpopular measure. Hillman (1993) notes for example that 18% of cyclists surveyed by the 'Cyclists Touring Club' say they would cycle less if helmet use was made compulsory and 9% would give it up altogether (Hillman, 1993). Sissons-Joshi et al (1994) report that 6% of non-wearers would give up cycling if made to wear a helmet. Although some British schools do make it a rule that their pupils must wear helmets if they travel by bicycle, in keeping with Hillman's (op. cit.) concerns, this deters a sizeable number from cycling to school (see Sissons-Joshi et al, 1994). There is also anecdotal evidence that if children are made to wear a helmet against their wishes, they simply remove it once out of sight of their home and/or school (see Sissons–Joshi et al, op. cit.). [2]

From a social psychological perspective, this makes the study of helmet use amongst young cyclists in the UK particularly interesting since it is likely to arise from their beliefs rather than the advice or insistence of others. Identifying these beliefs is far from simple though since helmet users often endorse many of the negative outcomes associated with helmet use in the same way that non–users frequently endorse the positive aspects (see for example, Elliot and Shanahan Research, 1986; Wasserman, Waller, Monty, Emery and Robinson, 1988; Howland, Sargent, Weitzman, Mangione, Ebert, Mauceri and Bond, 1989; DiGuiseppi, Rivara and Koepsall, 1990; Pendergrast et al, 1992; Stevenson and Lennie, 1992; Otis et al, 1993; Arnold and Quine, 1994; Sissons–Joshi et al, 1994). This suggests that the behaviour arising from these beliefs is the result of a cost–benefit analysis of the advantages and disadvantages of helmet use and that to understand cyclists decisions (to wear or not wear a helmet), we need to adopt an approach which allows us to identify which beliefs support which decision. From this point of view, the Health Belief Model and the Theory of Planned Behaviour are particularly well suited to investigate helmet use since they both propose that an individual will consider a number of negative and positive beliefs about the outcomes of a health protective behaviour before embarking on a course of action. This also suggests that the use of cycle helmets can best be conceptualised as a preventive health behaviour which renders the models especially apposite since they have both been used to investigate a wide variety of health behaviours. This includes understanding road–user

[2] Many of the cyclists interviewed during the course of the research reported in this thesis (for the modal beliefs survey referred to in chapter 2 and the preliminary survey referred to in chapter 3), admitted taking their helmets off when cycling to and from school when they believed themselves to be out of sight of whoever insisted they should wear one.

behaviour (where this concerns health–protective actions) such as wearing seatbelts (Wittenbraker, Gibbs and Kahle, 1983; Budd et al, 1984; Grube, Morgan and McCree, 1986; Sutton and Hallet, 1989); using car seats and restraints for children (Gielen, Erikson, Dulbray and Rost, 1984; Foss, 1985; Webb, Sanson–Fisher and Bowman, 1988; Thuen and Rise, 1994); investigating the behaviour of motor cyclists (Chesham, Rutter and Quine, 1991; Rutter et al, 1995), car drivers (Parker, Manstead and Stradling, 1995; Parker, Manstead, Stradling, Reason and Baxter, 1992) and school–age cyclists (Otis et al, 1992; Arnold and Quine, 1994; Sissons–Joshi et al, 1994) and promoting helmet use amongst schoolchildren (Witte et al, 1993). [3] Most recently, Parker, Stradling and Manstead (1996) have used the Theory of Planned Behaviour in an intervention to promote safe driving amongst car drivers. Because of this, the models have an advantage over alternative formulations such as 'Protection Motivation Theory' (Rogers, 1975) and the 'Health Action Process Approach' (Schwarzer, 1992) when investigating helmet use. These models are discussed below along with reasons for choosing to use the Health Belief Model and the Theory of Planned Behaviour in preference.

ALTERNATIVE HEALTH BEHAVIOUR MODELS: THE ADVANTAGES OF USING THE HEALTH BELIEF MODEL AND THE THEORY OF PLANNED BEHAVIOUR

Protection Motivation Theory

Protection Motivation Theory (Rogers, 1975, 1983; Maddux and Rogers, 1983) was originally developed to provide conceptual clarity to the understanding of fear appeals (Prentice–Dunn and Rogers (1986) rather than to investigate health behaviour. It is very much a hybrid model (Boer and Seydal, 1996)

[3] Many of these studies used the Theory of Reasoned Action (Fishbein and Ajzen, 1975) and are relevant since Ajzen (1985) developed his Theory of Planned Behaviour from the earlier model.

combining components of the Health Belief Model, the Theory of Reasoned Action and Bandura's (1977) Self-Efficacy Theory (Schwarzer, 1992). In essence, the model proposes that environmental or intrapersonal sources of information about a health threat initiate two cognitive processes: threat appraisal and coping appraisal (Prentice-Dunn and Rogers, 1986). Threat appraisal involves an evaluation of the severity of the health threat and an estimation of personal susceptibility. Coping appraisal involves evaluating the efficacy and costs of a recommended course of action aimed at preventing or ameliorating the health threat (response efficacy) and estimating one's personal ability (self-efficacy) to execute the recommended preventive behaviour successfully (Boer and Seydal, 1996). The result of these processes is the arousal of 'protection motivation' within the individual. According to Rogers (1975), protection motivation (said to arouse, direct and sustain activity), mediates the intent to adopt a preventive health behaviour (p. 98): If high, then the individual should form a positive intention to carry out a health protective action. If low, action is unlikely.

Although similar to the Health Belief Model (which also proposes that perceptions of vulnerability and severity lead to a consideration of the costs and benefits of a health action), in practice, Protection Motivation Theory resembles more the Theory of Planned Behaviour through its use of intention mediating between beliefs and behaviour and assessment of self-confidence.[4] Moreover, there is the same emphasis on cognitive appraisal (of a health threat) which Rogers (1975) views as more important than emotional arousal (Beck and Frankel, 1981). The opposite is true of the Health Belief Model since Rosenstock (1966) attaches more importance to emotional elements than to cognitive ones.

[4] Confidence (to carry out a health behaviour) is assessed as personal efficacy in Protection Motivation Theory and as perceived behavioural control in the Theory of Planned Behaviour. The differences and similarities between the two constructs are discussed at length below.

The Health Action Process Model

The Health Action Process Approach is another hybrid model which depends for its reputation on the proven utility of components borrowed from other models rather than empirical trials. Schwarzer (1992) developed the model after reviewing the literature and noting that few models focus on the processes that support or detract from the exercise of intentions. This convinced him of the need to include a temporal element in the understanding of beliefs and behaviour (Ogden, 1996) and to focus on self–efficacy (Bandura, 1977) as a determinant of intentions and self–reported behaviour. Thus Schwarzer borrows from the Health Belief Model and the Theory of Planned Behaviour to explain health motivation and from stage theories (such as Prochaska and DiClemmente's [1984] transtheoretical model of change) to explain the process of enacting and sustaining health–related behaviour. However, the model is most strongly informed by social cognitive theory (Schwarzer and Fuchs, 1996).

According to Schwarzer and Fuchs (1996) the underlying notion behind the Health Action Process Approach is that the adoption, initiation and maintenance of health behaviours should be conceived as a process consisting of two phases, a motivation phase and an action or volition phase (p. 174). In the motivation phase, an individual forms an intention either to adopt a precaution measure or to change risk behaviours in favour of other behaviours (ibid., p. 175). Three major cognitions are thought to operate during this phase: risk–perception (which involves an evaluation of personal vulnerability), outcome expectancies (which involve an assessment of the benefits of a health related behaviour) and perceived self-efficacy (which involves an evaluation of one's ability to carry out the recommended course of action. [5] In the action phase, self–regulatory mechanisms (i.e. action plans and action control) mediate between intentions and actions. This behavioural aspect of the volitional process is subject to both the cognitive influence of efficacy beliefs and to the influence of situational variables such as perceived barriers and social support. Schwarzer (1992) believes that while the motivation phase describes what people intend to do, the subsequent action phase describes how hard they try and how long they persist (p. 236). Persistence and effort are largely determined by self–efficacy (ibid., p. 237).

The advantages of using and comparing the Health Belief Model and the Theory of Planned Behaviour

The Health Belief Model and Theory of Planned Behaviour offer several advantages over Protection Motivation Theory and the Health Action Process Approach when investigating helmet use among young cyclists. Firstly, because Protection Motivation Theory originated as a framework to investigate the effects of persuasive messages, it has had to be adapted when applied to the investigation of preventive health behaviour (see for example, Seydal, Taal and Wiegman, 1990; Hodgkinson and Orbell, 1998). As a result, there is little operational consistency across studies. The model has also been revised and restructured several times (Prentice–Dunn and Rogers, 1986; Schwarzer, 1992; Boer and Seydal, 1996) to the extent that previous applications provide little in the way of guidance. Because of this, the integrity of the model has suffered prompting Schwarzer (1992) to describe Protection Motivation Theory as 'less a coherent theory than a cumulative number of varying assumptions that differ from publication to publication' (p. 229).

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[5] Schwarzer and Fuchs (1996) also recommend assessing an individual's 'motivation stage' through the use of Biener and Abrams (1991) 'Contemplation Ladder' – designed to assess whether an individual views him or her self as not thinking about a course of action, considering (or taking) a course of action, or as lying somewhere between the two.

The Health Action Process Approach has similar problems in that although strong on theory, it is vague in operational guidelines (especially where these concern the action phase) and lacks empirical support. In addition, Schwarzer's interest is in the processes that intervene between intentions and behaviour and as such his model offers no advantage over either the Health Belief Model or the Theory of Planned Behaviour when the research aim is to investigate salient beliefs that motivate health behaviour. Finally, Schwarzer (1992), Schwarzer and Fuchs (1996) acknowledge the influence of past behaviour (i.e. previous experience) on efficacy expectations and on the interplay between outcome expectancies and efficacy beliefs. However, these influences have not been empirically examined. Given the importance of self–efficacy in the Health Action Process Approach, these issues need to be investigated and if possible resolved before the model can by fruitfully applied to the investigation of health behaviour.

It can be seen then, that the Theory of Planned Behaviour and the Health Belief Model are to be preferred for the purposes of the research reported here. As well as their proven utility in identifying the social psychological determinants of preventive health behaviour and road–user behaviour, they are also well suited for comparative research – especially where this concerns an attempt to identify redundant variables (see Brawley, 1993). [6] Both models assess outcome expectancies yet do so in very different ways. Both are expectancy–value formulations yet place different emphases on cognitive and emotional elements (as motivators of health behaviour). More importantly, each possesses measures which the other neglects. In other words, although different, they retain sufficient similarities to make direct comparison meaningful. The models are reviewed below and these similarities and differences discussed.

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[6] This issue is discussed in chapter 2.

THE HEALTH BELIEF MODEL

The Health Belief Model has been described as an expectancy–value approach to health–related decisions (Becker, Drachman and Kirscht, 1972a) and is one in which the costs of a health–protective action are weighed against the value of that action for reducing the potential threat. It also has a phenomenological orientation, emphasising subjective beliefs rather than objective reality (Rosenstock, 1966; Sheeran and Abrams, 1996) and in the original version, proposes that these beliefs exert a direct influence on behaviour (see Rosenstock, op. cit.).

The original model

Rosenstock (1966) developed the Health Belief Model from motivational principles derived (conceptually) from Lewin's (1935) 'Field Theory' to investigate non–compliance with recommended health practices. According to Rosenstock (1960) the 'first principle' of motivation (to account for health behaviour) states that 'health behaviour is a function of a health motive or threat and the individual's beliefs about various courses of action open to him' (p. 297). He re–conceptualised this when formally introducing the Health Belief Model proposing that preventive health behaviour can be explained by two classes of variables; '(1) the psychological state of readiness to take specific action, and (2) the extent to which a particular course of action is believed to be beneficial in reducing the threat' (Rosenstock, 1966, p.98). It can be seen then that the 'readiness to act' variable is a function of a perceived threat to health and in this sense, the model is a *disease avoidance* model concerned with health–protective behaviour.

Rosenstock (1966, 1974a, 1974b) described both classes of variables as two–dimensional, with an individual's state of *readiness to act* determined by perceptions of personal susceptibility or *vulnerability* to a particular health threat, *and* perceptions of the *severity* with which that threat might affect his or her life. Similarly, the extent to which a course of action is believed to be beneficial, is the result of beliefs about the *benefits* to be gained by an action (i.e. its efficacy in reducing the threat) weighed against the costs of, or *barriers* to action. According to Rosenstock (1966), 'the level of readiness (susceptibility and severity) provides the energy or force to act and the perceptions of benefits (less barriers) provides a preferred path of action' (p. 101). However, the combination of these could reach considerable levels of intensity without resulting in overt action unless an instigating event occurs to set the process in motion or trigger action in an individual psychologically ready to act (ibid., p.102). Thus in addition to the variables already described, a factor that serves as a cue or a trigger to 'trip off' (sic) appropriate action is necessary. This 'cue to action' could be internal, in the form of symptoms or bodily states, or be external and take the form of personal experiences, or advice on, and media exposure to, health matters. Furthermore, the required intensity of a cue sufficient to trigger action is thought to vary with differences in the level of psychological readiness (ibid. p. 101).

Despite its intuitive appeal the Health Belief Model has a number of problems in that Rosenstock (1966, 1974a, 1974b) failed to specify how and in which way the different beliefs influence each other or how the explanatory variables combine to influence behaviour. As a result, different Health Belief Model studies utilise different combinations of variables by omitting one or more of those described by Rosenstock (see Mikhail, 1980; Sheeran and Abraham, 1996 for reviews). Allied to this is a tendency for different researchers to treat the variables differently in the analysis. While most researchers test an additive model in which the combined weight of the predictors is used to predict the outcome measure, several researchers (e.g. Conner and Norman, 1994; Hill, Gardner and Rassaby, 1985; Rutledge, 1987; Wyper, 1990) have combined variables by either (i) adding vulnerability to severity or subtracting one from the other or (ii) multiplying benefits and barriers together. The products of these computations are then used to predict the criterion. However, Rosenstock's (1974a, 1974b) discussion suggests that the dimensions be treated as separate influences on health behaviour – an argument supported empirically by Hill et al (1985) and Ronis and Kaiser (1989) – and thus an additive combination would seem consistent with the underlying theoretical principles (see also Oliver and Berger, 1979).

A second problem is that Rosenstock (op. cit.) offered no operational definitions of the measures leading different researchers to operationalise them in different ways (Sutton, 1987; Rosenstock, 1974b; Sheeran and Abrams, 1996). Thus in some studies, perceived vulnerability is measured as vulnerability (to a specific health threat) while others measure vulnerability relative to other people (Hoorens and Buunk, 1993). Similarly, perceived barriers, which should address psychological barriers, is often used to assess structural impediments (Melnyk, 1988) rather than perceptions of what Rosenstock (1966) describes as 'costs inherent in a health action' (Melnyk, 1988, p. 197).

Many of these problems can be traced to the revisions made by Becker and his colleagues (i.e. Becker, 1974; Becker, Drachman and Kirscht, 1972a, 1972b, 1974; Becker and Maiman, 1975; Becker, Haefner, Kasl, Kirscht, Maiman and Rosenstock, 1977; Becker, Maiman, Kirscht, Haefner and Drachman, 1977; Maiman and Becker, 1974) who set out to apply the model to the investigation of 'sick–role' behaviour' (the activity undertaken by those who consider themselves ill for the purpose of getting well', [Kasl and Cobb, 1966]). However, their initial version, said to 'borrow heavily' from the earlier formulation (Becker et al., 1974, p. 206), underwent further revisions resulting in a second version of the Health Belief Model based upon different motivational principles than the original and utilising different variables (see by Becker, Maiman, Kirscht, Haefner and Drachman, 1977). Although Becker et al's version is seldom used (but see Calnan, 1984; Calnan and Moss, 1984), a composite model has evolved (see for example, King, 1982; Champion, 1984, 1993; McCallum, Weibe and Keith, 1988; Nemcek, 1990), in which variables from Becker et al's version(s) are added to Rosenstock's original. This practice ignores the implications of using the additional variables and obscures Rosenstock's (1966) account of heath–related decisions and behaviour.

The amended model

Becker et al (1972a, 1972b, 1974) proposed that *three* rather than two classes of variables determined an individuals 'readiness to act' and thus added a third set of variables measuring 'health motivation' to Rosenstock's 'perceived threat' and 'preferred course of action'. This model then underwent a number of further amendments (Becker, 1974, Becker et al, 1974; Becker and Maiman, 1974) and was later applied to preventive health behaviour (Becker and Maiman, 1975; Becker, Haefner, Kasl, Kirscht, Maiman and Rosenstock, 1977; Becker, Maiman, Kirscht, Haefner and Drachman, 1977), until it eventually differed from Rosenstock's (1966) Health Belief Model in a number of important ways. For example, Rosenstock's (1966) benefits dimension was expanded to include additional variables such as 'perceived control' and 'faith in doctors' while barriers was moved elsewhere in the model. Severity and vulnerability were combined in an expanded 'threat' dimension which as well as measuring general and specific vulnerability, included 'worry about illnesses'. Finally, a host of non–attitudinal variables were introduced in the guise of modifying and enabling factors.

The most important change was the introduction of a specific measure of 'health motivation' described originally as 'different degrees of readiness to undertake a health action, aroused by health cues' (Becker et al, 1972b, p. 853). Although health motivation was initially thought to operate in conjunction with Rosenstock's two sets of determinants, Becker et al (1977a) later invoked a re–working of Atkinson and Feather's (1966) theory of 'achievement motivation' and described health motivation as providing the 'push factor' in compliance' (p. 18). This effectively relegates Rosenstock's (1960) motive force (his 1966 'readiness to act') to a secondary influence on health–related behaviour and introduces the notion that health behaviour is determined not so much by a threat to health, as by an individuals *dispositional* 'need to achieve' (see Atkinson, 1957, Atkinson, Bastion, Earl and Litwin, 1960; Feather, 1959) which exerts a constant influence across different situations irrespective of the salience of a health threat.

Despite these theoretical implications, health motivation is usually referred to simply as an amendment (to the original model) and is tacked onto Rosenstock's (1966) variables where it is used as another predictor variable (see for example, Champion, 1984; 1993; 1994; Hill et al, 1985; Henning and Knowles, 1991). It can be seen though that this practice actually introduces a non–specific global measure into a threat–specific model thus radically changing the underlying premise (that health behaviour is a function of beliefs specific to a health threat). There are practical problems too, since researchers set out to measure health motivation yet use items which actually concern the general value of health, concern over health and/or future intention (e.g. Hill et al, 1985; Kelly Zyzanski and Alemagno, 1991; Ronis and

Kaiser, 1989) which would seem to measure influences other than health motivation. Furthermore, Lindsay–Reid and Osbourne (1980), Hill et al (op. cit.), McCallum et al (1985), Champion (1987) and Nemcek (1990) have found health motivation not to be a significant predictor of preventive health behaviour which is perhaps why its status remains undecided. A review of the literature reveals that while many studies describe health motivation as intrinsic to the model, others either contain no reference to it at all, or describe it as an additional variable.

Of far greater significance, Becker et al (ibid.) radically altered the nature of perceived barriers to action. By placing barriers amongst the modifying variables, barriers ceased to be a set of subjective psychological beliefs and instead became a collection of objective structural impediments. This would seem contrary to theory, since usually, such factors as time, transport, accessibility and expense, will not become apparent (and thus salient) until an individual actually attempts the behaviour in question. Such factors should not therefore be viewed as belonging to an initial set of predictors but are probably best measured instead at Time two (in prospective studies) since they mediate between intention and behaviour. King (1982) for example, accounts for the discrepancy between the behavioural intent of her subjects and their actual behaviour, by proposing that practical barriers intervened between Time one and Time two (see also Clarke, Hill, Rassaby, White and Hirst, 1991). Few researchers, though, differentiate between the different types of barriers, and Melnyk (1988) notes that the barriers dimension is more often operationalised as systems characteristics rather than as the consumers perceptions of the subjective costs inherent in a health threat (p. 197). [7] Thus

[7] With regard to preventive behaviours that do involve an initial financial outlay, such as purchasing a cycle–helmet, or blood–pressure monitoring kit, the cost may well operate as a perceived barrier affecting the readiness to act. However, if researchers are to use the Health Belief Model correctly, in such an instance, cost should only be operationalised as a Time 1 predictor only if it is found to be amongst the salient psychological beliefs identified in the

McCallum et al (1988) for example, describe barriers as situational variables rather than psychological, while Mullen, Hershey and Iverson (1987) describe barriers as including both enabling *and* perceptual factors (p. 979). King (1982), Norman and Fitter (1989, 1991) use the barriers measure to address systems characteristics as well as psychological beliefs.

These changes have also heralded a move away from the original phenomenological orientation of the model. Rosenstock (1960, 1966) argued that an individual acts in response to the environment as it is represented in the mind of the perceiver. Becker et al's revisions have instead encouraged a tendency to measure a set of practical and structural influences judged to be salient by the researchers (see for example, Hennig and Knowles, 1990; Clarke et al (1991). This conceptual change has also extended to the perceived benefits construct with Hill et al (1985, p. 74) noting a tendency to measure objective medical factors rather than subjective ones (see for example, King, 1982; Mahoney, Thombs and Ford, 1995). More recently, Rosenstock, Strecher and Becker (1988) have suggested that a measure of efficacy beliefs (Bandura, 1977) should also be added to the model as a separate dimension influencing health behaviour. This is again a break with tradition since Janz and Becker (1984) point out that such beliefs can be assessed as an aspect of perceived barriers – a strategy adopted by (for example) Clarke et al (1991) [8] and Wilson, Manual and Lavelle (1991). [9]

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modal belief survey.

[8] Clarke et al (1991) use 'lack of confidence in doing BSE' as a barrier item (p. 301) at Time 2. At Time 1, what they refer to as their efficacy measure also assesses 'confidence in doing BSE (properly)'.

[9] This issue is discussed further (below) in the context of a review of the differences between the Health Belief Model and the Theory of Planned Behaviour.

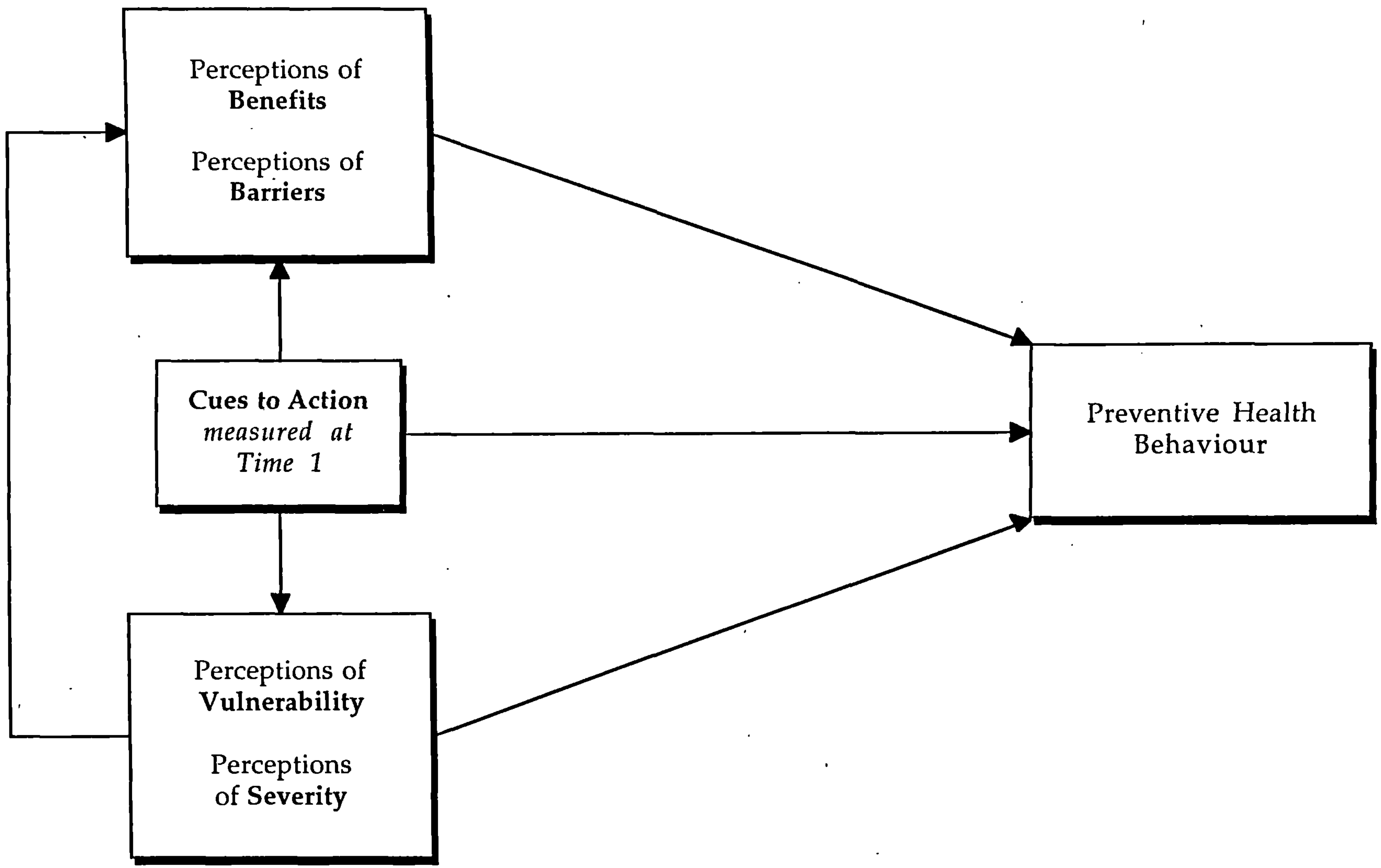


Figure 1.1: The Health Belief Model (after Rosenstock, 1966).

However, despite these complexities, the Health Belief Model has received substantial empirical support for predicting a wide variety of health behaviours thus confirming the importance of its 'core components' with respect to health–related decisions. Janz and Becker (1984) reviewed a total of 46 studies and calculated a significance ratio for each variable based on the percentage of studies that reported a significant relation of each component to health behaviour. Barriers to change had a significance ratio of 89%, vulnerability 81%, benefits 78%, and severity, 65% (p. 41). Taking the *prospective* studies alone into consideration, barriers was still the most significant component and severity the least, while benefits and vulnerability yielded equivalent levels of effectiveness (ibid., p. 36). Since 1984, the model has been successfully applied to a variety of preventive health behaviours (see Sheeran and Abrams, 1996 for a review) including the use and promotion of protective helmets by cyclists (Witte et al, 1993; Arnold and Quine, 1994). Although 'Cues' was not included in Janz and Becker's (1984) review, Arnold and Quine (1994) found cues to be a powerful influence on children's bicycle helmet use while Witte et al (1993) found cues to influence young cyclists' perceptions of threat. Champion (1988), Hennig and Knowles (1991), Jones, Jones and Katz (1991), Mullen et al (1987), Petosa and Jackson (1991) and Wilson and Lavelle (1992), have also found cues to be a significant influence on preventive health behaviour.

In summary, close inspection of the differences between Rosenstock's (1966) original model and the version derived from the revisions of Becker and his colleagues reveals two distinct models, each having its own theoretical underpinning and each utilising different operational definitions. Moreover, these revisions have not been uniformly accepted resulting in different variants of the Health Belief Model being used in different studies. To avoid these difficulties, the research reported here used Rosenstock's (1966) original disease–avoidance model with its emphasis on subjective beliefs as determinants of action and addressed the constructs of perceived vulnerability, severity, benefits and barriers and cues to action. A graphical representation of the Health Belief Model as suggested by Rosenstock (1966) is shown in Figure 1.1 This differs from the depiction usually offered in the literature (e.g. Maiman and Becker, 1974) and reflects the manner in which the majority of researchers use the Health Belief Model, that is, to predict behaviour from a simple additive combination of the variables.

THE THEORY OF PLANNED BEHAVIOUR

The Theory of Planned Behaviour (Ajzen, 1985, 1991; Ajzen and Madden, 1986) is described as an extension of the earlier Theory of Reasoned Action (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980) from which it derives its theoretical and conceptual underpinning (see Fishbein and Stasson, 1990; Conner and Sparks, 1996). Because of this, and because issues relating to one model often have implications for the other, the Theory of Planned Behaviour can only be fully understood within the context of a review of the earlier model.

Theoretical origins of the Theory of Reasoned Action

Fishbein's (1967b, 1967c) initial interest was to investigate the failure of researchers to successfully predict behaviour from attitudinal variables (see also Fishbein and Ajzen, 1974). In doing this, he applied expectancy–value principles to the association between beliefs and attitudes and began by making a distinction between beliefs and attitudes (Fishbein, 1961, 1963, 1967a). Defining attitudes as the evaluative dimension of a concept and beliefs as the probability dimension of a concept, [10] Fishbein proposed that ...'an individual's attitude towards an object is a function of his beliefs about the object (i.e. the probability that the object is associated with other objects, concepts, values and goals) and the evaluative aspects of those beliefs (i.e. the attitude towards the 'related object' (Fishbein, 1963, p. 233). In the Theory of Reasoned Action, this becomes the principle that an individual's attitude towards a behaviour is a joint function of beliefs about the outcomes of performing that behaviour and the evaluation of those outcomes.

From Dulany (1961), whose theory was concerned with predicting the probability of overt responses, Fishbein (1967c) adopted several important principles. The first of these was that behavioural intention is the immediate antecedent of overt behaviour. Furthermore, because Dulany was concerned with an individual's intention to perform a given behaviour in a given situation, Fishbein adopted the belief that we should measure intentions to engage in a particular act in a particular situation. He reasoned that the ensuing close correspondence between the measure of intention and actual behaviour should guarantee strong correlations between them and that as a result, in predicting specific intentions we should be able to predict overt behaviour (Fishbein, 1967c, p. 488). The second principle Fishbein adopted stems from Dulany's belief that an act would be reinforced both by the subject's expectations that a particular response should evoke a certain event and the evaluations of those events. Fishbein reinterpreted this (in terms of attitude theory) to state that a subject's attitude towards a particular object or act was a function of beliefs about the outcome of his or her behaviour with respect to that object weighted by an evaluation of that outcome. Lastly, Fishbein adopted Dulany's (op. cit.) belief that the probability of a given

[10] He later refined these and defined attitude as 'learned predispositions to respond to an object or class of objects in a consistently favourable way', and beliefs about an object as 'hypotheses concerning the nature of the object and its relations to other objects' (Fishbein, 1967a, p. 389).

response depended also on the subject's 'behavioural hypothesis', that is, his belief as to what he is expected to do or what he should do in the situation weighted by his 'motivation to comply', that is, how much the subject wants to do what he believes is expected of him (Fishbein, 1967c, p. 488). From this, Fishbein derives his belief that in predicting behaviour we should consider the social pressure on subjects in terms of their perceived normative expectations of referent others and the importance of complying with the perceived norms. [11] These principles were reformulated to become Fishbein's behavioural intention model (see Ajzen and Fishbein, 1969, 1970, 1972, 1973, 1974) in which the immediate antecedent of overt behaviour is the intention to perform that behaviour. This behavioural intention is viewed as a function of the individual's attitude towards the act and his or her perception of the expectations of relevant others. These perceived expectations or normative beliefs are multiplied by the individual's motivation to comply with the norms (Ajzen and Fishbein, 1974, p. 2). Lastly, Fishbein suggested that to obtain greater correlations between attitudes and behaviour, researchers should ensure a high degree of correspondence between the predicted behaviour and the measures used to predict this (see Fishbein, 1967b). This principle of correspondence – later reformulated as the 'principle of compatibility' (Ajzen and Fishbein, 1977) – along with the introduction of behavioural intention into the attitude–behaviour equation enhanced the predictive power of Fishbein's model by defining the conditions under which strong attitude–behaviour correlations should occur.

[11] Initially, Fishbein (1967b) argued that the subjects social and personal normative beliefs should be assessed but abandoned this idea when it became clear that there was little difference between a subjects personal norm and his or her behavioural intentions (see Ajzen and Fishbein, 1969; 1970).

The Theory of Reasoned Action

Fishbein's model underwent some minor adjustments (see Ajzen and Fishbein, 1970) and was eventually presented as the Theory of Reasoned Action. In this, Fishbein and Ajzen (1975) propose that a given behaviour is a function of the intention to perform (or not perform) that behaviour. This intention is said to be the immediate precursor of behaviour and represents an individual's motivation in the sense of his or her conscious plan or decision to exert effort to perform the behaviour (Conner and Sparks, 1996). Intention in turn is predicted by two conceptually independent determinants; the attitude towards that behaviour and the perceived social (normative) pressure to perform or not perform that behaviour. The first of these, 'attitude towards the behaviour', is itself a product of positive and negative beliefs (each termed a *belief strength*) about the consequences of the behaviour weighted by an evaluation of the importance of that outcome *(outcome evaluations).* The second determinant, 'subjective norm', is a function of the expectations of significant others *(normative beliefs)* weighted by the *motivation to comply* with referent others (Mullen et al, 1987). The product of each belief strength multiplied by its corresponding outcome evaluation gives a set of *behavioural beliefs*, the sum of which forms the overall attitude towards the behaviour. Similarly, the product of each normative belief multiplied by an evaluation of the motivation to comply gives a set of *subjective norms*, summed to form an overall subjective norm. Thus to predict a behaviour, we should identify the attitudinal and belief variables that predict an individual's behavioural intention with respect to that behaviour. The strength and direction of that intention should then allow us to predict subsequent behaviour.

In addition to its theoretical premise, the model also provides clear operational guidelines which Fishbein and Ajzen (1975) say should be adhered to ensure accurate prediction of behaviour. The first of these concerns the temporal stability of intention. Ajzen (1988) notes that behavioural intentions can change over time and that the accuracy of prediction will usually decline with the amount of time that intervenes between measurement of intention and observation of behaviour (p. 115). With the passage of time, either the underlying beliefs which inform intention may change (due perhaps to additional information) or extraneous events may intervene between intentions and behaviour. The optimum period of time between measuring intentions and assessing behaviour seems to be one month (see Ajzen, 1988) after which the correlation between measures decreases rapidly. The second consideration is the 'principal of compatibility' (see Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1977). This notion is based upon the assertion that each attitude and behaviour has the four elements of action, target, context and time and states that the correspondence between attitudes and behaviour will be greater when the measures of the predictors and the predicted correspond in terms of the target, the action being examined, the context in which this action is to be performed and the time scale involved. If for example, we are interested in predicting the use of protective helmets (the action) amongst children (the target) while cycling to and from school (the context) in the next four weeks (the time), then the measures used to assess their intentions with respect to this behaviour should relate specifically to helmet use while cycling to and from school in the next four weeks. Moreover, the statements relating to attitudinal, normative and control beliefs should adhere to the same principle.

The Theory of Planned Behaviour

Despite its empirical success (see Ajzen, 1988; Ajzen and Fishbein, 1980; Sheppard, Hartwick and Warshaw, 1988; Eagly and Chaiken, 1993; Conner and Sparks, 1996 for reviews), the Theory of Reasoned Action was widely criticised for the underlying assumption that most behaviours of social relevance are under volitional control. Critics (e.g. Liska, 1984; Sutton, 1987) pointed out that by limiting the Theory of Reasoned Action to behaviours under volitional control, the authors appeared to exclude behaviours partly or wholly dependent upon skills, abilities and opportunities, or the co-operation of others (Sutton, 1987). Ajzen (1985) responded by amending the Theory of Reasoned Action, adding a measure of 'control beliefs' to assess the extent to which individuals believe they could (or could not) exercise control over a given behaviour. This new variable also altered the operational parameters of the model *vis–a–vis* the conceptual determinants of behavioural intention and actual behaviour. The resulting Theory of Planned Behaviour is thus predicated on the premise that most behaviours can be located somewhere on a continuum from being under complete volitional control to being influenced by (internal and external) factors that affect the ability to carry out that behaviour at will (Ajzen, 1985). However, it still rests upon the same theoretical principles underpinning the Theory of Reasoned Action and therefore uses the same methodology to assess attitudinal and normative beliefs. In addition, it incorporates the same principle of compatibility seen in the earlier model (see Ajzen, 1988).

Ajzen's amendments

According to the Theory of Planned Behaviour, behaviour is still largely a function of the person's intention to perform (or not perform) that behaviour

(Ajzen, 1988) but this intention in turn is held to be determined by three rather than two conceptually independent components, 'one personal in nature , one reflecting social pressure ... and a third reflecting past experience and anticipated impediments to performing the behaviour' (ibid., p. 132). The first two of these, attitude towards the behaviour, and subjective norm are the same as described above which is why many of the critical assessments of the Theory of Reasoned Action apply equally to the Theory of Planned Behaviour. Where the difference between the models lies is in the introduction of a third determinant of behavioural intention, namely, 'perceived behavioural control' which refers to the 'perceived ease or difficulty of performing the behaviour (Ajzen, 1988) and is assumed to reflect past experience as well as anticipated impediments and obstacles (ibid.). "The more resources and opportunities that individuals think they posses, and the fewer obstacles or impediments they anticipate, the greater should be their perceived control over the behaviour (Ajzen and Madden, 1986, p. 457).

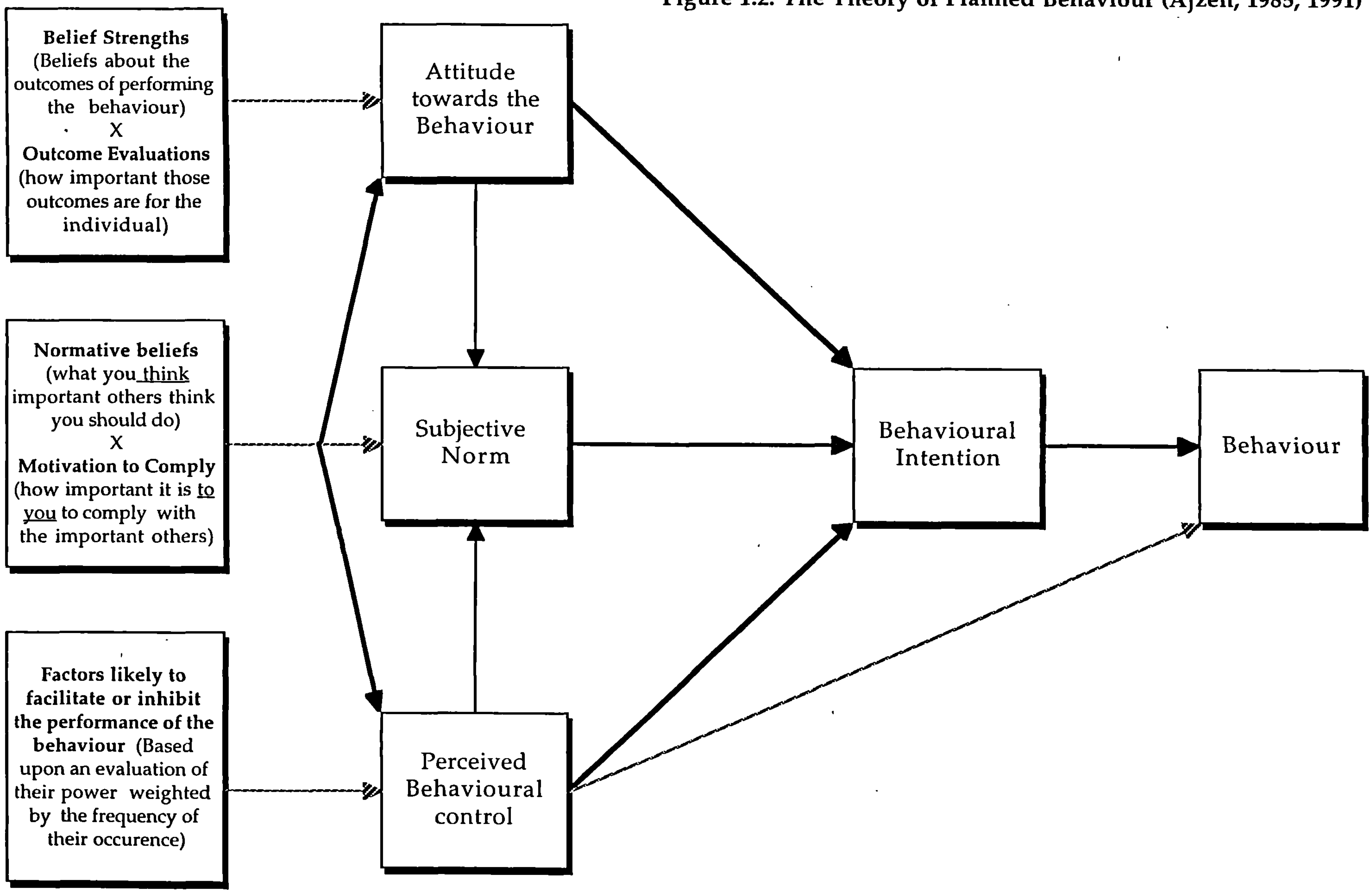
The introduction of perceived behavioural control is not however the only amendment to the Theory of Reasoned Action. In the Theory of Reasoned Action, the influence of beliefs and attitudes on behaviour is *always* mediated by behavioural intention. Ajzen (1985) departs from this, stating that in certain circumstances perceived behavioural control may directly influence behaviour. Specifically, Ajzen (1987, 1988; Ajzen and Madden, 1986) believe that perceived behavioural control can play three major roles in the prediction of behaviour. First, it can have motivational implications for intention, in which case its influence on behaviour is *mediated* by its influence on intention. Secondly, perceived behavioural control can have a *direct effect* on behaviour to the extent that perceived behavioural control reflects actual control, and thirdly, perceived behavioural control may interact with intention to predict behaviour and play a *moderating* role (DeVellis, Blalock and Sandler, 1990). More recently Ajzen (1991) has proposed that performance of a behaviour is a *joint* function of intention *and* perceived behavioural control (*pace* Liska, 1984).

A number of studies reviewed by Ajzen (1991) support his claim that perceived behavioural control provides extra power in predicting intention and (where perceived control reflects actual control) behaviour (but see DeVellis et al, 1990; Fishbein and Stasson, 1990; Netemeyer and Burton, 1990), but there is a continuing debate over what the construct refers to and how it should be assessed. [12]

Ajzen and Madden (1986) argue that "just as beliefs concerning consequences of the behaviour are viewed as determining attitudes, and normative beliefs are viewed as determining subjective norms, *so beliefs about resources and opportunities may be viewed as underlying perceived behavioural control* " (p. 457, my italics). Thus as well as approaching the issue of perceived behavioural control directly (using three items concerning the extent to which subjects view class attendance as being easy or difficult and under their control), they also assess a number of specific factors concerning practical impediments and presence or absence of resources and skills (see p. 462) likely to facilitate or inhibit the performance of the behaviour. These they term control beliefs, later described by Ajzen (1988) as 'belief–based measures' of perceived behavioural control. Ajzen (ibid.) argues that the summed belief–based measures indicate the specific kinds of concerns underlying the overall perception of behavioural control assessed by the direct measure and it is thus possible to identify particular areas of concern by examining the correlations between these measures and between specific items within the same scale.

[12] For comprehensive reviews, see Terry and O'Leary (1995) and Conner and Sparks (1996). See also Schwarzer and Fuchs (1996).

Figure 1.2: The Theory of Planned Behaviour (Ajzen, 1985, 1991)



However, while Ajzen (1988) initially suggests perceived behavioural control to be based upon the sum of frequency of occurrence of various facilitators and inhibitors he later (Ajzen, 1991) proposes that each control factor is weighted by its perceived power to facilitate or inhibit performance of the behaviour (Conner and Sparks, 1996). As a result, Valois, Desharnis, Godin, Perron and Lecomte (1993) have computed perceived behavioural control as a multiplicative composite (in keeping with Ajzen's, 1991 proposal) while a handful of others (e.g. Ajzen and Driver, 1991; Kimiecik, 1992; Corneya, 1995; Norman and Smith, 1995; Parker et al, 1995) have assessed both belief–based and direct measures and examined the relationship between them. It is far more usual however, for researchers only to assess variants of Ajzen and Madden's (1986) direct measures (see for example, DeVellis et al, 1990; Netemeyer and Burton, 1990; Netemeyer, Burton and Johnston, 1991; Madden, Ellen and Ajzen, 1992; Reinecke, Schmidt and Ajzen, 1996).

In addition, Fishbein and Stasson (1990) discuss the ambiguities surrounding perceived behavioural control questioning in particular whether it should measure control over the behaviour or control over goal attainment (see for example, Shifter and Ajzen, 1985). In similar fashion, Maddux (1993) notes that it is unclear whether perceived behavioural control refers to perceived barriers or to self–efficacy expectations. Such criticisms denote the conceptual confusion surrounding the construct which, according to White, Terry and Hogg (1994) and Terry and O'Leary (1995), derives from Ajzen having compounded perceived control and Bandura's (1977) concept of self–efficacy. They point out that the measures typically used to assess perceived behavioural control (see Ajzen and Madden, 1986; Madden et al, 1992) encompass both efficacy expectations internal to the individual, and control beliefs reflecting internal and external constraints. Dzewaltowski, Noble and Shaw (1990) point out that this may be acceptable since people may believe they have little control over the performance of physical activity but be confident that they can creatively use their skills and abilities to perform the behaviour (p. 391). However, Terry and O'Leary (1995) argue that the extent to which a person perceives that a situation is controllable is empirically distinct from a the persons confidence in his or her ability to deal with events. They cite evidence that efficacy beliefs predict intentions and not behaviour while levels of perceived behavioural control predicted behaviour but not intentions. In similar fashion, de Vries, Dijkstra and Kuhlman (1988.) propose that while efficacy beliefs should influence intentions, that aspect of efficacy which concerns *levels of skill* will intervene between beliefs and behaviour. This issue has methodological implications since if efficacy beliefs are consistently shown to predict intentions and control beliefs to predict behaviour (see de Vries et al, 1988; McCaul, Sandgren, O'Neill and Hinsz, 1993; Terry and O'Leary 1995), then that aspect of perceived behavioural control which concern the perceived ease or difficulty of performance (i.e. the direct measures) might best be used to predict behavioural intentions and measures which concern behavioural control (i.e. the belief–based measures) used to predict behaviour.

In summary, then, the Theory of Planned Behaviour has been shown to improve upon the predictive power of the Theory of Reasoned Action (see for example, Beale and Manstead, 1991; Kimieciek, 1992; Manstead and Parker, 1995; Millstein, 1996) and improve its overall utility since Ajzen's (1991) model can be applied to a wider range of behaviours. However, although many researchers consider (and show) perceived behavioural control to be an extremely useful addition to the original model (see for example Beck and Ajzen, 1991; Madden et al, 1992; Richard et al, 1994; Giles and Cairn, 1995; Parker et al, 1996), the construct is not as clearly defined as other components of the model and is subject to a degree of interpretation which detracts from an otherwise theoretically cohesive and clearly specified model.

In the research studies reported in this volume, direct measures of perceived behavioural control were obtained as well as belief–based measures in keeping with Ajzen (1988) and Ajzen and Madden (1986). The model itself was operationalised as suggested by Ajzen (1985, 1991) and remains as true to Fishbein and Ajzen's (1975) principles as possible. Figure 1.2 shows a schematic representation of the Theory of Planned Behaviour. The hatched line (shown in the original) indicates that perceived behavioural control may influence behaviour directly as well a via behavioural intention.

COMPARISON BETWEEN THE MODELS

It can be seen from these reviews that there is a considerable conceptual overlap between the Health Belief Model and the Theory of Planned Behaviour with both proposing a decision–making process that involves a costs–benefit analysis of the positive and negative consequences of behaviour. The models overlap in other ways too, assessing similar psychological and social influences although the extent of this overlap depends upon how the models are operationalised. There are however important methodological and structural differences with each model addressing constructs not measured by the other and measuring components common to both in different ways. Some of these differences have important implications for attempts to compare the models and in the research studies reported in chapters 2 and 3, steps were taken to remedy this. The following review discusses firstly the differences and similarities between the models before describing how the most important of these differences was limited. [13]

[13] As noted earlier, because the Theory of Planned Behaviour is an extension of the Theory of

Differences between the models

The most obvious difference between the models is that the Health Belief Model uses beliefs to directly predict the probability of behaviour while the Theory of Planned Behaviour uses beliefs to *indirectly* predict behaviour via behavioural intention(s). This difference becomes more important in prospective studies in which beliefs and attitudes at Time 1 are used to predict the likelihood of actual behaviour at some future date (Time 2). In these instances, the Health Belief Model measures Time 1 beliefs associated with a Time 2 outcome measure while the Theory of Planned Behaviour is always correlational, measuring beliefs and attitudes at Time 1 *at the same time* as the criterion measure (intention) which they purport to predict. To test the association between beliefs and behaviour, the intention measure of the Theory of Planned Behaviour is then used to predict the Time 2 outcome measure (behaviour). This difference between the models is more than just structural since it requires that different statistical procedures be used for each model which of course has direct implications for comparative analyses where these involve predictive performance. Sutton (1987) for example, in his review of the Theory of Reasoned Action, points out that measuring the beliefs which predict intention at the same time as obtaining a measure of intention creates conditions likely to maximise the correlation between measures (p. 363). This raises the question of how directly to compare the predictive power of the two models since using behavioural intention in one and not the other limits the utility of comparative studies (see Oliver and Berger, 1979). Several researchers have addressed this disparity by using a measure of behavioural intention in the Health Belief Model thus limiting the conceptual and methodological differences (see for example, Oliver and Berger, 1979; Champion and Miller, 1991; Conner and Norman, 1994). This

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Reasoned Action, issues from the literature relevant to one, often have relevance for the other.

strategy is discussed in more detail below after other differences between the models are examined.

A second important difference between the models concerns the ways in which they approach the assessment of the perceived consequences of performing a health behaviour. There are two differences here, one methodological and the other structural although both denote the conceptual differences underlying the models. In the first case, the models differ in how they approach the measurement of these beliefs – the Theory of Planned Behaviour utilising an evaluative procedure absent in the Health Belief Model. In the second case, the Theory of Planned Behaviour requires that a single measure of attitude towards the behaviour be constructed from the positive and negative outcomes associated with a behaviour. In the Health Belief Model, these are assessed separately as perceived benefits and barriers.

With respect to the first issue, Oliver and Berger (1979) note that the Theory of Reasoned Action ... 'requires that beliefs concerning the consequences of the preventive health act be multiplicatively combined with one's evaluation of those consequences' (pp. 114-5). This is also true of the Theory of Planned Behaviour and in this, it adheres more strictly to expectancy–value theory than the Health Belief Model since it examines beliefs about behavioural outcomes (the subjective probability or *expectancy* that a certain action will produce a specified outcome) as well as the evaluation of the outcomes *(value)* specified by those beliefs. The Health Belief Model has no mechanism with which to evaluate beliefs about the outcomes or consequences of behaviour and the degree of endorsement of (for example) an item denoting a perceived beneficial outcome is assumed to reflect its value to respondents. This difference is more than just theoretical. Measuring the value placed by respondents on each behavioural outcome makes it possible to determine which beliefs (of any salient set) contribute most to behavioural decisions. In the Health Belief Model, two belief statements might receive the same score from respondents and thus carry the same weight in the analysis. In the Theory of Planned Behaviour, where each belief statement is multiplied by its evaluation rating, the same two items may well have different weights in the analysis due to the different value placed on them. This would then reflect more accurately the different degree of importance attached to those beliefs and the influence each has with respect to intentions and/or behaviour. The effects of the different scoring procedures is made more apparent in comparative studies where the same questionnaire items (i.e. the negative and positive belief statements) are used as belief strengths in the Theory of Reasoned Action/Planned Behaviour and as perceived benefits and barriers in the Health Belief Model (see for example, Oliver and Berger, 1979; Hennig and Knowles, 1989). This strategy may limit the differences between the models in terms of how the outcome expectancies are measured [14]

With respect to the second issue, having separate measures of benefits and barriers as opposed to a single composite attitude measure may be advantageous where these can be seen (through path analysis) to be influenced differently by other variables and/or to exert their own influence separately on other variables (see for example, Ronis and Kaiser, 1989; Champion and Miller, 1992; Ronis, 1992; Aiken, West Woodward, Reno and Reynolds, 1994). Aiken et al (op. cit.) found for example that perceived barriers exerted its influence solely on behaviour rather than intentions while benefits influenced intentions and not behaviour. In addition, barriers to action have been shown to increase with the experience of a preventive behaviour. Clarke et al (1991) for example, found perceived barriers more influential when measured at Time 2 (after their respondents had attempted

[14] This procedure adopted in the research studies reported in Chapters 1 and 2 of this volume.

breast self-examination) than when measured prior to the attempt (see also King, 1982; Petosa and Jackson, 1991). These patterns of influence would not have been found if a single measure had been computed from the positive and negative beliefs as is standard practice in the Theory of Planned Behaviour.

A third important difference concerns the influence of 'social pressure' viewed by Ajzen and Fishbein (1975) as the behavioural prescriptions of referent others. Ajzen (1985) states that a person who believes that most referents with whom he is motivated to comply think he should perform the behaviour will perceive social pressure to do so (p. 14). Thus in the Theory of Planned Behaviour, as in the Theory of Reasoned Action, an individual's 'subjective norm' is viewed as one of the major determinants of intentions and actions. The lack of any equivalent measure in the Health Belief Model has been cited as a shortcoming of the model (see for example, Hecker and Ajzen, 1983; Calnan and Rutter, 1986) and some researchers (e.g. Calnan and Moss, 1984; Kelly et al, 1991) address this by adding a measure of social support/influence. Conner and Norman (1994) however, claim that the Health Belief Model can address normative influences by virtue of its cues (to action) measure (see for example, Becker et al, 1972a; Becker and Maiman, 1975), a claim supported empirically by Wilson and Lavelle (1992). [15] By way of contrast, Janz and Becker (1984) believe the subjective norm measure to be a logical refinement of the 'benefits' or 'barriers' dimension of the Health Belief Model since social compliance (and approval) may be a benefit associated with a preventive health action and social disapprobation, a barrier (see for example Arnold and Quine, 1994). In keeping with this, Petosa and

[15] Wilson and Lavelle (1992) assessed cues using a four item scale, three of which addressed normative influences i.e. 'Have you talked about AIDS with your ... friends/boy or girlfriend/a schoolteacher?' (p. 60). Amongst males, the measure was significantly associated with the criterion – Intended condom use.

Jackson (1991), suggest that social barriers are addressed by the perceived barriers dimension. This position is supported obliquely by Weinstein (1993) who questions the extent to which it is necessary to differentiate between normative and behavioural beliefs in the Theory of Planned Behaviour (Norman and Conner, 1996), the implication being that normative influences could be addressed by outcome expectancies that focus on the perceived social consequences of behaviour (ibid.) – in other words, conceptualised as perceived social barriers.

A fourth difference between the models concerns two constructs unique to the Health Belief Model – perceived vulnerability and severity. Through these, the Health Belief Model specifically address respondents' subjective beliefs about a specified health threat and thus caters for what Oliver and Berger (1979) refer to as 'emotional fear arousal variables'. Neither the Theory of Reasoned Action or the Theory of Planned Behaviour specifically assess perceptions of threat in this way and are thus limited to the rational part of human decision-making (Oliver and Berger, 1979; Conner and Norman, 1994). This points towards an important conceptual divergence in that Fishbein and Ajzen (1975) argue that it is beliefs (cognitions) which underlie behaviour while Rosenstock (1966) believes that 'readiness to act' is defined by beliefs which have both cognitive and emotional elements. Moreover, Rosenstock believes the underlying emotional aspects to have greater value in accounting for behaviour than the cognitive elements (ibid., p.99). Norman and Conner (1996) note that perceptions of severity may be tapped indirectly by the evaluative component of behavioural beliefs and perceived vulnerability by the belief strength (see Weinstein, 1993), but also suggest that it might be advantageous to maintain a distinction between threat perception and behavioural beliefs (p. 200). [16] In keeping with this, some researchers

[16] Maddux (1993) argues that in some circumstances, perceptions of vulnerability represent

have added (or have suggested adding) a measure of vulnerability to the Theory of Reasoned Action (e.g. Boyd and Wandersman, 1991) or the Theory of Planned Behaviour (e.g. Vaile, Calnan, Rutter and Wall, 1993). Such beliefs might provide the 'psychological explanation' for individual differences in behavioural beliefs which Sutton (1987) believes is wanting in the Theory of Reasoned Action.

A fifth difference arises from the Health Belief Model's 'cues to action' construct which can also be used to assess emotional arousal variables (see for example, Champion, 1988; Champion and Miller, 1992; Aspinwall, Kemeny, Taylor, Schneider and Dudley, 1991; Arnold and Quine, 1994). More usually though, the measure is used to assess a wide range of social influences. This might include 'awareness and memory of mass media campaigns, through leaflets and reminder letters, to descriptive and injunctive social norms from medical professionals and significant others' (Sheeran and Abrams, 1996, p. 43). Perhaps because it is so all–embracing the cues measure is the least researched and used component of the model (see Oliver and Berger, 1979; Janz and Becker, 1984; Aspinwall et al, 1991; Aiken et al, 1994). This may also be due in part to Rosenstock's (1966) failure to define the measure in precise terms and it remains unclear as to whether cues exert their influence on the perceived threat variables, affect an individual's 'readiness to act' or impact directly on perceived benefits and barriers (see Oliver and Berger, 1979). Despite this, cues is potentially an extremely useful measure where it relates to a specific event such as a bicycling accident acting as a cue to helmet use (e.g. Witte et al, 1993; Arnold and Quine, 1994) or receiving an invitation to attend a clinic (e.g. King, 1982; Conner and Norman, 1994). In these instances, where the measure can be made time and situation specific, the impact of the

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outcome expectancies since the degree of personal vulnerability (to for example, lung cancer) is conditional upon future action (i.e. smoking or not smoking.). See for example Ronis (1992).

influences it addresses is fairly easy to quantify. In general though, cues are conceptualised as recall of advertisements and media campaigns (Oliver and Berger, 1979; Mullen et al, 1987), advice from others (Rosenthal, Hall and Moore, 1992; Wilson, Manuel and Lavelle, 1991), having heard about the health threat in question (Champion and Miller, 1992) or knowing someone who suffers from it (Aspinwall et al, 1991) or is experiencing symptoms (McCallum et al, 1988). In such instances, the effect is difficult to quantify since (as Rosenstock, 1966, points out) with the passage of time, people are likely to forget the occurrence or the impact of an event that acted as a cue or may recall an event as influential when in fact it was not.

Finally, there are the issues of sufficiency and cohesion. The Theory of Reasoned Action and thus its derivative, the Theory of Planned Behaviour, is viewed by researchers as a theoretically cohesive and precise model (e.g. Hays, 1985; Schlegel, Crawford and Sanborn, 1977), while in contrast, the Health Belief Model, is usually described as a loose collection of variables, (see Oliver and Berger, 1979; Hecker and Ajzen, 1983; Sutton, 1987; Weinstein, 1993). In addition, strong claims have been made for the sufficiency of the Theory of Planned Behaviour (see Ajzen, 1991; Beck and Ajzen, 1990) while that of the Health Belief Model has been repeatedly questioned (both by inference – see Oliver and Berger, 1979; Calnan and Rutter, 1986, and directly – e.g. Hecker and Ajzen, 1983). Sutton (1987) however, points out that both models make the same assumption of sufficiency (p. 367) in that what Hays (1985) describes as 'contingent factors' (such as social conditions) may influence health behaviours and outcomes. For example, socio–demographic factors are not viewed as directly causally related to behaviour.

Similarities between the models

The perceived behavioural control construct of the Theory of Planned Behaviour is responsible for an overlap between the models through its potential to assess costs and impediments. This makes it very similar to the perceived barriers measure of the Health Belief Model. However, the extent of this similarity depends on how the two measures are operationalised. It will be recalled that perceived behavioural control can be used to address both belief–based and direct measures of control (see Ajzen, 1988; Ajzen and Madden, 1986) and can therefore assess the anticipated degree of control over performing a specific behaviour as well as the influence of psychological impediments (such as the presence or absence of skills and resources) and practical barriers (such as situational impediments). In this elaborated form, Wilson, Zenda and Lavelle (1992) describe perceived behavioural control as analogous to self–efficacy *and* perceived barriers (p. 262) although this is conditional upon the form that perceived barriers takes. According to Rosenstock (1966, 1974b), perceived barriers should address psychological costs but as Melnyk (1988) notes, the construct is often used to assess structural and practical barriers instead, or is broadened to address physical, social and psychological barriers (Petosa and Jackson, 1991). In other words, the barriers measure has become expanded to encompass the types of practical, emotional, and structural impediments assessed as belief–based measures of perceived behavioural control. Clarke et al (1991) for example, assessed emotional, practical and cognitive barriers. Hill et al (1985) and Norman and Fitter (1989, 1991) expand barriers to include practical considerations as well as emotional and motivational factors (see also Simon, Morse, Balson, Osofsky and Gaumer, 1993). Thus an extended barriers measure and an elaborated perceived behavioural control construct would assess the same kinds of emotional, practical and psychological costs making them very similar.

However, although both measures can be used to assess the various barriers and impediments associated with a health behaviour, the perceived behavioural control construct is primarily concerned with anticipated control over the behaviour and thus assesses the degree of confidence an individual has in his or her ability to carry out an action (Ajzen, 1985). The Health Belief Model has no such measure of confidence and control although Janz and Becker (1984) suggest that low self–confidence would constitute a barrier and that therefore, beliefs about personal efficacy could be addressed as an aspect of perceived barriers (see for example Langlie, 1977). More recently, Rosenstock et al (1988) have suggested adding a measure of efficacy beliefs to the Health Belief Model as a separate measure – a suggestion taken up by Aspinwall et al (1991), Clarke et al (1991) and Kelly et al (1991). With respect to perceptions of behavioural control, some researchers have added a measure of control beliefs to the Health Belief Model – most notably Champion (1987, 1988, 1893) – although this has met with limited success and derives more from Rotter's (1954) conception of dispositional control than Ajzen's use of situation/threat specific control beliefs (see Ajzen, 1988). [17]

In summary, although Norman and Conner (1996) point to the conceptual similarities between perceived barriers and perceived behavioural control noting that both are capable of assessing the impact of factors that detract from an individual's perceptions of volitional control over the performance of a behaviour, the perceived behavioural control construct has an advantage in that it can also directly assess anticipated control and efficacy expectations. In practice though, researchers tend to use the direct but not the belief–based measures (see Beck and Ajzen, 1991; Madden et al, 1991; DeVellis et al, 1990; Fishbein and Stasson, 1990; Netemeyer and Burton, 1990; Netemeyer et al,

[17] Champion (op. cit.) assessed perceptions of internal control amongst her respondents. Simon et al (1993) use a single measure to assess respondents' 'Locus of Control'. Interestingly, they describe this as a 'social barrier' (p. 268).

1991) which means that the Theory of Planned Behaviour does not usually assess the influence of the costs associated with the performance of a particular health protective action. In light of this ambiguity, perceived behavioural control was operationalised in the research studies used here as suggested by Ajzen and Madden (1986) to assess beliefs about anticipated control over the behaviour and ease of performance as well as specific control beliefs concerning structural, resource and skill–linked impediments.

Limiting the differences: behavioural intention and the Health Belief Model

It was noted above that the use of behavioural intention in the Theory of Planned Behaviour but not the Health Belief Model makes it difficult to compare the predictive ability of the two models directly. Oliver and Berger (1979), Conner and Norman (1994) and Aiken et al (1994) resolve this issue by placing a measure of behavioural intention in the Health Belief Model and using it (as it is used in the Theory of Planned Behaviour) as a variable mediating between the predictor variables and behaviour. This makes the models conceptually similar and more importantly, allows the data from each model to be analysed in identical ways. Thus the Health Belief Model analysis can utilise the same two–step multivariate procedure commonly used for the Theory of Planned Behaviour (in which intention is regressed on beliefs and then the behavioural criterion regressed on intention) or can be analysed by path analysis (see for example, Oliver and Berger, 1979; Chesham et al. 1991; Conner and Norman, 1994; Rutter et al, 1995).

There is a long history of incorporating Behavioural Intention into the Health Belief Model and using it as either a mediating variable between beliefs and behaviour (i.e. Cummings, Jette, Brock and Haefner, 1979; Oliver and Berger, 1979; Conner and Norman, 1994) or as the sole criterion

(McCallum et al 1988; Norman and Fitter, 1989; Wilson and Lavelle, 1992). It has also been used as one of a set of predictor variables (i.e. Becker and Maiman, 1975; Wurtele et al, 1980; Clarke et al, 1991). Although precedence alone may be insufficient justification for using intention in the Health Belief Model, there are also sound theoretical reasons for doing so.

In an early re–working of the Health Belief Model by Becker et al (1972a), 'readiness to act' was envisaged to be a variable mediating between health beliefs and outcome behaviour and one that was directly influence by cues to action (p. 845). There seems little conceptual difference between 'readiness to act' and 'behavioural intention' and Rosenstock's (1966) 'psychologically ready individual' may be one who has formulated an intention which is then put into action. More recently, Hays (1985) has suggested that cues in the Health Belief Model convert *behavioural intentions* into behaviour (p. 380, my italics) which echo's Rosenstock's (1966) argument that cues to action 'trip off behaviour'. Although Becker et al's (1972a) reformulation was undertaken to apply the Health Belief Model to the studying sick–role and compliance behaviour, the inclusion of a 'readiness to act' component, if viewed as a mediator, does make the model easier to reconcile with Rosenstock's (1966) original exposition. In a later incarnation of the Health Belief Model (Becker and Maiman, 1975), intention (to comply) is formally included in the Health Belief Model as a measure of motivation (p. 20) but from their discussion, appears to be a factor thought to intervene between health beliefs and health behaviour (see also Becker, Haefner, Kasl, Kirscht, Maiman and Rosenstock, 1977; Becker, Maiman, Kirscht, Haefner and Drachman, 1977). This research would seem to support the use of a formal measure of behavioural intention in prospective Health Belief Model studies in the way that Oliver and Berger (1979) and Conner and Norman (1994) suggest. Cummings et al (1979), King (1982), Calnan (1984) have also suggested that intention mediates between the influencing variables in the Health Belief Model and outcome behaviour. Furthermore, Norman and Fitter (1989) argue that since research suggests that intention may be a mediating variable between an individuals' health beliefs and their intentions, then what is needed is knowledge of the determinants of intention (p. 264/4). One way of doing this of course is to formally incorporate a measure of behavioural intention into the Heath Belief Model and determine empirically what a conceptual restructuring would imply; that certain health beliefs may predict intention rather than behaviour.

To date however, only Oliver and Berger (1979), Cummings et al (1979), Champion and Miller (1992), Aiken et al (1994) and Conner and Norman (1994) have empirically tested the mediating influence of behavioural intention in Health Belief Model studies. Conner and Norman found behavioural intention to be a function of perceived benefits, barriers and health value. Oliver and Berger (1979) found intention to be predicted by perceived threat, benefits and barriers and cues to action. Cummings et al (1979) found that three out of four Health Belief Model variables (perceived benefits, severity and vulnerability) had no direct paths to outcome behaviour but instead predicted behavioural intention. In turn, behavioural intention and perceived barriers predicted behaviour. Champion and Miller (1989) found behavioural intentions not to mediate between beliefs and behaviour. However, in their study, a year elapsed between the measure of intention and the Time–Two assessment of behaviour which may have weakened the relationship (see Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). Aiken et al (1994) found perceived vulnerability and severity to have direct paths to perceived benefits which in turn influenced intentions. Only perceived barriers had a direct path to outcome behaviour.

Corroboration of Norman and Fitter's view and further support for the use of a measure of behavioural intention in the Health Belief Model comes from research in which the model has been used to predict behavioural intentions as well as determine the correlates of *prior* (Hill et al, 1985; Champion, 1988; Stein, Fox, Murata and Morisky, 1992) or *future* (Sissons–Joshi et al, 1994) behaviour. Stein et al (1992) found certain Health Belief Model variables to predict intentions better than prior behaviour (and vice–versa) and argue that behaviours and intentions may have different antecedents and may need to be managed in different ways (p. 458). Similarly, Sissons–Joshi et al (1994) used the same beliefs to predict behavioural intention and outcome behaviour, and found vulnerability to predict intentions but not behaviour. This suggests that a model in which behavioural intention is used as a mediator may determine the role of social psychological variables better than one in which only direct paths to behaviour are considered.

It could be argued that incorporating a Time 1 measure of behavioural intentions into the Health Belief Model violates a basic assumption of the model – that health beliefs directly influence health behaviour. However, introducing behavioural intention into the Health Belief Model is preferable to removing it from the Theory of Planned Behaviour. The latter is a well defined model with strict operational guidelines whereas the Health Belief Model is not. Many researchers have commented on the lack of operational guidelines in the Health Belief Model and how poorly articulated its components are (see for example, Oliver and Berger, 1979; Montano, 1986; Mullen et al, 1987; Ried and Christensen, 1988; Stein et al, 1992). More recently, Weinstein (1993) has criticised the model for its lack of combinatorial rules and suggests that it is more accurately described as a short list of variables than as a theoretical model (p. 327). This echoes Sutton (1987), who regards the model as a collection of variables rather than a developed theory

(p. 367). Violating the assumptions of a model becomes less of an issue if these assumptions are not clearly defined in the first place. In view of this, the same measure of behavioural intention used (to mediate between beliefs and behaviour) in the Theory of Planned behaviour was added to the Health Belief Model in each of the investigative studies used for the research reported here (see chapters 2 and 3). This allowed the models to be compared on the basis of their predictive ability and conceptual strengths and enabled redundant variables to be identified. Testing the models in this way is an important pre-requisite of health promotion since it guards against theory failure (see Nelson and Moffit, 1988).

RATIONALE FOR CHOOSING CYCLING TO SCHOOL AS THE CRITERION BEHAVIOUR

There have been few formal attempts to investigate and promote helmet use amongst young cyclists in the UK, none of which have recognised and addressed the difference between play cycling and cycling to school and the implications this has for helmet use. The research reported here recognises this distinction and concentrates solely on the use of cycle helmets while cycling to and from school rather than helmet use during play cycling.

In the UK, most schools prohibit travelling to school by bicycle until students reach secondary school at the age of eleven. This means that having used their bicycles largely for recreational purposes in and around the neighbourhood and for 'off–road' cycling, they are suddenly allowed to cycle to and from a secondary school that may be some distance away and are exposed to novel and potentially hazardous cycling conditions. These include contending with motor vehicles during the morning and evening 'rush hours', negotiating unusual road junctions and travelling along major arterial roads (see Agran and Winn, 1993; Towner et al, 1994).

Agran and Winn (op. cit.) make a distinction between using a bicycle for recreational purposes and using it for transportation. They propose that cycling to and from school is an example of what they term 'purposive bicycling', which is characterised by situational and behavioural factors which differentiate it from 'recreational cycling'. Children using a bicycle for transportation are more likely to cycle further distances from home than when play cycling and to use multi-lane roads – both of which expose the cyclists to motor-vehicle traffic to a greater extent than when play cycling (see also Towner et al, 1994). For these reasons, we chose to focus on cycling to school as the criterion behaviour.

SUMMARY

The purpose of this chapter has been to outline the background to the research and the underlying rationale, examine the scale of the problem addressed by the research, and describe the theoretical models. It was explained that the research concerns the investigation and promotion of helmet use amongst school-age cyclists as a way of examining the utility of the Health Belief Model and the Theory of Planned Behaviour. It was also explained that the focus of the research was on helmet use while cycling to and from school (as distinct from recreational cycling). The chapter began by reviewing accident and casualty statistics. After this, evidence supporting the wearing of protective helmets was presented and current promotional strategies considered. This was followed by a description of two alternative health behaviour formulations. Finally, the two models used to investigate salient beliefs – the Health Belief Model and the Theory of Planned

Behaviour – were reviewed and their similarities and differences discussed. The next two chapters concern two prospective studies in which the models were compared on the basis of their ability to predict helmet use and identify beliefs which discriminated between helmet users and non–users – beliefs which could be used to inform the intervention reported in Chapter 4.

CHAPTER 2: STUDY 1

SCHOOLBOYS' ATTITUDES TOWARDS THE USE OF PROTECTIVE HELMETS WHILE CYCLING TO AND FROM SCHOOL : COMPARING THE HEALTH BELIEF MODEL AND THE THEORY OF PLANNED BEHAVIOUR

INTRODUCTION

The first part of this chapter considers the appropriateness of using a social psychological approach to understanding helmet use by young cyclists and examines the contribution of the Health Belief Model and Theories of Reasoned Action/Planned Behaviour to this understanding. The second part examines the utility of comparative studies and focuses on ways of limiting the differences between the Health Belief Model and Theory of Planned Behaviour in order to facilitate such a comparison. In the third section, the study itself is reported and the performance of the two models is contrasted on the basis of their ability to predict helmet use in schoolboys cycling to school and to identify salient beliefs. The chapter ends with a discussion of the relative performance of the models in predicting and explaining helmet use intention and behaviour. At the same time, the usefulness of specific beliefs are examined with regard to the proposed intervention.

BICYCLING SAFETY RESEARCH AND THE EMERGENCE OF A SOCIAL PSYCHOLOGICAL APPROACH

Much of the bicycling safety research conducted throughout the 1980's was primarily concerned with bicycle–related accident analysis (e.g. Atkinson and Hurst, 1983; Howarth, 1983; Hoque, 1990), the vulnerability of cyclists to road traffic accident involvement (e.g. Langley et al, 1987; Moyes et al, 1990; Nixon et al, 1987), the frequency and severity of head injury (e.g. McDermot and Klug, 1982; McKenna, Borman and Fleming, 1982; Sage et al, 1985), and the protective capabilities of helmets (e.g. Dorsch et al, 1987; Thompson et al, 1989; Williams, 1990). It is only in recent years that researchers have begun investigating the beliefs and attitudes that cyclists hold towards bicycling (e.g. Langley and Williams, 1992) and helmet use (e.g. DiGuiseppi et al, 1990; Pendergrast et al, 1992) and to use social psychological models such as the Health Belief Model and Theories of Reasoned Action and Planned Behaviour to try to predict and understand their behaviour (e.g. Otis et al 1992; Witte et al, 1993; Arnold and Quine, 1994; Sissons–Joshi et al, 1994).

This change of focus seems to have been brought about by an increased interest in promoting helmet use amongst young cyclists and the failure of promotional campaigns to have any appreciable impact on levels of helmet use – a failure which led researchers to consider the use of theory–driven models. One possible reason for the failure was that the interest in promoting helmet use and the campaigns that followed were a response to, and reflected the research priorities of, the studies described above. Many of these were concerned with the wider issue of safe cycling behaviour(s) rather than helmet use in particular, but even those which did view low user–rates amongst young cyclists as a problem failed to investigate the attitudes of young cyclists towards helmet use. Nor did researchers who called for efforts to increase helmet use recommend any coherent promotional strategies which might achieve this (see for example Weiss, 1986; Simpson et al, 1988; Nakayama, Gardner and Rogers, 1990; Jaques, 1994). As a consequence, promotional campaigns focused on reducing the cost of purchasing helmets and educating cyclists about injury susceptibility and the protective ability of helmets (see for example Rouke, 1994).

An alternative approach – that of investigating the beliefs and attitudes associated with helmet use – had been suggested by Weiss (1986), Elliot and Shanahan Research (1986) and Wasserman et al (1988). It was noted that peer pressure, risk–perception and beliefs about the utility of helmet use might explain the low rates of use among children. This was taken up by Howland et al (1989) and Stevensen and Lennie (1992) whose research, using focus groups consisting of young cyclists, confirmed the importance of normative influences and practical and psychological barriers in decisions to use or not use a helmet and indicated how these were associated with helmet ownership and use.

This new approach viewed the cyclist as an active agent whose decisions and behaviour were guided by personal beliefs and was consistent with the belief that normative and attitudinal beliefs are more likely to promote behavioural change than mass media campaigns or generic information. Two early studies directly influenced by this viewpoint were conducted by DiGuiseppi et al (1990) and Pendergrast et al (1992) which investigated the attitudinal and/or normative correlates of helmet use amongst young cyclists.

Investigating the attitudes and beliefs associated with helmet use

DiGuiseppi et al (op. cit.) report a number of psychological and practical reasons cited by children for not wearing a helmet. Amongst helmet owners, 'discomfort', 'forgetting' and 'friends not wearing' (in descending order) were the most frequently cited. Friends not wearing was also cited by 25% of non–owners as was 'didn't think about it'. Similarly, Pendergrast et al (op. cit.) found the single strongest predictor of helmet use or ownership by children was helmet ownership by a sibling and that a negative attitude towards helmets was associated with intentions not to wear. In addition, children with no history of serious bicycle–related injury tended not to own a helmet. However, although these studies confirmed the importance of earlier research, neither had any clear theoretical underpinning and were thus more prescriptive in pointing the way forward than descriptive of psychological influences. Concepts were only loosely defined, their measurement not systematic and little attempt was made to link beliefs to behaviour.

Pendergrast et al for example, assessed children's attitude towards helmet use by use of a single item, 'Do you think that helmet use is a good idea?'. This type of measure has been shown to be a poor indicator of helmet use and intentions since many non–users, like users, consider protective helmets to be a good idea (see for example, Sissons–Joshi et al, 1994; Lennie and Stevensen, 1992). In the event, Pendergrast et al found that while more than 75% of their sample thought helmets a good idea, roughly 85% had no intention of ever wearing one. Similarly, DiGuiseppi and colleagues asked children to write down whether they had worn a helmet on their last bicycle trip and if not, why not. As well as inviting a *post hoc* rationalisation of behaviour, this question was presented to the children on the back page of a questionnaire sent to their parents making it highly likely that their responses were influenced by the perceived or expressed wishes of their parents.

There were also other more fundamental problems with these studies. Pendergrast et al (op. cit.) were primarily concerned with the wider issue of promoting what Weiss (1994) has termed 'traditional safe cycling behaviours' (i.e. the Highway Code, cycling skills and bicycle maintenance) and assessed beliefs during, rather than prior to, a promotional exercise. DiGuiseppi and colleagues also presented their questionnaires to the children during a promotional campaign and actually measured the correlates of *non–use* since only 2% of their sample actually wore helmets. It is also noticeable that neither study was informed by a modal belief survey, either to guide the promotional component or the belief assessment.

Despite the shortcomings of these studies, certain of their findings were corroborated by Stevensen and Lennie (1992) who, influenced by Howland et al (1989), used focus groups in order to devise strategies to increase helmet use amongst young cyclists. The authors found the most important barrier to helmet use was peer derision and then a negative evaluation of helmet use derived from the beliefs that helmet use was unnecessary, expensive and uncomfortable. Moreover, children became more aware of barriers such as discomfort and peer derision, the longer they wore a helmet. DiGuiseppi et al (1990) report that discomfort was endorsed more by helmet owners (who had presumably worn their helmet at least once) than amongst non–owners. This suggests that barriers to helmet use will be more salient (and resistant to change) when they derive from personal rather than vicarious experience.

While studies such as these highlight the importance of considering the role of subjective beliefs in determining helmet use amongst young cyclists, their methodological and conceptual shortcomings confirm the need for an approach based upon clear theoretical principles. Three recent studies have done this, using the Health Belief Model and/or the Theory of Reasoned Action or Planned Behaviour to identify the psychological correlates and predictors of helmet use and intentions amongst young cyclists.[18]

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[18]Although a fourth study (Witte et al, 1993) used the Health Belief Model to investigate the influence of cues to action and the perceived threat to health implied by bicycle–related accidents, their survey involved the parents of cyclists and not the children themselves. This study is thus only of relevance to the extent that it indicates parental influence.

Investigating helmet use using the Theories of Reasoned Action and Planned Behaviour and the Health Belief Model

The first study, conducted by Otis et al (1992), used an expanded Theory of Reasoned Action to investigate the psychological correlates of intention to use helmets amongst children aged between 8 and 12 years. Behavioural and normative beliefs were assessed as well as perceived risk (of head injury when bicycling without a helmet) and severity (of head injury incurred while bicycling). Behavioural and then normative beliefs were the only variables of statistical significance, accounting for 51% of the variance in intention. However, behavioural intention was found to be 'neutral' with respondents neither strongly in favour of or strongly against helmet use (p. 287). In addition, the intention measure did not relate to intentions to wear a helmet while cycling to and from school but was constructed from four items concerning helmet use when cycling (i) on short trips near the home, (ii) to go to the park (iii), to go for a ride or (iv) to go riding with friends. The younger children in the sample, who were probably only used to bicycling around their immediate neighbourhoods (see Agran and Winn, 1993) may have had problems differentiating between these behaviours.

The second study used the Health Belief Model to investigate the determinants of helmet use among 162 schoolboys, focusing solely on helmet use while cycling to and from school (Arnold and Quine, 1994). The study addressed perceptions of vulnerability (to sustaining head injury in an accident) and injury severity as well as the perceived benefits of and barriers to helmet use. The role of own and other people's bicycle accidents as cues to action was also investigated. Multiple regression analysis showed that perceived benefits, barriers, vulnerability and cues to action were significant predictors of helmet use four weeks later. Several individual beliefs significantly discriminated between helmet users and non–users, in particular, the belief that helmet use would make parents worry less.

The third study, conducted by Sissons–Joshi et al (1994), used the Health Belief Model *and* the Theory of Planned Behaviour to identify the psychological correlates of helmet use and intentions to use amongst young cyclists. The only expectancy–value belief of any significance was perceived vulnerability – which predicted intentions but not behaviour – although three 'attitudinal measures' ('active consideration', 'conformity' and 'anticipated regret') did significantly predict helmet use and intentions. However, active consideration could have been assessed by either the Health Belief Model or Theory of Planned Behaviour as psychological barriers or resource–based impediments; [19] Conformity (e.g. 'I would be more likely to wear a helmet if my friends also wore one') could have been assessed as a normative belief by the Theory of Planned Behaviour. Anticipated regret has been used in the Theory of Planned Behaviour (e.g. Richards and Van der Pligt, 1991) but was not referred to amongst the modal beliefs used to inform the present study. [20]

While these three studies support the use of the Health Belief Model and Theory of Planned Behaviour in investigating helmet use amongst young cyclists, they suggest that neither may be entirely sufficient. The Health Belief Model does not consider social normative influences or practical impediments while the Theory of Planned behaviour does not assess risk factors such as perceptions of vulnerability and severity and the influence of accident history. These differences give each model an advantage over the

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[19] The authors report that 54% of non–wearers said they have so many items to think about these days that cycle helmets are pretty low on their agendas; 52% said that when they get on their bikes 'the last thing' they thought about was whether to wear a helmet or not (p. 537).
[20] Parker Manstead and Stradling (1995) also found the concept not to feature amongst the modal beliefs elicited for their study of intentions to commit driving violations.

other. For example, Sissons-Joshi et al (1994) and Arnold and Quine (1994) found perceived vulnerability of the Health Belief Model to predict helmet use intentions and behaviour (respectively) while accident history, as a cue to action, was shown to influence helmet use (Arnold and Quine, 1994) and ownership (Pendergrast, 1992). Similarly, Otis et al (1992), using the Theory of Reasoned Action, found the perceived normative expectations of referent others strongly associated with the intention to wear a helmet. There are also areas of 'overlap' with the models using different measures to address the same underlying concept. For example, Otis et al (1994) assessed the extent to which helmet use was perceived as a 'bother' as a behavioural belief. The perception of a behaviour being a 'bother' has also been assessed as a barrier to action using the Health Belief Model (Hill et al, 1985; Clarke et al, 1991).

This points to a conceptual as well as structural difference which makes the choice of models far from arbitrary. Because they assess different sets of beliefs and use different measurement techniques for overlapping constructs, each might identify particular influences as salient at the expense of others and might also identify the relative saliency of the same belief set differently. These observations informed the research reported here, which used both models to ensure the assessment of a broad spectrum of beliefs. In this way, it would be possible to identify which would have the most influence on helmet use.

COMPARING THE HEALTH BELIEF MODEL AND THE THEORY OF PLANNED BEHAVIOUR

Nelson and Moffit (1988) make the important point that theory failure may be a threat to health promotion. Formal comparisons between models are therefore essential. They allow researchers to determine which models and/or variables are the most accurate or influential in helping us to understand behaviour (Brawley, 1993). Mullen et al (1987) for example, compared the Health Belief Model and Theory of Reasoned Action on the basis of their predictive power, parsimony, acceptability to respondents and specificity for use in programme planning (p. 976). Oliver and Berger (1979) and Conner and Norman (1994) compared the Health Belief Model to the Theory of Reasoned Action/Planned Behaviour (respectively) on the basis of their predictive ability and conceptual strengths. This 'pitting' of models against each other also acts as a 'winnowing process' in which redundant variables and inefficient models are discarded (Weinstein, 1993). Such comparisons are thus extremely useful with respect to health promotion in that they allow researchers to focus on a small number of constructs and to employ the most efficient measurement techniques. They also expose important differences between the various models which need to be taken into consideration when attempting to compare the performance of one against the other.

One such difference between the Theory of Planned Behaviour and the Health Belief Model, discussed in chapter 1, is that the former uses a measure of behavioural intention to mediate between beliefs and behaviour while the latter does not. This discrepancy has been addressed in some studies by using the same measure of intention to mediate between beliefs and behaviour in both models. This strategy limits the conceptual and structural differences between the models and facilitates direct comparison of their predictive performance. Studies which compare the models yet do not address the intention issue are open to the criticism that their findings are artefactual. If for example, the Theory of Planned Behaviour is shown to be the superior model, this might be entirely due to the differential use of intention. One such study is that conducted by Mullen et al (1987) who found the Theory of

Reasoned Action to explain between 12 and 17% more of the variance in the criterion than the Health Belief Model (for all five health-related behaviours examined). However, intention was used as a predictor in the former model but not the latter. Similarly, Ried and Christensen (1988) report that the Theory of Reasoned Action explained 34% of the variance in drug-taking compliance against 10% by the Health Belief Model. In both studies, intention accounted for most if not all of the variance in the criterion.

Comparative studies which do use a measure of behavioural intention in the Health Belief Model usually find the results less inconclusive and are also better able to determine redundancy. Hill et al (1985) for example, compared the ability of the Health Belief Model and Theory of Reasoned Action to predict the intentions of a sample of women to obtain a PAP test (to detect cervical cancer) and practice breast self-examination (BSE). Both models significantly predicted behavioural intention although the Health Belief Model was marginally superior for both behaviours explaining 20% and 32% of the variance in BSE and PAP test intention (respectively) as opposed to the 17% and 26% explained by the Theory of Reasoned Action. Oliver and Berger (1979), who compared the Health Belief Model and Theory of Reasoned Action in predicting subjects' inoculation intentions and behaviour found the reverse. The Theory of Reasoned Action was marginally superior, explaining 50% of the variance in intentions as opposed to 30-35% for the Health Belief Model. However, both models explained almost the same amount of variance in behaviour (around 10%). A similar study by Conner and Norman (1994) compared the Health Belief Model and Theory of Planned Behaviour in predicting health screening intentions and behaviour. In this study though, the models were roughly equivalent in both their prediction of intentions – 55% and 52% respectively – and behaviour – approximately 10% for each. However, in all three studies, there was more evidence for redundancy (from the univariate analyses) amongst the components of the Health Belief Model. From this discussion, it can be seen that using behavioural intention in the Health Belief Model in the same way that it is used in the Theory of Planned Behaviour allows their predictive ability and conceptual strengths to be compared in a more valid way than could otherwise be achieved.

Another issue of concern to both models is the impact of past behaviour. Researchers using the Health Belief Model and/or Theories of Reasoned Action/Planned Behaviour have often found past behaviour significantly to increase the prediction of intentions and future behaviour (see for example Bentler and Speckart, 1979; King, 1982; Hill et al, 1985; Calnan and Rutter, 1986; Champion and Miller, 1991; Ross and McLaws, 1992; Kashima, Gallois and McCamish; 1993, Norman and Smith, 1995; Reinecke et al, 1996). As a result, Sutton (1994) recommends 'routinely' including measures of past behaviour' when studying health and social behaviours (p. 86). Past behaviour in this context refers to both prior and concurrent experience of using the preventive measures in question. In a test of the Health Belief Model, Arnold and Quine (1994) found the use of cycle helmets at Time 1 to predict use at Time 2. Similarly, Van Ryn, Lytle and Kirscht (1996), using the Theory of Planned Behaviour, show past BSE practice to predict future BSE intentions and behaviour.

THE RESEARCH STUDY

Aims of the study

The study reported in this chapter had two aims. The first was to compare the ability of the Health Belief Model and Theory of Planned Behaviour to predict helmet use in a sample of schoolboys cycling to and from school. The second was to identify beliefs discriminating between users and non–users and to expose redundant measures. A prospective design was used in which the beliefs, attitudes and intentions of school boys concerning helmet use were measured one month before the dependent measure, helmet use while cycling to and from school. It was expected that the Theory of Planned Behaviour would be a more reliable predictor of intentions to use a helmet and actual helmet use than the Health Belief Model, but that both models would identify a set of beliefs discriminating significantly between helmets users and non–users which could be used to inform an intervention promoting helmet use.

Additional measures

It was decided to use a measure of behavioural intention, to mediate between beliefs and behaviour in the Health Belief Model as well as the Theory of Planned Behaviour, in order to limit the more obvious differences between the models and allow the same statistical procedures to be used. In addition, the sufficiency of the models was tested by the addition of a measure of past behaviour to the equations predicting helmet use. It was hypothesised that this would significantly increase the amount of variance explained by each model.

Operationalising the models

In addition to using a measure of behavioural intention mediating between beliefs and behaviour, the research avoids many of the difficulties associated with the Health Belief Model (see the review in chapter 1) by using the dimensions described in Rosenstock's (1966) original disease–avoidance model with its emphasis on subjective beliefs as determinants of action. The questionnaire items thus addressed perceptions of vulnerability, severity, benefits and barriers as well as past ('distal') and recent ('proximal') cues to action. The first five of these measures were used to predict cyclist's intention to use a helmet while cycling to and from school. Intention and recent cues were then used to predict actual helmet use one month later. According to this model, the likelihood of a cyclist forming an intention to adopt the preventive measure of wearing a protective helmet can be assessed by measuring his beliefs among the above four dimensions and his awareness of salient cues. Thus if a cyclist feels sufficiently vulnerable to any number of undesirable outcomes when not wearing a helmet (such as head injury or the disapproval of parents and peers), and the consequences of non–use are recognised as sufficiently severe, then these perceptions of threat should motivate him to evaluate the benefits and costs of wearing a helmet. This in turn should lead to a positive intention to use a helmet which should then determine behaviour. In addition, a cue such as having had a bicycling accident or hearing about someone else's bicycling accident, may influence intention and helmet use. In an attempt to overcome the problems associated with cues to action discussed by Rosenstock (1966),[21] two sets of time–

[21] Rosenstock (1966) suggests that prospective studies are best suited to examine the influence of stimuli which serve as cues to trigger action in an individual who is *psychologically ready to act* (p. 102, my italics). He argues that cues may be of little intrinsic significance to respondents and thus forgotten with the passage of time. This suggests that in general, 'distal' cues may be subject to selective recall and forgetting. Rosenstock also argues that respondents who have taken a recommended action in the past will probably be more likely to remember preceding events as relevant than will respondents who were exposed to the same events but never took

dependent cues were used in the study reported here. The Time 1 measures of past bicycling accidents served as 'distal' cues thought to influence behavioural intentions both directly and through their effect on perceptions of vulnerability. The Time 2 measures of recent accidents assessed 'proximal' cues assumed to directly influence behaviour. Figure 2.1 depicts the version of the Health Belief Model used in this study.

The Theory of Planned Behaviour was operationalised according to the guidelines given for the Theory of Reasoned Action (see Fishbein and Ajzen (1975, Ajzen and Fishbein, 1980) and the recommendations of Ajzen (1985, 1988) and Ajzen and Madden, 1986). The measures assessed belief strengths and outcome evaluations (combined to give a set of behavioural beliefs), normative beliefs and motivation to comply (combined to give a set of subjective norms), and perceived behavioural control, assessed using both direct beliefs (concerned with anticipated control over helmet use) and belief–based measures (concerning resource–linked and structural impediments). The combined behavioural beliefs gave each respondent's attitude towards helmet use and the combined subjective norms each respondent's subjective norm rating. As is standard practice in the Theory of Planned Behaviour (see Ajzen, 1985) the measures of attitude and subjective norm were used to predict behavioural intention at Time 1 and the measure of perceived behavioural control used to predict Time 1 intentions and Time 2 helmet use. A depiction of the Theory of Planned Behaviour (as used in this study) is shown in Figure 1.2 on page 37 of this volume.

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the action. (ibid.,). Thus cyclists who experience helmet use prior to the measurement of cues may recall bicycling accidents better than cyclists who have never worn one. Since the 'readiness to act' has been re-conceptualised as 'behavioural intention' in the study reported here, the implications of Rosenstock's discussion are twofold. Recent events such as bicycling accidents which serve as (proximal) cues to action should be more easily recalled by respondents (whether they wear a helmet or not) and their influence more easy to assess. In addition, this influence will impact directly on helmet use at Time 2.

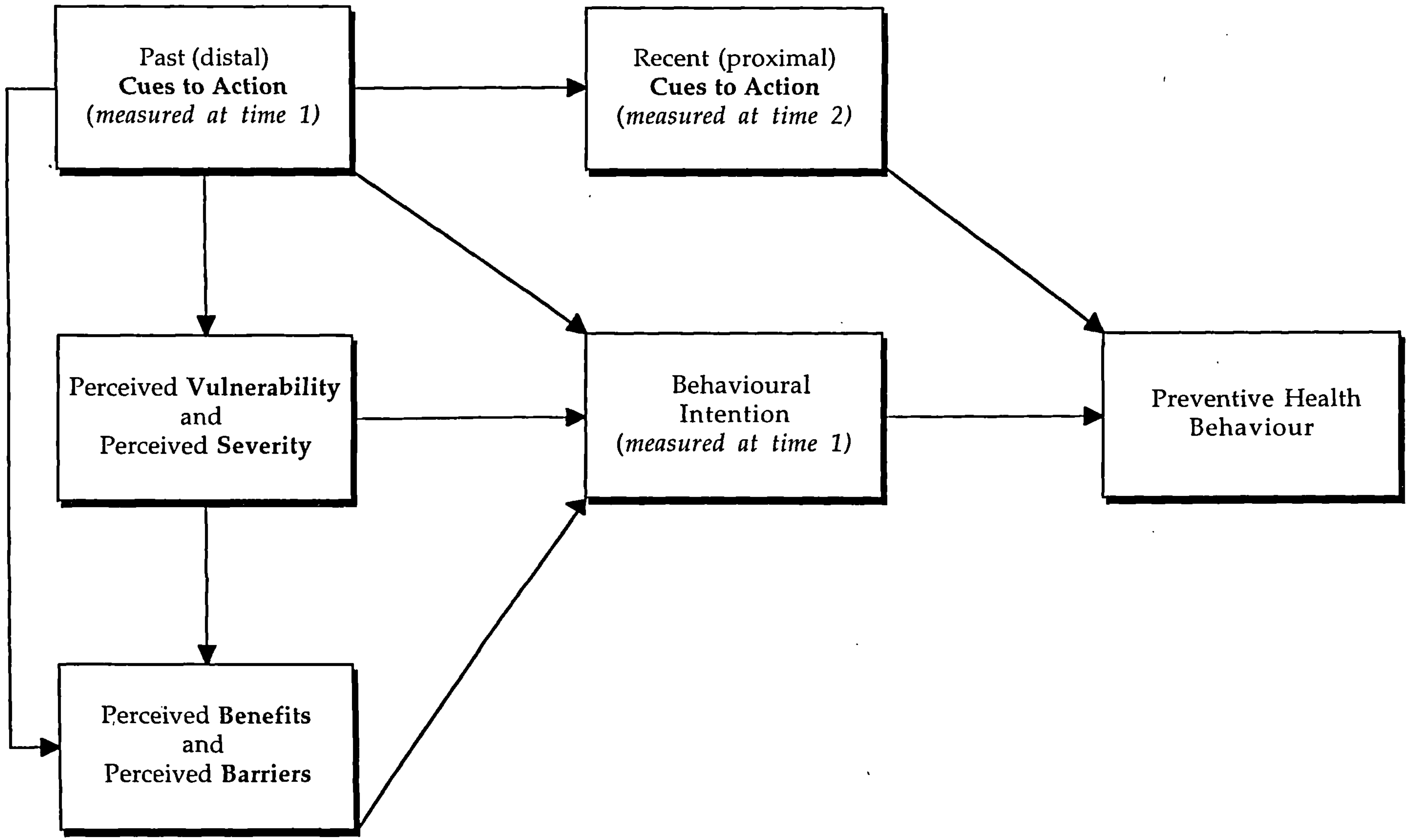

Figure 2. 1: The expanded Health Belief Model with behavioural Intentions and time–dependent cues to action (*after* Rosenstock, 1966; Oliver and Berger, 1979).

According to the Theory of Planned Behaviour, cyclists should form an intention to wear a helmet if their overall attitude is influenced more by positive beliefs about the consequences of wearing a helmet than by negative beliefs about the consequences, and they are sufficiently motivated to comply with referent others who are perceived as supporting helmet use. In addition, confidence in their ability to wear a helmet whenever they wish to do so, uninhibited by practical and/or psychological impediments that may detract from their perceived volitional control, will also be a powerful influence affecting both their degree of intention and actual helmet use.

Design

A prospective, within–subjects design was used in which information about respondents' beliefs, behavioural intentions and current behaviour was obtained by a questionnaire and used to predict future behaviour, assessed by questionnaire, four weeks later.

Subjects

Subjects were 185 schoolboys aged between 11 and 18 years who regularly cycled to school. Their average age was 13.6 years with a modal age of 14. They were drawn from six Secondary and Grammar schools in five different population centres to ensure a representative sample of young cyclists with experience of urban, semi–rural and rural cycling conditions. These schools had responded favourably to a letter sent to the Head Teachers of a number of schools throughout East Kent chosen at random. The participants themselves took part at the request of their teaching staff in the belief that they were to participate in a cycling survey. It was made clear that participation was voluntary. The only demographic information obtained was respondents' names and ages to enable the Time 1 and Time 2 questionnaires to be matched up.

Questionnaires

Two questionnaire booklets were designed and used at Time 1 and Time 2 (see appendices 1.1. and 1.2 respectively). These booklets were based on a modal beliefs survey used for an earlier study of school boys' attitudes towards the use of protective helmets while cycling to and from school (Arnold and Quine, 1994). Respondents' beliefs and attitudes towards bicycle-related injury and helmet use were assessed by scaled items relating to the standard Health Belief Model dimensions (perceived vulnerability, severity, benefits and barriers) and component scales of the Theory of Planned Behaviour (belief strengths, outcome evaluations, normative beliefs, motivations to comply and perceived behavioural control). In addition, two items assessed the hypothesised 'cues to action' of own and other people's accident history. There were also two items relating to helmet ownership and use, one of which gave the measure of past behaviour used in the multivariate analysis. The measures relating to subjective beliefs were organised in sections and used either five or seven point scales with individual items presented as statements that subjects responded to by indicating their degree of agreement or disagreement. The direction of scoring for all scale items was adjusted so that a high score always signified an affirmation of, or agreement with, the belief referred to. Items concerning helmet ownership and use and those assessing cues were presented as simple yes/no questions.

Dependent variables

At Time 1, a measure of 'behavioural intention' was obtained by use of a single item asking respondents whether or not they intended to wear a helmet while cycling to school in the next four weeks. This was used as the criterion predicted by beliefs and attitudes in both models. At Time 2, a measure of helmet use was obtained, this being the dependent variable representing outcome behaviour in both models. In this case the criterion was a dichotomous measure, obtained by use of simple yes/no question asking respondents whether or not they had worn a helmet while cycling to and from school in the four weeks prior to the questionnaire. Although the dependent variable in multiple regression should usually be a normally distributed interval variable (as was the case with behavioural intention), Cohen and Cohen (1983, p. 240) note that dichotomous dependent variables may be coded 1–0 and used as dependent variables in multiple regression/correlation analysis (MRC). Although they concede that this is a formal violation of the model, they argue that "... in practice, and with support from empirical studies, dichotomous dependent variables are usefully employed in MRC" (p. 241). In addition, Hedderson (1987) has argued that regression is a robust technique and that dichotomous variables may be used so long as no one category contains fewer than 20 per cent of the cases". In the study reported here the 20 per cent criterion was satisfied since 62 (38.3 per cent) of the 162 children who completed a Time 1 and Time 2 questionnaire said they wore a helmet. In other tests of the Health Belief Model and Theories of Reasoned Action/Planned Behaviour, Oliver and Berger (1979), DeVellis et al (1990), Netemeyer and Burton (1990), Boldero, Moore and Rosenthal (1992) and more recently, Arnold and Quine (1994), Conner and Norman (1994) and Wilson, Jaccard and Minkoff (1996) have analysed data using MRC techniques in which a dichotomous dependent variable was regressed on multiple independent variables (see also Sutton's 1987 review of the Theory of Reasoned Action).

Independent variables

At Time 1, seven items assessed *perceived vulnerability*. Three related to the perceived probability of sustaining head injury/brain damage in a cycling accident (e.g. "If I had an accident while cycling to school I would be likely to hit my head/suffer brain damage") and used five–point scales, scored from 1 'strongly disagree' to 5 'strongly agree'. The last four concerned perceptions of vulnerability in relation to speed travelled (e.g. "If I had an accident while cycling, I would not be going fast enough to hurt my head seriously") and also used five–point scales. These were reverse scored in the analysis so that a response of 1 was awarded a score of 5. *Perceived severity*, which concerned the medical and social consequences of head injury (see Rosenstock, 1966; 1974b), was measured using four items following the stem "If you had a serious accident involving head injury and hospital treatment, how seriously do you think it would affect..." ("your school life"/"family life"/"social and personal life"/"physical and mental well–being"). Again, five–point scales were used scored from 1 'Very little' to 5 'Very much'. To assess beliefs about the behavioural outcomes of helmet use, that is perceptions of benefits and barriers in the Health Belief Model and attitude towards the behaviour in the Theory of Planned Behaviour, ten items were used and shared by both models. All items used seven–point scales scored from 1 'extremely unlikely' to 7 'extremely likely'. The five negative belief items (e.g. "My wearing a helmet whilst cycling to school would make me look silly") were used in the Health Belief Model analysis as barriers items and summed to form the *perceived barriers* measure. The five positive beliefs (e.g. "My wearing a helmet whilst cycling to school would make me feel safe") were used as benefits items and summed to form the *perceived benefits* measure.

In the Theory of Planned Behaviour analysis, the ten items were used as the 'belief strength' items used to compute the *behavioural beliefs*. There were also ten *outcome evaluation* items corresponding to the ten belief strengths e.g. "Feeling safe is... good/bad": "Looking silly is... good/bad). These used the same seven-point scale format as the belief strength items but were scored from –3 to –1, and +1 to +3 (with a mid point of zero). In the Theory of Planned Behaviour analysis, the score from each of the ten belief items (belief strengths) was multiplied by its corresponding evaluation score to compute the ten behavioural beliefs. The sum of these behavioural beliefs constituted each respondent's attitude measure. Six items assessed normative beliefs and six, the corresponding motivation to comply ratings, used to compute the Theory of Planned Behaviour's *subjective norm* measure. All items used seven-point scales ranging from 1 'extremely unlikely' to 7 'extremely likely'. The score from each normative belief item was multiplied by its corresponding motivation to comply score to compute the six subjective norms. The sum of these gave an overall *subjective norm* for each respondent. To assess *perceived behavioural control,* 'belief-based' measures concerning practical impediments and 'direct measures' assessing perceptions of control were obtained as suggested by Ajzen (1988). These were summed to give an overall measure of perceived behavioural control for each subject. The five belief-based measures (e.g. "I might not be able to wear a helmet while cycling to school... because I'd forget to put it on/because it's too much effort") used five-point scales scored from 1 'strongly disagree' to 5 'strongly agree'. These were reverse scored in the analysis to make their scores consistent with the direct measures. The three direct measures were those recommended by Ajzen and Madden (1986) and assessed the extent to which respondents believed themselves to have control over helmet use and the perceived ease/difficulty of wearing a helmet (e.g. "For me to wear a helmet while cycling to school would be ... 'Very difficult/Very easy"). These were all scored from 1 to 5 so that a high score signified high levels of perceived behavioural control. At the end of the questionnaire there were two items concerning helmet ownership and use. The first of these asked whether or not respondents owned a helmet and the second whether or not they wore a helmet while cycling to and from school. This was used as the measure of prior or past behaviour used in the multivariate analysis. Both items used a simple yes/no response format. Two other items represented the Health Belief Model's 'cues (to action)' measures and also used a yes/no format. These items asked respondents about their own and other peoples' bicycling–related accident history in the year preceding the questionnaire session. These items were not summed but used as separate measures in the analysis. At Time 2, as well as the single item assessing helmet use in the previous four weeks, two other items assessed 'recent cues' by asking respondents if they, or someone they knew, had experienced a bicycle–related accident in the week prior to the questionnaire session. These three items all utilised a simple yes/no response format.

Procedure

At each school, subjects completed the questionnaire in a single experimental session during school hours in a room set aside for that purpose. They were seated at desks or tables. A questionnaire were handed to each subject at their desk/table and instructions given that they were to write their name and age in the spaces provided. Each session began with a brief introduction during which subjects were told that they were taking part in a cycling survey. They were not told that there was to be a second session at a later date. An explanation of the questionnaire and question format was given and an assurance that all information was confidential. It was stressed that the questionnaire was not a test and that there were no right or wrong answers for many of the items. Subjects were then asked to complete the questionnaire in silence and to raise their hand if they had any queries rather than to ask their neighbours. Completed questionnaires were left face down on the desks for collection. Four weeks later, the same subjects completed a second questionnaire using the same procedure as before. The session was introduced simply as a 'follow up' to the first session and it was again stressed that all information was confidential. At the end of the session, participants were debriefed and it was explained that the research concerned why cyclists either wore or chose not to wear a helmet while cycling to and from school.

Data from both questionnaires were collated and analysed using a mixture of univariate and multivariate statistical procedures. The measure of behavioural intention was used as the Time 1 dependent variable predicted by beliefs and the measure of helmet use while cycling to and from school used as the Time 2 dependent variable.

RESULTS

Of the 185 participants who took part in the study, 162 completed questionnaires at Time 1 and Time 2 giving a response rate of 88%. The average age of the sample was 13 years and 3 months. Eighty per cent were aged between 11 and 15 years.

Preliminary analyses

Descriptive data at Time 1

At Time 1, 63 (38. 9%) boys said they owned a helmet while fifty two (32.1%) reported wearing one while cycling to and from school; a user rate of 83%. 28 (17.3%) of the total sample said they had worn a helmet when cycling to and from school in the past but no longer did, although 19 (67.9%) of the 28 still owned a helmet and 13 (46.4%) had started wearing again. 64 (39.5%) boys said they had experienced a bicycling accident themselves and 90 (55.6%) reported knowing someone who had experienced such an accident.

Descriptive data at Time 2

At Time 2, 62 (38.3 %) boys reported wearing a helmet for cycling to and from school. Eleven of these reported wearing at Time 2 but not at Time 1, six of whom were new users. The remaining five boys had worn a helmet in the past but had stopped wearing prior to the survey. One wearer at Time 1 did not wear at Time 2. Of the total sample, 23 (14.2%) boys reported having had a cycling accident in the previous week and 35 (21.6%) knew someone who had experienced a cycling accident during that time. Finally, 39 (24.1%) of the boys said they had never read the Highway Code and 44 (27.2%) said they had never attended cycling proficiency lessons.

Scale construction and reliabilities

As a first step, scales were constructed of all the major dimensions and components to be used in the analysis. The Health Belief Model scales measuring perceived vulnerability, severity, benefits and barriers were computed using a simple additive combination of the respective scale items. The attitude and subjective norm measures of the Theory of Planned Behaviour were constructed as suggested by Fishbein and Ajzen (1975). To compute the attitude measure, the ten seven-point outcome evaluation items were recoded from –3 to –1 and +1 to +3 (with a midpoint of zero). Each *unipolar* belief strength item (scored from 1 to 7) was then multiplied by its corresponding *bipolar* evaluation score to give a belief strength. The sum of the ten belief strengths gave the measure of each respondents' attitude towards the behaviour. To compute the subjective norm measure, each normative belief (scored from 1 to 7) was multiplied by its corresponding 'motivation to comply' rating (also scored from 1 to 7) to give six subjective norms. The sum of these gave the overall subjective norm measure for each subject. The perceived behavioural control scale was computed by summing the scores for the eight scale items (as suggested by Ajzen, 1988). Scale reliabilities were then investigated using Cronbach's alpha to arrive at measures which best addressed the salient issues. These scales were then used in the subsequent analysis.

Reliabilities of the Health Belief Model components

Representative items from each scale and their reliability coefficients are shown in Table 2.1. The scale measuring perceptions of vulnerability had an alpha of 0.7 after one item was discarded. The discarded item related to the perceived probability of sustaining brain damage as a result of a hitting one's head in a bicycling accident. The remaining six items were summed and used as the measure of perceived vulnerability in all subsequent analyses. All other Health Belief Model measures returned satisfactory reliability coefficients and were used in the subsequent analyses. The perceived benefits scale achieved an alpha of 0.8, the perceived severity scale an alpha of 0.8 and the perceived barriers scale an alpha of 0.7.

Reliabilities of the Theory of Planned Behaviour components

Two of the three Theory of Planned Behaviour measures returned satisfactory reliability coefficients. The attitude measure (computed from the belief strength and outcome evaluation items) returned an alpha of 0.8. The reliability coefficient for the subjective norm scale (computed from the normative belief and motivation to comply items) was 0.9. Analysis of the eight perceived behavioural control items, led to two being discarded. Item 4

Table 2. 1: Reliability of scales from the Health Belief Model and Theory of Planned Behaviour and representative items from each scale

	Items	Alpha	Representative items	Scale/Scoring
Vulnerability	6	0. 7	If I had an accident while cycling to school, it would more than likely result in head injury	1 = Strongly disagree 5 = Strongly agree
Severity	4	0. 8	If you had a serious accident involving head injury and hospital treatment, how seriously do you think it would affect your ... school/family/life/physical and mental well-being	1 = Very little 5 = Very much
Benefits	5	0. 8	My wearing a helmet whilst cycling to school would make me feel safe	1 = Extremely unlikely 7 = Extremely likely
Barriers	5	0. 7	My wearing a helmet whilst cycling to school would make me look silly	1 = Extremely unlikely 7 = Extremely likely
Behavioural Beliefs †	10 x 10	0. 8	My wearing a helmet whilst cycling to school would make me feel safe	1 = Extremely unlikely 7 = Extremely likely
			Feeling safe is ...	+ 3 = Extremely Good − 3 = Extremely Bad
Subjective Norms‡	6 x 6	0. 9	My close friends think I should wear a helmet while cycling to and from school	1 = Extremely unlikely 7 = Extremely likely
			Generally speaking I want to do what my close friends think I should do	1 = Extremely bad 7 = Extremely good
Perceived Behavioural Control	6	0. 7	I might not be able to wear a helmet while cycling to school ... because I'd forget to put it on	1 = Strongly disagree 5 = Strongly agree
			For me to wear a helmet while cycling to school would be ...	1 = Very difficult 5 = Very easy

†Each behavioural belief produced by multiplying a belief strength by an outcome evaluation. Attitude is the sum of the products.

‡Each subjective norm belief produced by multiplying a normative belief by a motivation to comply. Subjective norm is the sum of the products.

('I might not be able to wear a helmet while cycling to school because my family are unwilling or unable to help towards the cost') and item 6 ('How much control do you have over whether you do or do not wear a helmet while cycling to school') were removed, which increased the alpha for this measure to an acceptable level (0.7). Representative items from these scales are shown in Table 2.1 which also shows the reliability coefficients.

Having established a reliable set of measures, a mixture of univariate and multivariate analyses was performed to compare the predictive ability of the models and to examine the differences between helmet users and non–users.

Main Analyses

Differences between helmet wearers and non–wearers

To test for differences in beliefs between helmet users and non–users, independent t–tests were carried out on the component scales of each model. Table 2.2 shows that there were significant differences between means for three of the measures of the Health Belief Model. Helmet users were significantly more likely than non–users to believe themselves vulnerable ($t = 2.2$, $df = 160$; $p < 0.05$) to sustaining head injury as a result of a cycling accident and were more likely than non–users to perceive the benefits ($t = 5.6$, $df = 154.8$; $p < 0.001$) of wearing a helmet and less likely to perceive the barriers ($t = 2.3$, $df = 155.4$; $p < 0.05$). To investigate whether having had an accident or knowing someone who had experienced an accident at Time 1 would act as cues to action, Chi–squared tests were carried out. There were no significant effects.

Table 2. 2: Differences Between Helmet Users and Non–Users

	Helmet users (N = 62)		Non–users (N = 100)		
	Mean	s.d.	Mean	s.d.	t
Health Belief Model					
Vulnerability	23. 4	3. 3	21. 9	4. 2	2. 2*
Severity	14. 9	3. 5	15. 4	3. 4	–0. 8
Benefits	27. 3	5. 3	21. 8	7. 2	5. 6***
Barriers	21. 6	5. 1	23. 8	7. 0	–2. 3*
Theory of Planned Behaviour					
Attitude	47. 9	39. 1	9. 7	44. 3	5. 6***
Subjective Norm	171. 1	59. 0	114. 7	63. 1	5. 7***
Perceived Behavioural Control	23. 5	4. 3	19. 5	4. 1	5. 9***
Intention to wear a helmet	5. 5	1. 9	2. 5	1. 7	10. 4***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 2.2 also shows that there were significant differences between means for all three measures of the Theory of Planned Behaviour. Helmet users and non–users achieved significantly different scores on the attitude ($t = 5.6$, df = 159; $p < 0.001$), subjective norm ($t = 5.7$, df = 160; $p < 0.001$) and perceived behavioural control measures ($t = 5.9$, df = 159; $p < 0.001$). This indicates that helmet users were significantly more likely than non–users to have a favourable attitude towards helmet use and more likely to be influenced by social pressure to wear a helmet. They were also significantly less likely than non–users to be put off wearing a helmet by any impediments and difficulties they might experience, and more likely to feel confident that they were capable of exercising adequate control over wearing a helmet. There were also significant differences between the means of helmet users and non–users for behavioural intentions ($t = 10.4$, $df = 160$; $p < 0.001$). Users had a mean score of 5.5 (s.d. 1.9), whilst non–users had a score of 2.5 (s.d. 1.7).

Next, t–tests were carried out to investigate the differences in means between helmet users and non–users for each benefit and barrier item and for each belief strength, outcome evaluation and (computed) behavioural belief item *separately* (Tables 2.3 and 2.4). This analysis gave an indication of which were the most important beliefs associated with helmet use and in the case of the Theory of Planned Behaviour, made it possible to examine whether the significant differences in behavioural beliefs between helmet users and non–users were due more to the importance of the expected outcomes (as measured by the belief strength items), than the evaluation of those outcomes.

Table 2.3 shows the differences between helmet users and non–users on the benefits and barriers items of the Health Belief Model. It can be seen that there were significant differences between helmet users and non–users for all five of the perceived benefits items. The greatest differences were for Benefit 1 ('My wearing a helmet whilst cycling to school would make me feel safe'), Benefit 2 ('My wearing a helmet whilst cycling to school would make my parents worry less'), and Benefit 3 ('My wearing a helmet whilst cycling to school would make me take care'). Only two of the five perceived barriers items showed significant differences between groups: Barrier 5 ('Wearing a helmet to school would mean having to carry it around with me during lessons') and Barrier 2 ('Wearing a helmet to school would mean having to spend too much money').

Table 2. 3: Differences between Helmet Users and Non–Users on Each Benefit and Barrier

	Helmet users (N = 62)		Non–users (N = 100)		
	Mean	s.d.	Mean	s.d.	t
Benefit 1 My wearing a helmet whilst cycling to school would make me feel safe	5. 5	1. 7	4. 2	2. 1	4. 4***
Benefit 2 My wearing a helmet whilst cycling to school would make my parents worry less	6. 0	1. 4	5. 1	2. 1	3. 5**
Benefit 3 My wearing a helmet whilst cycling to school would make me take care	4. 7	1. 8	3. 2	1. 9	5. 1***
Benefit 4 My wearing a helmet whilst cycling to school would protect my head if I had an accident	6. 5	0. 9	5. 5	1. 9	4. 4***
Benefit 5 My wearing a helmet whilst cycling to school would make me aware of the dangers of cycling	4. 6	1. 9	3. 9	1. 9	2. 4*
Barrier 1 My wearing a helmet whilst cycling to school would make me look silly	4. 8	1. 9	5. 1	2. 1	– 0. 9
Barrier 2 My wearing a helmet whilst cycling to school would mean having to spend too much money	3. 7	1. 7	4. 4	1. 9	– 2. 4*
Barrier 3 My wearing a helmet whilst cycling to school would make me too conspicuous if no one else wore one	5. 2	1. 8	4. 9	1. 8	1. 1
Barrier 4 My wearing a helmet whilst cycling to school would make me physically uncomfortable	4. 1	1. 9	4. 5	1. 9	– 1. 3
Barrier 5 My wearing a helmet whilst cycling to school would mean having to carry it around with me during lessons	3. 7	2. 6	4. 8	2. 3	– 2. 8**

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 2.4 shows the differences in means between helmet users and non-users for each belief strength and outcome evaluation item and computed behavioural belief of the Theory of Planned Behaviour. The behavioural beliefs are the product obtained by multiplying together each belief strength (scored 1 to 7) and outcome evaluation (scored − 3 to + 3) together. The greatest differences with respect to the *positive* Behavioural Beliefs were for Belief 3 ('My wearing a helmet whilst cycling to school would make my parents worry less'), Belief 4 ('My wearing a helmet whilst cycling to school would make me take care'), and Belief 6 ('My wearing a helmet whilst cycling to school would protect my head if I had an accident').

For the last two measures, the level of significance is the same as for the corresponding beliefs in the Health Belief Model ($p < 001$). The greatest differences in means between helmet users and non–users amongst the *negative* behavioural belief items were for Belief 2 ('My wearing a helmet whilst cycling to school would make me look silly'), Belief 5 ('My wearing a helmet whilst cycling to school would mean having to spend too much money') and Belief 10 ('My wearing a helmet whilst cycling to school would mean having to carry it around with me during lessons'). The differences between means for the corresponding measures in the Health Belief Model analysis was also significant although not at the same level ($p < 0.01$). In addition, the Theory of Planned Behaviour identified four negative behavioural beliefs which discriminated significantly between groups as opposed to two identified by the Health Belief Model.

An examination of the belief strengths and outcome evaluation items shown in table 2.4 reveals that with respect to the positive behavioural beliefs, there were significant differences between helmet users and non–users for both the belief strength ($t = 5.1$, $df = 160$; $p < 0.001$) *and* outcome evaluation ($t = 3.8$, df

Table 2. 4: Differences Between Helmet Users and Non–Users on Each Belief Strength, Outcome Evaluation and Behavioural Belief Item

My wearing a helmet whilst cycling to school would ...	Belief Strength				Outcome Evaluation				Product (Behavioural Belief)			
	users (n = 62)		nonusers (n = 100)		users (n = 62)		nonusers (n = 100)		users (n = 62)		nonusers (n = 100)	
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
Behavioural belief 1												
... make me feel safe	5. 5	1. 7	4. 2***	2. 1	2. 2	1. 2	2. 1	1. 4	12. 7	8. 2	9. 9*	7. 9
Behavioural belief 3												
... make my parents worry less	6. 0	1. 4	5. 1**	2. 1	2. 2	1. 2	1. 9	1. 5	13. 6	8. 5	10. 3*	8. 9
Behavioural Belief 4												
... make me take care	4. 7	1. 8	3. 2***	1. 9	2. 6	0. 9	1. 9***	1. 6	12. 5	5. 8	6. 2***	6. 9
Behavioural Belief 6												
... protect my head if I had an accident	6. 5	0. 9	5. 5***	1. 9	2. 8	0. 6	2. 2***	1. 4	18. 1	4. 5	12. 5***	8. 9
Behavioural Belief 9												
... make me aware of the dangers of cycling	4. 6	1. 9	3. 9*	1. 9	2. 2	1. 2	1. 9	1. 6	10. 5	7. 3	7. 4*	8. 2
Behavioural Belief 2												
... make me look silly	4. 8	1. 9	5. 1	2. 1	–1. 0	1. 5	–1. 9***	1. 3	–6. 0	8. 3	–9. 9**	8. 9
Behavioural Belief 5												
... mean having too spend to much money	3. 7	1. 7	4. 4*	1. 9	–0. 7	1. 9	–1. 4	1. 6	–2. 1	8. 0	–6. 9***	8. 9
Behavioural Belief 7												
... make me conspicuous if no one else wore one	5. 2	1. 8	4. 9	1. 8	–0. 2	1. 6	–0. 6	1. 8	–1. 6	9. 0	–2. 9	9. 6
Behavioural Belief 8												
... make me physically uncomfortable	4. 1	1. 9	4. 5	1. 9	–1. 3	1. 7	–1. 8*	1. 3	–4. 7	8. 3	–8. 1**	7. 4
Behavioural Belief 10												
... mean having to carry it around with me during lessons	3. 7	2. 6	4. 8**	2. 3	–1. 5	1. 4	–1. 9	1. 4	–4. 8	7. 4	–8. 7	8. 4
								Total	47. 9	39. 1	9. 7***	44. 3

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

= 158.2; $p < 0.001$) components of behavioural belief 4 ('wearing a helmet while cycling to school would make me take care') and the belief strength ($t = 4.4$, df = 156.9; $p < 0.001$) and outcome evaluation ($t = 3.8$, df = 154.4; $p < 0.001$) component of behavioural belief 6 ('My wearing a helmet whilst cycling to school would protect my head if I had an accident'). This suggests that helmet users were significantly more likely than non–users to endorse the beliefs that wearing a helmet would lessen accident risk and injury probability and significantly more likely than non–users to value these outcomes. There were also significant differences between means for the belief strength components of behavioural belief 1 ($t = 4.4$, df = 146.3; $p < 0.001$), behavioural belief 3 ($t = 3.5$, df = 158.9; $p < 0.01$) and behavioural belief 9 ($t = 2.4$, df = 160; $p < 0.05$), but not for the corresponding outcome evaluation measures. It seems that although helmet users are significantly more likely than non–users to believe that wearing a helmet will make their parents worry less, make them feel safe, and make them more aware of the dangers of cycling, they do not value these outcomes any more than non–wearers. Nonetheless, these behavioural beliefs did show a significant difference between means for helmet users and non–users at the 5 % level.

Of the negative behavioural beliefs, it can be seen that there were significant differences between means on both the belief strength ($t = -2.4$, df = 160; $p < 0.05$) and outcome evaluation ($t = 2.5$, df = 160; $p < 0.05$) components of behavioural belief 5 ('My wearing a helmet whilst cycling to school would mean having to spend too much money'). Non–users are significantly more likely than helmet users to believe that the cost of buying a helmet is unjustified and significantly more likely than non–users to evaluate such expenditure negatively. In addition, there was a significant difference between means for the belief strength component of behavioural belief 10 ($t = -2.8$, df = 118.3; $p < 0.01$) but not for the corresponding outcome evaluation. This indicates that non–users are significantly more likely than non–users to believe that wearing a helmet would result in the wearer having to carry it around during lessons but are no more likely than helmet users to perceive this as a problem. Conversely, there were significant differences between means for the outcome evaluation components of behavioural belief 2 ($t = 3.7$, $df = 159$; $p < 0.001$) and behavioural belief 8 ($t = 2.0$, $df = 189.8$; $p = < 0.05$) but not for the belief strengths. Helmet users and non–users alike endorse the beliefs that helmet use will make them uncomfortable and appear silly, but differ in their evaluation of these outcomes. Non–users are significantly more likely than users to negatively evaluate discomfort and looking silly. However, the three negative behavioural beliefs which discriminate between groups on one component only do show a significant difference between means for helmet users and non–users at the 5% level.

Next, in this first section of results, t-tests were carried out on each normative belief, motivation to comply item and computed subjective norm separately to determine which were the most significant normative influences associated with helmet use. Analysis of the six subjective norms (produced by multiplying each normative belief by its corresponding motivation to comply item) made it possible to determine which contributed most to the overall subjective norm measure. Analysis of the normative belief and motivation to comply items made it possible to determine whether the significant differences between helmet users and non–users on each subjective norm were due to the importance of the perceived normative wishes of referent others (as measured by the normative belief items), or the importance of complying with these referent others (as measured by the motivation to comply items).

Table 2. 5: Differences Between Helmet Users and Non–Users on Each Normative Belief, Motivation to Comply and Subjective Norm Item

My wearing a helmet whilst cycling to school would ...	Normative belief				Motivation to Comply				Product (Subjective Norm)			
	users (n = 62)		nonusers (n = 100)		users (n = 62)		nonusers (n = 100)		users (n = 62)		nonusers (n = 100)	
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
Subjective norm 1 My close friends think that I should wear a helmet while cycling to and from school	4. 1	2. 1	2. 6***	1. 8	4. 1	1. 7	3. 8	1. 8	16. 9	12. 3	11. 1*	10. 3
Subjective norm 2 My parents think that I should wear a helmet while cycling to and from school	6. 4	1. 1	4. 8***	1. 9	5. 7	1. 6	4. 8**	1. 8	37. 4	13. 3	24. 0***	14. 4
Subjective norm 3 Most other members of my family... think that I should wear a helmet while cycling to and from school	5. 9	1. 5	4. 1***	2. 0	5. 1	1. 7	4. 2**	1. 8	31. 8	14. 5	19. 5***	14. 3
Subjective norm 4 Most of my teachers think that I should wear a helmet while cycling to and from school	5. 7	1. 3	4. 6***	1. 9	4. 6	1. 8	3. 6**	1. 9	27. 0	13. 8	17. 8***	13. 1
Subjective norm 5 Most of the other cyclists at school think that I should wear a helmet while cycling to and from school	3. 8	1. 9	2. 9**	1. 7	4. 5	1. 8	3. 7**	1. 7	18. 2	13. 7	12. 4**	10. 7
Subjective norm 6 Most road safety experts think that I should wear a helmet while cycling to and from school	6. 7	0. 8	6. 4	1. 3	5. 9	1. 4	4. 5***	2. 0	39. 6	11. 4	29. 9***	14. 9
								Total	**171. 1**	**59. 0**	**114. 7*** **	**63. 1**

*** p < 0.05 ** p < 0.01 *** p < 0.001**

Table 2.5 shows that there were significant differences between means for all six items of the subjective norm scale, the greatest differences being for Item 2 ('My parents think that I should wear a helmet while cycling to and from school), Item 3 ('Most other members of my family think that I should wear a helmet while cycling to school') and Item 6 ('Most road safety experts think that I should wear a helmet while cycling to school').

At the molecular level, table 2.5 shows that there were significant differences between means for helmet users and non–users on the normative belief ($t = 6.9$, $df = 158.8$; $p < 0.001$) and motivation to comply ($t = 3.4$, $df = 160$; $p < 0.01$) components of Subjective Norm 2; the normative belief ($t = 6.3$, $df = 155.1$; $p < 0.001$) and motivation to comply ($t = 3.3$, $df = 160$; $p < 0.01$) components of Subjective Norm 3; the normative belief ($t = 4.5$, $df = 158.9$; $p < 0.001$) and motivation to comply ($t = 3.3$, $df = 160$; $p < 0.01$) components of subjective norm 4, and (lastly) the normative belief ($t= 2.9$, $df = 160$; $p < 0.01$) and motivation to comply ($t = 2.8$, $df = 160$; $p < 0.01$) components of Subjective norm 5.

These findings indicate that helmet users are significantly more likely than non–users to perceive normative support for their helmet use from parents, other family members, teachers and the other cyclists (at their respective schools) and are also significantly more motivated to comply with these referents than are non–users. There were also significant differences between means for the normative belief component ($t = 4.7$, $df = 160$; $p < 0.001$) of Subjective norm 1 and the motivation to comply component ($t = 4.9$, $df = 157.3$; $p < 0.001$) of Subjective norm 6. Helmet users are significantly more likely than non–users to perceive normative support from their friends but no more motivated to comply with them. In contrast, helmet users are no more likely than non–users to perceive social pressure to use a helmet from road safety experts but are significantly more likely to comply with their perceived wishes.

Table 2.6: Differences between Helmet Users and Non–Users on Each (belief–based and direct) Perceived Behavioural Control Item

	Helmet users (N = 62)		Non–users (N = 100)		
	Mean	s.d.	Mean	s.d.	t
Belief–based measures					
I might not be able to wear a helmet while cycling to school because ...					
Control belief 1					
... I'd forget to put it on	3. 9	1. 1	3. 3	1. 4	3. 2**
Control belief 2					
... there'd be nowhere to put it during lessons	3. 5	1. 3	2. 7	1. 3	3. 8***
Control belief 3					
... I'm not sure which is the best one to buy	3. 6	1. 3	3. 3	1. 1	1. 7
Control belief 5					
... it's too much effort	3. 9	1. 2	3. 3	1. 4	3. 0*
Direct measures					
PBC2					
For me to wear a helmet while cycling to school would be ... (*... difficult – easy*)	4. 1	0. 9	3. 2	1. 3	5. 3***
PBC3					
If I wanted to I could easily wear a helmet whenever I cycled to school (*Very unlikely – Very likely*)	4. 3	0. 9	3. 6	1. 3	4. 4***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Finally, t–tests were carried out on each perceived behavioural control item to examine the differences in perceptions of anticipated control over helmet use between helmet users and non–users and differences in perceptions of resource–linked and practical impediments. From table 2.6 it can be seen that there were significant differences between means for five of the six perceived behavioural control items with item 2 ('I might not be able to wear a helmet while cycling to school because there'd be nowhere to put it during lessons'), item 1 ('I might not be able to wear a helmet while cycling to school because I'd forget to put it on'), and item 4 ('I might not be able to wear a helmet while cycling to school because it's too much effort') showing significant differences for the resource–linked and practical impediments. The items relating to anticipated control also indicated significant differences between means for helmet users and non–users with item 7 ('For me to wear a helmet while cycling to school would be'... *difficult–easy*) showing a greater significant difference than item 8 ('If I wanted to I could easily wear a helmet while cycling to school').

Correlations between predictors

Finally in this section of the analysis, the relationships between and within the components of the Health Belief Model and the Theory of Planned Behaviour were investigated by correlation. Table 2.7 shows that the largest positive correlations were between perceived benefits and attitude and subjective norm, and between subjective norm and attitude and perceived behavioural control. These positive relationships suggest that the more subjects believe in the benefits of helmet wearing, the more they perceive social pressure for them to wear a helmet; and that the more subjects perceive social pressure for them to wear a helmet, the more they perceive themselves to have a high degree of control over the behaviour. There was also a significant positive correlation between perceived benefits and perceived

Table 2. 7: Significant Correlations Between and Within Predictors of the Health Belief Model and the Theory of Planned Behaviour

	Vulnerability	Benefits	Barriers	Attitude	Subjective norm	Perceived behavioural control
Vulnerability	–					
Benefits	0.28***	–				
Barriers	–0.07 NS	0.09 NS	–			
Attitude	0.25**	0.73***	0.27**	–		
Subjective norm	0.18*	0.64 ***	–0.09 NS	0.71 ***	–	
Perceived behavioural control	0.22***	0.37***	0.18*	0.47***	0.53***	–

* $p < 0.05$ ** $P < 0.01$ *** $p < 0.001$ NS = non–significant

vulnerability suggesting that subjects who believe in the benefits of helmet wearing are also those who perceive themselves to be vulnerable to the risk of head injury as a result of a cycling accident. The positive correlations between perceived benefits and attitude and between perceived barriers and attitude are to be expected from scales that use the same questionnaire items. The positive correlation between perceived vulnerability and attitude implies that subjects who feel vulnerable to the threat of head injury do have a *positive* attitude towards helmet use. Perceived barriers was significantly positively correlated with perceived behavioural control which indicates that cyclists who perceive themselves to be in control of the behaviour and not unduly influenced by practical difficulties are also aware of the perceived *psychological* barriers to helmet use. This may be because cyclists who are not put off wearing helmets by simple practical problems or simple lack of confidence in their abilities are likely to be helmet users or at least to be in a position to consider other problems associated with helmet use. Thus both groups are likely to be aware of other barriers, such as the perceived psychological barriers.

Predicting helmet use

Correlations between dependent and independent variables

Table 2. 8 shows the zero order correlations between the components of the models and behavioural intention and helmet use at Time 2. Intention was strongly correlated with actual helmet use at Time 2 ($r = 0.63$; $p < 0.001$). Intention was also correlated with each component of the Theory of Planned Behaviour – attitude ($r = 0.48$; $p < 0.001$), subjective norm ($r = 0.57$; $p < 0.001$), and perceived behavioural control ($r = 0.45$; $p < 0.001$) – and with prior (Time 1) helmet use ($r = 0.65$; $p < 0.001$), but with only three components of the Health Belief Model: perceived vulnerability ($r = 0.16$; $p < 0.05$); perceived benefits ($r = 0.44$; $p < 0.001$), and perceived barriers ($r = -0.15$; $p < 0.05$). Time

Table 2. 8: Simple Correlations Between Components of the Models, Behavioural Intention and Helmet use at Time 2

	N = 162	
	Intention	Time 2 Helmet use
Health Belief Model		
Vulnerability	0. 16 *	0. 17 *
Severity	– 0. 06 NS	– 0. 06 NS
Benefits	0. 44 ***	0. 38 ***
Barriers	– 0. 15 *	– 0. 17 *
Cues to action (distant)		
Own accident T1	0. 03 NS	0. 03 NS
Other's accident T1	– 0. 02 NS	– 0. 01 NS
Cues to action (recent)		
Own accident T2	–	0. 15 NS
Other's accident T2	–	– 0. 03 NS
Theory of Planned Behaviour		
Attitude	0. 48 ***	0. 40 ***
Subjective norm	0. 57 ***	0. 41 ***
Perceived behavioural control	0. 45 ***	0. 42 ***
Intention	–	0. 63 ***
Additional variables		
Prior helmet use	0. 65 ***	0. 85 ***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ NS = non–significant

2 helmet use was similarly significantly correlated with all components of the Theory of Planned Behaviour – attitude ($r = 0.40$; $p < 0.001$), subjective norm ($r = 0.41$; $p < 0.001$), and perceived behavioural control ($r = 0.42$; $p < 0.001$), but with only three components of the Health Belief Model: vulnerability ($r = 0.17$; $p < 0.05$); barriers ($r = 0.17$; $p < 0.05$), and benefits ($r = 0.38$; $p < 0.001$). For the Theory of Planned Behaviour the correlations were in general higher for intention than for behaviour. For the Health Belief Model, only the correlation between perceived benefits and intention was higher than that between perceived benefits and behaviour. Table 2.8 also shows the correlations between intention and past behaviour ($r = 0.65$; $p < 0.001$) and between Time 2 helmet use and past behaviour ($r = 0.85$; $p < 0.001$).

Comparing the predictive power of the models

Next, linear multiple regression analyses were conducted to compare the relative powers of the Health Belief Model and Theory of Planned Behaviour in the prediction of (i) *intention* to use helmets and (ii) *actual* helmet use. To examine the capabilities of the Health Belief Model, in the first of two regressions, the Time 1 measure of behavioural intention was regressed on perceived vulnerability, severity, benefits, barriers and the two Time 1 measures of cues to action. This combination of predictors explained 21% of the variance in the criterion with perceived benefits and then barriers (in order of significance) proving to be significant predictors of the intention to use a helmet. Benefits was positively associated with intention and barriers negatively associated. Neither perceived vulnerability and severity nor the two cues to action (of past cycling accidents involving either oneself or another) were significant. In the second multiple regression, the Time 2 measure of helmet use was regressed on behavioural intention and the two measures of recent cues to action (obtained at Time 2). This combination of variables explained 39% of the variance in helmet use although the intention

Table 2. 9: Multiple Regression Analysis of Helmet Use and Intentions Using the Health Belief Model and Theory of Planned Behaviour

	Predicting Intention		Predicting Behaviour	
Health Belief Model	Beta	t	Beta	t
Vulnerability	0. 02	0. 28	–	–
Severity	– 0. 09	– 1. 2	–	–
Benefits	0. 46	6. 0***	–	–
Barriers	– 0. 18	– 2. 5*	–	–
Own accident at Time 1	– 0. 00	– 0. 03	–	–
Others' accident at Time 1	– 0. 02	0. 27	–	–
Behavioural intention	–	–	0. 62	9. 6***
Own accident at Time 2	–	–	0. 06	0. 91
Other's accident at Time 2	–	–	– 0. 09	– 1. 4
	Adjusted R^2 = . 21 F = 7. 7*** df = 6, 149		Adjusted R^2 = . 39 F = 32. 7*** df = 3, 148	

	Predicting Intention		Predicting Behaviour	
Theory of Planned Behaviour	Beta	t	Beta	t
Attitude	0. 13	1. 3	–	–
Subjective Norm	0. 37	3. 8***	–	–
Perceived Behavioural Control	0. 19	2. 5*	0. 16	2. 5*
Behavioural Intention	–	–	0. 57	8. 5***
	Adjusted R^2 = 0. 34 F = 28. 0*** df = 3, 156		Adjusted R^2 = 0. 43 F = 60. 8*** df = 2, 158	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

measure was the only significant predictor. Recent cues to action (cycling accidents in the past few weeks involving either oneself or another) were not significant. Table 2.9 shows the betas for the predictor variables of the Health Belief Model.

To examine the capabilities of the Theory of Planned Behaviour, in the first of two regressions, the Time 1 measure of behavioural intention was regressed on attitude, subjective norm and perceived behavioural control. The combined weight of these variables explained 34% of the variance in the criterion with subjective norm and then perceived behavioural control (in order of significance) shown to be significant predictors of helmet use intention. In a second multiple regression, the Time 2 measure of helmet use was regressed on behavioural intention and perceived behavioural control (see Ajzen, 1988), explaining 43% of the variance in the criterion. Both variables significantly predicted helmet use with intention the more powerful of the two. Table 2.9 also shows the betas for the predictor variables of the Theory of Planned Behaviour.

Examining the sufficiency of the models

The final step in the analysis involved testing the sufficiency of the models in predicting helmet use by adding a measure of past behaviour (helmet use at Time 1) to each in turn. The technique used was Hierarchical multiple regression. Two regression analyses were performed. In the first, which tested the expanded Health Belief Model, past helmet use was entered on the first step and used to predict helmet use at Time 2. Behavioural intention and Time 2 cues (own and other cyclists accidents) were then entered in a block on the second step to examine how much (if any) additional variance they would explain. This procedure was repeated in the second analysis which tested the expanded Theory of Planned Behaviour. Past behaviour was entered on the

Table 2. 10: Hierarchical Multiple Regression Analysis of Helmet Use using the expanded Health Belief Model and expanded Theory of Planned Behaviour

Health Belief Model		Adjusted R^2	F Change	Beta in final equation
Past (T1) Helmet use				
	Block 1	0. 72	–	0. 85***
Behavioural Intention				0. 17**
Own accident				– 2. 12
Other's accident				– 0. 02
	Block 2	0. 73	3. 1*	
Final F = 102. 3 ***		df = 4, 147		

Theory of Planned Behaviour		Adjusted R^2	F Change	Beta in final equation
Past (T1) Helmet use				
	Block 1	0. 71	–	0. 85***
Behavioural Intention				0. 15**
Perceived Behavioural Control				0. 02
	Block 2	0. 72	4. 3*	
Final F = 141. 4 ***		df = 3, 157		

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

first step and used to predict helmet use. On the second step, behavioural intention and perceived behavioural control were entered in a block to examine how much additional variance was explained by these predictors. A summary of this hierarchical analysis is shown in table 2. 10 which shows the results from both the Health Belief Model and the Theory of Planned Behaviour analysis.

From Table 2. 10 it can be seen that in the Health Belief Model analysis, past behaviour explained 72% of the variance in helmet use at Time 2. When intention and the Time 2 cues of own and others recent accident history were added, the variance explained rose to 73%. The increase between blocks was small yet significant (F change = 3. 13; p = 0.02). Only intention, with a beta weight of 0.17, made a significant contribution in Step 2. Table 2.10 also shows that in the Theory of Planned Behaviour analysis, past behaviour explained 71% of the variance in helmet use at Time 2. The addition of intention and perceived behavioural control on the second step led to the amount of variance explained rising to 73%. Again, the increase between blocks was small but significant (F change = 4. 34; p = 0.01). In Step 2, intention was the only significant variable, with a beta weight of 0.15.

The addition of past behaviour rendered both models equally effective in predicting future behaviour. Adding past behaviour to the Health Belief Model increased the amount of variance in helmet use explained to 73%, an increase of 34%. The addition of past behaviour to the Theory of Planned Behaviour increased the amount of variance in helmet use explained to 72%, an increase of 29%. However, neither Time 2 cues to action of the Health Belief Model or perceived behavioural control of the Theory of Planned Behaviour contributed towards the variance in outcome behaviour. The above results and their implications are discussed in the next section which examines their ability to identify beliefs which discriminate between helmet users and non–users before contrasting the predictive performance of the models.

DISCUSSION

Synopsis

This study set out, using a prospective design, to compare the ability of the Health Belief Model and the Theory of Planned Behaviour to predict helmet use amongst young cyclists and to identify salient beliefs. The Health Belief Model was expanded by a measure of behavioural intention mediating between beliefs and behaviour which allowed the models to be compared on the basis of their predictive power and parsimony and aided comparison of their respective measurement techniques. The results provide strong support for both models although the Theory of Planned Behaviour was shown to be a more reliable predictor of the *intention* to use a helmet than the Health Belief Model and was also the more parsimonious using half as many components in this prediction as the Health Belief Model.

The three components of the Theory of Planned Behaviour – attitude, subjective norm and perceived behavioural control – were shown to explain 34% of the variance in intention with subjective norm and then perceived behavioural control (in order of statistical significance) having significant beta weights. Attitude showed no association. In the Health Belief Model analysis, the six components of the model – perceived vulnerability, severity, benefits and barriers and the Time 1 cues of own and other people's *past* accident history – explained 21% of the variance in intention although only perceived benefits and then barriers were significant predictors. There was no association with either perceived vulnerability or severity or cues to action. Furthermore, although univariate analysis showed both models able to identify beliefs discriminating between helmet users and non–users, there was more evidence of redundancy amongst the components of the Health Belief Model than the Theory of Planned Behaviour.

In predicting outcome behaviour, both models explained equivalent amounts of the variance in helmet use at Time 2 although again, the Theory of Planned Behaviour was the more parsimonious, using two components compared to the Health Belief Model's three. In the Theory of Planned Behaviour analysis, perceived behavioural control and intention accounted for 43% of the variance in helmet use at Time 2 with both measures significantly associated with the variance. Intention was by far the most powerful predictor of the two. In the Health Belief Model analysis, intention and the Time 2 cues of own and other people's *recent* bicycling accidents explained 39% of the variance in helmet use at Time 2. In this equation, only intention was significantly associated with the variance.

In a final set of regression analyses, the sufficiency of the models was examined by adding a measure of past behaviour to the variables used by each model to predict Time 2 helmet use. When used in the Health Belief Model, past behaviour explained 72% of the variance in the criterion. The addition of Time 2 cues and behavioural intention led to a small yet significant increase of 1%. After prior behaviour, only intention was a significant predictor. In the Theory of Planned Behaviour, Past behaviour explained 72% of the variance in helmet use with the addition of intention and perceived behavioural control contributing a small but significant 1%. After prior behaviour, only intention was associated with the variance.

Investigating salient beliefs

Because an important aim of this study was to identify beliefs about helmet use which could be used to inform a promotional intervention, a detailed univariate analysis of the components associated with the outcome measures was carried out to identify specific concerns underlying cyclists decisions to use or not use a helmet.

Health Belief Model components

Benefits and Barriers

There was correlational evidence that perceived benefits were strongly associated with the intention to wear a helmet and with actual helmet use. This is in keeping with earlier research showing solutions to the health and safety concerns of young cyclists to be associated with helmet use (see for example DiGuiseppi et al, 1990; Lennie and Stevensen, 1992; Arnold and Quine, 1994). Perceived benefits also correlated with perceived vulnerability and with subjective norm indicating firstly, that helmet users feel vulnerable to the health threat implicit in road traffic accidents and believe in the value of protective helmets as a preventive measure, and secondly, that an appreciation of the benefits of helmet use is partially acquired through the influence of powerful others such as parents.

An examination of the scores obtained by helmet users and non–users on the individual benefits revealed important differences between the two groups. Although helmet users endorsed all five benefits more than non–users, the three which discriminated most between groups were those concerned with the wearer taking care, feeling safe and being protected. 'Taking care' and 'feeling safe' were also shown to significantly discriminate between helmet users and non–users by Arnold and Quine (1994). Lennie and Stevensen

(1992) report 'protection' as the most important attribute associated with helmet use amongst their sample of young cyclists. [22]

Perceived barriers were also correlated with both intention and helmet use although previous research (e.g. Howland et al, 1989; Lennie and Stevensen, 1992; DiGuiseppi et al, 1990; Arnold and Quine, 1994) has shown the costs associated with helmet use to be of more importance than in the study reported here. However, Hu et al (1994) point out that while researchers draw attention to the factors associated with non–use of helmets, few have investigated factors that have a positive influence. Had this been the case, then barriers may have been less important relative to that of benefits. Moreover, the study reported here used these beliefs to predict cyclists intentions rather than in relation to actual helmet use.

Only two barriers, the cost of buying a helmet and worries about what to do with the helmet once at school, differentiated between helmet users and non–users. This is in keeping with Sissons–Joshi et al (1994) who report that 60% of the cyclists in their sample who did not use a helmet cited cost as a factor in their decision. In addition, 70% said that having to carry a helmet around school or college was a major obstacle (p. 538). The remaining three barriers to helmet use (looking silly, being conspicuous and being physically uncomfortable) did not discriminate between users and non–users. Since these three barriers were subscribed to equally by helmet users and non–users, the difference between cyclists who intend to wear helmets and those who do not, would appear to be a greater appreciation of the benefits of helmet use. This supports Rosenstock's (1966) belief that health behaviour involves a costs-benefit analysis.

[22] Benefits and barriers are discussed further below in the context of an examination of behavioural beliefs.

Nonetheless, it appears counter–intuitive that barriers such as discomfort and appearance should not discriminate between helmet users and non–users. It also contradicts the findings of DiGuiseppi et al (1990) and Otis et al (1992) who found these factors significantly associated with non–use. However, this discrepancy may reflect the different levels of helmet use between the different studies. Only 13% of DiGuiseppi et al's sample and 4.1% of Otis et al's sample wore helmets as opposed to 38.3% of the cyclists in the study reported here. It is possible that certain barriers to helmet use will become increasingly influential amongst cyclists who experience the problems associated with their use. Lennie and Stevensen (1992) for example, found that children who reported back after a trial period of wearing a helmet, said they had become much more aware of peer pressure not to wear. DiGuiseppi et al (1990) found that helmet *owners* – who amounted to 24% of their sample – more frequently (than non–owners) judged helmets to be too uncomfortable. In the study reported here, it is noticeable that helmet users and non–users alike positively endorsed each of the three barriers which failed to discriminate between groups. Thus barriers relating to appearance and comfort were of equal concern to helmet users and non–users suggesting that these derive from the experience as well as the anticipation of helmet use. This explains why, when a large proportion of the sample wear helmets, such beliefs fail to discriminate between groups. Furthermore, perceived factors being equally influential as actual experience supports the phenomenological orientation of the Health Belief Model. The practical implication of these findings is that in order to promote helmet use, increasing the salience of the perceived benefits would be more practicable than reducing the salience of the perceived barriers.

Theory of Planned Behaviour components

Subjective Norm

In the univariate analyses, Subjective norm was the measure most strongly correlated with intention to use helmets and was responsible for the greatest difference in mean scores between helmet users and non–users. That all six normative beliefs were endorsed significantly more by helmet users than non–users indicates that helmet users were far more aware of and influenced by the social pressure of referent others. In particular, helmet users positively endorsed the beliefs that parents, other family figures, road safety experts and teachers thought that they should wear a helmet whilst cycling to school.

The largest difference in normative beliefs between users and non–users was for the item 'My parents think that I should wear a helmet while cycling to school'). These results are consistent with the findings of Witte et al (1993), who found parental attitudes to be a significant influence on helmet use, and Pendergrast et al (1992) who also showed parental attitudes to be more influential than the behaviour of friends. Otis et al (1992) however, report the reverse, that peer influence was the most discriminant factor followed by parental support (p. 287). They did not though assess helmet use amongst children cycling to and from school but amongst children engaged in short, local journeys. This suggest that parents may worry more when they know their children to be cycling to and from school rather than on short trips around the immediate neighbourhood. Children's attitudes towards helmet wearing are thus strongly influenced by the views of their parents and helmet use may partly derive from a desire to allay parental anxieties. However, Sissons–Joshi et al (1994) found that users and non–users of cycle helmets shared the same norms, stating that while parents pressed them to wear a helmet, friends discouraged them. This suggests that other factors may act to moderate the impact of normative influences where these are shown to discriminate between helmet users and non–users.

It is also possible, through an examination of individual subjective norms, to determine whether the importance of the beliefs which discriminate between helmet users and non–users is due to the endorsement of the normative prescriptions of referent others or to the value placed on complying with their wishes. This is a useful exercise in view of the intention to use these beliefs to inform a persuasive intervention. Helmet users not only endorsed the view that parents, other family members and teachers were likely to support their use of a helmet significantly more than non–users, but were also significantly more motivated to comply with these respective referents. The item concerning other cyclists also discriminated between groups on both components although the pressure to comply with these referents is more important than the perception of their wishes. Two other subjective norms only discriminated between groups on one of the two components: Helmet users were more likely than non–users to endorse the view that their close friends would want them to wear a helmet but were no more motivated than non–users to comply with them. Conversely, although both groups endorsed the belief that road safety experts would want them to wear a helmet, only helmet users were strongly motivated to comply with their wishes. It appears that these two subjective norms do not discriminate between groups as effectively as the item concerning the perceived wishes of other cyclists, which shows a significant difference between means for both components. The implications of this analysis are that the perceived expectations of parents, other family members, teachers and other cyclists could be used in an intervention promoting helmet use amongst non–users whereas the items concerning close friends and road safety experts could not. In the first case, non–users are clearly motivated to comply with friends who do *not* use helmets and in the second, are not likely be persuaded to comply with a non–specific referent whom they will seldom encounter.

Attitude towards the behaviour

Although the attitude measure did not predict intention, evidence for the importance of its constituents, the behavioural beliefs, is provided by the zero order correlations which show attitude to be more highly correlated than either perceived benefits or barriers with the Time 1 intention and Time 2 helmet use measures. [23] It is also noteworthy that while perceived benefits is significantly associated with intention, perceived barriers shows only a weak association. Since the attitude measure incorporates both benefits *and* barriers and is more highly correlated than either, we are justified in examining which of its components could be used in an intervention.

The relative importance of the individual behavioural outcomes associated with helmet use can be fully appreciated from an analysis of the individual benefits and barriers and individual behavioural beliefs. The most obvious difference is that although both models show all five *positive* behavioural beliefs to be endorsed significantly more by helmet users than non–users, the Theory of Planned Behaviour identifies four of the *negative* behavioural beliefs as discriminating between groups, while the Health Belief Model identifies only two. In addition, those identified as discriminators by both models achieve different significance levels. These differences suggest that the different measurement techniques employed by the models do have a significant effect. This raises the question as to which model is of the greater utility in helping us to understand cyclists' decisions regarding helmet use.

[23] Although the attitude measure did not predict intention in the multivariate analysis, it used the same questionnaire items as the Health Belief Model's benefits and barriers measures which were significant predictors. This issue is discussed further below.

In the Health Belief Model, behavioural outcomes are measured as simple costs and benefits which are (to one degree or another) either endorsed or rejected by subjects. In the Theory of Planned behaviour, the ratings of these costs and benefits are combined with an evaluation of their relative importance (to give the individual behavioural beliefs) which improves the assessment of their importance. It is notable that the behavioural beliefs which show the most significant differences between helmet users and non–users are those in which both the belief strength and outcome evaluation are endorsed significantly more by one group than the other.

The beliefs that wearing a helmet makes the wearer take care and would provide protection in an accident, discriminated between helmet users and non–users more than any other beliefs. This suggests that helmet use raises the salience of personal vulnerability. In support of this, perceived vulnerability was shown to correlate significantly with attitude. Also of importance was the belief that using a helmet would make parents worry less although it is the importance of the behavioural outcome rather than its value to the respondents that separates helmet users from non–users. Helmet users do appear to attach slightly more value than non–users to the idea that parents may worry less, but neither group evaluates this outcome highly. The importance of taking care through wearing a helmet may also implicate concerns about the dangers of cycling and being made to feel safe. Both of these were only marginally more important to helmet users than non–users but may reflect a desire to lessen the perceived risks associated with cycling and the desire to take responsibility for personal safety. Arnold and Quine (1994) found this an important consideration for helmet–users.

In addition to the positive behavioural beliefs associated with helmet use, four negative behavioural beliefs were shown to predict non–use. Having to spend too much money was the most significant barrier being endorsed significantly more by non–users than helmet users on both the belief strength and evaluation component. Being made to look silly and having to carry the helmet around during lessons were also important barriers showing the same mean difference and significance level. However, it is the evaluative component of the behavioural belief 'looking silly' rather than the outcome which discriminates between groups, while for the behavioural belief 'having to carry the helmet around during lessons, it is the belief strength component which discriminates between groups rather than its evaluation. In the first case, this suggests that while helmet users and non–users equally endorse the belief that wearing a helmet makes them look silly, helmet users are much less concerned about looking silly than non–users. This may be because the benefits of helmet use are more salient than concerns about appearance or because cyclists who wear a helmet often become less worried about the reactions of others. In the second case, while both groups rate having to carry a helmet around during lessons as undesirable, helmet users are much less concerned about this. Again, the daily experience of carrying a helmet around may make it less of a problem than is anticipated by non–users.

Experience with helmet use and a belief in the benefits may also be the reason why helmet users appear less concerned about discomfort than non–users. Although both groups subscribe to the belief that wearing a helmet will make them uncomfortable, it is non–users who attach more significance to this. It may be that helmet users become used to the discomfort or believe it to be a small price to pay. In addition, many non–users may have worn a helmet long enough to experience the discomfort but not long enough to remedy this through proper adjustment of the straps.

It can be seen from this discussion how useful the Theory of Planned Behaviour's measurement technique is. While the Health Belief Model shows that helmet users and non–users alike endorse discomfort and looking silly, the Theory of Planned Behaviour shows that the two groups differ in how they value these outcomes. This highlights a shortcoming of the Health Belief Model in that a simple rating of an outcome expectancy may not be as helpful in understanding the mechanisms behind helmet use as an analysis which also identifies the extent to which cyclists value these outcomes.

Perceived Behavioural Control

The examination of individual control beliefs shows that those relating to anticipated control over performing the behaviour discriminated between helmet users and non–users suggesting that cyclists do need to feel confident that they possess the requisite skills and resources to be able to wear a helmet properly. In addition, three of the four beliefs relating to practical impediments and/or personal resources were also endorsed significantly more by non–users than by users. Forgetting to put the helmet on, it being too much effort, and having nowhere to store it once at school were factors likely to intervene between intentions and behaviour. Otis et al (1992) also found that the effort involved in helmet use discriminated between helmet users and non–users although they used the concept as a behavioural belief, assessing it as the extent to which helmet use was a' bother'. Sissons–Joshi et al (1994) report that non–users in their sample cited having nowhere to store the helmet at school as a significant factor in their non–use.

The problem of having to carry a helmet around during lessons was also used as a behavioural belief in the study reported here although the format differed than when used as a measure of perceived control. As a behavioural belief, the item was presented using the wording ... 'My wearing a helmet whilst cycling to school would mean having to carry it around during lessons'. As a control belief, the item followed the stem 'I might not be able to wear a helmet while cycling to school because ... *there would be nowhere to put it during lessons*'. Assessing what appears to be a purely practical consideration by both methods was thought to reflect a conceptual difference. Cyclists may worry about appearing foolish in the eyes of other children while carrying their helmet around (which would contribute towards a negative attitude) as well as not wish to endure the inconvenience (which would act as a practical impediment directly influencing perceived behavioural control). There is also an empirical advantage in assessing the influence of certain issues as both a behavioural and a control belief. Helmet users might be more concerned than non–users about the inconvenience of carrying the helmet around all day simply because they experience the problem on a daily basis. Asking the same question after the stem 'I might not be able to wear a helmet while cycling to school because...' is a way of evaluating the behavioural outcome which involves anticipation more than actual experience.

Predicting intentions to use a helmet

Health Belief Model

Perceived benefits and barriers

Perceived benefits were the strongest predictors of intention to wear a helmet in the multivariate analysis with a beta of 0.46. Perceived barriers were the next most powerful predictors with a beta of – 0.18. This may reflect the finding that all five benefit items yet only two barrier items discriminated between helmet users and non–users. In other tests of the Health Belief Model in which behavioural intention has been included, either perceived barriers (Champion, 1988; Champion and Miller, 1992; Lux and Petosa, 1994) or benefits (Cummings et al, 1979, Norman and Fitter, 1989; Aiken et al, 1994) or both (Oliver and Berger, 1979; Abraham, Sheeran, Spears and Abrams, 1992; Conner and Norman, 1994) were significant predictors of intention.

The order of significance of benefits and barriers in the study reported here is contrary to that reported by Arnold and Quine (1994). They found perceived barriers and then benefits to predict helmet use – a 'rank order' which accords with the review of post–1974 Health Belief Model literature by Janz and Becker (1984). However, Arnold and Quine used health beliefs to predict behaviour directly rather than intention suggesting that perceived barriers are more salient than perceived benefits when associated with helmet use rather than the intention to use. If this is the case, it reflects the decision–making process assumed to underlie the Health Belief Model (see Rosenstock, 1966). An individual who is motivated by awareness of a health threat to consider a preventive action (such as wearing a protective helmet when cycling) will probably consider the benefits of such an action first before thinking about the costs involved since these benefits operate to reduce the anxiety caused by the health threat. Thus the perceived benefits will be more salient when an individual is considering, or forming an intention to carry out a preventive action than any barriers. These will become more relevant when the behaviour is about to be carried out. In other tests of the Health Belief Model McCallum et al (1988), Stein et al (1992) and Conner and Norman (1994) also found benefits and then barriers to predict *intentions*. Champion (1984, 1985) and more recently, Ried and Christensen (1988), Nemcek (1990), Wyper (1990) and Wilson, Manuel and Lavelle (1991) have all found barriers to be the most reliable predictor of *behaviour*.

Perceived vulnerability and severity

These findings provide only partial support for the model since neither perceived vulnerability nor severity – said by Rosenstock (1966) to provide the readiness to act – were significant predictors of the intention to wear a helmet. According to Rosenstock (1966), an individual's motivation to consider taking a preventive action should derive from their perception of the magnitude of a health threat. Thus in the case of deciding whether or not to wear a cycle helmet, the threat of head injury sufficient to initiate the cost/benefits analysis of helmet use should arise from the individual's perceptions of personal vulnerability to head injury and the perceived severity of such an injury. That neither of these were significant predictors of intention suggests that they were redundant constructs measuring beliefs which do not overly concern young cyclists.

However, the poor performance of perceived vulnerability and severity must be viewed in the light of previous research concerning helmet use amongst children (e.g. Wasserman et al, 1988; Howland et al, 1989; Otis et al, 1992) showing that high school students do not rate head injury very highly (if at all) amongst the possible outcomes of bicycling accidents. It would appear therefore, that cyclists do not perceive themselves vulnerable to head injury to the extent that it constitutes a health threat sufficient to directly influence helmet use – a finding corroborated by the research study reported here. This in turn explains the poor performance of perceived severity since an individual is unlikely to consider the relative severity of a health threat unless he or she believes they are actually or potentially threatened (Janz and Becker, 1984). Thus head injury, being perceived by young cyclists as a remote threat, will not necessarily evoke considerations of severity.

Recent research findings support these arguments. Otis et al (1992), using an expanded Theory of Reasoned Action, report that behavioural beliefs (i.e. costs and benefits) predicted the intention to use a helmet, while vulnerability – assessed as perceptions of *risk of head injury* – and severity did not – findings very similar to those reported here (see also Arnold and Quine, 1994). Conversely, although Sissons–Joshi et al (1994) found that perceived vulnerability (but not benefits and barriers), *was* related to intention to use a helmet, their study assessed the probability of *accident involvement* rather than likelihood of head injury (see also Witte et al, 1993). This suggests that if perceptions of vulnerability do play a role in cyclists decision to use or not use helmets, then it is fear of accident involvement rather than fear of head injury which is important. There is some support for this from the zero order correlations in the study reported here since vulnerability was strongly correlated with the perceived benefits measure, the most important of which were 'taking care' and 'feeling safe'. These correlations also suggest that rather than being entirely redundant, vulnerability may exert an influence on helmet use via other variables. It is notable that perceived vulnerability correlated strongly with perceived benefits, subjective norm and perceived behavioural control – all of which predicted intention in the multivariate analysis.

Cues to action

The hypothesised Time 1 cues to action of having had a bicycle–related accident in the past year and/or knowing someone else who had experienced one were also not significantly associated with the intention to use a helmet. In the only other study investigating helmet use amongst children in which cues were used to predict intention (Witte et al, 1993), accident history did not predict the intentions of parents to encourage helmet use amongst their children even though these children had been injured in bicycling accidents. Evidence from research which has either recruited subjects from hospital accident and emergency departments, or specified the nature of any injury, does suggest an association between *serious* injuries and helmet ownership (but not use) which suggests an intention to wear at the time of purchase (see for example Pendergrast et al, 1992; Cushman, Down, MacMillan and Waclawik, 1991; DiGuiseppi et al, 1992; Hu et al, 1994). In tests of the Health Belief Model, Stein et al (1992) and Lux and Petosa (1994) showed cues to predict intentions, while (consistent with the research reported here) Hill et al (1985), Mullen et al (1987) and Champion (1988) did not.

Theory of Planned Behaviour

Subjective norm

Subjective norm was a powerful predictor of intention with a beta of 0. 37. Otis et al (1992) also found subjective norm to predict intentions to use helmets while Sissons–Joshi et al (1994) used a similar measure (termed conformity) which predicted intentions to use a helmet. Attitude was not associated with the variance although this anomaly can be attributed to the strong performance of the subjective norm measure in the multivariate analysis rather than behavioural beliefs being unimportant. Perceived barriers and benefits, which share the same questionnaire items as the belief strength component of the attitude measure, were predictors of helmet use.

The correlation between attitude and subjective norm was 0. 72, suggesting that the effects of attitude on intention were absorbed by subjective norm. This raises the issue of whether there is a distinction between normative and behavioural beliefs as Fishbein and Ajzen argue (Fishbein and Ajzen, 1980; Ajzen, 1988). Other researchers also report strong attitude–subjective norm correlations and there seems to be some evidence that attitudes and subjective norms can sometimes have causal affects on each other (Smetana and Adler, 1980; Warshaw, 1980; Corneya, 1995). Furthermore, it is possible to account for findings from studies that seem to show a distinction by arguing that different kinds of consequences are important for different kinds of behaviours (see Ryan, 1982 for a discussion). For some behaviours the types of consequences assessed by attitudinal measures are more salient than those assessed by subjective norm measures, and the reverse is true for other behaviours (Trafimow and Fishbein, 1995). Fishbein and Ajzen (1987) have reported findings showing that attitude and subjective norm correlated more highly with intention than with each other and argue that this would not have been the case if attitude and subjective norm do assess the same underlying variable. However, in the study reported here, attitude and subjective norm correlated more highly with each other than with intentions, which seems to suggest that the distinction is arbitrary rather than conceptually valid. Miniard and Cohen (1981) have argued that since both kinds of beliefs are concerned with consequences, a distinction is not very meaningful. Ryan (1981) argues that they should be viewed as interdependent.

Other studies have also found subjective norm rather than attitude to be the better predictor of intention (Lacy, 1981; Budd and Spencer, 1984; Harrison, Thompson and Rodgers, 1985; Hessing, Elfers and Weigal, 1988; Beck and Ajzen, 1991; Boyd and Wandersman, 1991). These writers have examined behaviours that are performed in the presence of a partner, with friends or in public (e.g. condom use, illicit drug use, intention to drink), or are highly susceptible to prevailing standards of public morality (lying, tax evasion). [24] It may be that in general attitude is more important than subjective norm when the behaviour is performed in private (e.g. breast/testicular self examination) but that the reverse is true when the behaviour is performed publicly, as in wearing a seat belt (Wittenbraker et al, 1983) or where it is perceived that the consequences of failing to carry out the behaviour may

[24] In a study by Tedesco, Keffer and Fleck-Kandath (1991), although subjective norms were a better predictor of intentions to use dental floss than attitudes, the reverse was true of intention to brush. However, until flossing becomes as widely accepted as brushing , it is likely to be affected more by public opinion.

profoundly affect the lives of referent others (e.g. condom use). Wearing a cycle helmet is very much a public behaviour and is thus subject to a variety of normative influences, particularly those of parents and other cyclists. Although Otis et al (1992) show instead that behavioural beliefs and then subjective norm predicted intention to use a helmet, they used only three normative belief items as opposed to the six used here and only assessed the perceived expectations of mothers, fathers and friends.

Perceived behavioural control

Perceived behavioural control also predicted intention supporting Ajzen's (1985) claim that it increases the predictive power of the Theory of Reasoned Action. However, this may depend upon whether researchers follow Ajzen and Madden (1986) and assess belief–based as well as direct measures. The study reported here did this, using both belief–based measures (relating to resource–linked and practical impediments) and direct measures (concerning anticipated control) to assess the influence of perceived behavioural control. Valois et al (1993), Manstead and Parker (1995) and Parker et al (1995) have also used both types of measures. However, while Valois et al found them both significant predictors, Manstead and his associates report that only the belief–based measures significantly predicted intentions (to commit driving violations). Conversely, Fishbein and Stasson (1990), Chan and Fishbein (1993), Conner and Norman (1994) and Sissons–Joshi et al (1994) who used only direct measures, found perceived behavioural control not to predict intentions.

Predicting helmet use: behaviour

Health Belief Model

Intention to wear a helmet was a powerful predictor of helmet use with a beta of 0. 62 supporting Ajzen's (1975, 1988) claims that intentions are amongst the best predictors of behaviour. The intention measure also correlated with perceived benefits, barriers (negatively) and vulnerability suggesting that cyclists who feel vulnerable to the threat of head injury, believe in the benefits afforded by cycle helmets and are not influenced by the barriers to wearing, formulate an intention to wear a helmet which in turn, leads to helmet use. In other tests of the Health Belief Model in which intention has been used to mediate between beliefs and behaviour, Cummings et al (1979) Oliver and Berger (1979), Mullen et al (1987) and more recently, Ronis (1992), Aiken et al (1994), also show intention to be the best predictor of behaviour.

The Time 2 cue of having had a recent bicycling accident was not related to helmet use. Sissons-Joshi et al (1994) also found no relationship between helmet use and personal experience of a bicycle accident. Nor is this dependent upon accident severity. Pendergrast et al (1992), DiGuiseppi et al (1992) and Hu et al (1994) report that having had a *serious* bicycle-related head injury (requiring treatment at a hospital or clinic) positively influenced helmet ownership amongst their respective samples, but not use. Hu et al (1994) suggest that the impact of having had an accident may only have a short term effect if at all (see also Sissons-Joshi et al, 1994). Nakayama, Pasieka and Gardner (1990) found no increase in helmet use amongst children unless an accident, as a cue, was followed by other promotional activities. There was however correlational evidence that subjects who had recently experienced a bicycling accident had heightened perceptions of vulnerability to the threat of injury.

Although Arnold and Quine (1994) did find personal accident history to predict helmet use, they asked subjects about accidents in the four weeks prior to the measurement of behaviour as opposed to the one week in the study reported here. It may be that when accident history is shown to positively influence helmet use, the effect is contingent upon the temporal proximity of the accidents to the questionnaire session in which their influence is assessed rather than their relative severity. Similarly, demonstrating the influence of personal accidents may also depend upon the time–scale specified in the questionnaire. A period of 7 days may be too short a time since few accidents will occur in any one week; Any longer, and accidents, being more distant in time, will exert less and less influence upon decisions.

Theory of Planned Behaviour

Both intention and perceived behavioural control were predictors of helmet use. Intention was the strongest predictor with a beta weight of 0. 57, while perceived behavioural control had a beta weight of 0. 18 supporting Ajzen's argument that attitudes concerned with perceived behavioural control may also exert direct effects on behaviour (Ajzen, 1985, 1988). Forgetting to put the helmet on, or it being too much effort, or having nowhere to store it once at school are factors likely to intervene between intention and behaviour as well as directly influencing the formation of intention (as discussed earlier). This supports a version of the Theory of Planned Behaviour proposed by Schaalma, Kok, Poelman and Reinders (1994) in which barriers and abilities intervene between intention and behaviour. Schaalma et al's barriers and abilities can of course be re–conceptualised as Ajzen's (1988) practical and resource–based impediments. Norman and Smith (1995) and Reinecke et al (1996) also found perceived behavioural control to exert an influence on exercise and condom use behaviour and intentions (respectively).

As well as being a powerful predictor of helmet use, intention was also correlated with attitude, subjective norm and perceived behavioural control, suggesting that cyclists who have a positive attitude towards helmet use, perceive normative support for this, and believe that they have the requisite resources to overcome any problems associated with helmet use, will formulate a strong intention to wear a helmet which in turn will predict actual helmet use. Although Otis et al (1992), using the Theory of Reasoned Action, report that intention did not predict behaviour, they suggest that intention may have been neutral due to their respondents lack of experience with helmet use (p. 287). This supports Ajzen's (1988) claims that behavioural intention is a more valid index of future behaviour than attitudes and beliefs themselves. Otis et al's (1992) subjects held beliefs which might normally be expected to lead them to use helmets yet their intentions showed otherwise. Similarly, Pendergrast et al (1992) found that although their subjects strongly endorsed the outcomes of helmet use, they did not intend to wear them.

In summary, it would appear that in predicting helmet use amongst school boys travelling to and from school, the behavioural prescriptions of significant others and the degree of confidence in the ability to perform the behaviour are important considerations. The Theory of Planned Behaviour, which measures these beliefs, thus appears to be more sufficient than the Health Belief Model which does not. To achieve parity with the Theory of Planned Behaviour in predicting helmet use intentions and behaviour, it would be necessary to expand the Health Belief Model so that it assessed perceptions of control and normative influences. However, the impact of past behaviour on the predictive ability of both models raises the question of whether the beliefs shown to be salient truly precede behaviour or arise as a result of helmet use through some kind of dissonance (Festinger, 1957). It could be argued that if the beliefs associated with helmet use arise from, or are influenced by, prior behaviour, then what we have done is identify the psychological correlates of helmet use – that is, the beliefs associated with its uptake – rather than its predictors. This issue warrants examination.

The role of past behaviour

Prior helmet use was significantly associated with intentions to wear in the univariate analysis, and predicted helmet use at Time 2. Furthermore, when entered into the regression analysis, past behaviour dramatically increased the proportion of variance explained by the models and rendered them equal in terms of predictive power. This is similar to a study of motorcyclist behaviour by Rutter, Quine and Chesham (1992) in which the addition of past behaviour to the Health Belief Model and Theory of Reasoned Action increased the explained variance (in the criterion) from 47. 6% to 62. 0% and from 38.4% to 63.3% respectively. In tests of the Health Belief Model, Arnold and Quine (1994) have also found past helmet use to significantly predict future helmet use, while Calnan and Rutter (1986) and Champion and Miller (1991) report prior experience with breast self–examination (BSE) to be the best predictor of future BSE. Similarly, in applications of the Theory of Planned Behaviour, Reinecke et al (1996) have shown past condom use to exert a direct effect on later intentions to use condoms (measured one year later). Norman and Conner (1994), Norman and Smith (1995) and Millstein (1996) report prior screening, exercise and physician behaviour (respectively) to be the strongest predictors of later behaviour. Van Ryn et al (1996) found that pre–test levels of BSE had direct effects on both intention and attempts to practice BSE.

The impact of past behaviour on future behaviour has been taken by some researchers to suggest that it is not so much the beliefs assessed by the Health

Belief Model that influence later behaviour but past experience with that behaviour (see for example Kegeles and Lund, 1984). Sutton (1994) says as much about the Theory of Planned Behaviour. Ajzen (1985, 1991) however argues that the Theory of Planned Behaviour is sufficient and that past behaviour should not be viewed as an explanatory variable exerting independent effects on behaviour. He maintains that studies which show such an influence may not have assessed one of the predictor variables adequately (see also Beck and Ajzen, 1991) and in particular, argues that the effect of past behaviour should be primarily mediated by the perceived behavioural control construct (see Ajzen, 1988). Moreover, Ajzen (ibid.) suggests that the omission of this measure may account for reported direct effects of past behaviour on the criterion. However, in the study reported here, the beta for the measure of prior helmet use in the regression analysis was greater than the beta for either perceived behavioural control (see also Kashima et al, 1993) or behavioural intention, and caused perceived behavioural control to drop from significance. Godin, Vallois Lepage and Desharnis (1992), Reinecke et al (1996) also report large effects of past behaviour on the criterion even though perceived behavioural control was used. Reviews of the Theories of Reasoned Action and Planned Behaviour by Sutton (1994) and Norman and Conner (1996) also cite studies in which past behaviour has been shown to exert a direct influence on either intention, unmediated by beliefs, or behaviour, unmediated by intention and/or perceived behavioural control.

Although this may seem to imply that it is the past which predicts the future (see, Sutton, 1994) rather than beliefs or attitudes, Arnold and Quine (1994) argue that the beliefs they identified as significantly associated with helmet use were likely to be those that led to helmet use in the first place. Furthermore, they suggest that because helmet use is a minority practice and one that runs counter to social norms, it is a behaviour that is likely to be constantly re–evaluated by each individual with reference to his belief structure. This is similar to the position of Sutton (1994) who makes a distinction between habits – viewed as unreasoned repetitive actions – and routines. The latter, which Sutton defines as ... a sequence of behaviours that is repeated on a regular basis... (p. 83), are in most cases the result of a deliberate decision to adopt a particular course of action (ibid.,). In this, they differ from habits that have become autonomous and are subject to repeated self reminders. In other words, an established pattern of behaviour such as putting a helmet on before getting on one's bicycle can be viewed as a routine maintained by personal beliefs (see Arnold and Quine, 1994) rather than mere repetition.

Summary of the study

In predicting the intention to use and actual helmet use among young males cycling to and from school, the Theory of Planned Behaviour was clearly superior to the Health Belief Model and better able to identify salient beliefs. In addition, correlational evidence suggests that certain variables of the Health Belief Model (i.e. perceived severity and vulnerability) might be better employed as a means of identifying the beliefs underlying the behavioural and normative beliefs assessed by the Theory of Planned Behaviour. The findings thus support the predictive utility and cohesion of the Theory of Planned Behaviour while casting doubt upon the theoretical basis of the Health Belief Model.

It is possible of course that the Health Belief Model may be better at predicting preventive health actions when these are directly related to a medical condition with severe consequences such as practising breast self–

examination or attending a screening clinic for the early detection of coronary heart disease. These are likely to be more emotive issues and the simple measures used by the Health Belief Model more appealing. Behaviours in which the preventive action concerns a distant health threat such as helmet use may be responded to in a more measured manner and involve more cognitive elements than emotional ones.

These findings differ from those reported in previous comparative research since neither model has been shown to be clearly superior in terms of predictive power. Mullen et al (1987) and Ried and Christensen (1988) for example, show the Theory of Reasoned Action to predict more of the variance in the criterion measure(s) than the Health Belief Model; Hill et al (1985) report the opposite. In contrast, the two studies most similar to the one reported here (i.e. Oliver and Berger, 1979 and Conner and Norman, 1994) did find the models equivalent when predicting behaviour [25] although they were only able to explain 10% and 4% of the variance respectively. However, there are important differences between these studies and the one reported here which make comparisons difficult. It was noted earlier that (with the exception of behavioural intention added to the Health Belief Model) only those variables discussed by Rosenstock (1966) and Ajzen (1985) were used and care was taken to operationalise these as originally suggested. Furthermore, the addition of intention to the Health Belief Model standardised the models methodologically which allowed identical methods of data analysis to be used for each. Finally, the focus of the study was a specific preventive action: using a protective helmet while cycling to and from school. In contrast, Hill et al (1985) and Mullen et al (1987) did not concentrate on single preventive practices and also used different versions of

[25] Oliver. and Berger (1979) did find the Theory of Reasoned Action to predict more of the variance in intentions than the Health Belief Model. Conner and Norman (1994) found the Theory of Planned Behaviour alone to significantly predict behaviour.

the Health Belief Model to the one used here. Oliver and Berger (1979) and Conner and Norman (1994) added variables to the Health Belief Model and computed them differently. Ried and Christensen (1988) used intention as a mediator in model and not the other.

However, the results are broadly consistent with the literature to the extent that analysis of the zero order correlations shows greater redundancy amongst the components of the Health Belief Model than amongst the components of the Theories of Reasoned Action and Planned Behaviour (see Ried and Christensen, 1988; Oliver and Berger, 1979; Conner and Norman, 1994). Furthermore, in these studies (as in the research reported here), simple correlations between the predictor variables of the Theories of Reasoned Action/Planned Behaviour and the criterion measures (i.e. intention and/or behaviour) are generally of greater statistical significance than the same correlations demonstrated by the Health Belief Model.

Concluding remarks

The results show the Theory of Planned behaviour to be a more reliable predictor of intentions to use a helmet and of actual helmet use than the Health Belief Model and able to identify a greater number of salient beliefs associated with these criteria. It also used fewer variables than the Health Belief Model and had fewer redundant components.

The study also confirms the utility of restructuring the Health Belief Model by incorporating a measure of behavioural intention mediating between beliefs and behaviour. Comparing the results of the present study with those reported by Arnold and Quine (1994) suggests that the inclusion of behavioural intention identifies causal pathways more effectively than a direct prediction of outcome behaviour. This was especially true of perceived vulnerability. A problem for both models however is that past behaviour had an extreme impact on future helmet use. It is apparent that most of the helmet users at Time 2 were users at Time 1 and that only ten cyclists began wearing a helmet after the first questionnaire session. Although Ajzen (1991), Arnold and Quine (1994) and Sutton (1996) suggest this to be less of a problem than it at first appears, the influence of past behaviour remains a contentious issue. In order therefore to identify the salient beliefs that predict helmet use unconfounded by prior behaviour, we need to conduct a study amongst cyclists who have no previous experience of using a helmet while cycling to and from school. In addition, the roles of personal vulnerability and perceived barriers to helmet use need to be examined to determine whether the former has a role in cyclists decisions *vis-`a-vis* helmet use and to establish whether the latter is made more salient by helmet use and therefore associated with behaviour more than intention.

CHAPTER 3: STUDY 2

PREDICTING HELMET USE AMONG SECONDARY SCHOOL CHILDREN: A LONGITUDINAL TEST OF THE HEALTH BELIEF MODEL AND THE THEORY OF PLANNED BEHAVIOUR

INTRODUCTION

The purpose of this chapter is to report a longitudinal study in which the beliefs of junior school children about the wearing of cycle helmets whilst cycling to and from school were used to predict their use of helmets a year later. The study differed from the one reported earlier in this thesis in two important ways. First, it examined the beliefs and behaviour of girls as well as boys thus extending the research beyond its initial premise. Second, it aimed to reduce the influence of past behaviour – in this case, prior helmet use – on the beliefs used to predict future behaviour in order to establish their suitability for use in an intervention promoting helmet use. To this end, the children's beliefs about helmet use were measured several months before they were allowed to begin cycling to and from school and used to predict their use or non–use of helmets at senior school a year later. In addition, the study assessed the impact of helmet use during cycle proficiency training at junior school. [27] A three–wave, prospective design was used in which the Health Belief Model (Rosenstock, 1966) and the Theory of Planned Behaviour (Ajzen, 1985, 1991) were compared on the basis of their ability to predict helmet use and identify individual beliefs associated with cyclists' decisions.

The first part of this chapter describes how the study was designed to examine and address issues arising from the previous study and the reasons for doing

[27] This took place a month after the initial questionnaire session.

this. It begins by examining the necessity of limiting the influence of past behaviour, both as a predictor of future behaviour and as an influence on the beliefs used to predict intentions and helmet use. After this, the rationale behind including female as well as male cyclists is explained followed by a description of the procedure used to validate their inclusion and how this (inclusion) affected the operationalisation of the models. The second part of the chapter describes how the study set about examining firstly, the roles of perceived vulnerability and severity, and secondly, the influence of impediments to helmet use. Finally, the utility of using the models in longitudinal studies to investigate health behaviours is examined. In the third section, the study itself is presented and the performance of the models contrasted in terms of their ability to assess the beliefs associated with the intentions of junior school children to use a helmet in the future and their ability to predict actual helmet use at senior school from these beliefs.

REDUCING THE INFLUENCE OF PAST BEHAVIOUR ON CHILDREN'S DECISIONS AND BEHAVIOUR.

The problem of past behaviour

In the previous study, because the majority of the sample had been cycling to and from school for some time and helmet use was thus an ongoing rather than novel behaviour, it could be argued that the beliefs shown to be associated with helmet use should be regarded more correctly as the correlates of behaviour rather than its predictors. It is possible that the experience of helmet use will have brought about changes in beliefs. It will be recalled that Stevensen and Lennie (1992) found children more sensitive to the negative outcomes associated with helmet use (such as peer derision) after the experience of wearing one. Other researchers have also pointed out that experience with the preventive action effects changes in the beliefs antecedent to that behaviour. Reinecke et al (1996) for example, argue that beliefs about condom use were influenced significantly by respondents' experience of condom use during the twelve months prior to the second assessment session.[28] Thus experience of a health protective action prior to the measurement of beliefs could be responsible for the relative salience of the beliefs associated with outcome behaviour. This is a common problem for researchers attempting to predict health protective behaviours from attitudinal variables when the outcome measure relates to the frequency of carrying out a health protective action in the previous few weeks. This problem is largely due to the fact that many health protective actions are by necessity repeated behaviours such as breast or testicular self examination (e.g. Champion, 1984; Vaile et al, 1993; Brubaker and Wickersham, 1990) which are practised on a regular basis rather than 'one off' actions such as voting behaviour (e.g. Granberg and Holmberg, 1990). However, Sutton (1994) points out that many health–related behaviours should be considered routines rather than habits and as such are the result of a deliberate decision to adopt a particular course of action (p. 83). Thus while Kegeles and Lund (1984) suggest that past behaviour predicts future behaviour over and above beliefs, Sutton (op. cit.) maintains that a routine is sustained by 'brief self–reminders' of the earlier (belief–based) decision.

In keeping with Sutton's argument, it was suggested in chapter 2 that the use of protective helmets by cyclists is more of a routine (i.e. a sequence of behaviours repeated on a regular basis) than a habit and is a behaviour constantly re–evaluated with reference to the wearer's belief structure (see also Arnold and Quine, 1994). Even so, Dishman (1982) makes a distinction

[28] Schaalma, Kok and Peters (1993) also show how the beliefs of young adolescent's towards condom use change with experience. Boldero et al (1992) show changes in respondents behavioural intention over time.

between the initiation and maintenance of a behaviour and argues that only the initiation of behaviour is determined by cognitive variables. Thus in prospective tests of the Health Belief Model and the Theory of Planned Behaviour, as long as past behaviour can be shown to influence later behaviour or the beliefs associated with it, doubts must remain as to what extent the attitudinal and belief variables measured at Time 1 truly predict behaviour at Time 2. This has obvious implications for attempts to promote helmet use by exploiting salient beliefs since if we are to evaluate the salience of beliefs associated with helmet use in order to design a promotional intervention, we need to satisfy ourselves that the beliefs were antecedent to that behaviour. In this way we can be confident that their salience reflects their importance in initiating behaviour rather than the influence of helmet use. We can also distinguish, should we need, between beliefs associated with the initiation of helmet use and those associated with its maintenance.

The only practicable way of doing this is to reduce the influence of past behaviour on the beliefs used to predict future behaviour by measuring the beliefs before the behaviour occurs.[29] This can be achieved in the UK, by measuring the beliefs and attitudes of junior school children – who are not allowed to cycle to school – towards helmet use while cycling to and from school and using these beliefs to predict their use of helmets when they begin cycling to and from senior school. In accordance with this, in the study reported here, the beliefs of a sample of junior school children about wearing a helmet while cycling to and from school were used to predict their actual helmet use (or non–use) a year later – by which time they were had been cycling to and from senior school for several months. By this method, it was

[29] Clarke et al (1991) attempted to do this in a longitudinal test of the Health Belief Model by excluding the scores from subjects with prior experience of BSE from their analyses. Similarly, Wilson et al (1996) used the Theory of Reasoned Action to predict uptake of a novel behaviour by women – having an HIV screening test.

possible to assess beliefs, unaffected by previous and/or current experience, which predicted the uptake of helmet use while cycling to and from school as a novel behaviour. This strategy addresses the points raised by Kegeles and Lund (1984) and Dishman (1982).

However, because many of the respondents will have engaged in leisure cycling before commencing senior school and may well have worn a helmet, it could be argued that this constitutes prior behaviour and as such will exert an influence on beliefs and subsequent behaviour. The rationale behind the study discussed here though rests upon the premise that using a bicycle as a means of transport – when for example travelling to and from school – and using it for recreation are behaviours subject to different influences to the extent that helmet use during leisure cycling will not necessarily result in, or even influence, helmet use while cycling to and from school.

It will be recalled that Agran and Winn (1993) make a distinction between using a bicycle for play (termed 'recreational cycling') and using it as a means of transport (termed 'purposive cycling) and argue that there are behavioural and experiential differences between the two (see also and Towner et al, 1994), especially in terms of what might be called risk–factors. There is also evidence that purposive cycling influences beliefs associated with helmet use in a different way than play cycling. Hu, et al (1994) for example, report that children who rode to school were twice as likely to wear a helmet than children who did not, suggesting that perceptions of vulnerability were different for the two groups. In keeping with this, Arnold and Quine (1994, who focused specifically on school–related cycling, found helmet wearers to have raised perceptions of vulnerability relative to non–wearers. In contrast, Otis et al (1992), who focused on leisure cycling, found no difference in perceptions of vulnerability between children who intended to wear a helmet and those who did not. This implies that it is purposive cycling that is associated with the increased perceptions of vulnerability likely to lead to helmet use. In addition, Maring and Van Schagen (1990) found attitudes towards 'rule compliance' and other road users more negative amongst 12–to–15 year old cyclists than amongst those aged 9–to–11. The older age group were also less likely to adhere to traffic regulations. This suggests that once cyclists reach the age when they are able to cycle to and from school in the UK, they are more likely to cycle in a way which increases accident risk which may enhance personal vulnerability (see Elliot and Shanahan Research, 1986).

There is also evidence that school–related helmet use is influenced more by socio–normative beliefs than attitudinal beliefs and that the reverse is true of helmet use during play cycling. Studies which show peer pressure and the perceived expectations of others to be more important than attitudinal beliefs either focus exclusively on helmet use while cycling to school (see for example chapter 2) or include large numbers of children who cycle to school (e.g. DiGuiseppi, et al, 1990; Pendergrast et al, 1992). The only study in which attitudinal influences were shown to be more important than normative ones focused instead on children's intentions to wear a helmet during play cycling (see Otis et al, op. cit.). Moreover, although Otis et al report peer pressure to be more important than the perceived expectations of parents, the opposite is true of studies which have examined helmet use during purposeful cycling (e.g. Pendergrast et al, 1992). In these, parental pressure is more important than peer pressure. This suggests that helmet use while bicycling to and from school is influenced more by normative than attitudinal beliefs and that the perceived wishes of parents is more important than peer pressure. The opposite is true (on both counts) of helmet use during recreational cycling. These differences are particularly relevant to the study reported here given the fact that when the children were first seen at

Junior school, they would have not been allowed to cycle to and from school and would therefore have no experience of purposive, school–related cycling. When they were seen a year later however, they had been cycling to and from school on a daily basis for a period of several months. This means that differences in beliefs associated with the different patterns of cycling would also show a sharp demarcation by age and that as a result, the beliefs associated with the children's decisions to wear or not wear a helmet while cycling to and from senior school, would differ from those which influenced any helmet use while they were at junior school. It would seem therefore, that the strategy adopted in the study reported here, of assessing the beliefs about future helmet use while cycling to and from school among a sample of children too young to do so, does effectively circumvent the influence of past behaviour.

Examining the influence of helmet use during cycle proficiency training.

Although junior school children do not cycle to and from school, they undergo a 5 day, school–based cycle proficiency training course in their last term and may be required to wear a helmet whenever the course involves using their bicycles outside the school. This means that they are exposed to, and will become more aware of, the reactions of their peers and other children, especially if these are negative. Any misgivings about the comfort, practicality and ease of use of bicycle helmets may also be confirmed (see Stevensen and Lennie, 1992 who discuss these issues). To examine whether or not the beliefs associated with helmet use might have arisen through the experience of helmet use during proficiency training and differ from those that existed when first assessed, the items used to assess behavioural and normative outcomes in the Health Belief Model and the Theory of Planned Behaviour were assessed again one month after the children had attended the proficiency course (i.e. at Time 2). In this way the effects of wearing a helmet during cycle proficiency training on the salience of the beliefs assessed at Time 1 could be measured. It was expected that because helmet use would be transient and largely due to external pressure, it would not lead to a significant difference in the relative salience of the beliefs measured at Time 1 or cause a significant increase in the salience of perceived barriers.

PREDICTING THE USE OF CYCLE HELMETS AMONGST GIRLS AS WELL AS BOYS

We have seen that one of the problems in establishing the beliefs associated with helmet use amongst school–age cyclists is that the experience of wearing a helmet while cycling to and from school is likely to effect changes in the initial beliefs which led to helmet use. Furthermore, the cycling behaviour of girls, being different to that of boys (see Towner et al, 1994) might be responsible for any gender–based differences in beliefs about helmet use. However, because junior school children are not allowed to travel to school by bicycle, their beliefs about future helmet use will not be influenced differentially by experiences that affect one sex more than the other. By measuring the beliefs of the respondents before they began cycling to school, we are more likely therefore to establish whether any gender–based differences in beliefs exist amongst the beliefs which initiate helmet use. Few studies, though, investigate differences in beliefs about helmet use between girls and boys and those which do make no attempt to identify specific beliefs which might differentiate between the sexes. For example, Lennie and Stevensen (1992) note that male students had a stronger dislike of helmets than female students (p. 561) but do not say if this general attitude reflected specific differences between the sexes regarding beliefs about bicycle helmets or reasons for non–use. Other studies refer instead to gender effects in relation to helmet ownership and use rather than attitudes. Hu et al (1994) found that whereas only about one fifth of teenage boys used a helmet regularly (p. 122) over half of the teenage girls wore a helmet all the time. Because of the lack of information regarding gender–based differences in beliefs about helmet use, an extensive preliminary study was carried out amongst primary school children to determine whether there were gender differences in beliefs about future helmet use while cycling to and from school. [30] Data from 137 children at seven different junior schools was gathered showing firstly that boys and girls raised the same sorts of concerns as used to inform the first study (reported in chapter 2) and secondly, were equally concerned about the same issues. In view of this, the study reported here involved girls and boys and used similar questionnaire items to those used for the initial study.

THE ROLES OF PERCEIVED VULNERABILITY AND SEVERITY AND THE INFLUENCE OF IMPEDIMENTS TO HELMET USE

Examining the roles of perceived vulnerability and severity

The previous study found no relation between perceptions of vulnerability and severity and the intention to wear a helmet. This is consistent with the findings of Otis et al (1992) who also found no relationship between either vulnerability or severity and helmet use intentions but partly contradicts those of Arnold and Quine (1994) and Sissons–Joshi et al (1994) who found perceived vulnerability (but not severity) to predict helmet use and intentions (respectively). It was suggested in Chapter 2 that perceptions of vulnerability might operate as distal influences on health behaviour with

[30] Children were asked to write down the good and bad things about wearing a helmet while cycling to and from senior school and then to list other people who would think their use of a helmet (i) a good thing or (ii) a bad thing. Details of this study can be found in the appendices .

their influence mediated by perceived benefits (see also Ronis, 1992; Aiken et al, 1994; Conner and Norman, 1994) and that people will only seriously consider the relative severity of an illness when they actually have, or believe they have, that illness (see Janz and Becker, 1984). However, there is another possibility. Many of the questionnaire items used by Arnold and Quine (1994) to assess perceptions of vulnerability did not relate specifically to head injury but to the relative likelihood of experiencing a road traffic accident compared to other road users. Similarly, Sissons–Joshi et al (1994) asked respondents how vulnerable they were to bicycle accident involvement. In contrast, the two studies referred to above which did *not* show vulnerability to predict helmet use and/or intentions (i.e. Otis et al, 1992 and the research reported in the previous chapter) used items which asked specifically about the probability of head injury. This suggests that (as noted by Howland et al, 1989) young cyclists may feel vulnerable to accident involvement but not perceive themselves likely to sustain serious head injury in such an accident. It also has implications for the role of perceived severity since if cyclists do not feel vulnerable to head injury then they are unlikely to reflect upon the severity of such an injury or the likely social and medical consequences. In study 2, these issues were examined by firstly assessing both vulnerability to head injury and vulnerability to accident involvement and secondly by assessing more generalised perceptions of head injury severity in addition to assessing the extent to which a serious injury would effect respondents' lives. Studies which have shown perceived severity to be significantly associated with the variance in the criterion (i.e. Cummings et al, 1979; Champion, 1988; Petosa and Jackson, 1991; Budd, Hughes and Smith, 1996) have used this type of measure.

Examining the pattern of impediments to helmet use

A review of the literature suggests that perceived barriers (in their wider sense) are more strongly associated with the variance in behaviour than with the variance in behavioural intention or that as King (1982) suggests, intervene between intentions and behaviour (see also Schaalma, Kok and Peters, 1993). There is also evidence that the salience of the impediments associated with a health behaviour increase as a result of its performance (see Clarke et al, 1991; Petosa and Jackson, 1991). In the Health Belief Model, where the perceived costs can be assessed separately from the perceived benefits, this issue can be investigated by using path analysis to determine whether perceived barriers exerts its influence on behaviour as well as or instead of intentions. In keeping with this, in study 2 it was hypothesised that perceived barriers would exert a stronger influence on actual helmet use than on concurrent intentions.

The issue of impediments also involves the perceived behavioural control construct to the extent that this measure includes a belief–based component assessing the influence of external constraints. It is noticeable that many of the beliefs assessed by Clark et al (1991) drew attention to the increased salience of barriers to BSE after respondents had attempted the behaviour. The barrier items in question related more to the types of practical impediments that Ajzen and Madden (1986) conceptualise as the types of belief–based measures of control underlying perceived behavioural control, than to the types of psychological barriers assessed by the Health Belief Model. Thus in the research study reported here, belief–based measures of behavioural control were used to assess the influence of practical and skill/resource–based impediments. Furthermore, these were obtained at the same time as the measure of helmet use which they were hypothesised to predict rather than being assessed at Time 1 along with the direct measure.

There are good practical and theoretical reasons for doing this in a longitudinal study. The direct measures of perceived behavioural control relate to anticipated control over a future behaviour and should thus be measured at Time 1 and used to predict intentions and/or behaviour. The belief–based measures concern factors which directly influence the actual performance of a behaviour and ought therefore be measured in way a which reflects this. This accords with Ajzen and Madden (1986) who point out that it is often difficult for researchers to obtain an adequate measure of control in advance of the observation of a behaviour since many of the factors that can prevent execution of an intended action cannot be anticipated (pp 456–7). This must also be true for respondents who may not be able to anticipate such impediments (or appreciate how problematic they may be) until they attempt the behaviour. In a longitudinal study such as the one reported here, this issue can be addressed by assessing the influence of such factors at the same time as the measure of helmet use by which time, having cycled to and from school for several months, the cyclists will be well aware of the internal and external constraints on helmet use.

USING THE MODELS IN LONGITUDINAL STUDIES

There are two problems with longitudinal studies involving the Health Belief Model and Theory of Planned Behaviour. Firstly, as the time interval between the measurement of beliefs and the assessment of behaviour increases, the stability of the intention–behaviour relationship decreases (see Ajzen, 1988). Secondly, the influence of attitudes and beliefs on behaviour also diminishes with time (e.g. Reinecke et al, 1996). The first issue is important where behavioural intention is used to mediate between beliefs and behaviour while the second issue affects attempts to establish direct links between attitudinal and belief variables and a criterion measure (whether intentions or behaviour) obtained at a later date.

Unless controlled for in the analysis or its role in the study delimited, prior behaviour is commonly the best predictor of the outcome measure(s) and more often than not achieves a greater significance than in short term prospective studies. Reinecke et al (1996) found past behaviour to be the strongest predictor of intentions to use condoms one year later. Van Ryn et al (1995) [31] and Clarke, et al (1991) [32] found the prior practice of Breast self–examination (BSE) to be the best predictor of BSE assessed six months and a year later (respectively). Champion and Miller (1992) found the past performance of BSE the sole predictor of BSE a year later. Norman and Smith (1995) report past exercise behaviour the sole predictor of exercise behaviour six months later. These findings may be a reflection of changes in intentions over time which increase the predictive power of past behaviour. In keeping with this, Van Ryn et al (op. cit.) found past exercise behaviour to exert a greater influence on outcome behaviour than intentions.

Reinecke et al (1996) also suggest that in longitudinal studies, the strong influence of past behaviour on outcome measures results from the diminishing influence of attitudes over time and it is common in longitudinal studies for the attitudinal and belief variables measured at Time

[31] Van Ryn et al (1995) use self–efficacy rather than perceived behavioural control. Whether the two constructs are similar enough to be interchangeable is the subject of debate (see for example, Ajzen, 1985; Ajzen, Timko and White 1982; de Vries et al, 1988; McCaul, O'Neill and Glasgow, 1988; Dzewaltowski et al, 1990; Terry and O'Leary, 1995).

[32] Although Clarke et al (1991) and Champion and Miller (1992) both test the Health Belief Model, Champion and Miller conceptualise and use behavioural intention as mediating between beliefs and behaviour in the manner proposed by Fishbein and Ajzen (1975). Clarke et al instead use intention simply as one of a number of predictor variables.

1 to exert their influence solely on concurrent intentions (e.g. Reinecke et al (op. cit.) and/or to be associated with past, rather than future behaviour (see for example, Champion and Miller, 1992). Any attitudinal and belief variables which are shown to be associated with the outcome measure are usually those assessed at the same time as the criterion. In keeping with this, Clarke et al (1991) found BSE predicted by practical barriers measured at the same time while Reinecke et al (1996) found condom use predicted by a measure of perceived behavioural control measured concurrently. Where attitudes and beliefs can be shown to exert a direct influence on subsequent behaviour, this tends to decrease sharply as time passes. Reinecke et al (1996) for example, found perceived behavioural control and behavioural intention to be far more strongly associated with the variance in condom use when measured at Time 2 than at Time 1 (see also Clarke et al, 1991).

This shows the importance of limiting the influence of past behaviour in order to determine which of the attitudinal and belief variables assessed are associated with the outcome measure and the true extent of this association. Norman and Smith (1995) for example, found the two measures of intention,[33] and the direct measures of attitude, subjective norm and perceived behavioural control significantly associated with exercise behaviour. However, past behaviour, when added to the analysis, was the only variable to make a significant contribution. The reverse is true of the study by Clarke et al (op. cit.) who found that when past behaviour was included as a predictor, self–efficacy was significantly associated with the performance of BSE. When the same belief set was used to predict BSE amongst women with no previous experience, self–efficacy was non-significant.

[33] Norman and Smith use a measure of self–prediction (i.e. 'I will take exercise') and a measure of desire (i.e. 'I want to take exercise') rather than the standard measure(s) of intention (see Warshaw and Davis, 1985; Fishbein and Stasson, 1990).

As well as past behaviour predicting future behaviour there is also a significant impact of experience on belief salience to consider. Reinecke et al (1996) argue that beliefs, attitudes and intentions, with respect to condom use, can change considerably over a relatively short period of time (p. 768) and attribute these changes largely to experience (see also Petosa and Jackson, 1991; Schaalma et al, 1993). If experience with a preventive behaviour can influence attitudes and beliefs increasingly as time passes, beliefs measured after the behaviour has been practised are likely to be associated with the maintenance of that behaviour (as Dishman, 1982 claims) rather than its initiation. This reaffirms the importance of either restricting the influence of past behaviour, or measuring the beliefs associated with a behaviour before respondents ever practice it, if we are to identify the beliefs associated with the uptake of a novel behaviour – such as helmet use amongst children. In summary, in the Health Belief Model, path analysis was used to determine whether perceived barriers exerted its influence on behaviour more than intention. In the Theory of Planned Behaviour, several practical and psychological impediments to helmet use were assessed at Time 3 and used to compute a belief-based measure of behavioural control thought to directly affect behaviour. This was referred to as the 'control beliefs' measure to distinguish it from the direct measures of anticipated control assessed at Time 1 and used to form the traditional perceived behavioural control measure.

THE RESEARCH STUDY

Aims of the study

The study set out to compare the ability of the Health Belief Model and the Theory of Planned Behaviour to predict the uptake of bicycle helmet use amongst young adolescents from a set of beliefs measured one year earlier.

The principal aim of the study was to reduce the influence of prior behaviour on the beliefs used to predict helmet use in order to increase the likelihood that the beliefs identified as associated with subsequent helmet use were responsible for the initiation rather than the maintenance of this behaviour. Allied to this was an examination of the influence of helmet use during cycle proficiency training on the relative salience of the attitudinal and normative beliefs used to predict helmet use. The study also examined the beliefs and behaviour of female as well as male cyclists to determine whether the same beliefs could be used to inform an intervention promoting helmet use amongst girls as well as boys. In addition, the study examined the roles of perceived vulnerability and severity to determine whether accident probability was more salient than the likelihood of head injury and whether a the perceived severity measure would be improved by adding a more general measure to those assessing specific consequences of head injury. Finally, the influence of perceived barriers and impediments were explored to determine whether the costs associated with helmet use and factors affecting perceptions of control would exert a direct influence on helmet use and/or intention.

A three wave prospective design was used in which the beliefs, attitudes and intentions of a sample of junior school children regarding the use of bicycle helmets while cycling to and from school were used to predict their use or non–use of helmets twelve months later (while cycling to and from senior school). It was expected that the Theory of Planned Behaviour would be a more reliable predictor of intention to use a helmet and actual helmet use than the Health Belief Model, but that both models would identify a set of beliefs discriminating significantly between helmets users and non–users which could be used to inform an intervention promoting helmet use. It was also expected that girls and boys would not differ significantly in their beliefs about helmet use and that helmet use during cycle proficiency training would not significantly affect the salience of the beliefs measured in the initial assessment session which preceded this.

Additional variables

A measure of behavioural intention was used in the Health Belief Model as well as the Theory of Planned Behaviour in an attempt to limit the more obvious conceptual differences between the models. However, path analysis was used in the Health Belief Model to determine whether there were any direct paths from these beliefs to behaviour as well as, or instead of, paths to intention. Champion and Miller (1991), Ronis (1992) and Aiken et al (1994), have shown behavioural intention to mediate certain Health Belief Model variables but not others.

Operationalising the models

The Health Belief Model addressed perceptions of vulnerability, severity, benefits and barriers as well as cues to action and behavioural intention. An additional item was added to the scales assessing perceived benefits and barriers which were otherwise identical to those used in the previous study. The perceived vulnerability and severity measures differed from those used previously in that an item assessing accident probability was included in the former and an item relating to general perceptions of injury severity added to the latter. The two item cues to action measure was still concerned with the influence of bicycling accidents while cycling to and from school but only measured this at Time 3 since participants did not cycle to and from school at the time of the previous data points. The measure assessed the influence of own and other people's bicycle accidents while cycling to and from school in the past year and was thought to exert a direct influence on Helmet use.

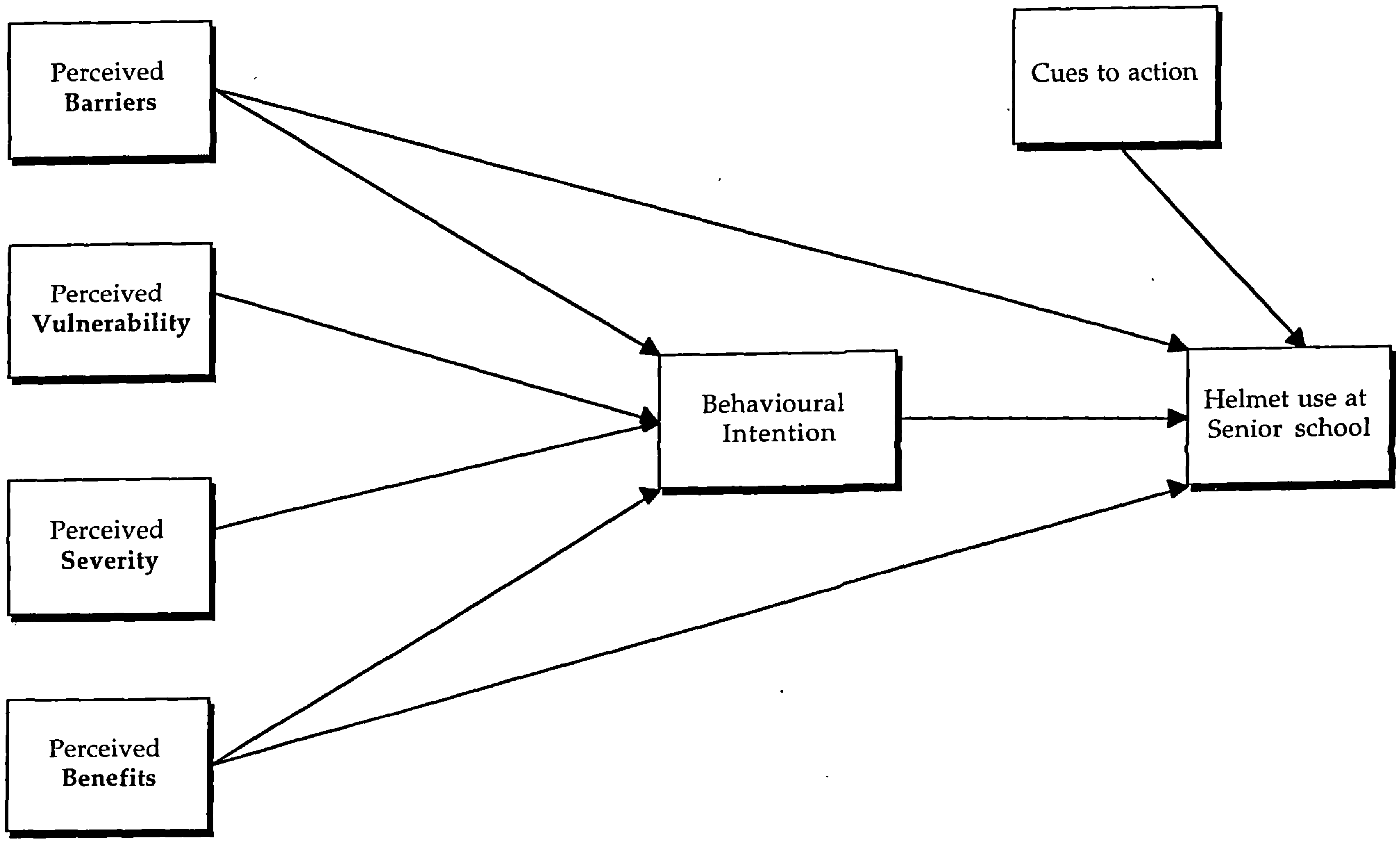

Figure 3. 1: Path model showing the hypothesised influences on helmet use described by the expanded Health Belief Model

The measures relating to perceived benefits, barriers, vulnerability and severity were assessed at Time 1 and used to predict concurrent behavioural intention. Perceived benefits and barriers were also measured after the children had attended their cycling proficiency course to assess any resulting changes in beliefs. Perceived benefits and barriers, behavioural intention and cues to action (assessed at Time 3) were then used to predict helmet use at Time 3 and determine whether perceived benefits and barriers exerted a direct influence on behaviour. According to this model, if a cyclist feels sufficiently vulnerable to accident involvement and recognises that head injury could have severe consequences, then these threats should motivate him or her to evaluate first the benefits and then the costs of wearing a helmet. This evaluation may indirectly affect helmet use through its influence on an individual's behavioural intention at junior school as well as directly influencing their decision to use or not use a helmet when at senior school. In addition, a cue such as having had a bicycling accident while cycling to and from school or knowing of someone else's may increase the likelihood of helmet use. A diagram depicting the version of the Health Belief Model used in this study is shown in Figure 3.1.

The Theory of Planned Behaviour assessed attitude towards the behaviour (i.e. the sum of each belief strength weighted by outcome evaluation), subjective norm (i.e. the sum of each normative belief weighted by motivation to comply) and perceived behavioural control, assessed using direct measures at Time 1 (concerned with anticipated control over helmet use). In addition, a belief–based measure of behavioural control was obtained at Time 3 (concerning practical problems and the presence or absence of resources and skills that might operate as impediments to helmet use). The perceived behavioural control measure was assumed to influence both intention and behaviour directly, while the measure assessing control beliefs

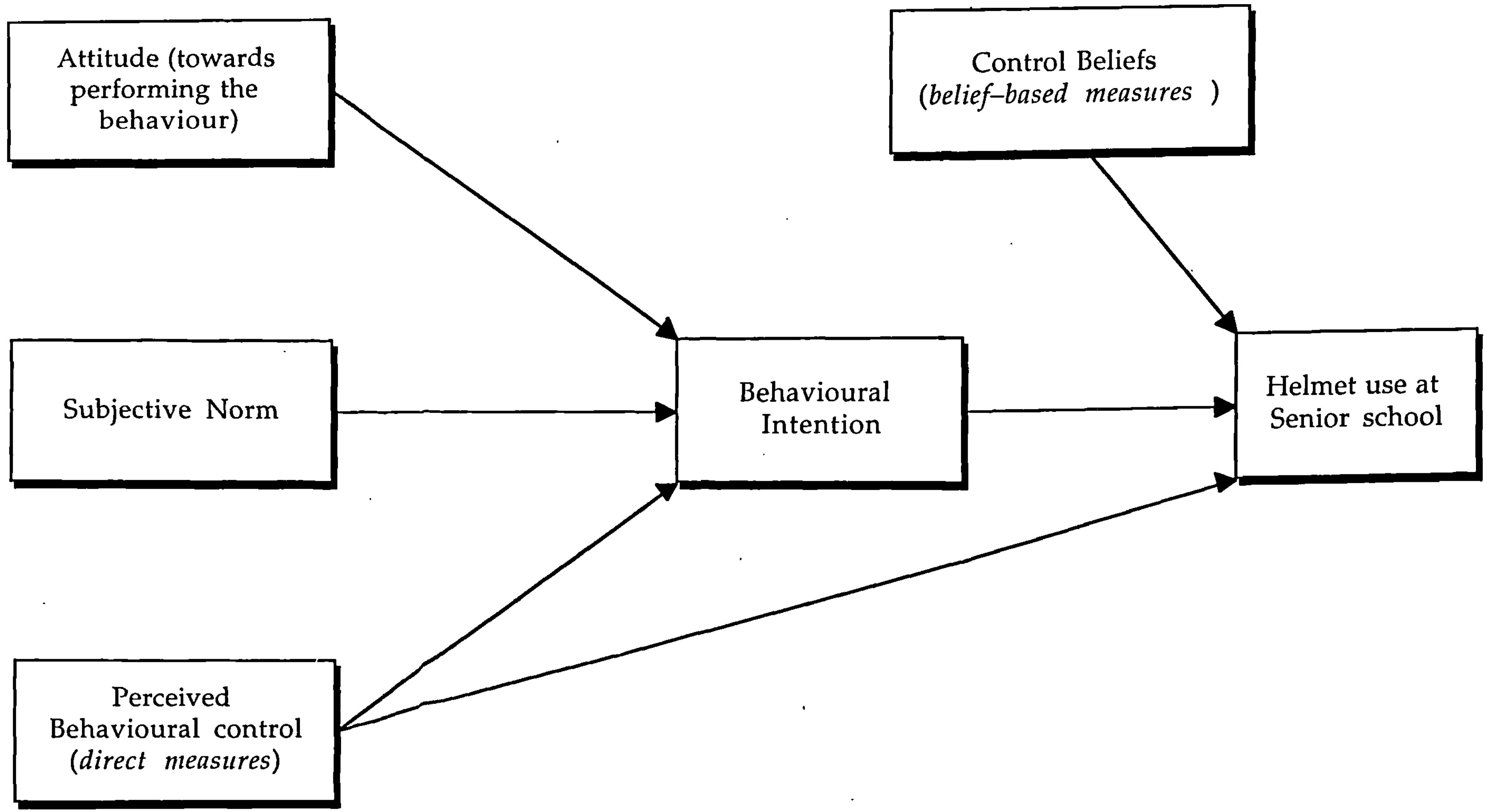

Figure 3. 2: Influences on intentions and helmet use described by the expanded Theory of Planned Behaviour

was assumed to influence helmet use directly. Hierarchical regression analysis was used to determine whether control beliefs added to the amount of variance in outcome behaviour explained by intention and perceived behavioural control. In addition, attitude towards the behaviour and subjective norm, assessed at Time 1, were assessed again at Time 2 to examine any changes in belief saliency engendered by the experience of helmet use.

According to the Theory of Planned Behaviour, if cyclists' overall attitude towards helmet use is influenced more by positive beliefs about the consequence of wearing a helmet than by negative beliefs, and they are sufficiently motivated to comply with referent others who are perceived as supporting the helmet use, they should form an intention to wear a helmet and be motivated directly by their beliefs to actually wear one. In addition, confidence in their ability to wear a helmet will also be a powerful influence on intention while factors such as the lack of requisite skills and personal resources and the influence of practical impediments may directly influence helmet use by detracting from perceived levels of control and/or intervening between beliefs and behaviour. A diagram showing the version of the model used in this study can be found in Figure 3.2.

Design

A three wave, prospective, within–subjects design was used in which the beliefs and attitudes of junior school children towards the use of cycle helmets when cycling to and from senior school were assessed via an initial questionnaire at Time 1 and then used predict the use or non–use of helmets while cycling to and from school a year later (at Time 3). A repeated measures questionnaire was used one month after the Time 1 session to assess the effects of a bicycling proficiency course on the initial beliefs set. Behaviour at

Time 3 was predicted from the beliefs assessed at Time 1 and beliefs measured concurrently. A diagrammatic representation of the study, showing the data collection points and measures taken, is shown in Figure 3.3.

Participants

Preliminary study

Participants for the preliminary modal beliefs survey were 137 junior school children aged between 10 and 11 years who intended to undergo cycle proficiency training the following term. The children, 60 of whom were girls, were recruited from 6 junior schools in East Kent located in 5 different population centres. They took part at the suggestion of their Head Teachers in what was described as a road safety survey. None had any experience of cycling to and from school but anticipated doing so when they reached senior school.

Main study

Participants at Time 1 were 383 junior school children aged between 10 and 12 years of age due to take cycle proficiency training classes with a view to cycling to and from senior school. Their average age was 10.5 (sd = 0.4) years. They were drawn from twelve junior schools in eight different population centres in south and east Kent which ensured a representative sample experienced in urban, semi–rural and rural bicycling. They took part at the request of their teaching staff in the belief that they were to participate in a cycling survey and were not told that they would be seen at senior school. The only demographic information obtained concerned the name and age of respondents to enable 'cross–matching' of the three questionnaires. At Time 2, 370 of the subjects took part in a second questionnaire session while still at junior school shortly after they had completed their cycling proficiency training. Of these, the 103

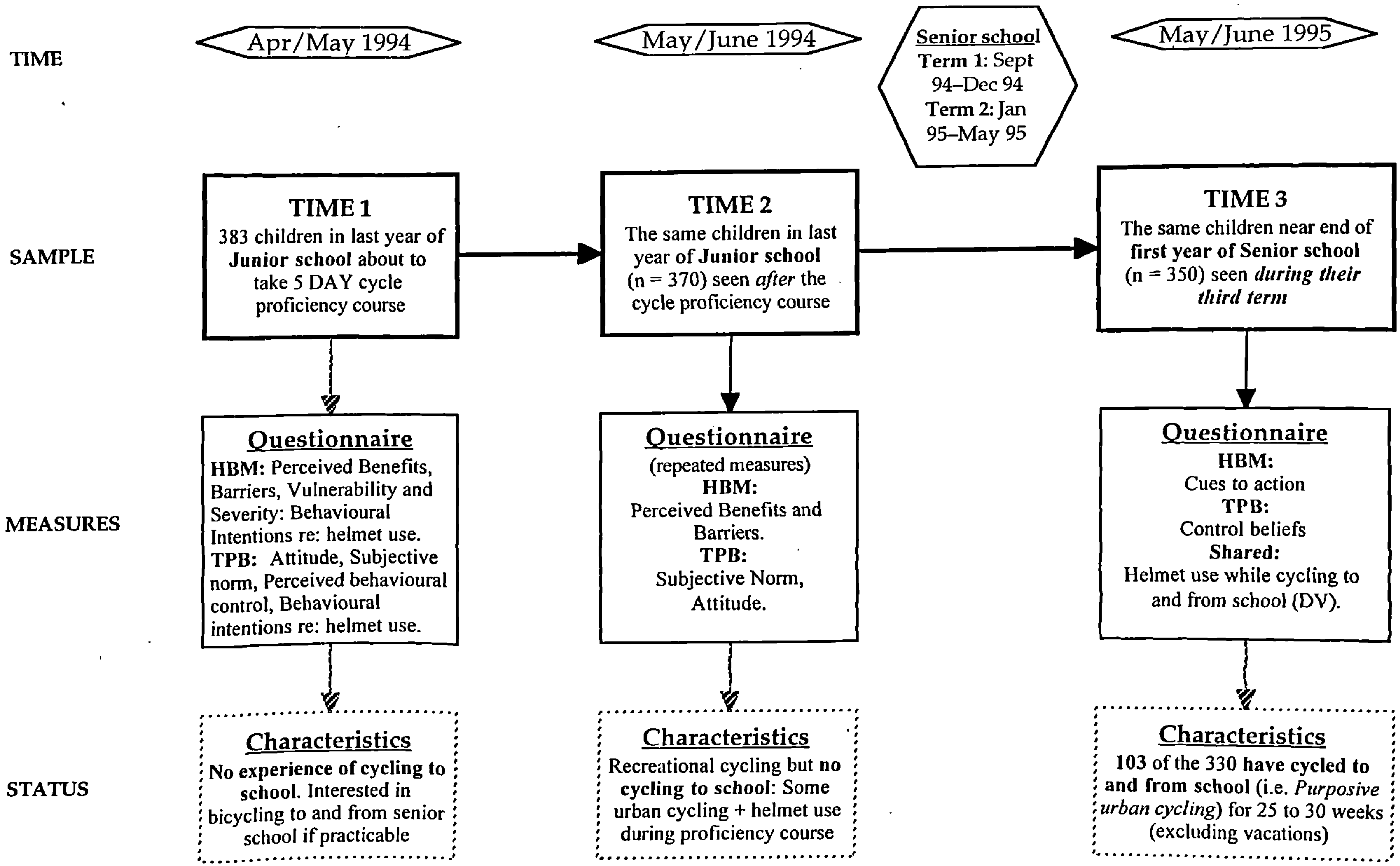

Figure 3.3: Study design showing data points, sample characteristics and measures obtained

who regularly cycled to and from school were then seen at their respective senior schools a year later for the Time 3 questionnaire session. By this time they had been attending senior school for more than two school terms.

Materials

Preliminary study

A short questionnaire booklet was designed, consisting of three sections, to elicit the children's beliefs about helmet use while cycling to school (see appendix 2.1). The first section asked respondents to state their name and age and whether or not they planned to cycle to and from senior school in the future. In the next section respondents were asked to write down firstly, all of the good things and secondly, all of the bad things they could think of about wearing helmets while cycling to and from school. Spaces were provided for the children to write in. The last section asked subjects to name other people who were likely to think it a good thing if they (the subjects) wore a helmet while cycling to and from school and then to name any people who would regard helmet use as a bad thing. Finally, a space was provided for further comments or for use if the children needed more room for any of their lists.

Main study

Three questionnaires were designed and used at Time 1, 2 and 3 (see appendices 2.3, 2.4 and 2.5 respectively) to assess respondents' beliefs about helmet use while cycling to and from senior school. These were based on the results and scale reliabilities of the previous study and the findings of the preliminary modal beliefs survey. Beliefs were assessed by scaled items relating to the standard Health Belief Model dimensions (perceived vulnerability, severity, benefits and barriers, and cues to action) and component scales of the Theory of Planned Behaviour (belief strengths, outcome evaluations, normative beliefs, motivations to comply and perceived behavioural control). In addition, a separate measure of behavioural control was used (at Time 3 only). The measures relating to subjective beliefs were organised in sections and used either five or seven point scales with individual items presented as statements that participants responded to by indicating their degree of agreement or disagreement. The only two exceptions were one item of the perceived severity scale and one item of the perceived vulnerability scale. These both used ten point scales and asked subjects to circle a number to indicate their response. The direction of scoring for all scale items was adjusted so that a high score always signified an affirmation of, or agreement with, the belief referred to. All helmet use and cue items were presented as simple yes/no questions.

Dependent variables

At time 1, a measure of behavioural intention, common to both models, was obtained by use of a single item asking respondents whether or not they intended to wear a helmet while cycling to and from senior school. A seven-point scale was used scored from 1 'extremely unlikely' to 7 'extremely likely'. At Time 3, the dependent variable representing outcome behaviour was obtained by use of a single yes/no item asking respondents whether or not they wore a helmet while cycling to and from school.[34]

Independent variables

At Time 1, perceived vulnerability was assessed using three measures: The first two items concerned the perceived probability of sustaining head injury/serious head injury in a cycling accident (e.g. "If you had a cycling

[34] The item did not ask the children if they had worn a helmet whilst cycling to and from school in the past year since this would not distinguish between cyclists who currently wore a helmet and those who had worn a helmet for a short period of time only – to attend a cycling proficiency course for example if they had missed this at junior school) – but no longer wore one.

accident and hit your head ... how likely is it that you would suffer head injury/serious head injury?"). These used five–point scales, scored from 1 'strongly disagree' to 5 'strongly agree'. The third item concerned perceptions of vulnerability to bicycling accidents (e.g. "If you ride your bike to school every day ... how likely are you to have a serious accident sometime in the future?") and asked subjects to rate their accident probability on a scale of 1 to 10. These three items were summed to give a single measure of perceived vulnerability. To assess perceived severity, one item concerned the perceived seriousness of hitting one's head and four items, the specific medical and social consequences of head injury. The first four items related to specific aspects of the severity of head injury and followed the stem "If you had a serious accident involving head injury and hospital treatment, how seriously do you think it would affect" ... ("your school life"/"family life"/"social and personal life"/"physical and mental well–being"). These items used five–point scales, scored from 1 'very little' to 5 'very much' and were followed by a fifth single item which asked respondents to rate (on a scale of 1 to 10) how serious they thought hitting their head would be if they were not wearing a helmet. The outcome expectancies were assessed by use of twelve items shared the 'Benefits and Barriers' dimension of the Health Belief Model and the 'belief strength' component of the Theory of Planned Behaviour's Attitude measure. All used seven–point scales scored from 1 'extremely unlikely' to 7 'extremely likely'. The ten statements used in the previous study to assess benefits and barriers/behavioural beliefs were used again plus two additional items based on beliefs cited frequently in the preliminary survey. The belief that wearing a helmet is responsible/sensible was used as a belief strength/perceived benefit item (i.e. 'My wearing a helmet whilst cycling to school would mean taking responsibility for my own safety'). The belief that wearing a helmet would make the wearer appear to be a 'wimp' or a 'baby' was used as a belief strength/perceived barrier item (i.e.

'My wearing a helmet whilst cycling to school would make me look as if I was being over–cautious').[35] In addition, the wording of two of the items used in the previous study was altered to make them more easily understood. The barrier/belief strength which reflected cyclists' concerns about the expense of purchasing a helmet (item 6) was amended so that it asked whether the initial cost was justified if head injury was only a possibility. Another barrier item (item 8) was re–worded to avoid using the word 'conspicuous'. Instead, the statement concerned being made to look different from other cyclists through using a helmet. In the Health Belief Model analysis, the six positive belief items were summed to form the perceived benefits measure and the six negative beliefs summed to give the measure of perceived barriers. All twelve items were used in the Theory of Planned Behaviour analysis as belief strengths and each multiplied by a corresponding outcome evaluation item (e.g. "taking responsibility for my own safety is...good/bad": "being over–cautious is...good/bad) to give a set of twelve behavioural beliefs. These were summed to form the attitude measure. The twelve outcome evaluation items used the same seven–point scale format as the belief strength items but were scored from –3 to –1, and +1 to +3 (with a mid point of zero). The Theory of Planned Behaviour's 'subjective norm' measure was assessed using the same measure as in the previous study with one important exception. The item referring to 'road safety experts' was replaced with one referring to 'cycling proficiency teachers' since the children were due to undergo their cycle proficiency course in the near future and would have been familiar with the term and its implications. There were six normative belief items and, corresponding to each of these, six motivation to comply items. Both scales used seven–point scales ranging from 1 'extremely

[35] Worries about the helmet impairing visibility (i.e. slipping down over the wearers eyes), cited as a 'bad thing' by a number of children, was not used to inform a separate questionnaire item since on closer examination, these worries reflect concerns about adjusting the straps properly so that the helmet is not loose. An item relating to problems associated with the straps was included in the belief–based component of the perceived behavioural control scale.

unlikely' to 7 'extremely likely'. The score from each normative belief item was multiplied by its corresponding motivation to comply rating to compute the six subjective norms. The sum of these gave an overall subjective norm for each respondent. To assess perceived behavioural control, the same three direct measures used in the previous study were used again. These were concerned with anticipated control over future helmet use and were summed to give a single measure assumed to directly influence both intentions and behaviour (see Ajzen, 1988). Five point scales were used scored from 1 (low control) to 5 (high control).

At Time 2, the measures used to assess perceptions of benefits and barriers (in the Health Belief Model) and attitude and subjective norm (in the Theory of Planned Behaviour) were presented to respondents again to assess these beliefs after they had attended a bicycle proficiency course. Perceived Behavioural Control was not re-assessed in the questionnaire since the session took place so soon after the children's cycle proficiency course that it would have assessed actual and not perceived control. There was also one item asking respondents which senior school they would be attending in the future which required a written response.

At Time 3, two items asked respondents about their own and other people's bicycle-related accident history whilst cycling to and from school in the previous year. These were used as the Health Belief Model's cue to action items thought to directly influence helmet use and used a simple yes/no response format (with 'yes' awarded 1 and 'no' awarded 0). They formed separate measures in the analysis. Also in this questionnaire were six items assessing control beliefs, summed to give the belief-based measures of behavioural control (see Ajzen, 1988), thought to directly influence helmet use. Respondents were asked the extent to which specific practical impediments and those relating to the presence or absence of requisite skills and resources might influence their decision to use a helmet while cycling to school (e.g. "Even if I wanted to, I might not be able to wear a helmet while cycling to school because ... I'd be in too much of a hurry in the morning to use it"/"there is nowhere to put it during lessons"). These items used 5 point scales, scored from 1 ('strongly disagree') to 5 ('strongly agree') and were reverse scored in the analysis to maintain directional consistency with the other belief measures.

Procedure

Preliminary study

At each of the six schools, the children sat at their decks and completed the questionnaire in single sessions. Each session began with a brief introduction during which subjects were told that they were taking part in a cycling survey and that this had no bearing on their cycle proficiency classes. It was stressed that there were no right or wrong answers and that they were to work on their own to answer the questions. It was explained that their task was to firstly write down what they thought the 'good' and then the 'bad' things were about helmet use when cycling to and from school. After this, they were asked to make a list of other people who also thought that their wearing a helmet while cycling to and from senior school would be a 'good thing' followed by a list of people who were likely to regard their helmet use as a 'bad thing' (for a full transcript of this pilot study, see appendix 2.2).

Main study

At each school subjects completed the questionnaire in a single experimental session during school hours in a room set aside for that purpose. They were seated at desks or tables. Subjects were each handed a questionnaire and asked to complete it in silence and not to collaborate with their neighbours. Each session began with a brief introduction during which subjects were told that they were taking part in a cycling survey. They were not told there were to be further experimental sessions. The question format was explained and an assurance given that all information was confidential. It was stressed that the questionnaire was not a test and that for many items there were no right or wrong answers. Completed questionnaires were left face down on the desks for collection. Four weeks later, the same subjects completed the second questionnaire using the same procedure as before. The session was introduced simply as a 'follow up' to the first session and it was again stressed that all information was confidential. Subjects were not told that they would be seen at their respective senior schools and asked to complete a third questionnaire. A year after the Time 1 questionnaire session, the subjects were traced (by virtue of the information obtained earlier) to a total of 31 different senior schools and arrangements made to see those who cycled to and from school for a third and final session. The teaching staff agreed to give the children as little warning a possible about the forthcoming session, and in many cases, subjects did not know of the survey until the morning of the day it was scheduled for. By the time the children were seen, they had been attending senior school for about 25 weeks (not including school holidays). Only 103 cycled to and from school on a regular basis. At each school, respondents were seen in a single session during school hours in a room set aside for that purpose and the session introduced simply as a 'follow up' to the first session. They were each given a questionnaire to complete and reminded that if they had any questions they were to ask the experimenter and not their neighbours. Subjects were assured that the survey was an independent one and that confidentiality was guaranteed. At the end of the session, questionnaires were left face down on the desks for collection and an explanation of the research given. Data from all three questionnaires were then collated and analysed by a mixture of univariate and multivariate statistical procedures using SPSS.

RESULTS

Preliminary analyses

Of the 370 children who completed questionnaires at Time 1 and Time 2 while at junior school, only those 103 found to cycle to and from senior school on a regular basis were included in the final sample. Eight of the 103 cyclists had rendered one or more of their questionnaires unusable leaving data from 95 children (56 boys and 39 girls) to be analysed. It is the analysis of this data which is reported here.

Descriptive data at Time 1 and Time 2

At Time 1, 34 of the girls were aged eleven years and 5 were aged ten. Similarly, 44 of the boys were aged eleven years and 11 were aged ten. One boy was aged twelve. In response to the statement of behavioural intention, 45 boys (80%) and 32 girls (82%) thought it likely that they would wear a helmet while cycling to and from senior school while 6 boys (11%) and 6 girls (13%) thought it unlikely. Six children were undecided. At Time 2 (a month later), 80 of the 95 (89%) said they planned to cycle to and from senior school and 66 of these (69%) intended to wear a helmet while doing so.

Descriptive data at Time 3

At Time 3, 46 (82 %) of the boys said they owned a helmet and 40 (71%) said they wore a helmet while cycling to and from school – a user rate of 86.9 per cent. All of the 26 girls who said they owned a helmet also reported wearing one while cycling to and from school. Fifteen boys (26%) and five girls (19%)

had themselves experienced an accident/spill while cycling to or from school while twenty three of the boys (41%) and six of the girls (15%) were aware of someone else's accident/spill.

Scale construction

As a first step, scales were constructed of all the major dimensions and components to be used in the analysis. The Health Belief Model's perceived vulnerability, severity, benefits and barriers scales were created by an additive combination of the respective scale items. The Theory of Planned Behaviour's attitude (towards the behaviour) measure was computed by multiplying together each belief strength and evaluation item and summing the products. The subjective norm measure was obtained in similar fashion by multiplying each normative belief by its corresponding 'motivation to comply' rating and summing the products. The (direct) measure of perceived behavioural control and the belief–based measure of behavioural control were obtained by summing the scores for the respective scale items. Scale reliabilities were then investigated using Cronbach's alpha to arrive at measures which best addressed the salient issues. These measures were then used in the analysis. Table 3.1 shows the scale reliabilities of the component scales of the Health belief Model and Theory of Planned Behaviour and shows representative items from these scales.

Reliabilities of the Health Belief Model dimensions

The scale measuring perceptions of vulnerability (not shown in Table 3.1) returned an unacceptably low reliability coefficient (alpha = 0.5) and was not used. Instead, the two items assessing susceptibility to head injury were discarded and the single item relating to accident probability retained as the measure of perceived vulnerability for the analysis.[36] The alpha coefficients for the remaining scales assessing perceived benefits, barriers and severity are shown in Table 3.1.

Reliabilities of the Theory of Planned Behaviour components

The reliabilities of the Theory of Planned Behaviour components are shown in Table 3.1. Analysis of the three direct measures of perceived behavioural control led to one item (PBC 1) being discarded. The remaining two items returned an alpha of 0.6 and were used as the Time 1 (direct) measure of perceived behavioural control.

Having established a reliable set of measures, univariate analysis was used to examine the differences between helmet users and non–users and between the beliefs of males and females and then to investigate changes in beliefs. Multivariate analyses was then used to examine the predictive ability of the models and the importance of individual variables.

Main Findings

Differences in beliefs between helmet users and non–users

To test for differences in beliefs between helmet users and non–users, independent t–tests were carried out on the component scales of each model. From Table 3.2, it can be seen that there were significant differences between means for two of the measures of the Health Belief Model – perceived benefits and perceived vulnerability. These differences suggest that helmet users are significantly more likely than non–users to endorse the benefits of helmet use ($t = 3.4$, $df = 36.2$; $p < 0.01$) and to believe themselves vulnerable to cycling accidents ($t = 2.1$, $df = 91$; $p<05$). Both groups appear to endorse equally

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[36] This was suggested by the coefficients of the individual items in the reliability analysis.

Table 3. 1: Reliability of Scales from the Health Belief Model and Theory of Planned Behaviour and Representative Items from each Scale

	Items	Alpha	Representative items	Scale/Scoring
Severity	5	0. 7	If you had a serious accident involving head injury and hospital treatment, how seriously do you think it would affect your... school/family/life/*etc.*	1 = Very little 5 = Very much
			On a scale of 1 to 10, how serious do you think hitting your head would be if you were not wearing a helmet?	1 = Not serious 10 = Very serious
Benefits	6	0. 7	My wearing a helmet whilst cycling to school would make me feel safe	1 = Extremely unlikely 7 = Extremely likely
Barriers	6	0. 7	My wearing a helmet whilst cycling to school would make me look silly	1 = Extremely unlikely 7 = Extremely likely
Behavioural Beliefs †	12 x 12	0. 7	My wearing a helmet whilst cycling to school would make me *feel safe/look silly*	1 = Extremely unlikely 7 = Extremely likely
Corresponding Outcome evaluation items			Feeling *safe/silly is...*	+ 3 = Extremely Good − 3 = Extremely Bad
	12 x 12	0. 7		
Subjective Norms‡	6 x 6	0. 9	My *close friends/parents* think that I should wear a helmet while cycling to and from school	1 = Extremely unlikely 7 = Extremely likely
Corresponding Motivation to comply items			Generally speaking, I want to do what my *close friends/parents* think I should do	1 = Strongly disagree 7 = Strongly agree
	6 x 6	0. 9		
Perceived Behavioural Control				
Direct Measure	2	0. 6	For me to wear a helmet while cycling to school would be ...	1 = Very difficult 5 = Very easy
Belief–based Measure	6	0. 8	I might not be able to wear a helmet while cycling to school because...*it's too much effort/I'd forget to put it on*	1 = Strongly disagree 5 = Strongly agree

†Each behavioural belief produced by multiplying a belief strength by an outcome evaluation. Attitude is the sum of the products.

‡Each subjective norm belief produced by multiplying a normative belief by a motivation to comply. Subjective norm is the sum of the products.

Table 3.2 also shows that there were significant differences between means for all three standard components of the Theory of Planned Behaviour measured at Time 1 and for the belief–based measure of perceived behavioural control measured at Time 3. At Time 1, helmet users were significantly more likely than non–wearers ($t = 3.1$, $df = 93$; $p < 0.01$) to hold positive attitudes towards helmet use and to be influenced by social pressure from referent others to wear one. The subjective norm measure was the more significant of the two with a mean difference of 48.7; the attitude measure returned a mean difference of 31.1. Helmet users were also significantly more likely than non–users to anticipate being able to exercise control over future helmet use ($t = 2.5$, $df = 93$; $p < 0.05$) and at Time 3, were shown to be significantly *less* likely than non–users to be influenced by practical and resource–linked impediments to helmet use ($t = 2.8$, $df = 93$; $p < 0.01$) . Finally, there were also significant differences between the means of helmet users and non–users for behavioural intentions indicating that helmet users were more likely than non–users to have entertained positive intentions towards future helmet use while at junior school ($t = 4.9$, $df = 93$; $p < 0.001$).

Next, t–tests were carried out to examine the differences in means between helmet users and non–users for each benefit and barrier and for each belief strength, outcome evaluation and behavioural belief *separately* (Tables 3.3 and 3.4). This indicated the most important beliefs associated with helmet use and made it possible to determine whether the significant differences in behavioural beliefs between helmet users and non–users were due to the importance of the behavioural outcomes or to the evaluation of those outcomes.

Table 3.2: Differences between Helmet Users and Non–Users on the Predictor variables of the Health Belief Model and Theory of Planned Behaviour

	Helmet users (N = 66)		Non – users (N = 29)		
	Mean	s.d.	Mean	s.d.	t
Health Belief Model					
Vulnerability	5. 3	2. 2	4. 3	1. 6	2. 1*
Severity	24. 0	3. 9	22. 9	4. 6	1. 2
Benefits	36. 2	4. 3	31. 1	7. 6	3. 4**
Barriers	21. 1	7. 8	23. 7	7. 5	– 1. 5
Theory of Planned Behaviour					
Attitude	91. 4	44. 5	60. 3	45. 0	3. 1**
Subjective Norm	221. 0	53. 5	172. 3	75. 6	3. 1**
Perceived Behavioural Control (direct measure)	8. 5	1. 7	7. 5	1. 7	2. 5*
Perceived Behavioural Control (belief–based measures)	13. 0	5. 2	16. 2	5. 2	– 2. 8**
Intention to wear a helmet	6. 5	1. 0	4. 3	2. 2	4. 9***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 3.3 shows the differences between helmet users and non–users on the benefits and barriers items of the Health Belief Model. There were significant differences between means for three of the six perceived benefits - Benefit 3 ('My wearing a helmet whilst cycling to school would make me take care'); Benefit 4 ('My wearing a helmet whilst cycling to school would protect my head if I had an accident'); and Benefit 2 ('My wearing a helmet whilst cycling

Table 3.3: Differences between helmet users and non-users on each benefit and barrier.

	Helmet users (N = 66)		Non-users (N = 29)		
	Mean	s.d.	Mean	s.d.	t
Benefit 1 My wearing a helmet whilst cycling to school would make me feel safe	6.3	0.9	5.6	2.1	1.1
Benefit 2 My wearing a helmet whilst cycling to school would make my parents worry less	6.0	1.6	5.0	1.9	2.5*
Benefit 3 My wearing a helmet whilst cycling to school would make me take care	5.8	1.4	4.6	2.1	2.8**
Benefit 4 My wearing a helmet whilst cycling to school would protect my head if I had an accident	6.4	1.0	5.4	1.6	1.4**
Benefit 5 My wearing a helmet whilst cycling to school would make me aware of the dangers of cycling	5.6	1.7	4.9	1.9	1.5
Benefit 6 My wearing a helmet whilst cycling to school would mean taking responsibility for my own safety	6.1	1.2	5.6	1.7	1.9
Barrier 1 My wearing a helmet whilst cycling to school would make me look silly	3.7	1.8	4.0	1.9	−0.8
Barrier 2 My wearing a helmet whilst cycling to school would make me look as if I was being over-cautious	3.0	1.8	3.4	1.9	−0.9
Barrier 3 My wearing a helmet whilst cycling to school would mean having to spend too much money on preventing possible head injury	3.5	2.1	4.1	2.0	−1.4
Barrier 4 My wearing a helmet whilst cycling to school would make me look different from other cyclists if no one else wore one	4.1	2.1	4.0	2.1	0.2
Barrier 5 My wearing a helmet whilst cycling to school would make me physically uncomfortable	3.2	2.0	4.3	1.7	−2.7**
Barrier 6 My wearing a helmet whilst cycling to school would mean having to carry it around with me during lessons	3.6	2.1	3.8	2.3	−0.5

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

to school would make my parents worry less'). In addition, one of the perceived barriers, Barrier 5 ('My wearing a helmet whilst cycling to school would make me physically uncomfortable'), showed a significant difference between helmet users and non–users and was the second most reliable discriminator of the four beliefs considered as a whole. None of the remaining barrier items were subscribed to significantly more by one group than the other and an examination of the mean scores shows in fact that both helmet users and non–users positively endorsed these negative outcomes.

The implications of these findings can be better understood in the context of the t–tests between means involving the component parts of the Theory of Planned Behaviour's attitude measure (Table 3.4). These examined the differences between helmet users and non–users for each belief strength and outcome evaluation item and each computed behavioural belief (obtained by multiplying each belief strength by its corresponding outcome evaluation). [37] From Table 3.4, it can be seen that there were significant differences between helmet users and non–users for two of the *positive* and one of the *negative* behavioural beliefs. With respect to the positive behavioural beliefs, Belief 5 ('My wearing a helmet whilst cycling to school would make me take care') and then Belief 7 ('My wearing a helmet whilst cycling to school would protect my head if I had an accident'), were endorsed significantly more by helmet users than non–users. The reverse is true of the negative behavioural belief, Belief 11 ('My wearing a helmet whilst cycling to school would mean having to carry it around with me during lessons'), which was subscribed to significantly more by non–users than helmet users. In terms of mean difference, Belief 5 was the most reliable (significant) discriminator of the three and Belief 7 the least.

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[37] Because the models use the same questionnaire items to assess belief strengths and benefits and barriers, the t–tests between means are identical for these measures.

Table 3. 4: Differences Between Helmet Users and Non–Users on Each Belief Strength, Outcome Evaluation and Behavioural Belief Item

My wearing a helmet whilst cycling to school would ...	Belief Strength				Outcome Evaluation				Product (Behavioural Belief)			
	users (n = 62)		nonusers (n = 100)		users (n = 62)		nonusers (n = 100)		users (n = 62)		nonusers (n = 100)	
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
Behavioural belief 1 ... make me feel safe	6.3	0.9	5.6	2.1	2.7	0.7	2.3	1.3	17.3	5.2	14.3	8.5
Behavioural belief 3 ... make my parents worry less	6.0	1.6	5.0*	1.9	2.4	1.1	2.0	1.5	14.3	8.4	11.4	8.8
Behavioural Belief 5 ... make me take care	5.8	1.4	4.6**	2.1	2.6	0.9	2.3	1.2	15.4	6.8	11.7*	8.1
Behavioural Belief 7 ... protect my head if I had an accident	6.4	1.0	5.4**	1.7	2.9	0.3	2.6	0.9	18.8	3.6	14.7**	6.4
Behavioural Belief 10 ... make me aware of the dangers of cycling	5.6	1.7	4.9	1.9	2.1	1.6	1.8	2.0	12.5	10.2	10.6	10.5
Behavioural Belief 12 ... mean taking responsibility for my own safety	6.1	1.2	5.6	1.7	2.1	1.2	1.7	1.9	13.4	8.3	10.0	11.8
Behavioural Belief 2 ... make me look silly	3.7	1.8	4.0	2.0	–0.7	1.6	–1.5*	1.6	–2.1	6.7	–5.1	8.5
Behavioural Belief 4 ... make me look as I was being over-cautious	3.0	1.8	3.4	1.9	0.7	1.9	0.1	1.8	1.8	6.7	–0.2	7.4
Behavioural Belief 6 ... mean having to spend too much money on preventing possible head injury	3.5	2.1	4.1	2.0	1.3	1.9	1.2	1.9	4.0	8.6	4.8	9.7
Behavioural Belief 8 ... make me look different from other cyclists if no one else wore one	4.1	2.1	4.0	2.1	0.3	1.5	–0.1	1.4	1.2	7.2	–0.6	5.9
Behavioural Belief 9 ... make me physically uncomfortable	3.2	2.0	4.3**	1.7	–1.2	1.7	–1.2	1.5	–3.5	7.3	–5.8	6.9
Behavioural Belief 11 ... mean having to carry it around with me during lessons	3.5	2.1	3.8	2.3	–0.6	1.7	–1.4*	1.8	–1.7	6.9	–5.5*	8.7
								Total	**91.4**	**44.5**	**60.3*****	**45.0**

*** p < 0.05   ** p < 0.01   *** p < 0.001**

An examination of the belief strengths – the Health Belief Model's benefits and barriers variables – and outcome evaluation items shown in Table 3.4 shows that the significance of the positive behavioural beliefs discriminating between helmet users and non–users is due largely to the belief strength component rather than to the evaluative component. There were significant differences between helmet users and non–users for the belief strength components of Behavioural Belief 5 ($t = 2.8$, $df = 38.3$; $p < 0.01$) and Behavioural Belief 7 ($t = 3.1$, $df = 37.2$; $p < 0.01$) but not for the corresponding evaluation items. This suggests that helmet users are significantly more likely than non–users to endorse the beliefs that wearing a helmet will make them take care and protect their head but no more likely to perceive these outcomes as important – both groups positively evaluating them.

Conversely, it is the evaluative component of the negative behavioural belief (Belief 11) which is implicated in its significance rather than the behavioural outcome. There was a significant difference between helmet users and non–users for the outcome evaluation ($t = 2.1$, $df = 93$; $p < 0.05$) but not the belief strength. This suggests that while both groups acknowledge that having to carry their helmets around during lessons is a probable consequence of helmet use, non–users perceive this to be a more undesirable outcome than users.

Table 3.4 also shows that among the positive behavioural beliefs, there were significant differences between helmet users and non–users ($t = 2.5$, $df = 93$; $p < 0.05$) for the belief strength component of Belief 3 ('My wearing a helmet whilst cycling to school would make my parents worry less') but not the corresponding outcome evaluation. This suggests that although helmet users are significantly more likely than non–users to endorse the belief that wearing a helmet would make their parents worry less, both groups believe parents worrying less to be important. Similarly, among the negative behavioural beliefs, there was a significant difference between means ($t = -2.7$, $df = 63.2$; $p < 0.05$) for the belief strength component of Behavioural Belief 9 ('My wearing a helmet whilst cycling to school would make me physically uncomfortable') but not the corresponding outcome evaluation. This implies that while helmet users are significantly *less* likely than non–users to believe that helmet use would make them uncomfortable, both groups consider this outcome undesirable. There was also a significant difference between helmet users and non–users ($t = -2.4$, $df = 93$; $p < 0.05$) for the evaluative component of Behavioural Belief 2 ('My wearing a helmet whilst cycling to school would make me look silly') but not for the belief strength itself. It appears that helmet users and non–users subscribe equally to the belief that wearing a helmet will make them look silly but can be distinguished by their evaluation of this outcome – non–users are significantly more likely than helmet wearers to evaluate looking silly as being highly undesirable.

Next, in this first section of results, t-tests were carried out on each normative belief, motivation to comply item and computed subjective norm separately to determine which were the most significant normative influences associated with helmet use. While the analysis of the six subjective norms (produced by multiplying each normative belief by its corresponding motivation to comply item) indicates which contributes most to the overall subjective norm, analysis of the individual normative beliefs and motivation to comply items shows whether the significant differences between helmet users and non–users on each subjective norm are due to the importance of the normative beliefs themselves or to the magnitude of the motivation to comply.

Table 3. 5: Differences Between Helmet Users and Non–Users on Each Normative Belief, Motivation to Comply and Subjective Norm Item

My wearing a helmet whilst cycling to school would ...	Normative belief				Motivation to Comply				Product (Subjective Norm)			
	users (n = 62)		nonusers (n = 100)		users (n = 62)		nonusers (n = 100)		users (n = 62)		nonusers (n = 100)	
	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
Subjective norm 1 My close friends think that I should wear a helmet while cycling to and from school	5. 9	1. 4	4. 9*	2. 0	4. 9	1. 9	4. 1	2. 1	29. 5	13. 9	22. 2*	15. 4
Subjective norm 2 My parents think that I should wear a helmet while cycling to and from school	6. 7	0. 9	5. 6**	1. 9	6. 4	1. 1	5. 6*	1. 5	42. 7	9. 4	32. 8**	15. 6
Subjective norm 3 Most other members of my family... think that I should wear a helmet while cycling to and from school	6. 4	1. 0	5. 6*	1. 7	5. 7	1. 6	5. 1	1. 7	37. 4	12. 1	29. 9*	15. 1
Subjective norm 4 Most of my teachers think that I should wear a helmet while cycling to and from school	6. 3	1. 2	5. 7	1. 8	5. 6	1. 6	4. 7*	1. 9	36. 6	13. 2	28. 7*	15. 2
Subjective norm 5 Most of the other cyclists at school think that I should wear a helmet while cycling to and from school	5. 9	1. 2	4. 3***	1. 9	5. 3	1. 8	4. 4*	1. 8	31. 1	12. 7	20. 9**	14. 7
Subjective norm 6 Most cycling proficiency teachers think that I should wear a helmet while cycling to and from school	6. 7	0. 6	6. 3	1. 5	6. 5	1. 2	5. 8	1. 6	43. 5	9. 3	37. 7	14. 4
								Total	221. 0	53. 5	172. 3**	75. 6

$^{*} p < 0.05$ $^{**} p < 0.01$ $^{***} p < 0.001$

Table 3.5 shows that there were significant differences between means for five of the six items of the subjective norm scale, the greatest differences (in order of significance) being for Item 5 ('Most of the other cyclists at school think that I should wear a helmet while cycling to and from school) and Item 3 ('My parents think that I should wear a helmet while cycling to and from school').

Examination of the (normative) belief and evaluative components of these two subjective norms shows that their significance derives from the contribution of both. Table 3.5 shows that there were significant differences between means for helmet users and non–users on both the normative belief ($t = 3.9$, $df = 37.9$; $p < 0.001$) and motivation to comply ($t = 2.0$, $df = 93$; $p < 0.05$) components of Subjective Norm 5 and the normative belief ($t = 3.1$, $df = 33.2$; $p < 0.01$) and motivation to comply ($t = 2.4$, $df = 40.5$; $p < 0.05$) components of Subjective Norm 2. Helmet users were significantly more likely than non–users to believe that their parents would want them to wear a helmet and that other cyclists would also think it a good idea. Helmet users were also significantly more likely than non–users to value complying with the perceived wishes of these referents. Of the three subjective norms which discriminated significantly between helmet users and non–users, only one component showed a significant difference between groups. There were significant differences between means for the normative belief components of Subjective Norm 1 ('My close friends think that I should wear a helmet while cycling to and from school' – $t = 2.4$, $df = 40.8$; $p < 0.05$) and Subjective Norm 3 ('Most other members of my family ... think that I should wear a helmet while cycling to and from school' – $t = 2.6$, $df = 37.5$; $p < 0.05$) but not for the corresponding motivation to comply items. Conversely, there was a significant difference between means for the motivation to comply component of Subjective Norm 4 ('Most of my teachers think that I should wear a helmet while cycling to and from school' – $t = 2.3$, $df = 92$; $p < 0.05$), but not for the normative belief itself. These findings indicate that firstly, helmet users are significantly more likely than non–users to perceive normative support for their behaviour from close friends and other family members but no more likely to comply with these referents – both groups wanting to be in accord with their parents and friends. Secondly, although helmet users and non–users both endorse the belief that teachers would want them to wear a helmet while cycling to and from school, users are significantly more likely than non–users to wish to comply with the advice of their teachers.

Table 3.6: Differences between Helmet Users and Non–Users on Each Perceived Behavioural Control Item

	Helmet users (N = 56)		Non–users (N = 39)		
	Mean	s.d.	Mean	s.d.	t
Perceived Behavioural Control 1 For me to wear a helmet while cycling to school would be ... (*Very difficult – Very easy*)	4.3	0.9	3.7	0.8	3.0**
Perceived Behavioural Control 2 If I wanted to I could easily wear a helmet whenever I cycled to school (*Very unlikely – Very likely*)	4.2	1.1	3.8	1.1	1.4

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Finally, t–tests were carried out on each of the direct measures of perceived behavioural control to examine the differences between helmet users and non–users. From Table 3.6 it can be seen that Helmet users were significantly more likely than non–users to positively endorse Belief 1 ('For me to wear a helmet while cycling to school would be'... *Very difficult – Very easy*) but no more likely to subscribe to Belief 2 ('If wanted to, I could easily wear a helmet whenever I cycled to school') which was positively endorsed by both groups. This suggests a conceptual distinction between the two beliefs.

Differences between helmet users and non–users at Time 3

Finally in this first section, t–tests were carried out to examine the differences between helmet users and non–users on each of the control beliefs (the belief–based measures of perceived behavioural control) assessed at Time 3.

Table 3.7: Differences between Helmet Users and Non–Users on Each Item of the Behavioural Control Scale

	Helmet users (N = 56)		Non–users (N = 39)		
	Mean	s.d.	Mean	s.d.	t
I might not be able to wear a helmet while cycling to school ...					
Control belief 1 ... Because I'd forget to put it on	2. 2	1. 2	2. 4	1. 2	– 0. 9
Control belief 2 ... Because there is nowhere to put it during lessons	2. 2	1. 4	3. 1	1. 2	3. 2**
Control belief 3 ... Because it's too much effort to put it on	1. 7	1. 0	2. 2	0. 8	– 2. 2*
Control belief 4 ... Because it feels uncomfortable (too heavy/tight/large/hot)	2. 5	1. 4	2. 8	1. 3	– 1. 2
Control belief 5 ... Because if I do the straps up so that the helmet fits properly, the straps hurt my chin	2. 5	1. 4	3. 3	1. 1	– 2. 6*
Control belief 6 ... Because I'd be in too much of a hurry in the morning to use it	1. 9	1. 2	2. 3	1. 0	3. 0

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 3.7 shows that there were significant differences between means for three of the six items with (in order of significance) Item 2 ('I might not be able to wear a helmet while cycling to school because there is nowhere to put it during lessons'), Item 5 ('I might not be able to wear a helmet while cycling to school because its too much effort to put it on') and Item 6 ('I might not be able to wear a helmet while cycling to school because if I do the straps up so that the helmet fits properly, the straps hurt my chin') endorsed significantly more by non–users than helmet users. The control beliefs concerning 'forgetting'/'being in 'too much of a hurry' to put the helmet on and the helmet being 'uncomfortable' were not subscribed to highly by either group.

Differences between the beliefs of girls and boys

The next step in the analysis was to examine any gender–based differences in beliefs to determine whether girls and boys differed in their beliefs, attitudes and intentions *vis–á–vis* helmet use and were influenced by different reference groups. To this end, a series of independent t–tests were performed (using helmet use as the criterion) to examine the significance of any differences between the mean scores attained by the two groups on the attitudinal and belief variables measured at Time 1. The results of these t–tests are shown in Table 3.8.

From Table 3.8, it can be seen that boys and girls differed significantly on one of the Theory of Planned Behaviour components with girls having a significantly more positive attitude towards the use of helmets while cycling to and from school than boys. To examine this further, t–tests were carried out to examine the differences in means between girls and boys for each belief strength, outcome evaluation and behavioural belief item *separately*. This was to examine whether there were any significant differences between girls and boys on the individual behavioural beliefs which might account for the anomaly and whether any differences were due to the importance of the behavioural outcomes or the evaluation of those outcomes. There were significant differences between means for the behavioural belief "My wearing

Table 3.8: Differences between Girls and Boys on the predictor variables of the Health Belief Model and Theory of Planned Behaviour

	Boys (n = 56)		Girls (n = 39)		
	Mean	s.d.	Mean	s.d.	t
Health Belief Model					
Vulnerability	4.9	1.8	5.1	2.3	−0.2
Severity	23.7	4.1	23.8	4.3	−0.1
Benefits	33.9	6.8	35.7	4.5	1.5
Barriers	22.2	8.2	23.3	7.3	0.6
Theory of Planned Behaviour					
Attitude	72.1	67.9	96.1	35.1	−2.7**
Subjective Norm	197.6	53.5	217.8	59.1	−1.5
Perceived Behavioural Control (direct measure)	7.9	1.9	8.5	1.4	−1.5
Perceived Behavioural Control (belief–based measures)	13.2	5.1	15.1	5.6	−1.7
Intention to wear a helmet	5.8	1.9	5.8	1.6	−0.2

* $p < 0.05$ ** $p < 0.01$

a helmet whilst cycling to and from school would mean having to spend too much money on preventing possible head injury" (mean 2.5, sd 9.6 vs., mean 6.7, sd 7.3; $t = -2.3$, $df = 93$; $p < 0.05$) and for the behavioural belief "My wearing a helmet whilst cycling to and from school would make me look different from other cyclists if no one else wore one" (mean −0.8, sd 5.9, vs. mean 2.6, sd 7.6; $t = -2.5$, $df = 93$; $p < 0.05$). In both cases, male cyclists attained the higher score suggesting that boys were more concerned about these issues than girls. An examination of the belief strengths and outcome evaluations reveals that for both behavioural beliefs, there were significant differences between girls and boys for the evaluative component but not the belief strength. For the first belief (i.e. ...spend too much money...) boys were significantly more likely than girls to negatively evaluate spending money on purchasing a helmet (mean 0.9, sd 2.1, vs., mean 1.7, sd 1.6; $t = -2.2$, $df = 91.9$; $p < 0.05$) but no more likely to subscribe to the belief that the cost was unjustified. For the belief strength component both groups scored slightly above the mean. Similarly, for the second belief (i.e. ...make me look different...), although boys and girls equally and positively endorsed the belief that helmet use would make them look different from other cyclists not wearing helmets, it was the boys who were significantly more likely (than girls) to negatively evaluate this outcome (mean -0.2 sd 1.3, vs., mean 0.7 sd 1.5; $t = -2.9$, $df = 75.4$; $p < 0.01$). These findings are not shown in tabular form.

None of the other composite measures (of either model) showed significant differences between the sexes though there was a significant difference between girls and boys for one of the six items of the subjective norm scale. [38] The mean score attained by girls for Item 1 ('Most of my friends would want me to wear a helmet while cycling to and from school') was significantly greater than the mean score attained by boys (mean 24.1, sd 14.8, vs., mean 31.7, sd, 13.9; $t = -2.5$, $df = 93$; $p < 0.05$). However, although girls endorsed both the belief and evaluative components of this belief more than boys, these differences were not significant.

[38] The six subjective norm items are not shown in a separate table since Subjective norm did not discriminate between boys and girls.

Predicting helmet use

In this last section of the analysis, the ability of the models to predict helmet use was examined by correlation and multiple regression to determine the association between beliefs, intention and behaviour. In addition, paired t-tests were used to investigate changes in beliefs between Time 1 and Time 2.

Changes in belief between Time 1 and Time 2

The first step was to ensure that the Time 1 beliefs used to predict subsequent behaviour at Time 3 were not significantly altered by the experience of helmet use during cycling proficiency classes at junior school at Time 2. To examine this, matched t-tests were carried out on the benefits and barriers measures of the Health Belief Model and the attitude and subjective norm components of the Theory of Planned Behaviour to determine whether there were significant changes between Time 1 and Time 2. No significant differences were found on any of the major components of either model suggesting that the children's attitude towards helmet use, their beliefs about the benefits and barriers associated with helmet use and their perception of the social pressure to wear a helmet were not unduly influenced by the experiences during cycle proficiency lessons.

Correlations between predictors

Next, the relationships between and within the components of the Health Belief Model and the Theory of Planned Behaviour were investigated by correlation. Table 3. 9 shows that amongst the beliefs measured at Time 1, the largest positive correlations occur between perceived benefits and attitude and subjective norm, between subjective norm and attitude and perceived behavioural control, and between perceived behavioural control and perceived benefits and attitude. These positive relationships suggest that the more subjects believe in the benefits of helmet use, the more they perceive

Table 3. 9: Significant Correlations Between and Within Predictors of the Health Belief Model and the Theory of Planned Behaviour

	Vulnerability	Severity	Benefits	Barriers	Attitude	Subjective norm	Perceived Behavioural control
Vulnerability	–						
Severity	0.24*	–					
Benefits	0.38***	0.39***	–				
Barriers	−0.15 NS	−0.08 NS	0.08 NS	–			
Attitude	0.27 **	0.35**	0.73***	−0.12 NS	–		
Subjective norm	0.15 NS	0.36 ***	0.58 ***	−0.07 NS	0.53 ***	–	
Perceived behavioural control (at Time 1)	0.16 NS	0.28 **	0.52 ***	−0.23 *	0.50 ***	0.53 ***	–
Control Beliefs (at Time 3)	0.01 NS	−0.04 NS	−0.19 NS	0.26**	−0.20*	−0.24*	−0.22*

* $p < 0.05$ ** $P < 0.01$ *** $p < 0.001$ NS = Not significant

social pressure for them to wear a helmet and perceive themselves to have a high degree of control over the behaviour. There were also significant positive correlations between perceived benefits and both perceived vulnerability and perceived severity suggesting that subjects who believe in the benefits of helmet use believe themselves likely to be involved in a cycling accident and believe also that hitting their head when unprotected would be very serious and have serious medical and social consequences. These associations are supported by the positive correlations between attitude and perceived severity and perceived vulnerability which imply that subjects who feel vulnerable to the threat of head injury and believe that hitting their head would have severe consequences, have a *positive* attitude towards helmet use. The positive correlation between perceived benefits and attitude and the non–significant correlation between perceived barriers and attitude suggests that the overall attitude towards helmet use is derived more from the benefits of helmet wearing than the perceived psychological difficulties. Perceived severity was also significantly positively correlated with both subjective norm and perceived behavioural control. Those cyclists who perceive social pressure to wear a helmet and believe themselves capable of exercising control over helmet use, believe hitting their head to be serious and that serious head injury would have severe consequences. As well as these positive correlations, perceived barriers was significantly *negatively* correlated with perceived behavioural control indicating that cyclists who are aware of, and influenced by, the perceived *psychological* barriers to helmet use, perceive themselves to have poor control over the behaviour. Table 3.9 also shows that there were also significant correlations between the Time 3 measure of perceived control and several of the attitudinal and belief variables assessed at Time 1. The positive correlation between perceived control and perceived barriers indicates that cyclists who are influenced by the barriers to helmet use are also likely to doubt that they have the necessary

Table 3.10: Simple Correlations Between Components of the Models, Behavioural Intention and Helmet Use at Time 3

	N = 95	
	Intention	Time 3 Helmet use
Health Belief Model		
Vulnerability	0. 08 NS	0. 21 *
Severity	0. 15 NS	0. 12 NS
Benefits	0. 50 ***	0. 39 ***
Barriers	0. 06 NS	− 0. 15
Cues to action (at Time 3)		
Own accident	–	0. 02 NS
Other's accident	–	0. 11 NS
Theory of Planned Behaviour		
Attitude	0. 41 ***	0. 30 **
Subjective norm	0. 49 ***	0. 34 ***
Perceived behavioural control (direct measure at Time 1)	0. 29 **	0. 25 *
Perceived control (belief–based measure at Time 3)	–	− 0. 27 **
Additional variables		
Intention	–	0. 55 ***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ NS = non–significant

personal resources and skills to enable them to wear a helmet. Perceived control was also negatively correlated with attitude and subjective norm suggesting that the more positive a cyclist's attitude towards helmet wearing and the more he/she perceives social pressure to wear one, then the less likely they are to be unduly influenced by resource–based and practical impediments to helmet use. Lastly, the belief–based (Time 3) measure of perceived control and the direct (Time 1) measure of perceived behavioural control were negatively correlated implying that subjects who anticipated while at Junior school being able to exercise control over helmet use at senior school are unlikely to be put off wearing a helmet by a lack of personal skills and resources and/or practical difficulties.

Correlations between dependent and independent variables

Table 3.10 shows the zero order correlations between the components of the models and behavioural intention and helmet use at Time 3. Intention was strongly correlated with actual helmet use at Time 3 ($r = 0.55$; $p < 0.001$). Intention was also correlated with three of the four standard components of the Theory of Planned Behaviour – attitude ($r = 0.41$; $p < 0.001$), subjective norm ($r = 0.49$; $p < 0.001$) and perceived behavioural control ($r = 0.29$; $p < 0.01$) – but with only one component of the Health Belief Model; perceived benefits ($r = 0.50$; $p < 0.001$). Time 3 helmet use was similarly significantly correlated with two of the three standard components of the Theory of Planned Behaviour – attitude ($r = 0.30$; $p < 0.01$) and subjective norm ($r = 0.34$; $p < 0.001$) but with only two components of the Health Belief Model: perceived vulnerability ($r = 0.21$; $p < 0.05$) and perceived benefits ($r = 0.39$; $p < 0.001$). Helmet use was also significantly correlated with the belief–based measure of perceived control assessed at Time 3 ($r = 0.27$; $p < 0.01$). For the Theory of Planned Behaviour the correlations were higher for intention than for behaviour. For the Health Belief Model, the correlation between perceived benefits and intention was higher than that between perceived benefits and behaviour while the reverse was true of perceived vulnerability.

Testing the predictive power of the models

Next, the ability of the Theory of Planned Behaviour to predict the children's intention regarding helmet use at Time 1 and then their actual helmet use at Time 3 was examined using linear multiple regression to predict intention and hierarchical multiple regression to predict behaviour. These results are shown in Tables 3.11. and 3.12. In the first regression equation, the Time 1 measure of behavioural intention was regressed on the measures of attitude, subjective norm and perceived behavioural control. It can be seen from Table 3.11, that this combination of variables explained 24% of the variance in the criterion although only subjective norm was a significant predictor of the intention to use helmets. Neither the direct measure of perceived behavioural control or the attitude measure were significantly associated with the variance in the criterion although the latter was close to significance.

Table 3. 11: Multiple Regression Analysis of Intentions to Use Helmets Using the expanded Theory of Planned Behaviour

	Beta	t	Sig
Attitude	0. 21	1. 9	NS
Subjective Norm	0. 38	3. 4	***
Perceived Behavioural Control (Time 1 direct measure)	– 0. 01	0. 9	NS

Adjusted $R^2 = 0.25$ $F = 11.2^{***}$ df = 3, 90

*** $p < 0.001$

To predict helmet use, a hierarchical regression was performed to determine whether helmet use could be predicted from a combination of behavioural intention and perceived behavioural control and whether the addition of the Time 3 measure of perceived control would account for any extra variance in the criterion. First, behavioural intention and perceived behavioural control were entered in a block and used to predict helmet use at Time 3. This combination of variables explained 30% of the variance in helmet use. On the second step, the Time 3 measure of perceived control was entered and explained an additional 4% of the variance. The F change was significant at the 5 per cent level.

Table 3. 12: Hierarchical Multiple Regression Analysis of Helmet Use Using the expanded Theory of Planned Behaviour

		Adjusted R^2	F Change	Beta in final equation
Behavioural Intention				0. 52***
Perceived Behavioural Control				0. 47
	Block 1	0. 30	–	
Perceived Control				– 0. 21*
	Block 2	0. 34	6. 37*	
Adj R squared = 0.34;		F = 17.0***	df = 3, 91	

* $p < 0.05$ *** $p < 0.001$

Table 3.12 shows a summary of the hierarchical regression, from which it can be seen that the three variables in the final equation explained 34% of the variance in helmet use. Behavioural intention and then perceived control were both significant predictors of behaviour. The direct measure of perceived behavioural control (assessed at Time 1) was not significant.

The final step was to test the ability of the Health Belief Model to predict behavioural intention and helmet use and to determine whether perceived barriers and perceived benefits exerted a direct influence on helmet use as well as (or instead of) an influence on behavioural intention. The technique used was path analysis in which the criterion variables were regressed upon all and then selected antecedent variables to test the hypothesised paths (shown in Figure 3.3).[39] The analysis entailed three steps. the first step was to regress the Time 3 measure of helmet use upon the Time 1 measures of perceived benefits and barriers and behavioural intention and the Time 3 cue to action measures (assessing own and other people's accident history). Second, behavioural intention was regressed on perceived benefits, barriers, vulnerability and severity. Third, steps one and two were repeated using only the significant paths that had emerged to provide final standardised beta weights and proportions of variance explained. The results are shown in Figure 3.4, which shows only the pathways significant at the 5 per cent level or below. Intention and perceived barriers both exerted a direct influence on helmet use explaining 33% of the variance. Perceived benefits and cues were not associated with helmet use. When predicting intention, perceived benefits alone exerted a significant influence on the criterion explaining 24% of the variance in intention to wear helmets. Perceived vulnerability, severity and benefits were not significantly associated with the variance.

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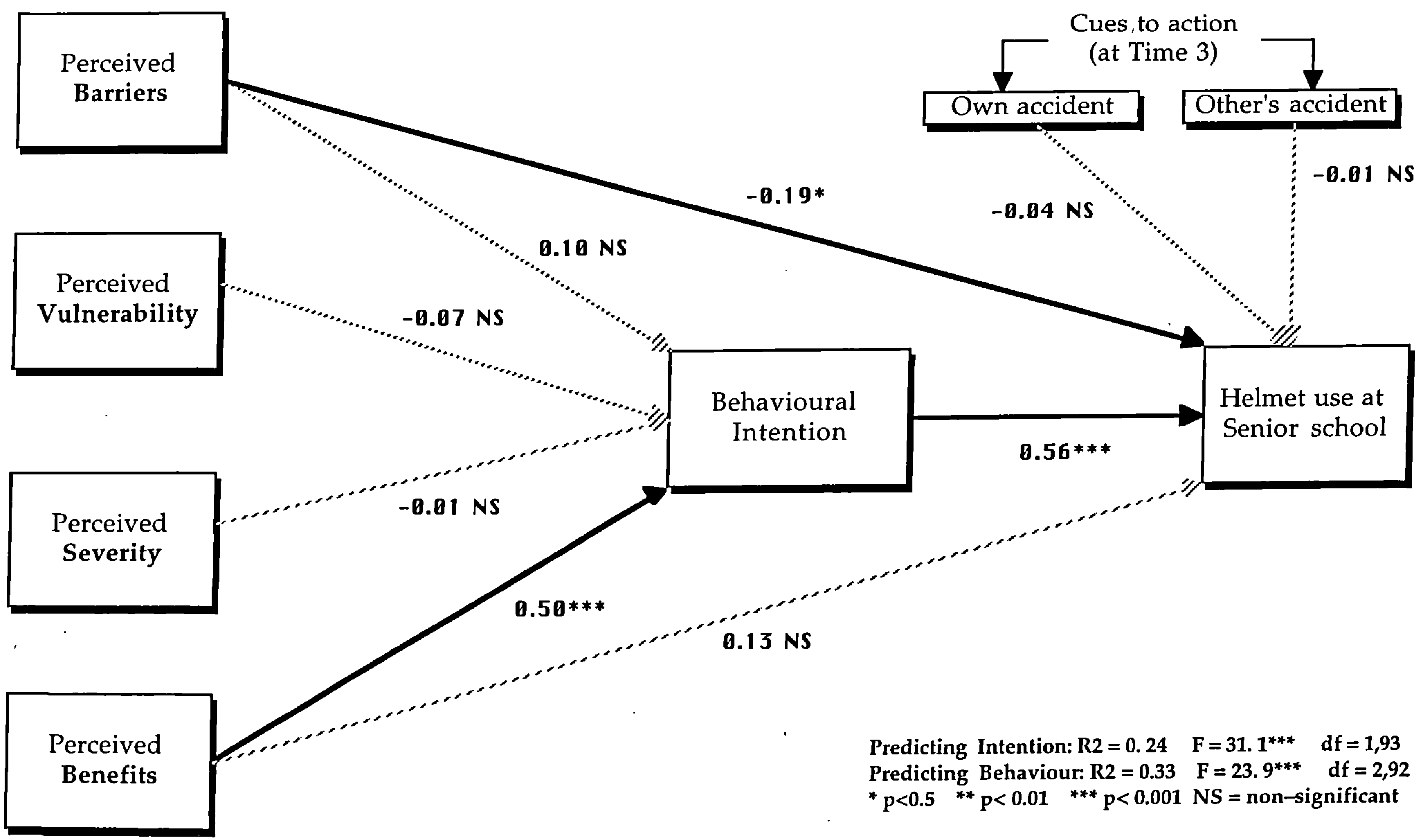
[39] This type of regression-based path analysis has been used with the Health Belief Model by Oliver and Berger (1979), Conner and Norman (1994) and Rutter, Quine and Chesham (1995).



Predicting Intention: R2 = 0. 24 F = 31. 1*** df = 1,93
Predicting Behaviour: R2 = 0.33 F = 23. 9*** df = 2,92
* p<0.5 ** p< 0.01 *** p< 0.001 NS = non–significant

Figure 3. 4: Final path model showing the influences on behavioural intention and helmet use described by the expanded Health Belief Model

DISCUSSION

Synopsis

This study set out to predict the use of cycle helmets amongst children in their first year of senior school from beliefs measured at junior school. The principal aim was to identify the beliefs associated with children's decisions to wear or not wear a helmet while cycling to and from school unconfounded with previous experience. The Health Belief Model and Theory of Planned Behaviour were used in a longitudinal study to assess the belief of a sample of junior school children towards the wearing of helmets while cycling to and from senior school, and use these beliefs to predict their use of helmets a year later. As expected, both models explained significant proportions of the variance in intentions and behaviour and identified beliefs which discriminated between helmet users and non–users. Once again, the Theory of Planned Behaviour proved to be the superior model in terms of predictive power, parsimony and conceptual strengths.

In the Health Belief Model, where path analysis was used, perceived benefits was the sole variable significantly associated with behavioural intention, explaining 24% of the variance in the final equation. The other components of the model – perceived barriers, vulnerability and severity – did not exert a significant influence on intention. Of the five variables used to predict helmet use – behavioural intention, perceived barriers and benefits, and the two cue variables (of own and other's bicycling accidents) – only intention and then perceived barriers (as hypothesised) were found to have direct paths to the criterion explaining 32% of the variance in the final equation. Perceived benefits, and the two cue variables were not associated with the variance in helmet use.

In the Theory of Planned Behaviour, linear multiple regression analysis was used in the equation predicting behavioural intention, after which hierarchical multiple regression was used in the equation predicting behaviour. In the first equation, the three components of the model – attitude, subjective norm and perceived behavioural control – explained 25% of the variance in concurrent intentions with subjective norm shown to be the only measure significantly associated with the variance. Attitude and perceived behavioural control showed no association although attitude was almost significant. In the second equation, perceived behavioural control and behavioural intention – entered in a block – accounted for 30% of the variance in the outcome measure – helmet use at Time 3. Only intention was a significant predictor, perceived behavioural control's contribution being non-significant. The addition of the control beliefs measure, assessed at the same time as the criterion, led to a small yet significant increase in the (explained variance) of 4%, the final model accounting for 34% of the variance. Behavioural intention and control beliefs (in descending order of significance) were both significant predictors of helmet use. Perceived behavioural control remained non-significant.

Although both models explained similar proportions of the variance in behaviour, the Theory of Planned Behaviour explained more of the variance in intention than the Health Belief Model and was once again the more parsimonious and cohesive model. Whereas the Theory of Planned Behaviour used three components to predict intention and three to predict behaviour, the Health Belief Model used four variables to predict intention and five to predict behaviour. Moreover, neither of the Health Belief Model components said to initiate a consideration of preventive health behaviour (i.e. perceived vulnerability and severity) were associated with behavioural intention. The Theory of Planned Behaviour performed according to theory.

Investigating salient beliefs

The univariate analysis of the components of each model is again helpful in that it enables us to identify specific concerns underlying cyclists' initial decisions to use or not use a helmet. This is extremely useful given that a whole year elapsed between measuring the beliefs and obtaining the dependent measure, during which any number of extraneous events could have influenced the cyclists behaviour. We shall examine these findings and their implications before turning our attention to the multivariate analysis and the performance of the models.

Health Belief Model dimensions

Benefits and Barriers

As in the previous study, there was correlational evidence that perceived benefits were strongly associated with the intention to wear a helmet and with actual helmet use showing that the positive outcomes associated with wearing a helmet do influence cyclists' decisions and are likely to lead to helmet use. In addition, the difference between means shows that helmet users, more than non–users, subscribe to the beliefs that wearing a helmet would protect their head, make them take care and to a lesser extent, make their parents worry less. These same beliefs were also shown to discriminate between helmet users and non–users in the previous study.

Perceived benefits also correlated strongly with both perceived vulnerability and severity indicating that cyclists who believe in the value of protective helmets as a preventive measure also feel vulnerable to the health threat implicit in road traffic accidents and believe that hitting their head is likely to be serious and to have serious consequences. Perceived benefits also correlated with subjective norm and perceived behavioural control and it seems that an appreciation of the benefits of future helmet use is partially acquired through the influence of the perceived normative expectations of powerful others (such as parents and other cyclists) and is associated with confidence in one's ability to wear a helmet. The implication of this is that low levels of confidence will be associated with non–use of helmets. The association between perceived behavioural control and barriers supports this.

The univariate analysis showed perceived barriers to be of less significance in the study reported here than in the previous study. There was no correlation with either behavioural intention or actual helmet use. Furthermore, the barriers measure did not discriminate between helmet users and non–users. However, the t–tests between means showed that one of the perceived barriers items did discriminate between helmet users and non–users. Children who believed that wearing a helmet would make them physically uncomfortable were unlikely to wear a one a year later. These findings suggest that many of the barriers associated with helmet use become more salient with experience and that children cannot anticipate certain barriers or appreciate them fully until they attempt to wear a helmet regularly (see Lennie and Stevensen, 1992). In the first study, in which helmet use was an ongoing behaviour for many cyclists, the barriers measure was far more salient. Similarly, Clarke et al (1991), in a longitudinal study involving an ongoing behaviour i.e. breast self–examination (BSE), also found individual barriers to discriminate between frequency of performance.

The perceived barriers measure was however, correlated with both perceived behavioural control and the belief–based measure of control beliefs. In the first case, this suggests that children with low self–confidence (in their ability to wear a helmet) are likely to endorse the costs associated with helmet use. If this is a causal relationship then is it possible that low self–confidence increases the magnitude of the anticipated difficulties (i.e. perceived barriers). Janz and Becker (1984) and Rosenstock et al (1988) note that low self–confidence can be viewed as a barrier to action. In the second case, with respect to the correlation between barriers and control beliefs, we can be more sure of causality since perceived barriers were assessed at Time 1 and control beliefs a year later. It seems that children who strongly endorse the costs associated with anticipated helmet use and are put off wearing one at a later date because of this, also believe that they lack the resources and skills necessary to overcome some of the common impediments to helmet use. It is possible of course that (as Conner and Sparks (1996) suggest) these three measures overlap to the extent that they concern factors affecting volitional control. It may be this which accounts for the correlation between them.

Perceived severity and vulnerability

There was correlational evidence that the single item assessing perceived vulnerability to accident involvement was associated with future helmet use but not with concurrent intentions. This suggests that a belief in the likelihood of accident involvement does cause sufficient worry amongst children to influence their behaviour and that such beliefs are salient amongst children before they even cycle to and from school. However, the items assessing perceptions of vulnerability to head injury were shown not to be relevant, supporting the findings of Wasserman et al (1988) and Howland et al (1989) which suggests that young cyclists are not overly concerned about the threat of head injury.

Nonetheless, Howland et al (1989) found that some cyclists did cite head/neck injury as a consequence of cycling accidents and in the study reported here, there was a weak but significant correlation between severity and vulnerability suggesting that cyclists do believe that a cycling accident could result in head injury. Howland et al (op. cit.) also report that most of their sample believed that if head injury were sustained it would probably be severe (see also Lennie and Stevensen, 1992). In keeping with this, in the study reported here, perceived severity was positively endorsed by helmet users and non–users alike. It was also correlated with attitude, subjective norm and perceived behavioural control. It could be argued, in keeping with Fishbein and Ajzen (1975), that this is a causal relationship and shows that specific concerns about the consequences of head injury influence attitudinal, normative and control beliefs in a way likely to favour helmet use. Of particular interest is the association between severity and subjective norm since the social consequences of a serious head injury are likely to impact upon one's family and friends.

Theory of Planned Behaviour components

Subjective norm

In the zero order correlations, subjective norm was shown to be strongly associated with intention and behaviour confirming the importance of the normative expectations of referent others in cyclists' decisions. In addition, the subjective norm measure discriminated significantly between groups with five of its component beliefs (subjective norms) endorsed significantly more by helmet user than non–users. As in the previous study, the perceived normative expectations of parents was an important consideration for cyclists who intended to wear a helmet in the future and subsequently did. However, a more important concern was the perceived expectations of other cyclists which discriminated between groups more strongly (in terms of the mean difference) than any other measure. Both of these subjective norms discriminated between groups on both the belief and the evaluation component. This order of significance is different than that shown by the previous study which found parents to be a stronger influence on children's helmet wearing than their peers (see also Pendergrast et al, 1992; Witte et al, 1993) but is nevertheless to be expected given that when the beliefs were measured none of the children cycled to and from school. The subjective norm measure thus concerned *anticipated* normative expectations rather than normative pressure reinforced by daily experience. This shows the importance of assessing children's beliefs before they begin cycling to and from school and supports the earlier suggestion that the normative expectations of parents will become more influential than the influence of peers (i.e. friends and other cyclists) when children begin cycling to and from school. It will be recalled that the study by Otis et al (1992) which found peer pressure to play a more important role in helmet use than parental expectations, focused upon play cycling amongst children too young to cycle to school. It was suggested (in Chapter 1) that parents may worry more when they know their children to be cycling to and from school rather than on short trips around the immediate neighbourhood.

Since we are interested primarily in investigating salient beliefs, an examination of the components of the subjective norms is useful. In the two shown to discriminate most between groups, it is the anticipated normative expectations (i.e. the belief component) which is more important to helmet users than the motivation to comply (i.e. the evaluative component). Thus to use these beliefs in a promotional intervention, it would be wise to increase awareness of the normative wishes of parents and other cyclists rather than simply promote compliance.

There were also significant differences between groups for three other subjective norms – albeit on one component only. Although helmet users were significantly more likely than non–users to believe that their friends and family would wish them to use a helmet, both groups showed a desire to comply with the wishes of these referents. The item concerning the normative beliefs of teachers showed the opposite pattern, helmet users and non–users alike believing that teachers would support them in their helmet use at senior school but only the former being highly motivated to comply with them. This analysis indicates that the behaviour and wishes of friends would not be suitable for an intervention since cyclists who do not wear helmets are motivated to comply with other non–wearers. It also contradicts the research of Sissons–Joshi et al (1994) who found that helmet users and non–users shared the same normative beliefs.

Attitude towards the behaviour (behavioural beliefs)

Once again, the attitude measure did not predict intention in the multivariate analysis although it was very close to significance (see Table 3.12). There is however evidence for its importance from the zero order correlations which show attitude to be highly correlated with behavioural intention at Time 1 and with helmet use at Time 3. It was also the measure most highly correlated with perceived benefits which in the light of the non–significant correlation between attitude and perceived barriers, shows that the overall attitude is informed more by the positive behavioural beliefs than the negative ones. Attitude was also more strongly associated with subjective norm than with intention or behaviour. While this might suggest that participants aware of normative pressure to wear a helmet also have a positive attitude towards helmet use it also raises the issue of whether there is a meaningful distinction between attitude and subjective norm.[40]

The attitude measure also significantly discriminated between helmet users and non–users with two of the positive and one of the negative behavioural

[40] This issue was discussed in chapter 2 where it was noted that Fishbein and Ajzen (1975) claim there is a distinction while others (e.g. Miniard and Cohen, 1981; Corneya, 1995) dispute this.

beliefs endorsed significantly more by helmet users than non–users. Helmet users were significantly more likely than non–users to believe that wearing a helmet would provide protection in an accident and to a lesser extent, make the wearer take care. In both cases it was the behavioural outcome that discriminated between groups rather than the value placed on them, both groups appearing to value the outcomes highly. These two beliefs were also the most reliable discriminators in the previous study indicating their importance in initiating and maintaining helmet use. The third behavioural belief discriminating between helmet users and non–users concerned a negative outcome (carrying a helmet around during lessons) and owes its significance to the evaluative component. Although helmet users and non–user alike believe that carrying a helmet around during lessons is a likely outcome of helmet use, non–wearers negatively evaluate this outcome to a greater extent than helmet wearers. This is in keeping with the suggestion that many barriers to helmet use are salient for users as well as non–users and that amongst helmet users, a belief in the benefits outweighs the costs. It seems that the more cyclists endorse the benefits of helmet use, the less importance they attach to the negative outcomes. For example, although helmet users and non–users alike agreed that if they were to wear a helmet while cycling to and from school, they might have to carry it around during lessons, it was the children who negatively evaluated this outcome to a greater extent who did not wear a helmet.

Also of importance was the belief that using a helmet would make parents worry less although, as in the previous study, it is the importance of the behavioural outcome and not its value that separates helmet users from non–users. Both groups highly value parents worrying less although helmet users do see it as slightly more desirable than non–users. Conversely, it is the evaluative component of the behavioural belief 'looking silly' which discriminates between groups rather than the outcome itself. Although helmet users and non–users alike believe that wearing a helmet is likely to make them look silly, helmet users are much less concerned about this than non–users. This finding suggests that the anticipation of looking silly may be as salient an influence on cyclists decisions as the actual experience of ridicule and supports the argument that cyclists who endorse the benefits of helmet use are less worried than non–wearers about the negative consequences – whether these be practical considerations (such as comfort and storage) or psychological ones such as the reaction of other people to one's appearance.

Perceived behavioural control

Perceived behavioural control also discriminated between helmet users and non–users, the latter believing themselves to have poor control over helmet use and to anticipate difficulty in wearing one. It also correlated with intention and behaviour and correlated more strongly with attitude and subjective norm than with either of the outcome measures suggesting a causal relationship. Cyclists who have a positive attitude towards helmet use and perceive social pressure for them to wear one, are likely to intend to use a helmet at senior school. Enthusiasm for helmet wearing may in turn overcome any doubts or lack of confidence resulting in high levels of perceived control. It is noticeable that only the first item discriminated between groups, while the second was equally (positively) endorsed by both helmet users and non–users. This supports Terry and O'Leary's (1995) suggestion that Ajzen and Madden (1986) have compounded efficacy beliefs and control beliefs in their perceived behavioural control measure. The first item asked respondents to respond to the item "For me to wear a helmet while cycling to school would be ... *Very easy – Very difficult*" and the second, to respond to the item "If I wanted to, I could easily wear a helmet whenever I cycled to school". It is possible that the first of these assesses the children's confidence in their ability to perform the behaviour and is concerned with efficacy beliefs, while the second item, which is more concerned with actuality than anticipation, relates to beliefs about personal control.

Control beliefs

The Time 3 measure of control over the behaviour, which assessed what Ajzen and Madden (1986) refer to as belief-based measures of perceived behavioural control, discriminated significantly between helmet users and non-users and correlated strongly with helmet use in the zero order correlations. It also showed significant negative relationships with perceived severity, attitude, subjective norm and perceived behavioural control and a positive relationship with perceived barriers. With respect to the negative relationships, it appears that cyclists who do not perceive head injury to be serious, do not perceive normative pressure to wear a helmet and also have a negative attitude towards helmet use, do not have sufficient motivation to overcome the difficulties associated with helmet use (whether these be practical problems or concern skills and resources). It also appears that belief-based measures of control are associated with the amount of control cyclists anticipate being able to exercise over future helmet use. Although the measures were assessed a year apart, cyclists who believed at Time 1 that wearing a helmet in the future would be easy, were unlikely to believe that the types of problems assessed as control beliefs would put them off helmet use. Ajzen and Madden (1986) also report significant correlations between the direct and belief-bases measures although they assessed them at the same time. The positive correlation between barriers and control beliefs is to be expected since three of the control belief items relate to practical barriers.

Three individual control beliefs in particular were endorsed significantly more by non-users than users. Having nowhere to store a helmet during lessons was again a significant issue for non–users confirming the findings of the previous study. It is also in keeping with the negative evaluation of the belief strength concerning carrying a helmet around during lessons and shows how a difference in the evaluation of a behavioural outcome can explain differences in behaviour. Non–users more than users were also put off wearing a helmet due to the difficulties in adjusting the straps – an item suggested by the modal beliefs survey. This suggests that there are specific worries underlying the general concerns about comfort indicated by the earlier examination of individual behavioural beliefs. Given that non–users find adjusting the straps a problem and are concerned about having to carry a helmet around once at school, it is hardly surprising that they also view helmet use as too much effort. However, forgetting to put the helmet on and being in too much of a hurry did not discriminate between groups as in the previous study which might be due to the age difference of the children used in the two studies. In the previous study, many of the children were ıpproaching the age when they are likely to stop wearing their helmets (see Veiss, 1986; Sissons–Joshi et al, 1994). These children may have used ɔrgetting' as a justification for doing this.

Differences between the beliefs of girls and boys

Girls were found to have a significantly more positive attitude towards the use of helmets while cycling to and from school than boys. Examination of the individual behavioural beliefs and their component belief strengths and outcome evaluation shows that although only two of the computed behavioural beliefs – both concerning negative outcomes – discriminated significantly between groups, girls were significantly less likely than boys to worry about the cost of purchasing a helmet and less likely to think that wearing one would make them look different from non–wearers. For both of these beliefs it is the evaluation of the outcome that is the decisive factor in producing the size of the effect – boys evaluating spending money on helmets as less desirable and being more concerned about looking different as highly undesirable. As well as these significant differences, the overall trend was for girls to endorse the belief strength components of all six positive behavioural beliefs more than boys. In particular, girls were more likely to believe that helmet use would mean taking responsibility for personal safety and would also provide protection, make them feel safe and make them take care; they were also more likely than boys to see these outcomes as valuable. There were no significant differences between girls and boys on either the subjective norm measure or the individual items used to compute it suggesting that the two groups do not differ significantly on their awareness of normative expectations regarding future helmet use. However, girls did evaluate the belief that their friends would support their helmet use significantly more than boys although they were no more motivated than boys to comply with the perceived wishes of their friends.

These findings are not only consistent with previous studies which have examined gender–based differences (e.g. Lennie and Stevensen, 1992; Hu et al, 1994), but are more informative in that they point towards specific likes and dislikes associated with helmet use by boys and girls that are endorsed and/or rated differentially according to gender. It was noted earlier for example that although Lennie and Stevensen (1992) found male students to dislike helmets more than female students, they do not examine specific reasons why this should be. While the findings of Hu et al (1994) suggest that girls may wear helmets more due to a greater compliance with recommended safety measures, the results of the study reported here suggest that the reasons for greater helmet use amongst girls can in fact be traced to boys actively disliking helmets and helmet use. The findings also reaffirm the importance, referred to in the previous study, of using a theoretical framework such as the Theory of Planned Behaviour to investigate helmet use. DiGuiseppi et al (1990) and Pendergrast et al (1992) who did not use any specified model, report no association between the sex of the rider and helmet use. Moreover, they point to the superiority of the Theory of Planned Behaviour over the Health Belief Model in identifying salient beliefs since the latter found no significant differences between boys and girls on any of the outcome expectancies.

Predicting intentions and helmet use: testing the models

Testing the Health Belief Model

In terms of prediction, after dropping all non-significant causal paths in the saturated model, the reduced causal model was supportive of the Health Belief Model's ability to predictive concurrent intention and actual helmet use at Time 3. Perceived benefits, with a beta of 0.50 in the final equation, was once again the most powerful predictor of intention to wear a helmet accounting for most of the explained variance. Next in significance was perceived barriers. Perceived vulnerability and severity had no paths to intention. In predicting behaviour, intention again proved to be the most reliable predictor of helmet use with a beta of 0.56 although perceived barriers, with a beta of –0.19 was also significant and the only expectancy-value variable to exert a direct influence on helmet use. Perceived benefits and the two cue to action variables were dropped, having no association with helmet use.

That intention to wear a helmet at Time 1 was the most powerful predictor of helmet use at Time 3, is consistent with the results of the previous study and suggests that in the absence of prior experience of helmet use while cycling to and from school, the decision to wear a helmet will follow from positive intentions derived from the perceived advantages of helmet use. Clarke et al (1991), in a longitudinal test of the Health Belief Model, also found intention to be the best predictor of (BSE) behaviour a year later (but see Champion and Miller, 1992, who found no paths from intention to behaviour). Given the importance of perceived benefits in the univariate analysis, a direct effect of benefits on helmet use might have been expected. However, that its influence on helmet use was entirely mediated by intention is in keeping with the proposal that perceived benefits are inexorably linked to the initial consideration of whether to adopt a health protective action or not – a consideration shown by Ronis and Kaiser (1989) to be initiated by the awareness of a health threat. Perceived barriers however, which was of less consequence than benefits in the univariate analysis, had no path to intention and instead, exerted a direct influence on helmet use. This is consistent with the argument that barriers should be more closely associated with behaviour since individuals are unlikely to consider the barriers to action until they are at least considering adopting the recommended behaviour. Only then will barriers become salient. It would seem that in the same way that benefits are associated with intention, perceived barriers are intimately connected with behaviour whether this behaviour is practised or anticipated (see King, 1982; Clarke et al, 1991; Petosa and Jackson, 1991). Neither perceived severity or vulnerability had direct paths to either intention or behaviour – a common finding when using path analysis to test the Health Belief Model (whether including a measure of intention e.g. Champion and Miller, 1991; Aiken et al, 1994 – or without intention e.g. Oliver and Berger, 1979; Ronis and Kaiser, 1989). Similarly the cues to action of own and others accident history were also redundant measures having failed to predict behaviour. This is in keeping with Clarke et al (1991) who found that over half of their sample failed to use the calendars and stickers provided as cues to remind them to practice BSE. Champion and Miller

(1992), who measured cues using two measures (i.e. Have you recently heard about BSE/breast cancer), found neither to influence BSE intentions.

These findings confirm the importance of the positive and negative outcomes associated with helmet use and show that their salience is not dependent upon experience. It also shows that these beliefs are associated with the uptake of helmet use via their influence on decisions or behaviour. Furthermore, the findings support earlier research (i.e. Otis et al, 1992; Sissons–Joshi et al, 1994) which shows that beliefs about personal vulnerability (to accidents and/or head injury) and the severity of possible head injury not influence cyclists sufficiently to be a major determinant of subsequent behaviour *vis-`a-vis* helmet use. They also confirm research showing that the experience of a bicycling accident and/or knowing of someone else's accident involvement do not influence cyclists helmet use.

The above results are consistent with those of Aiken et al (1994), investigating uptake of mammography screening. Their reduced path model also shows the influence of perceived benefits (on behaviour) to be entirely mediated by intention while perceived barriers exerts a direct effect on behaviour but not intention. In addition, Aiken et al (ibid.) also showed perceived severity and vulnerability to have no paths to intention or behaviour, their influence instead being mediated by perceived benefits (see also Ronis, 1992). However, Champion and Miller (1991), in a longitudinal test of the Health Belief Model, found perceived barriers, rather than benefits, to have a direct path to BSE intention. The authors did not control for prior behaviour – which proved to be the best predictor of intention and behaviour.

Testing the Theory of Planned Behaviour

Predicting intention to wear a helmet

Subjective norm was the only predictor of intention with a beta of 0.38 showing that the perceived normative expectations of referent others and in particular, the expectations of parents and other cyclists, play a major role in cyclists decisions. More importantly, these normative pressures are relevant to the anticipated uptake of a novel behaviour and do not reflect expressed preferences or the example of others. This strongly supports the notion of preventive behaviour being a planned and rational course of action undertaken by an individual with reference to his or her belief structure.

There is support for the importance of subjective norm from other longitudinal studies although these also show attitude to be associated with the intentions. [41] Reinecke et al (1996) for example, show that at Time 1, subjective norm predicted intentions to use condoms although it was second in importance after attitude. At Time 2, it was the most important predictor of intentions showing how beliefs can change through experience with the preventive behaviour in question. Van Ryn et al (1996) also found subjective norm to predict BSE intentions although it was third in order of importance after attitude and self–efficacy.

Perceived behavioural control did not predict intention to wear a helmet which reflects the finding that only one measure discriminated between helmet users and non–users. Children generally anticipated being able to exercise control over future helmet use whether they intended to wear one or

[41] Although attitude was not associated with the variance in intentions in the study reported here, it was extremely close to significance and the correlation between attitude and subjective norm of 0.73, suggests that the effects of attitude on intention may have been absorbed by subjective norm. Perceived benefits and barriers, which shared the same questionnaire items as the attitude measure, did predict intention and helmet use (respectively) indicating that the perceived behavioural outcomes do play an important role in cyclists decisions.

not. Other longitudinal tests of the Theory of Planned Behaviour have also failed to find convincing support for perceived behavioural control. Reinecke et al (1996), report that perceived behavioural control was only a significant predictor of condom use amongst respondents classed as high intenders. Norman and Smith (1995) did find perceived behavioural control to predict exercise behaviour six months later but only in the absence of past behaviour. When this was entered into the equation, perceived behavioural control showed no association with the outcome measure. [42]

Predicting helmet use

Both intention and the Time 3 measure of behavioural control were predictors of helmet use. Intention was the strongest predictor with a beta of 0. 52, supporting Ajzen's (1985) claim that intentions are amongst the best predictors of behaviour. As well as being the best predictor of helmet use, intention was also correlated with attitude, subjective norm and perceived behavioural control, suggesting that children who have a positive attitude towards future helmet use, anticipate normative support for helmet use, and believe that they have the ability to wear a helmet should they choose to do so, will formulate a strong intention to use a helmet while at junior school which in turn will predict actual helmet use at senior school. However, that the Time 3 measure of behavioural control was significantly associated with helmet use (beta = –0. 21) indicates that cyclists also need to have the requisite personal resources and skills to overcome any problems associated with helmet use and need to be motivated to overcome any practical impediments. Having nowhere to store the helmet once at school, or it being too much effort, or difficulties with adjusting the straps so as not to cause discomfort are

[42] The study by Van Ryn et al (1995) referred to earlier, also used the Theory of Planned Behaviour to predict exercise behaviour and BSE six months later. However, they used a single item for each behaviour (relating to confidence) rather than the three measures of perceived behavioural control suggested by Ajzen (1985) and more usually associated with the model.

factors likely to intervene between intention and behaviour. Because these influences were assessed at Time 3, the findings support researchers who argue that barriers and (the lack of) abilities intervene between intentions and behaviour (see for example, see de Vries et al, 1988; Schaalma et al, 1993). It also suggests that in prospective studies which investigate uptake of a novel behaviour, control beliefs should be measured after the uptake of behaviour and preferably near to, or at the same time as, the outcome measure by which time, the extent of their influence will have been experienced. In this way, the belief–based measures will be more a measure of actual behavioural control than a proxy measure of anticipated control. (see Ajzen and Madden, 1986). Clarke et al (1991) assessed a similar set of measures (i.e. 'laziness', 'forgetting' and 'lack of time') at Time 2 and found them to directly influence behaviour.

Summary of the study

The study set out to identify the beliefs associated with the uptake of a novel behaviour – the use of protective helmets by young cyclists whilst cycling to and from school. The main objective of the study was to remove the effect of prior behaviour to identify the beliefs associated with cyclists' initial decisions to wear or not wear helmets while cycling to and from school. This was achieved by measuring the beliefs of a sample of junior school children (who had no experience of cycling to school about helmet use and using these beliefs to predict their uptake of helmet use some months later while cycling to and from senior school).

The study was successful in that one year after the initial questionnaire session, several beliefs were shown to be significant predictors of behaviour. These beliefs were not altered sufficiently by the experience of helmet use during cycle proficiency training to undermine such claims but did show girls to be more positive in their attitude towards helmet use than boys. Furthermore, both models were able to explain a substantial proportion of the variance in concurrent intention and future behaviour and confirmed the important role played by the normative expectations of significant others. The particular referents shown to strongly influence helmet were also those identified as influential in the previous study. Similarly, the specific positive and negative behavioural outcomes found (by the earlier study) to either support or detract from ongoing helmet use, were shown to be important considerations amongst children and to exert a powerful influence on their subsequent decisions.

The study also confirmed that children were not motivated in their decisions by worries about personal vulnerability (whether to accident involvement or head injury) even if they had experienced an accident themselves or knew of someone else who had. They were also not influenced by perceptions of severity although these were uniformly high across the sample. This again, implies that the decision–making process thought to underlie the Health Belief Model (see for example Rosenstock, 1966) needs to be re–evaluated. Similarly, in the Theory of Planned Behaviour, beliefs about being able to exercise control over helmet use were not as significant as discriminators as when assessed (in the previous study) as correlates of ongoing helmet use. In the first study, helmet users were far more positive than non–users about exercising control. In the study reported here, both groups anticipated high levels of control. Evidently, perceived behavioural control measures beliefs particularly affected by experience (see also Reinecke et al, 1996) confirming the importance of limiting the influence of prior behaviour. It also casts doubts upon Ajzen's (1985) assertion that perceived behavioural control adds to the predictive ability of the Theory of Reasoned Action and specifically, that individuals are able to anticipate the extent of their behavioural control sufficient to influence intentions or regarding outcome behaviour. The study did however, show that factors which operate as practical and psychological impediments to helmet use are associated with non–use. This suggests that in longitudinal studies, subjects may not be able to anticipate the influence of factors affecting volitional control and that control beliefs should be assessed *after* the behaviour has been carried out, as an adjunct to the direct measures of perceived behavioural control assessed at Time 1.

If we compare the models in terms of predictive ability and parsimony, there is little to choose between them. The Theory of Planned Behaviour was a slightly more reliable predictor of intentions than the Health Belief Model but had only one component – subjective norm – associated with the variance. Neither attitude or perceived behavioural control were significant predictors although attitude was close to significance. The Health Belief Model showed only perceived benefits to be associated with the intentions to use helmets while there was no association with perceived barriers, severity or vulnerability. In predicting actual helmet use at Time 3, both models performed equally well and can only be distinguished in terms of parsimony and sufficiency. The Theory of Planned Behaviour was again the more parsimonious, predicting helmet use from two out of the three variables used. The Health Belief Model used five variables to predict helmet use, three of which were not associated with the behaviour. Furthermore, it was the variables unique to the Health Belief Model (i.e. vulnerability, severity and cues) which were shown to be redundant. This was balanced to an extent by the failure of perceived behavioural control (unique to the Theory of Planned Behaviour) to predict helmet use. However, the only expectancy–value belief measured at Time 1 shown to be significantly associated with Time 3 helmet use was the Health Belief Model's perceived barriers measure. Thus while the study suggests that the Health Belief Model suffers in terms of sufficiency through not measuring normative beliefs, the Theory of Planned Behaviour was improved by the measure of impediments similar in conception to the perceived barriers dimension of the Health Belief Model.

Conclusion

The results of this study show that it was possible to predict helmet use among school–age cyclists from a set of beliefs measured a year earlier. In addition, the findings are broadly consistent with the previous study in that they confirm the predictive utility and cohesion of the Theory of Planned Behaviour while casting fresh doubts upon the theoretical basis and sufficiency of the Health Belief Model. Although both models were able to explain similar (and substantial) amounts of the variance in intentions and behaviour the Theory of Planned Behaviour identified a broader set of salient beliefs then the Health Belief Model and was the more parsimonious, using fewer variables to achieve the same effect.

In conclusion, the findings suggest that the decision to use or not use a helmet while cycling to and from senior school is very much a planned behaviour. Emotional factors (such as those implicit in the Health Belief Model's perceived threat variables) do not seem as important as the cognitive ones measured by the Theory of Planned Behaviour although it is debatable whether beliefs such as those assessed by the subjective norm and attitude measures are based solely upon a rational consideration of the advantages and costs of helmet wearing, but also 'capture' emotional issues such as wanting to please parents and/or allay their anxieties, not wanting to incur the social disapproval of peers and wanting to feel safer whilst cycling.

CHAPTER 4: STUDY 3

PROMOTING THE USE OF PROTECTIVE HELMETS AMONG SCHOOL–AGE CYCLISTS: AN INTERVENTION BASED ON THE ELABORATION LIKELIHOOD MODEL OF PERSUASION

INTRODUCTION

The purpose of this chapter is to present a longitudinal study designed to promote the use of cycle helmets amongst young adolescents while cycling to and from school. Beliefs shown by two earlier studies (see chapters 2 and 3) to be significantly associated with the decision to wear a helmet while cycling to and from school were used to inform a persuasive intervention based upon the 'Elaboration Likelihood Model of Persuasion' (Petty and Cacioppo, 1981, 1986a, 1986b). The intervention aimed to influence cyclists intentions and behaviour regarding the use of a helmet and thus lead to their increased use amongst the target population. The study would provide an experimental test of the Theory of Planned behaviour (see Fishbein, 1993).

To achieve this, the most salient of the beliefs associated with intention and behaviour in studies 1 and 2 were used to develop a series of persuasive messages presented to pupils who cycled to and from school but did not wear helmets. These messages were intended to enhance specific attitudinal and normative beliefs about helmet use and decrease the influence of factors affecting perceptions of control.

The study involved three sessions – an initial assessment survey, the intervention session and a behavioural follow–up. The assessment survey was carried out at Time 1 to assess initial behaviour (i.e. the use or non–use of cycle helmets) and baseline beliefs about the use of helmets while cycling to and from school prior to the main study. This was to ensure that helmet users could be identified and excluded from further participation and permit a 'randomisation check' to examine the distribution of pre–intervention beliefs across the experimental and control groups. [43] The cyclists identified as non–wearers were then used as participants in the main intervention study. In the first experimental session (Time 2), participants were randomly assigned to control or experimental conditions and presented with different persuasive messages using an adaptation of the procedure recommended by the ELM. A post–intervention 'manipulation check' then examined the effects of the persuasive messages. Five months later at Time 3 a behavioural follow–up was conducted to examine changes in helmet use and to assess the long–term affects of the persuasive communication on beliefs, attitudes and intentions.

The chapter begins by reviewing the literature concerning school–based attempts to promote helmet use amongst young cyclists and then describes the rationale behind the intervention reported here. After this, the Elaboration Likelihood Model of Persuasion is presented and the study itself reported. The chapter ends with a discussion of the implications of the study for persuasive interventions amongst school children and the utility of the Health Belief Model and the Theory of Planned Behaviour in identifying beliefs for use in health promotion.

[43] This analysis was not carried out until after the final session.

PROMOTING HELMET USE AMONGST YOUNG CYCLISTS

Review of the problem

It was noted in Chapter 1 that the wearing of protective helmets by bicyclists is viewed as a desirable practice (Collins et al, 1993; Maimaris et al, 1994; Weiss, 1994) and one that should be encouraged amongst school–age cyclists (see for example McKenna et al, 1984; Weiss, 1987, 1992; Simpson et al, 1988; Sibert, 1996). Case control studies have shown the effectiveness of bicycle helmets in reducing serious head injuries and fatalities amongst this group (Thompson et al, 1989; McDermot et al, 1993; Maimaris et al, 1994; Thomas et al, 1994) and as a result, numerous attempts have been made to increase helmet use amongst young cyclists using school–based interventions (Moore and Adair, 1990; Pendergrast et al, 1992; Towner and Marvel, 1992; Rouke, 1994), local community programmes (Morris, Trimble and Fendley, 1994; Puczynski and Marshall, 1992; Winn, Jones and Bonk, 1994), community–wide campaigns (Wood and Milne, 1988; Bergman, Rivara, Richards and Rogers, 1990), physician advice (Cushman et al, 1991) and legislative and/or educational interventions (Cameron et al, 1994; Dannenberg, Gielen, Beilensen, Wilson and Joffe, 1993; Cote, Sacks, Lambert–Hubert, Dannenberg, Kresnow, Lipsistz and Schmidt, 1992). However many of these campaigns have either failed or achieved only limited success (see Hillman, 1993; Weiss, 1994; Sibert, 1996 for reviews) and user rates amongst school–aged cyclists remain generally low. In the UK for example, Towner et al (1994) found that out of 4,015 cyclists surveyed in the Newcastle area, only 4.2.% of those aged between 11 and 12 and 1.8% of those aged between 13 and 14 wore a helmet. Similarly, Maimaris et al (1994) report that only 50 of 309 young cyclists (i.e. under 16 years of age) injured in bicycle–related accidents in and around Cambridge were helmet wearers – a user rate of 16%. Sissons–Joshi et al (1994) report a 13% user rate amongst school children in Oxford.

Promoting helmet use using school–based interventions

According to Weiss (1992), relatively modest school–based interventions may be effective in increasing the use of bicycle helmets by children. Moreover, they do not have the problems associated with large–scale community–wide and legislative programmes such as prohibitive running costs, falling rates of bicycle use amongst adolescents and difficulties with enforcement strategies (see Hillman, 1993 and Weiss, 1996 for reviews and commentaries). Unfortunately, as noted in Chapter 1, no formal attempts have been made to promote helmet use amongst school–age cyclists in the UK and we need to turn to school–level promotional attempts in other countries for guidance and comparison. However, it is difficult to compare the intervention reported here directly with previous school–based interventions since none of these have adopted a theory–driven approach and attempted to use salient beliefs to promote helmet use by persuasive advocacy. Instead, they typically focus on helmet wearing as a 'common sense' practice and utilise such things as educational pamphlets, audio/video presentations and lectures to increase awareness of helmets and the consequences of non–use, and to urge children to wear helmets (see for example Moore and Adair, 1990; Pendergrast et al, 1992; Towner and Marvel, 1992; Rouke, 1994). This dependence on the advice and insistence of powerful others may explain the lack of success amongst these studies and indirectly supports a different approach such as one based upon persuasive advocacy. There are other differences too, between these studies and the one reported here. All involve elementary (i.e. junior) school children either exclusively or as a large part of their sample; None focus exclusively on school–related cycling. There is also a reliance amongst some upon helmet discount schemes as if reducing the cost of purchasing a helmet will in itself increase wearing. Nonetheless, a review of these studies is useful in that they provide a benchmark against which to judge the success of the study reported here.

Pendergrast and his colleagues (1992) conducted a year–long educational intervention in two elementary schools in Augusta, USA, in which they compared two types of intervention programmes, one a traditional educational campaign and the other enhanced by meetings, 'bike clubs' and safety clinics. Although helmet *ownership* increased in both schools, only 9.3% of the 'intensive group' actually wore a helmet after the programme compared to a 6.8% baseline user rate, an increase of just 2.5%. A similar five–day intervention set in six elementary schools in Wisconsin, USA (Towner and Marvel, 1992), had no more success despite using 'fear–appeal', [44] prizes (for best posters) and discount vouchers. The authors report an increase in helmet *ownership* from 13% to 27% after a five day programme but no increase in observed *helmet use* (either immediately after the intervention or 19 weeks later). By way of contrast, a more elaborate intervention set in two intermediate schools in Auckland, New Zealand (Moore and Adair, 1990) did achieve a degree of success. After an initial (educational) intervention, helmet use in the experimental school increased from 3.5% to 14.4%. The introduction of 'on the spot' prizes for helmet use then increased helmet use to 23% and final user rates ten weeks after the intervention were reported to be 33.3%. However, the awarding of attractive prizes for 'good behaviour' is likely to be partly responsible for the second increase and a serious bicycling accident involving a pupil at the experimental school responsible for the final increase. The effects of this

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[44] Eggs, with or without a protective (egg carton) helmet and representing the human skull, were dropped to demonstrate (i) the protection afforded by helmets and(ii) the effects of an impact.

accident can be gauged by comparison with a similar two year long campaign conducted by Rouke (1994) which also featured a serious bicycling accident. Rouke's campaign was based around three elementary schools in Ontario, Canada, but also placed newspaper adverts to publicise the programme and held public 'bicycle rodeos'. In addition, the local police carried out the roadside spot checks (to reward helmet use) and it was possible to purchase subsidised helmets. Rouke notes that despite an initial 17–fold increase in helmet use (0.75% to 12.8%) provoked by the intervention, more than 87% of children still did not wear a helmet. However, following a fatal bicycling accident involving a non–helmeted cyclist at the experimental school, helmet use rose dramatically to 51% but then began to fall soon after. This does suggest that a highly publicised bicycling accident is likely to have a noticeable but perhaps short–lived impact on helmet user rates.

EMPIRICAL AND CONCEPTUAL CONSIDERATIONS

The review suggests that the failure of these programmes may be due to their conceptual and methodological weaknesses. It is noticeable that none of the researchers used a modal beliefs survey to guide the intervention programme or formally investigate and utilise the beliefs that cyclists hold about helmet use. Although Pendergrast et al (1992) claimed to have examined children's attitudes, they used two global measures asking whether children thought helmet use was a good idea and whether or not a helmet would protect them. Another study (Towner and Marvel, 1992) used a drama production to 'deal with peer pressure' (p. 156) but did not assess the effects of this either before or after (see also Morris et al, 1994). The interventions also lack any clear theoretical underpinning to guide their construction or encourage empirical rigour, reflected in their inadequate sampling procedures. For example, the comparison groups in all four studies come from different schools which means that the possibility of 'confound by within–school variables' (such as bicycling accidents) was not adequately controlled for. Data collection was also problematic with only one study (Pendergrast et al, op. cit.) obtaining information about participants' age and their pre and post intervention helmet user rates in a quantifiable manner – the others relying upon observation from road side sites or by school–staff. In view of this, it was decided to design an intervention using the Elaboration Likelihood Model of Persuasion of Petty and Cacioppo (1986a; 1986b) which advocates a method of persuasion that aims to bring about lasting attitude change (Eagly and Chaiken, 1993) and involves a procedure that can be adapted for use with children. This was based upon the beliefs shown by the two previous studies to underlie children's decisions and set out to promote the use of helmets amongst non–helmeted cyclists.

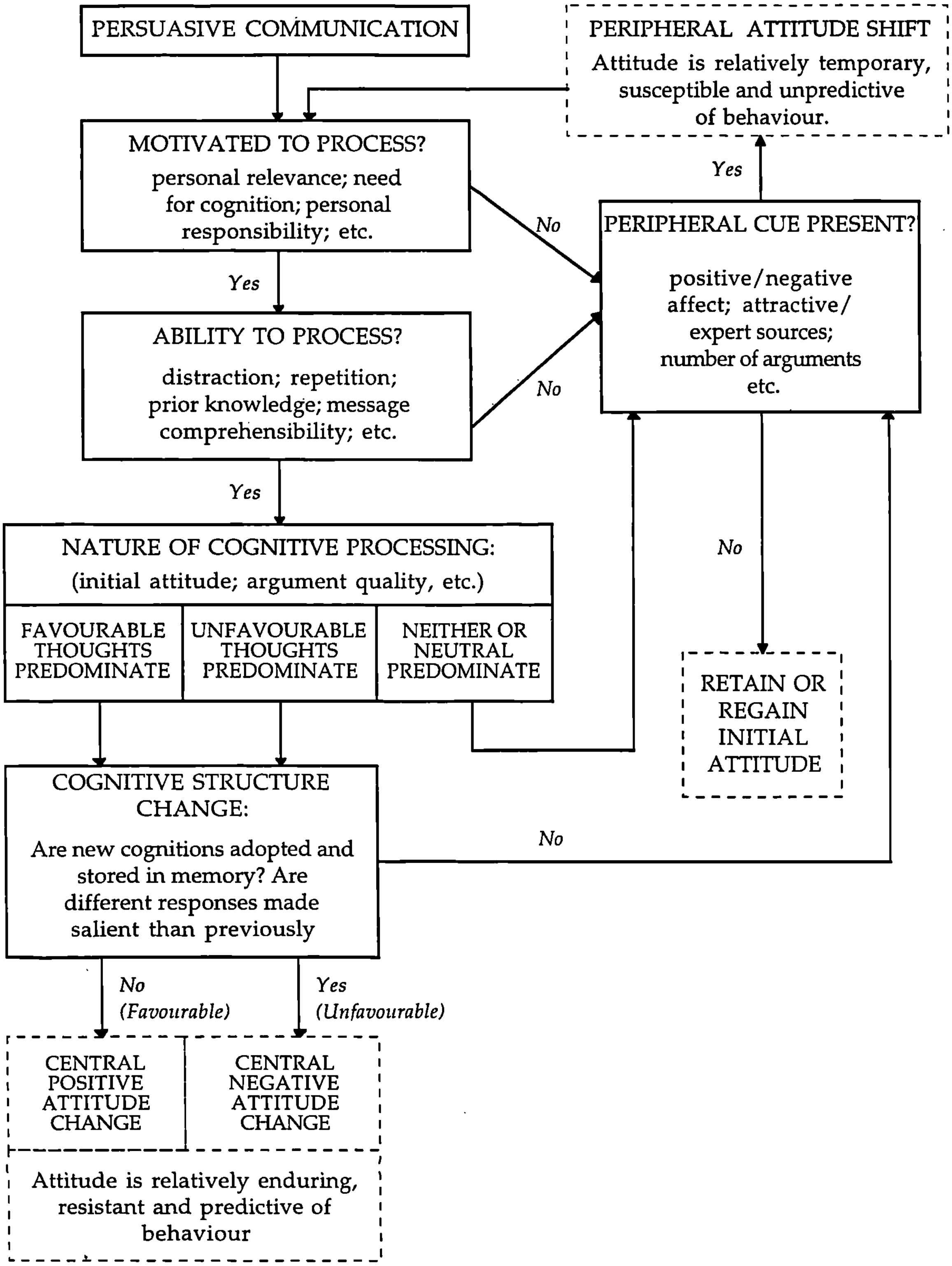
A review of the 'Elaboration Likelihood model' (ELM) of persuasion'

Having evolved from the cognitive response model of Greenwald (1968) and Petty, Ostrom and Brock (1981), the Elaboration Likelihood Model of Persuasion (e.g. Petty and Cacioppo, 1986a) describes a psychological process whereby cognitive responses to information effect lasting attitude change and defines the conditions under which this is likely to occur. The model's postulates (see below in table 4.1) can be used to construct and present persuasive messages in a way that fosters the desired cognitive response. In essence, the model proposes that there are two qualitatively different routes to persuasion; a 'central route' in which message recipients engage in the cognitive elaboration of issue–relevant arguments contained in, and induced by, a persuasive advocacy, and a 'peripheral route' in which recipients are influenced by peripheral issues such as source credibility or attributional reasoning (Petty and Cacioppo, 1986a; 1986b; Eagly and Chaiken, 1993). By elaboration, Petty and Cacioppo (1986a) mean the extent to which an individual carefully thinks about issue–relevant information (p. 7) and argue that in the context of persuasion, elaboration involves the scrutiny of issue–relevant arguments contained in a persuasive communication (ibid.).

Petty and Cacioppo (1984), in keeping with the cognitive response perspective, identify *message–relevant thinking* as the mechanism that mediates central route processing (Eagly and Chaiken, 1993). Thus if participants can be induced by the nature and quality of an advocacy to engage in a "diligent consideration of 'issue–relevant arguments'" (Petty, Cacioppo and Goldman, 1981), then the 'elaboration likelihood' is said to be high. In Petty and Cacioppo's terms, this means that people are likely to attend to an appeal; attempt to access relevant information from both internal and external sources; scrutinise and make inferences about the message arguments in light of other pertinent information available; draw conclusions about the merits of the arguments for the recommendation based upon their own analyses; and consequently derive an overall evaluation of, or attitude towards, the recommendation (1986a, p. 7). Furthermore, Petty and Cacioppo (ibid.) believe that issue–relevant elaboration results in the new arguments being integrated into the underlying belief structure for the attitude object. Thus 'central route' processing produces attitudes which have temporal persistence, are predictive of behaviour and resistant to change (Eagly and Chaiken, 1993). In contrast, Peripheral route processing, being influenced by associations between the attitude object and negative or positive cues in the persuasion context (Petty and Cacioppo, 1986b), is typified by an absence of argument scrutiny and produces attitude change of an ephemeral nature. A schematic depiction of the two routes to persuasion is shown in Figure 4.1.[45]

[45] Petty and Cacioppo do not refer to this as a depiction of their model, only as showing the antecedents and consequences of each route. The seven postulates shown in Table 4.1 are a more formal description of the ELM (see Petty and Cacioppo, 1986a pp 3–5).

Figure 4.1: Schematic description of the two routes to persuasion described by The Elaboration Likelihood Model of Persuasion (Petty and Cacioppo, 1986a)



Theoretical premise

The ELM has much in common with the earlier cognitive response approach of Greenwald (1968) and Petty, Ostrom and Brock (1981) which, according to Eagly and Chaiken (1993), emphasises the mediating role of the idiosyncratic thoughts or "cognitive responses" that recipients generate – and thus rehearse and learn – as they receive and reflect upon persuasive communications (p. 281). More importantly, the model assumes that cognitive responses mediate the effect of persuasive messages on attitude change (ibid., p. 281/2). Petty and Cacioppo's (1986) approach is thus similar since they also believe attitude change produced by the information contained in a persuasive message to be mediated by the cognitive response it provokes (see Eagly and Chaiken, 1993) and that belief change involves the appraisal and reconstruction of existing beliefs (see Petty and Cacioppo, 1981, 1986a). Thus it is not the information itself or the learning of this which promotes belief change, but the arguments that an individual produces in response to the message. This is an important alternative to more 'traditional' education–based persuasive attempts – such as the attempts to promote helmet use amongst children described earlier – which encourage participants to learn the contents of a message as if this will be sufficient. Instead, the ELM promotes attitude change by provoking and utilising recipients' subjective responses to the communication thus embodying Greenwald's (1968) assertion that "the learning of cognitive response content may be more fundamental to persuasion than the learning of communication content" (Cited in Eagly and Chaiken, 1993, p. 280).

Applying theory to practice

As well as its comprehensive psychological foundation, the strength of the model lies in Petty and Cacioppo's (e.g. 1986a) description of the conditions under which central route processing (i.e. the cognitive elaboration of issue–

relevant arguments) is likely to occur. The first is 'personal involvement' which can be manipulated by message framing. Thus with respect to promoting helmet use amongst children, the contents of a persuasive message should make clear that the issues under consideration concern the behavioural and normative outcomes associated with their own use of a helmet while cycling to and from school. According to Petty and Cacioppo (1986a; 1986b), high personal involvement with the central issue(s) contained in a persuasive communication produce conditions of high elaboration–intensity amongst participants and provoke the production and elaboration of issue–relevant arguments. Involvement has been defined as personal relevance (Petty and Cacioppo, 1984a) and has been shown to significantly affect the processing of communicated information (see Greenwald, 1968, for a review).

The other factor necessary to ensure the desired cognitive response is 'argument quality' which refers to a recipients perception that a message's arguments are strong and cogent as opposed to weak and specious (Eagly and Chaiken, 1993). Petty and Cacioppo (1986a) describe a process whereby arguments are shown to be either 'strong', in which case they elicit predominately favourable thoughts about the messages advocated position, or 'weak', in which case they elicit primarily unfavourable thoughts. In practical terms this means that strong arguments (i.e. arguments based upon beliefs shown to be highly salient) in favour of for example helmet use, presented to participants to whom the issue has great personal relevance (such as children who cycle to and from school), maximise elaboration likelihood to the extent that participants will scrutinise the arguments presented in a persuasive communication and generate a large number of (largely favourable) cognitive responses. This cognitive elaboration will increase the likelihood that the contents of a persuasive communication will produce lasting attitude change (Cook and Flay, 1968; Petty and Cacioppo, 1981).

The ELM applied to the promotion of helmet use amongst children

Table 4.1 shows the postulates of the ELM which can be translated in terms of the intervention study reported here and shown to have theoretical and practical implications. Theoretically, the premise upon which the intervention is based – that cyclists should be regarded as active decision-makers and that a cognitive approach to helmet promotion should be used – is consistent with Petty and Cacioppo's position that people are motivated to hold correct attitudes and thus have an underlying motivation to seek out the truth (postulate i). In practical (methodological) terms, the belief that attitude change brought about through the processing of issue–relevant arguments (central route) is likely to have temporal persistence and to effect behavioural change (postulate vii) provides an incentive to present the intervention in a way that ensures 'central route' processing. According to postulate ii, the extent of issue–relevant processing is dependent upon situational and individual variables which can therefore be manipulated by the nature of the presentation of an advocacy. This had direct implications for message framing. Thus an advocacy presented as a persuasive message can enhance the extent of argument elaboration (postulate iii) by manipulating personal relevance and argument quality and presenting these in a manner calculated to produce either a positive (favourable) or motivational and/or ability bias to the issue–relevant thoughts attempted (postulate vi). In the intervention reported in this chapter, the overall argument (advocacy) in favour of helmet use was thus presented as a series of persuasive messages and questions specific to, and biased towards, personal helmet use while cycling to and from school.

Table 4.1. Postulates of the Elaboration Likelihood Model of Persuasion

I	People are motivated to hold correct attitudes
II	Although people want to hold correct attitudes, the amount and nature of issue–relevant elaboration in which people are willing or able to engage to evaluate a message vary with individual and situational factors.
III	Variables can affect the amount and direction of attitude change by: (A) serving as persuasive arguments, (B) serving as peripheral cues, and (C) affecting the extent or direction of issue and argument elaboration.
IV	Variables affecting motivation and/or ability to process a message in a relatively objective manner can do so by either enhancing or reducing argument scrutiny.
V	As motivation and/or ability to process arguments is decreased, peripheral cues become relatively more important determinants of persuasion. Conversely, as argument scrutiny is increased, peripheral cues become relatively less important determinants of persuasion.
VI	Variables affecting message processing in a relatively biased manner can produce either a positive (favourable) or negative (unfavourable) motivational and/or ability bias to the issue–relevant thoughts attempted.
VII	Attitude changes that result mostly from processing issue–relevant arguments (central route) will show greater temporal persistence, greater prediction of behaviour and greater resistance to counterarguments than attitude changes that result mostly from peripheral cues.

Source: Petty and Cacioppo (1986a).

As well as being of high personal relevance, these messages were based upon beliefs shown to be significantly associated with helmet use and thus known to be highly salient. In Petty and Cacioppo's terminology, these would be considered to be 'strong messages' of 'high argument quality'. This procedure was therefore calculated to ensure a high 'elaboration likelihood' thus optimising the amount of issue–relevant elaboration in which the cyclists engaged (i.e. 'central route' processing) and in turn, effect lasting attitude change in favour of helmet use while cycling to and from school.

Thought listing

The ELM also makes use of the 'thought listing procedure' introduced by Brock (1967) and Greenwald (1968). This is often used to test the efficacy of an advocacy or to generate arguments provoking a desired response (see Brock, 1967; Petty and Cacioppo, 1986; Cacioppo and Petty, 1989; Haugtvedt and Petty 1992; Petty, Cacioppo and Goldman 1981), but can also be used in an applied setting to encourage cognitive elaboration and rehearsal of issue–relevant arguments and thus facilitate attitude change. Greenwald and Albert (1968) for example gave participants ten minutes to recall a number of written arguments in favour of/against college education. More recently Parker et al (1996) gave participants three minutes in which to write down their thoughts about videotapes they had just watched to encourage them to recall issues and elaborate upon their initial responses. This application of the thought–listing procedure is particularly useful amongst children since it suggests a number of strategies aimed at encouraging the recall and improvisation of issue–relevant arguments that might otherwise be forgotten.

In summary, the ELM focuses on personal relevance/issue–involvement and argument quality, viewing these as variables which can be manipulated to optimise the scrutiny of information presented during a persuasive attempt and thus ensure the elaboration and rehearsal of issue–relevant responses. This central route processing can be further enhanced by a thought–listing exercise which can be adapted to suit the characteristics of the participants and appears particularly suitable for use with adolescents.

THE RESEARCH STUDY

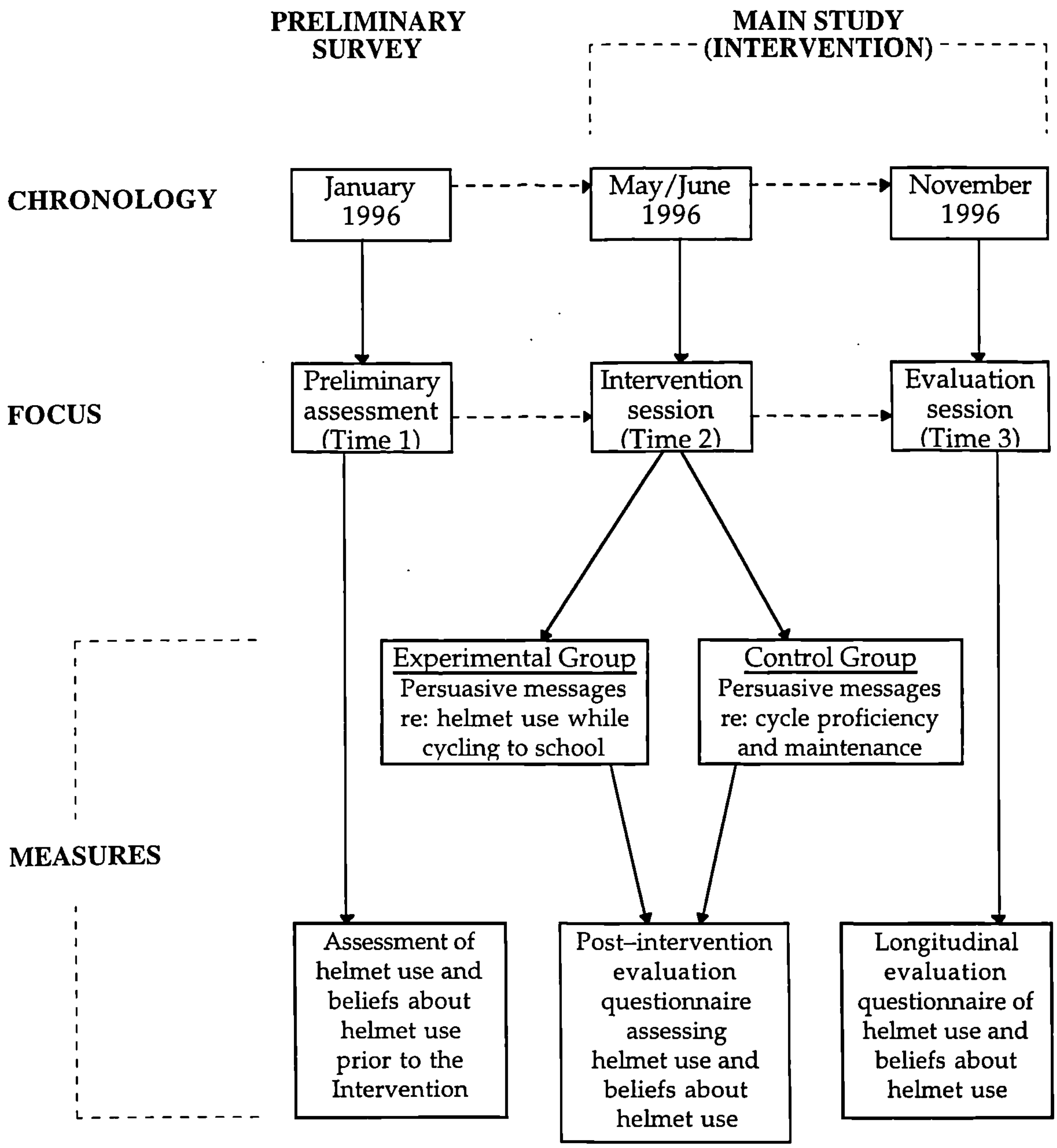
Design

A two by two, between subject, repeated measures design, a sample of young adolescents who regularly cycled to school were seen three times over a period of eleven months. A preliminary assessment survey (at Time 1) obtained information about participants beliefs and behaviour prior to the main study to ensure that only participants who did not wear a helmet were included. This was followed six months later by the first of two experimental sessions. In the first of these (at Time 2), participants were randomly assigned to control or experimental conditions and experimental participants were presented with an intervention, consisting of a series of persuasive messages, designed to change beliefs about helmet use. A control group was presented with a different series of messages concerning a cycling proficiency and bicycle maintenance course. Immediately after this, the efficacy of the intervention was evaluated in terms of between–groups belief differences using a post–test questionnaire. Five months later (at Time 3) a questionnaire was presented to participants to evaluate the long–term effects of the intervention on beliefs and behaviour. A graphic representation of the study design can be seen in Figure 4.2.

Participants

The participants in the study were adolescents aged between 11 and 15 years (mean = 12.3 years; SD = 0.9) who cycled to and from school on a regular basis. They were seen at their respective schools after being asked by teaching staff if they would like to take part in a cycling survey. Participating schools were picked at random from local authority lists before being approached. The only criterion insisted upon was that schools were situated in, or adjacent to, large towns or population centres to ensure that participants experienced urban traffic conditions while travelling to and from school. The Head Teachers of twelve schools responded favourably to the approach although only nine were suitable. These schools were located at eight different population centres throughout east Kent. Three were classified as 'High Schools' and five as 'Comprehensive schools'. One was a girls Grammar school.

Figure 4.2: Design of the study showing the time scale, data collection points and measures used



Choosing the beliefs to inform the persuasive messages

In order to test the effectiveness of a theory–based intervention, it was necessary to develop a series of persuasive messages based upon the beliefs shown by the earlier studies to be important in the formation of an intention to use (or not use) a helmet and/or associated with actual helmet use. It was decided to use beliefs identified by the Theory of Planned Behaviour to inform the intervention rather than those identified by the Health Belief Model. In the previous two studies, the Theory of Planned Behaviour was shown to be marginally superior in identifying beliefs associated with the uptake and maintenance of helmet use. It also used fewer variables to achieve similar results to the Health Belief Model and displayed less redundancy amongst its components. More importantly, the Theory of Planned Behaviour also proved to be the more sufficient model, assessing beliefs about normative expectations and perceptions of control – shown to be amongst the best predictors of helmet use amongst young cyclists – neither of which are assessed by the Health Belief Model. Finally, perceptions of vulnerability and severity, unique to the Health Belief Model and central to its theoretical premise, were shown to be relatively unimportant with regard to cyclists' decisions. This suggests that such beliefs would not be particularly effective in promoting helmet use (see for example, Cushman et al, 1991). The only beliefs which were shown by the model to be associated with helmet use (i.e. perceived benefits and barriers) were assessed more effectively as outcome expectancies by the Theory of Planned Behaviour through its evaluative strategy. Because of this, the attitudinal, normative and control beliefs shown by the Theory of Planned Behaviour to be consistently associated with helmet use were used to provide a pool of salient beliefs from which several were chosen to inform specific persuasive messages.

Two general criteria were adopted in choosing the beliefs upon which to base the persuasive messages: firstly, they should form part of a measure shown to be significantly associated with the variance in intentions and/or helmet use; and, secondly, they should discriminate significantly between helmet users and non–users. In the first study, the subjective norm and perceived behavioural control components were significantly associated with the variance in intention to wear a helmet. Perceived behavioural control was also significantly associated with the outcome measure of Time–2 behaviour. In the second study, the subjective norm component was again significantly associated with behavioural intention, which in turn predicted behaviour a year later. The belief-based measure of behavioural control also predicted behaviour. It is clear from this that beliefs measured by the subjective norm, perceived behavioural control and belief–based behavioural control components are strongly associated with the uptake and/or maintenance of helmet use. Using univariate analysis, it was possible to identify the relative salience of individual normative and control beliefs to determine which of these discriminated most between helmet users and non–users.

In addition to these beliefs, it was also decided that the most salient behavioural beliefs should be considered for the persuasive communication. Although at multivariate level the attitude measure was not significantly associated with behavioural intentions or behaviour, it will be recalled that this was attributed to the interaction of the subjective norm and attitude variables in the regression equations concealing the true significance of the relationship between attitude and behavioural intentions (see Cohen and Cohen, 1983, pp. 95–96 for a discussion of suppression effects). It was decided therefore that specific behavioural beliefs should be used in the intervention as long as these satisfied the second criterion i.e. that they significantly discriminated between helmet users and non–users.

Normative beliefs

Two beliefs indicating the most important sources of social–normative pressure on helmet wearers were chosen for the persuasive messages. The Subjective norm concerning parental expectations ('My parents think that I should wear a helmet while cycling to and from school') and the Subjective norm concerning the expectations of other cyclists ('Most of the other cyclists at school think that I should wear a helmet while cycling to and from school') significantly discriminated between helmet users and non–users in both studies. Moreover, these are referents that cyclists are likely to encounter on a daily basis. Raising the salience of these normative outcomes should increase the probability that cyclists will positively evaluate the outcomes of helmet use and form a more positive intention towards their use while cycling to and from school.

Behavioural control beliefs

In the first study, perceived behavioural control was a significant predictor of intentions and behaviour with five of the seven individual scale items discriminating significantly between helmet users and non–users. In Ajzen's (1988) terminology, two of these, ('I might not be able to wear a helmet while cycling to school because I'd forget to put it on' and 'I might not be able to wear a helmet while cycling to school because it's too much effort') concern beliefs about resources and opportunities, the lack of which clearly detract from helmet use. A third, 'I might not be able to wear a helmet while cycling to school because there'd be nowhere to put it during lessons' concerns a 'practical impediment' (ibid., p. 135) and is also a belief subscribed to by non–users. These three are what Ajzen (1988) terms 'belief–based measures' of perceived behavioural control indicating specific concerns underlying overall perceptions of behavioural control. This suggests that to enhance cyclists perceptions of control over helmet wearing, an intervention should address the specific problems shown to impede helmet use. However, in the second study, "forgetting to put it on" and "helmet use being too much effort" were not as salient as two other items used in the Time 3 (belief–based) measure of behavioural control, both of which discriminated significantly between helmet users and non–users. These concerned the problems of (i) having nowhere to keep the helmet during lessons and (ii) the difficulty of doing up and adjusting the straps. Accordingly, two persuasive messages were designed around these beliefs and used in the intervention. Their effectiveness in enhancing perceptions of behavioural control was assessed by use of a single direct measure ('If I wanted to, I could easily wear a helmet whenever I cycled to and from school') in the questionnaire used to evaluate the persuasive attempt.

Behavioural beliefs

In the first study, at the univariate level, all six behavioural beliefs were found to discriminate between helmet users and non–users although only four proved to be strong discriminators. Of these, two concerned positive behavioural outcomes ('Wearing a helmet whilst cycling to and from school would make me take care'/'protect my head in an accident') and two concerned negative behavioural outcomes ('Wearing a helmet whilst cycling to and from school would mean having too spend too much money'/'make me look silly'). Although these negative behavioural outcomes appear important, it was considered more appropriate (and practicable) to enhance beliefs concerning the positive outcomes of helmet use rather than attempt to alter those concerning negative outcomes. This is in keeping with the belief that the difference between helmet users and non–users derives from their appreciation of the benefits of helmet use rather than a differential endorsement of the barriers. Thus enhancing the positive aspects of helmet use should render negative consequences relatively unimportant. However, these considerations become somewhat academic in the light of the second study which identified beliefs associated with the initial decision to wear a helmet. In this study, the same two positive beliefs shown to be strongly associated with helmet use in the first study (i.e. 'Make me take care' and 'Protect my head in an accident') were the two that discriminated most strongly between helmet users and non–users. Because these beliefs were strongly associated with helmet use in both studies, they were used to inform the persuasive message.

The beliefs used to inform the persuasive communication were:

Normative beliefs

- 'My parents think that I should wear a helmet while cycling to and from school'

- 'Most of the other cyclists at school think that I should wear a helmet while cycling to and from school'

Control beliefs

- 'I might not be able to wear a helmet while cycling to and from school because doing up and/or adjusting the straps is too much effort'

- 'I might not be able to wear a helmet while cycling to and from school because there'd be nowhere to keep it during lessons'

Behavioural beliefs

- 'My wearing a helmet while cycling to and from school would make me take care'

- 'My wearing a helmet while cycling to and from school would protect my head in an accident'.

Materials

Persuasive communication booklets

Two booklets were designed each containing two 'paper and pencil tasks' (appendices 3.1 and 3.2 respectively). The first task concerned the experimental manipulation in the form of a series of persuasive messages designed to make participants respond to, and elaborate upon, the arguments contained on each page. The second task concerned the thought–listing procedure used by (for example) Gotlieb (1990) and Parker et al (1996) in their studies. This has been shown to be an effective technique for increasing cognitive rehearsal and elaboration of issue–relevant arguments (See for example, Brock, 1967; Greenwald, 1970). In the experimental condition, the booklet concerned the use of cycle helmets while cycling to and from school. In the control condition, the booklet concerned a (hypothetical) 'cycling proficiency and bicycle maintenance course'. These booklets were designed to be as similar as possible in terms of the format used for each message, the tasks involved and the time required to read and respond to each one.

Experimental booklets

The experimental condition booklet consisted of a series of persuasive communications based on the six salient beliefs discussed earlier. The messages contained in these communications were designed to enhance the cyclists' perceptions of the positive behavioural and normative outcomes associated with helmet use and to lessen the influence of beliefs detracting from overall perceptions of behavioural control (over helmet use). The first six pages related to the six normative, behavioural and control beliefs and were ordered so that the first two pages dealt with the perceived normative expectations of parents and other cyclists (respectively); the next two pages with the two impediments to helmet use shown to affect perceptions of control (i.e. the difficulty of doing up and/or adjusting the straps and having nowhere to store the helmet once at school), and the last two with the two most salient outcome expectancies associated with helmet use (i.e. 'taking care' and one's 'head being protected' in an accident).

All the messages took the form of a 'question and answer' flow chart designed to ensure that participants had to respond to and 'act upon', textual information rather then merely read it. The charts were deliberately designed to contain a considerable amount of stimuli so that children would have to concentrate on them in order to work out exactly what issues were involved in each chart. Thus they contained a number of graphics (depicting such things as bicycles, cars, ambulances and smiling/sad faces) used to engage the respondents in an appraisal of each chart and emphasise and reinforce various points. They also added attraction to the presentation so that the charts would not consist entirely of text boxes. Each chart was headed by statements concerning a particular normative or behavioural outcome or impediment to helmet use and required participants to follow 'arrowed' paths which led to different text boxes relating to either the positive outcomes of helmet use or to possible solutions to problems impeding helmet use. After this, arrows led to boxes containing a number of questions designed to encourage cyclists to engage in an active consideration of the concepts and arguments arising from the central issue which they had read in the text-boxes. The intention was to make the respondents reconsider these messages. An exception to this general format was the chart concerned with the two impediments to helmet use. This contained no questions about the issues which instead, were placed on the adjoining page. The persuasive message charts used for the experimental condition are described below and shown in Figures 4.3 to 4.11. [46]

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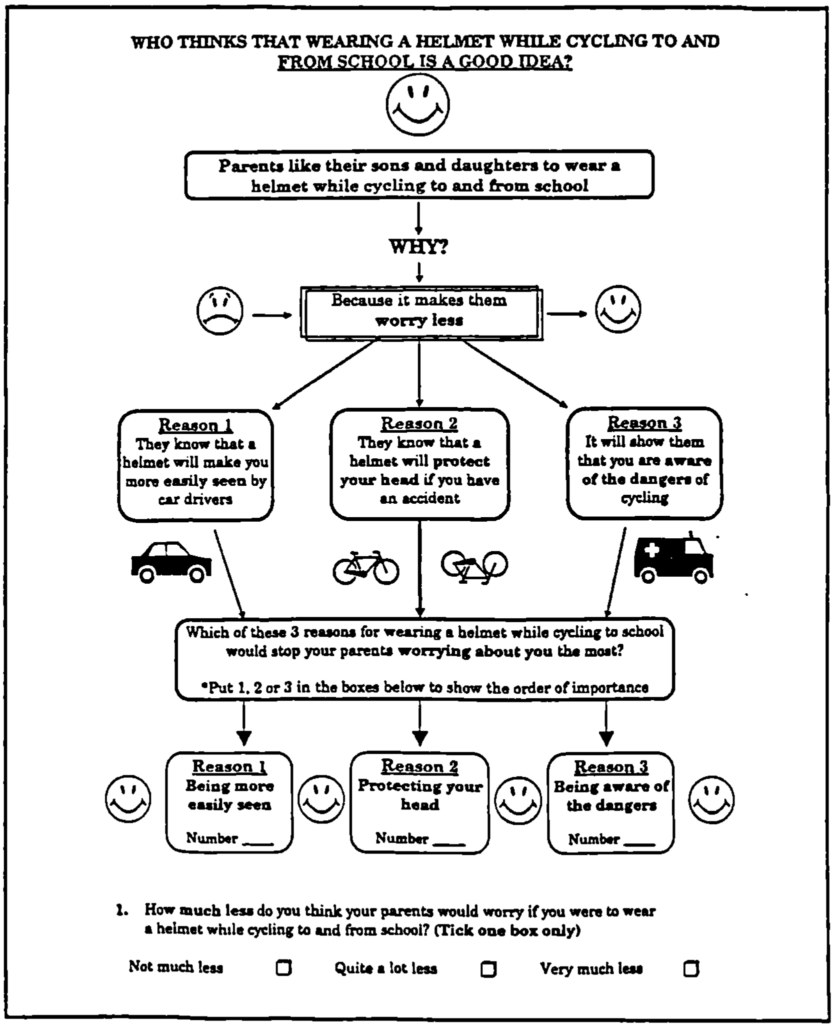
[46] These charts are not here shown full size but can be seen in the appendices.

The first chart (shown in Figure 4.3), concerned the perceived normative expectations of parents. It began with the question 'Who thinks that wearing a helmet while cycling to and from school is a good idea?', followed by the statement 'Parents like their sons and daughters to wear a helmet while cycling to and from school'.

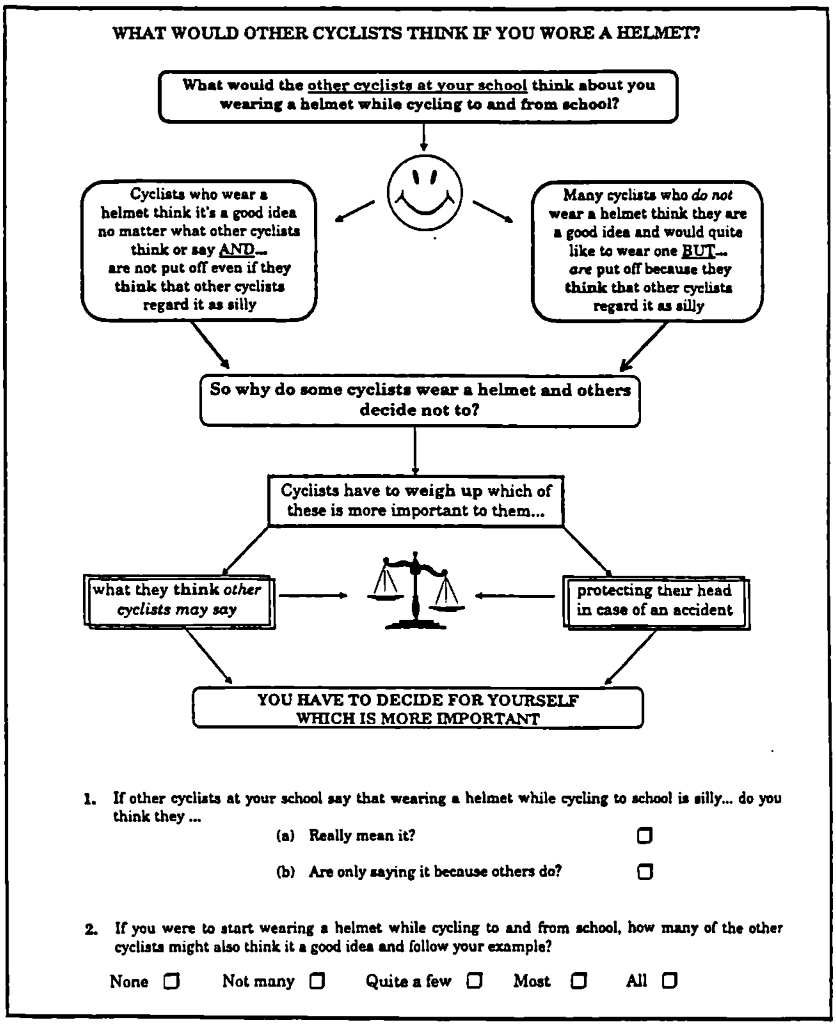
Figure 4.3: Persuasive message concerning normative belief 1: Perceived parental expectations



After this, three reasons were given in separate text boxes as to why parents like their children to wear a protective helmet. From these, arrows led to a box asking participants to rate these reasons in order of importance by writing

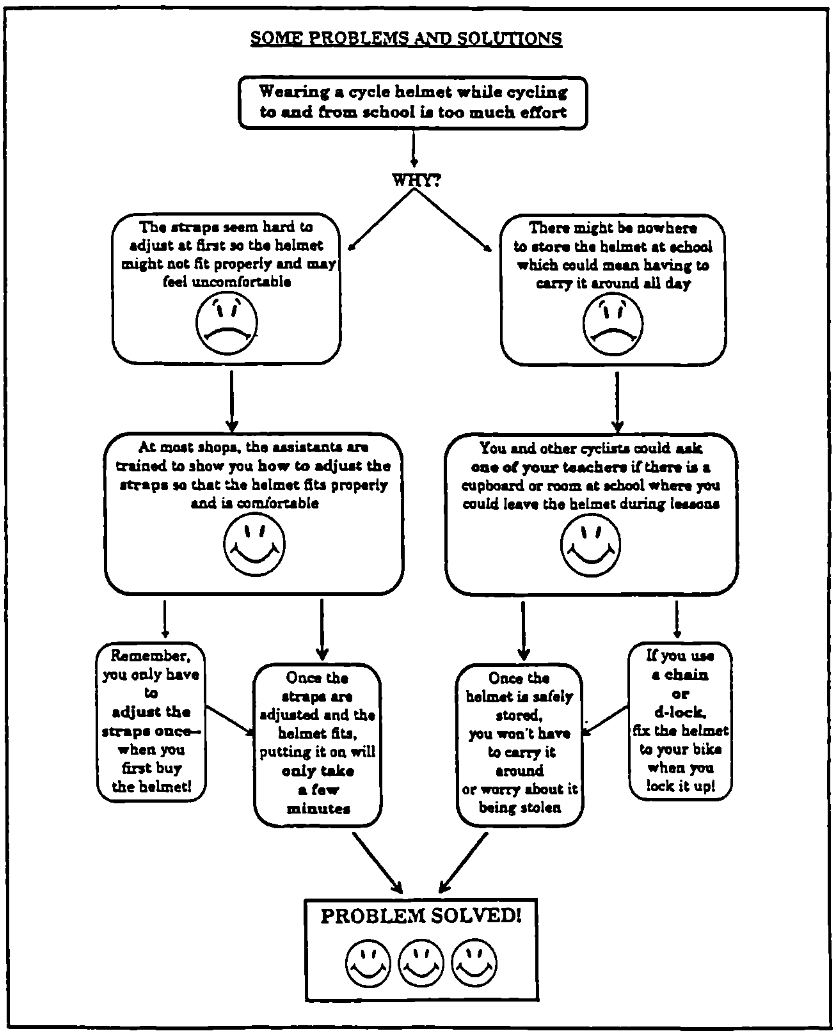
'1', '2' or '3' in spaces provided in another series of boxes containing abbreviated forms of the original statements. This exercise was designed to make cyclists reconsider and elaborate on the reasons why parents would worry less; In considering the relative importance of these three reasons, respondents would have to formulate and 'weigh up' a series of arguments in favour of each one. Lastly, there was a direct question asking respondents how much their parents would worry less if they were to wear a helmet while cycling to and from school. Again, this question was included to stimulate an active consideration of the main issue.

Figure 4.4: Persuasive message concerning normative belief 2: The expectations of other cyclists



The second clearly related to the perceived normative expectations of other cyclists (Figure 4.4) at the respondents' school to their use of a helmet. It was headed by the question 'What would other cyclists think if you wore a helmet?' followed by the question 'What would the other cyclists at your school think about you wearing a helmet while cycling to and from school?'.

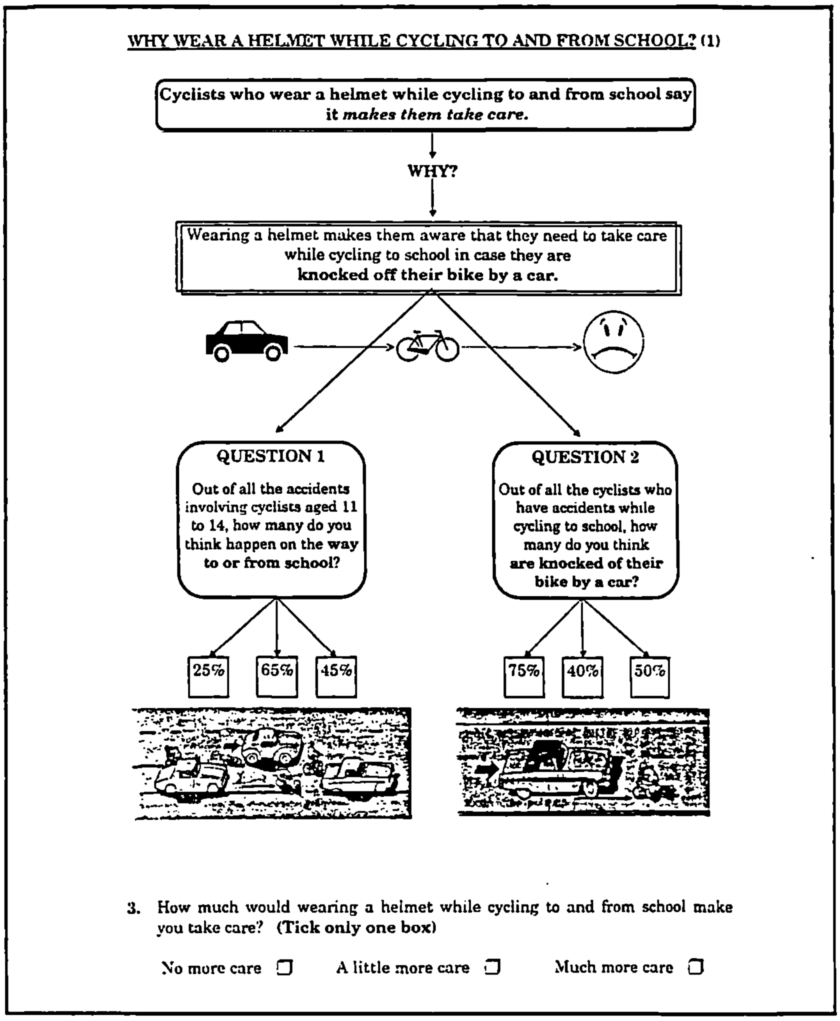
Figure 4.5: Persuasive message concerning control beliefs 1 and 2: Impediments to helmet use



The third chart, shown in Figure 4.5, was concerned with the impediments to helmet use affecting perceptions of behavioural control and was designed to encourage respondents to consider suggested ways to overcome these problems. The remainder of the page was intended to make participants consider the possible reactions of other cyclists and the reasons behind these and aware of the choice to be made when considering helmet use. These deliberations were further encouraged by two questions at the end of the chart. The emphasis of this chart was that each cyclists should make a choice about whether or not to wear a helmet bearing in mind that the expressed negative reaction of other cyclists may not reflect what they actually think. The chart was headed by the general statement 'Some problems and solutions', followed by the statement 'Wearing a helmet while cycling to and from school is too much effort'. After this arrows pointed to two text boxes one of which concerned the problem of adjusting the straps and the other, having nowhere to store the helmet at school. Arrows then led from each of these to two further text boxes offering possible solutions to these problems and finally to another four text boxes pointing out the outcomes of following this advice. The questions designed to encourage an active consideration of these messages were on the next page (see appendix 3.1).

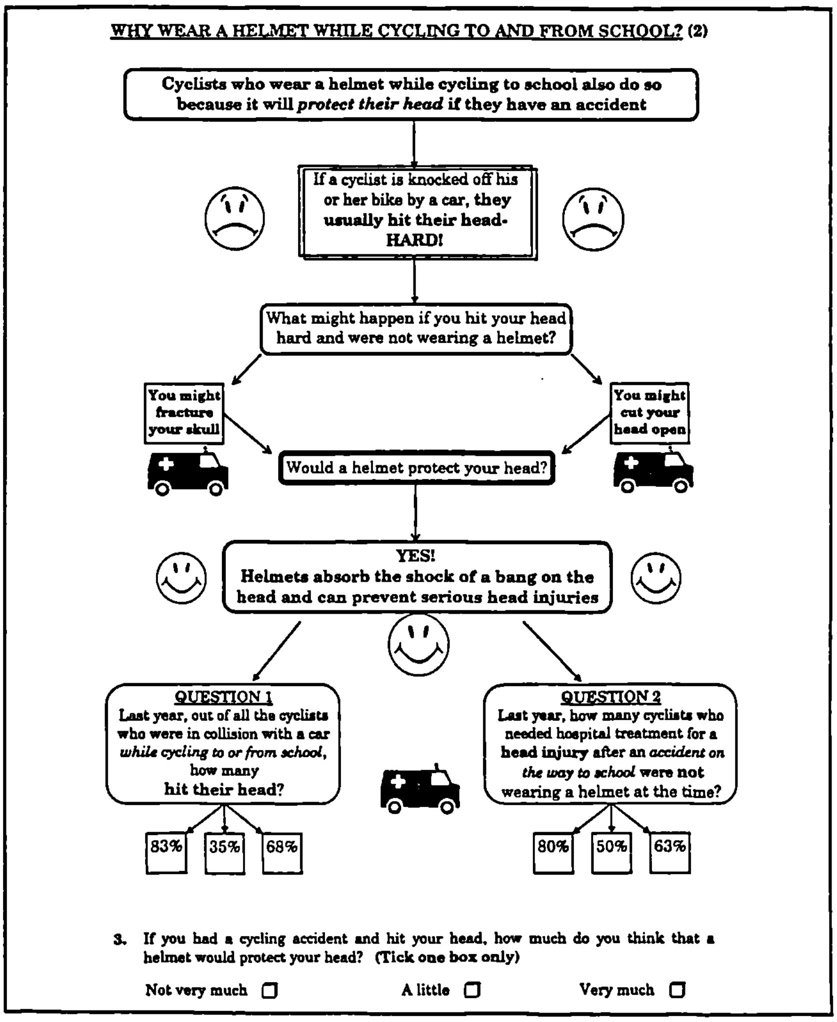
The last two charts were concerned with the positive behavioural outcomes associated with helmet use, 'taking care' and 'being protected in an accident' (Figures 4.6 and 4. 7 respectively). Both charts were headed by the statement 'Why wear a helmet while cycling to and from school'. The first contained a text box with the statement 'Cyclists who wear a helmet while cycling to and from school say it makes them take care'. The remainder of the page consisted of a flow chart with arrows leading firstly to a text box stating the reason why cyclists believe that helmet use makes them take care and then to two boxes containing specific questions about the location of cycling accidents and the outcomes of bicycle–motor vehicle collisions. These questions asked respondents to consider the general vulnerability of school–age cyclists to accidents and were included to ensure that the response to the two issues contained in the previous boxes was cognitive rather than emotional. Lastly, a direct question encouraged an active consideration of the central issue.

Figure 4.6: Persuasive message concerning behavioural belief 1: 'taking care'



The next chart was very similar but was designed to encourage cyclists to consider the possible outcome of not wearing a helmet and the effectiveness of helmets in preventing such outcomes. The first text box thus focused attention on the possibility that cycling accidents involving bicycle–car collisions could result in the cyclist hitting his or her head and that as a result, head injury might occur. Next, two more text boxes described possible outcomes of such an accident after which a positive statement about the efficacy of helmet use was given. As with the previous chart, two questions focused attention on the likely outcomes of bicycle–car collisions and the probability of incurring head injury. These were again intended to encourage a rational response to the central issues rather than an emotional one.

Figure 4.7: Persuasive message concerning behavioural belief 2: 'protecting one's head'



At the end of the chart, a direct question asked participants to consider the amount of protection they thought a helmet would provide if they were to hit their head in an accident. This was intended to encourage a consideration of the issues covered by the persuasive message – bicycling accidents and the consequences of hitting one's head if not wearing a protective helmet.

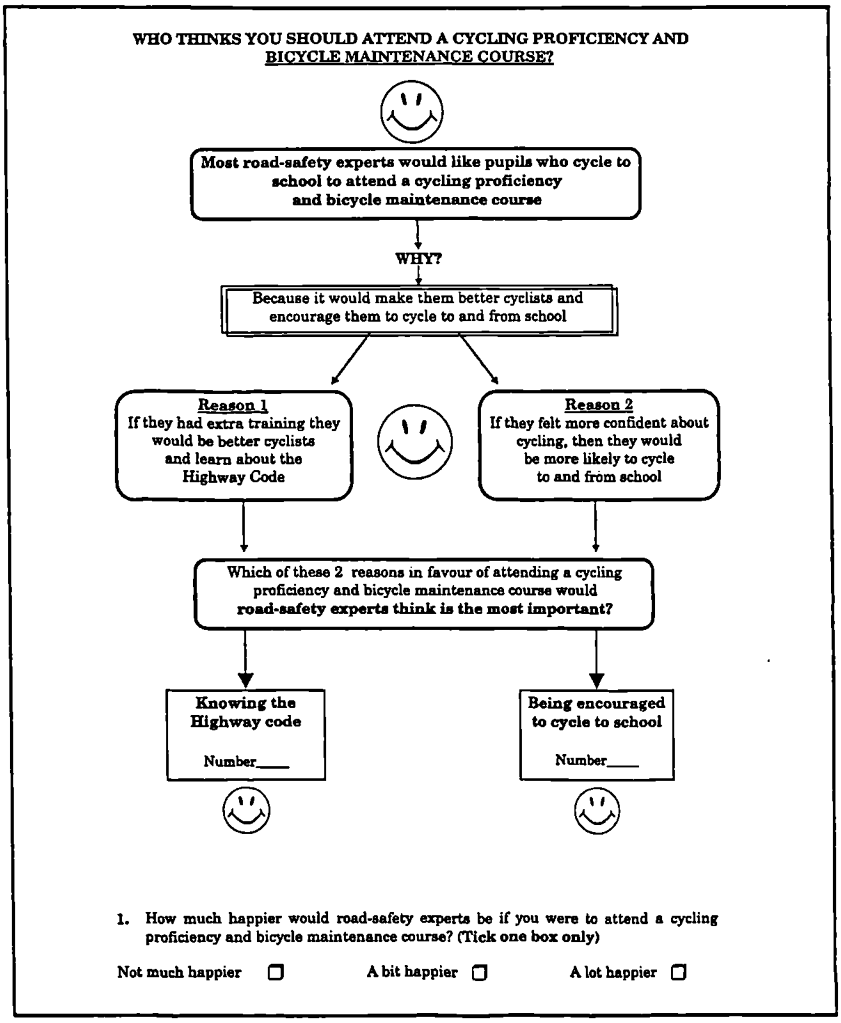
Control condition booklets

The booklet designed for the *control condition* , concerned the (hypothetical) 'cycling proficiency and bicycle maintenance course' and was designed to mimic the experimental booklet by presenting persuasive messages about the behavioural and normative outcomes associated with attending such a course and solutions to practical difficulties that this attendance might cause. These messages took the form of flow–charts similar to the ones used in the experimental booklet.

The first two charts dealt with the normative expectations of two reference groups with respect to course attendance, 'road–safety experts' and 'other cyclists' (respectively) and were designed to mimic the experimental group's persuasive message relating to the normative expectations of parents and other cyclists concerning helmet use while cycling to and from school. The first, reproduced in figure 4.8, concerned the first referent group, 'road–safety experts' and corresponded to the chart presented to the experimental participants concerning parental expectations. This chart was headed by the statement 'Who thinks you should attend a cycling proficiency and bicycle maintenance course?', followed by the statement 'Most road–safety experts would like pupils who cycle to school to attend a cycling proficiency and bicycle maintenance course'. After this, respondents were required to read and respond to a flow chart consisting of a series of text boxes and questions designed to encourage active consideration and elaboration of message.

The second chart, reproduced in Figure 4.9, concerned the normative expectations of a second reference group towards attending the proposed course, other cyclists, and corresponded to the chart used in the experimental booklet relating to the expectations of other cyclists towards helmet use. This chart drew attention to the possible reactions of other cyclists if respondents were to attend the proposed 'cycle proficiency and bicycle maintenance course' and some of the reasons for these reactions. The emphasis was on personal choice and weighing up the 'pros and cons' of attendance.

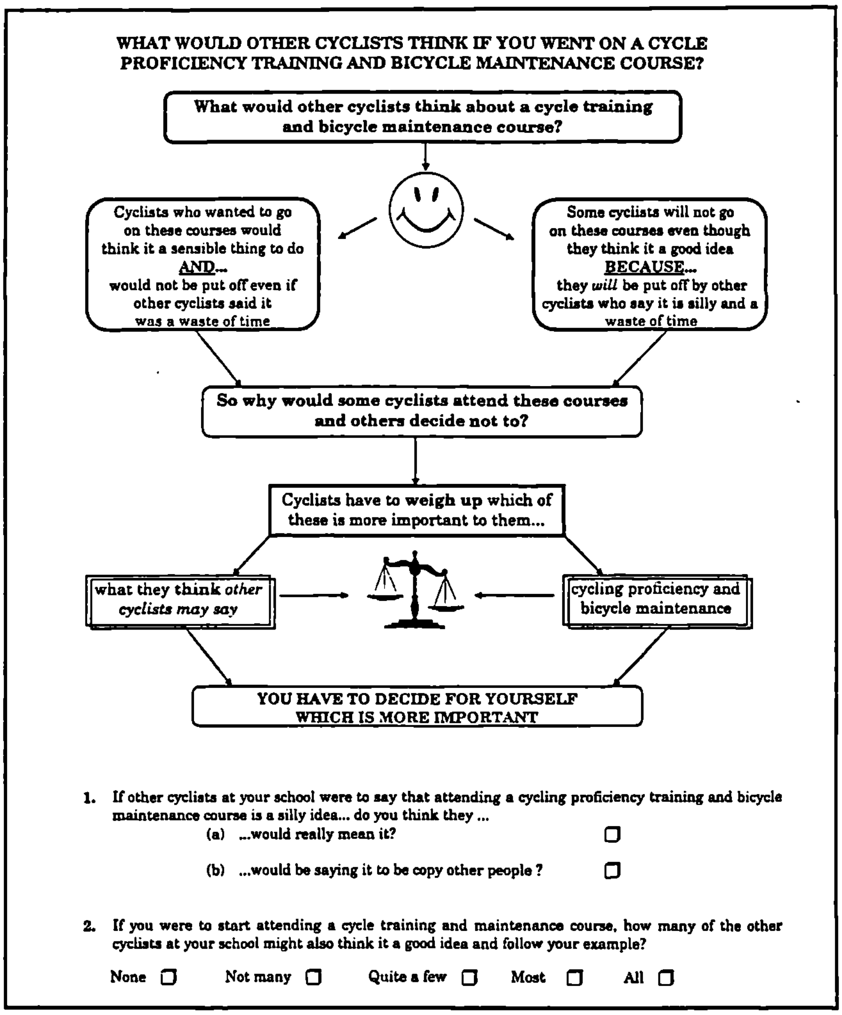
Figure 4.8: Control condition message chart relating to the normative expectations of road-safety experts



The third and fourth charts (see Figures 4.10 and 4.11) concerned practical impediments and behavioural outcomes (respectively) and corresponded to the charts used in the experimental booklet concerning control beliefs (Figure 4.5) and outcome expectancies (Figures 4.6 and 4.7) with respect to helmet use.

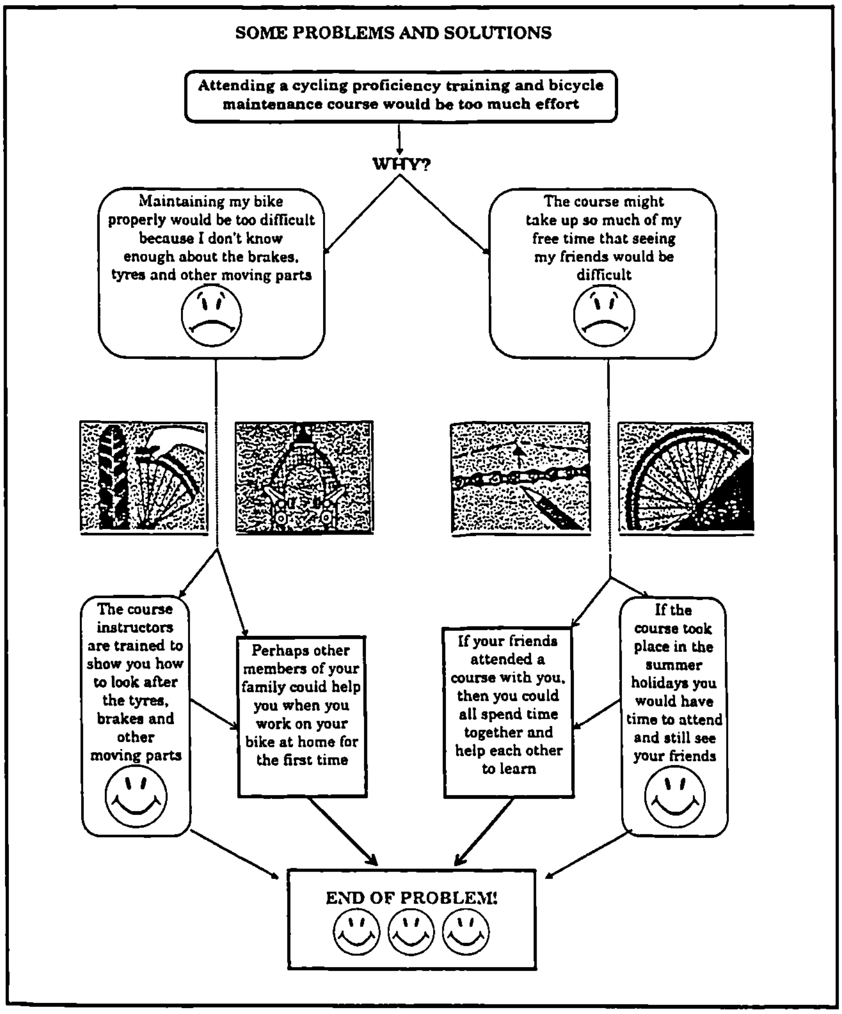
The first of these concerned 'Some Problems and Solutions' and provided some solutions to impediments that might have otherwise prevented cyclists from attending the 'cycle proficiency and bicycle maintenance course'.

Figure 4.9: Control condition message chart relating to the normative expectations of other cyclists



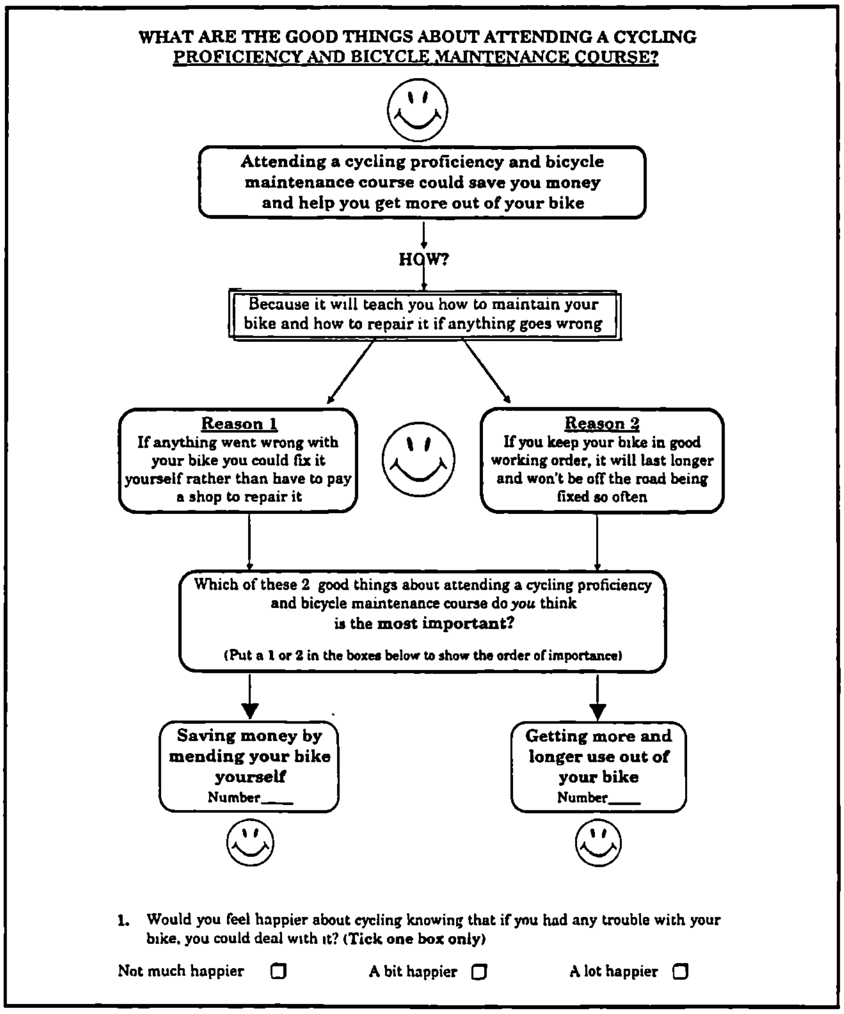
This chart, reproduced here in Figure 4.10, was designed to mimic the persuasive message chart in the 'experimental' booklet relating to the two control beliefs, that is, the impediments to helmet use (Figure 4.5) and possible solutions to these difficulties.

Figure 4.10: Control condition message chart relating to 'practical impediments' (i.e. control beliefs)



The final chart was concerned with 'behavioural outcomes' by way of a consideration of the 'Good Things' about attending the proposed cycle proficiency and maintenance course. This was intended to imitate the two persuasive message charts (presented to the 'experimental' group) relating to the two behavioural outcomes associated with helmet use – taking care and protecting one's head (see Figures 4.6 and 4.7). This chart is reproduced in Figure 4.11 from which it can be seen that it concerns two issues in the same chart rather than using a separate chart for each issue.

Figure 4.11: Control condition message relating 'to perceived behavioural outcomes'



Evaluation questionnaires

Three variations of the same questionnaire booklet were designed for use as a preliminary assessment instrument and to evaluate the persuasive attempt at post test and follow up (see appendices 3.5, 3.6. and 3.7). These questionnaires assessed beliefs about helmet use while cycling to and from school and focused upon the attitudinal and belief variables used to inform the persuasive communications. They also obtained information about age, gender, helmet ownership and use and about cyclists' intentions and expectations regarding helmet use. The first version of the questionnaire was used in the preliminary assessment survey to obtain demographic information (i.e. age and sex), to identify cyclists who wore a helmet while cycling to and from school and to assess beliefs about wearing a helmet while cycling to and from school. The second version of the questionnaire was used as both a post–intervention evaluation questionnaire completed immediately after participants had completed the intervention tasks and to confirm that no participants wore a helmet while cycling to school. The third version was used five months later as a follow up evaluation of beliefs and behaviour. In all three questionnaires, the measures relating to subjective beliefs utilised seven point scales with individual items presented as statements that participants responded to by indicating their degree of agreement or disagreement. Helmet use and ownership items were presented as simple yes/no questions. Details of the assessment/evaluation questionnaire are given below.

Time 1 preliminary assessment questionnaire (appendix 3.4)

Three items asked participants if they cycled to and from school, whether or not they owned or had use of a helmet and whether they wore a helmet while cycling to and from school. All used a simple yes/no questions. Four items assessed participants' endorsement of the relevant normative beliefs (i.e. 'My parents/'Most of the other cyclists at my school ... think that I should wear a helmet while cycling to and from school') and their corresponding evaluation ratings or 'motivations to comply' (i.e. 'Generally speaking, I want to do what my parents/most of the other cyclists at my school ... think I should do'). Three items concerned anticipated and actual behavioural control. The two control belief items assessed the influence of specific impediments to helmet use (i.e. 'Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because adjusting and/or doing up the straps is too much effort' and 'Even if I wanted to, I might not be able to wear a helmet ... because there would be nowhere to put it during lessons'). A third item ('For me to wear a helmet while cycling to and from school would be ... *easy–difficult*') assessed participants' perceptions of behavioural control using a measure recommended by Ajzen and Madden (1986). Lastly, four items assessing the two behavioural beliefs focused on in the persuasive messages. Two items concerned the belief strength or outcome expectancies (i.e. 'My wearing a helmet while cycling to and from school would ... make me take care'/'protect my head if I had an accident'), and two items, their corresponding evaluation ratings (i.e. 'Taking care/Protecting my head ... while cycling to and from school is ... *good – bad*'). All items other than the two control belief items were scored so that a high score indicated a positive endorsement of the belief referred to. The control belief items were reverse scored since agreement with these indicated low behavioural control.

Time 2 post–intervention evaluation questionnaire (appendix 3.5)

At Time 2, an amended version of the same questionnaire was used immediately after the intervention to evaluate the effects of the persuasive messages. This assessed participants beliefs about helmet use using the same questions presented in the assessment questionnaire although this time, two extra items were used to evaluate the importance of the impediments to helmet use (the belief–based measures of behavioural control) [47] (i.e. 'The effort involved in doing up/adjusting the straps on my helmet a helmet is ... *good – bad*'), while the second evaluated the problem of having nowhere to store the helmet (i.e.' having nowhere to store the helmet during lessons is ... *good – bad*'). Two items asked participants about their behavioural intentions ('I intend to wear a helmet while cycling to and from school at some time in

[47] This procedure has been suggested by Conner and Norman (1994) and tested empirically by Valois et al (1992).

the future') and behavioural expectations (e.g. 'I expect to wear a helmet while cycling to and from school at some time in the future'). There was also an item asking whether a helmet was worn when cycling to school.

Time 3: Five–month follow–up evaluation questionnaire (appendix 3.6)

The third questionnaire was identical to that used at the post–intervention session and assessed the same behavioural, normative and control beliefs as the previous questionnaire using the same format. It also repeated the two behavioural intention/expectation items.

Procedure for the intervention

Presenting the persuasive communication

At each school, participants were seated four or five to a table so that pupils at half of the tables could be assigned to the experimental condition and half to the control condition. An experimenter (the table leader) sat at each table and was responsible for dealing with any queries and ensuring that participants completed the tasks properly. To ensure uniformity across the different tables of children, each table leader was issued with two written guides, one for use with the experimental booklet (see appendix 3.3) and the other for use with the Control booklet (see appendix 3.4), detailing the purpose of each chart and the answers to any specific questions concerning accidents and injury. Each participant was then given either an experimental or a control booklet depending upon the designation of their table and, after a brief introduction, asked to complete the first task. Participants were then asked to read through the six flow charts in turn with their table leader and completed any tasks they were required to do. Participants were encouraged to discuss issues and queries with the experimenter as the group worked through the charts. As well as encouraging cyclists to think about the messages contained in the flow charts rather than 'skip' though the text and answer the questions automatically, this procedure also had the benefit of ensuring that pupils worked through their booklet at the same pace as others at their table. Approximately five minutes was allowed for participants to read and respond to each message (i.e. five minutes each for pages 1, 2, 5 and 6 and ten minutes for page 3 and the accompanying questions on page 4).

The second task in the same booklet consisted of the 'thought listing' procedure designed to encourage the pupils to recall and elaborate upon the information presented in the persuasive messages. Participants in the experimental condition were asked firstly to list 'other people' who might also think it a good thing if they were to wear a helmet while cycling to and from school. This was to encourage participants to consider the normative expectations of significant others and in particular, the expectations of those others referred to in the persuasive communication. Similarly, with the same strategy in mind, participants were then asked to think of solutions to the practical problems and inconvenience associated with wearing a helmet while cycling to and from school. Lastly, participants were asked to list as many 'good things' about helmet use while cycling to and from school (i.e. behavioural outcomes). Pages with brief instructions were provided for these lists with lined spaces set out to indicate where participants should write their responses (see appendix 3.1). These spaces were set to encourage the children to consider more than one response. There was one page for the two normative beliefs, one for the two behavioural beliefs and one for each of the two control beliefs (impediments). Each page was clearly labelled so that the first obviously related to 'other people', the second and third to 'possible solutions' and the fourth to 'good things'. In the control condition, participants were asked to complete the same lists but in relation to the proposed cycle proficiency and bicycle maintenance course. The first list required participants to write down names of 'other people' who also thought that they should attend a cycle proficiency and bicycle maintenance course', the second to write down possible solutions to the problems associated with attending such a course, and the third, with writing 'good things' about attending the course (see appendix 3.2).

After this, participants handed their completed booklets to their table leader and were given a chocolate bar. They then commenced upon the third task. This was a collaborative task intended to further encourage participants to think about – that is to rehearse and elaborate upon – the arguments presented in the persuasive messages. In the experimental condition, it involved participants compiling one list per table of (i) 'other people who thought they should wear a helmet' (ii), possible solutions to the problems of 'storage and straps' and (iii) 'good things about helmet use'. In the control condition, it involved participants compiling one list per table of (i) 'other people who thought they should attend a cycling proficiency and bicycle training course' (ii), 'possible solutions to the problems of learning about bicycle maintenance and attendance' and (iii) 'good things about attending a cycling proficiency and bicycle training course'. Participants were instructed firstly to compile these lists using the individual lists they had written out earlier (during the second task), secondly to put them in order of importance and lastly, to include all of the ideas written by all group members. The point of this task was to encourage a group discussion in which participants would have the opportunity of explaining their ideas to other group members and defending them against criticisms if for example, there was disagreement amongst the group as to the order of importance of particular referents/solutions/good things. This was to allow further opportunity for the cyclists to elaborate their own thoughts and to actively consider/become aware of those of other cyclists. Each of these lists were compiled under the guidance of the table leader whose role was to lead the discussion, ensure that each participant had their say, and to write out the lists using a separate sheet for each list. [48]

After this group task, the booklets and response sheets were collected by the experimenter and each participant, whether in the control or the experimental condition, given a 'belief evaluation' questionnaire booklet to complete (see below). Participants were instructed to complete this questionnaire on their own and in silence. They were supervised in this task by the experimenter at their table. Once this questionnaire was completed, participants were given a second bar of chocolate, thanked, dismissed and sent back to their normal lessons. If an explanation of the study was given to any of the participants after this session, care was taken not to compromise the validity of the forthcoming final evaluation session. [49]

Presenting the preliminary assessment and five month follow up evaluation questionnaires

The same procedure was followed for the initial assessment session and for the five month follow up sessions. At each school participants completed their questionnaires in a single session during school hours in a room set aside for that purpose. They were seated at desks or tables with care being taken to ensure that they did not sit too closely together. Questionnaires were handed out to each participant and instructions given that they were to write their name and age in the spaces provided. Each session began with a brief introduction during which participants were told that they were taking part

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[48] These lists were included in the guide booklets used by the research assistants rather than being handed to participants. The lists used in the experimental condition can be seen in appendix 10, pp. 9 – 14. The lists used in the control condition can be seen in appendix 11, pp. 8 – 13.

[49] There are two points to note here. Firstly, because the experimental session lasted for an hour, participants were expected to return to their lessons immediately afterwards. There was thus little time in which to give feedback. Secondly, participants were not told that there was to be a final evaluation session some months later since this might have influenced their behavioural choices. Any feedback was given with this in mind.

in a cycling survey. They were not told at Time 1 that there was to be a second session at a later date. and did not know that there would be a third questionnaire session at Time 3. An explanation of the questionnaire and question format was given and an assurance that all information was confidential. It was stressed that the questionnaire was not a test and that there were no right or wrong answers for many of the items. Participants were then asked to complete the questionnaire in silence and to raise their hand if they had any queries. Completed questionnaires were either left face down on the desks for collection or handed to the experimenter by respondents before they left the room. At the end of the third session, it was explained that the survey was concerned with the reasons why cyclists either did or did not wear helmets while cycling to school. Manipulating beliefs was not mentioned since this may have discouraged cyclists who now intended to wear a helmet, or who actually did wear a helmet, from doing so. Data from the post–intervention and five–month follow up evaluation questionnaires (used at Time 2 and Time 3) were then collated and analysed using a mixture of univariate and multivariate statistical techniques, reported in the next section. None of the data from the persuasive message tasks was analysed.

Time 1 (Preliminary assessment)

189 boys and 51 girls took part in the preliminary assessment session and completed a questionnaire concerning their pre–intervention beliefs and behaviour. One school withdrew its (55) pupils from the study and staff at four other schools asked that cyclists over the age of 14 (33 boys and 7 girls) were excluded from further involvement (due to logistic problems). Of the original 240 cyclists, this left 27 girls and 118 boys. A further 33 cyclists were then excluded from future involvement after declaring themselves to be helmet users. After these adjustments, 112 cyclists were considered suitable to take part in the intervention and arrangements made to involve these

children in the intervention session at Time 2 and the follow up evaluation session at Time 3.

Time 2 (Intervention session)

Due to absenteeism, 104 cyclists took part in the intervention and were randomly assigned to either a control (n = 49) or experimental (n = 48) condition. Data from seven of the 104 was discarded (three had rendered one or both of their questionnaires unusable and four said they wore helmet while cycling to school) leaving data from 97 participants (75 boys and 22 girls) to be collated. It is the analysis of this data which is reported here.

After working through their respective booklets, containing the persuasive messages, participants then completed the post–intervention evaluation questionnaire. The sample at this stage ranged in age from eleven to fourteen years with a mean of 12.3. Eighteen of the participants were aged 11 and nine were aged 14. Seventy were aged 12 or 13. Boys had a marginally higher average age than girls – 12.4 as opposed to 12.3. Both sexes were equally represented in all age groups. Fifty one of the participants – 52.6% of the overall sample – owned or had use of a helmet with girls showing a proportionally higher rate of helmet ownership (63.6%) than boys (49.3%).

Time 3 (Five month follow up)

Five months later at Time 3, the same participants completed the follow up evaluation questionnaire. At this time, fifty cyclists said they owned or had use of a helmet – 51.5% of the sample. Thirty were in the experimental group and twenty in the control group. Although helmet ownership amongst boys remained constant at 49.3% across the two sessions, it fell slightly amongst the girls with one less than at Time 2 claiming to own a helmet. Thirteen (59.1%) still owned or had use of a helmet at Time 3. Twelve participants in the experimental group (7 boys and 5 girls) said they wore a helmet while cycling to and from school, eleven of whom had owned a helmet at Time 1 (6 boys and 5 girls). None of the control group wore a helmet at Time 3.

Construction of measures

As a first step, composite variables were created from their constituent items. The two subjective norms assessed were computed by multiplying each of the normative beliefs by the corresponding 'motivation to comply' items. All four items were scored from 1 to 7. The two behavioural beliefs were formed by multiplying each of the belief strength items (scored from 1 to 7) by their corresponding evaluation (scored –3 to –1 and +1 to +3 with a midpoint of zero). Finally, the two control beliefs were computed by multiplying each of the control belief items by their corresponding evaluation items. These four items all used seven point unipolar scales.

RESULTS

Differences in beliefs between control and experimental participants

The first step in the analysis was to investigate the effects of the intervention on beliefs across times of assessment. This was done by examining differential effects by group, that is, whether participants in the experimental group positively endorsed the behavioural, normative and control beliefs associated with helmet use more than control participants. A series of two–way–repeated measures ANOVAs were performed (i) to examine the differences between the control and experimental groups on the attitudinal and belief variables presented at Time 2 and at Time 3; (ii) to determine whether these differences would remain constant over time; and (iii) to identify any significant interactions between time and group. These findings

Table 4.2: Time 2 and Time 3 Beliefs, Intentions and Expectations By Experimental Group (control or experimental group)

	Means								F Ratios		
	Time 2				Time 3						
	Exp (n = 48)		Con (n = 49)		Exp (n = 48)		Con (n = 49)				
	mean	s.d	mean	s.d	mean	s.d	mean	s.d	Group	Time	Interaction
Intention											
I intend to wear a helmet while cycling to and from school at some time in the future	4.2	2.1	3.2	1.9	3.8	2.0	2.9	2.1	6.7*	3.2	0.2
Expectation											
I expect to wear a helmet while cycling to and from school at some time in the future	4.6	2.2	3.1	1.9	4.0	2.2	3.0	2.1	11.6***	2.0	1.3
Subjective Norm 1											
My parents think that I should wear a helmet while cycling to and from school	29.2	13.2	18.2	14.2	24.9	12.9	17.0	12.9	15.8***	4.2*	1.5
Subjective Norm 2											
Most of the other cyclists at my school think that I should wear a helmet while cycling to and from school	14.7	15.4	8.9	9.8	12.0	10.4	8.6	8.2	5.3*	1.8	1.2
Control Belief 1											
Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because adjusting and/ or doing up the straps is too much effort	21.4	14.3	14.3	10.3	21.3	3.3	13.5	8.7	13.1***	0.1	0.1
Control Belief 2											
Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because there is nowhere to keep it during lessons	10.6	8.2	9.4	9.9	11.3	10.3	9.8	11.4	0.7	0.2	0.0
Perceived Behavioural Control											
For me to wear a helmet while cycling to and from school would be ... (difficult-easy)	4.8	1.8	3.8	2.1	4.5	1.9	3.7	1.9	6.5*	2.0	2.8
Behavioural Belief 1											
My wearing a helmet while cycling to and from school would make me take care	10.9	9.0	8.5	6.6	8.5	6.6	4.9	7.8	11.3***	3.6	2.6
Behavioural Belief 2											
My wearing a helmet while cycling to and from school would protect my head if I had an accident	11.6	10.4	11.2	11.8	12.9	9.3	10.4	11.0	0.6	0.0	0.9

* $p < 0.05$ *** $p < 0.001$ Exp = Experimental   Con = Control

are shown in Table 4.2. It can be seen that all but two of the nine measures revealed a significant main effect dependent on group. There were no interaction effects and only one item, Subjective Norm 1, showed a main effect for time. This strongly suggests that group was the major source of variance and reliably accounted for the differences in beliefs between the two groups.

If we examine the differences between groups for the individual beliefs, it can be seen that there was a significant difference between groups in the endorsement of both Subjective Norms across times of assessment. The largest effect is for Subjective Norm 1 ($F = 15.8$, $df = 1{,}95$; $p < 0.001$) suggesting firstly, that message recipients and control participants differ widely on their perceptions of parents wishes and secondly, that message recipients endorsed this belief more than control participants and were more likely therefore to be influenced with respect to helmet use by the normative expectations of their parents. The size of this effect had evidently decreased by Time 3 reflected in the main effect for time shown by the analysis of variance ($F = 4.2$, $df = 1{,}95$; $p < 0.05$). However, a within-group post hoc test (using Fisher's *lsd*) revealed that the difference between groups remained significant at both Time 2 ($t = 3.3$, $df = 95$; $p < 0.01$) and at Time 3 ($t = 2.3$, $df = 95$; $p < 0.05$). The significant main effect for group on Subjective Norm 2 ($F = 5.3$, $df = 1{,}95$; $p < 0.05$) suggests that experimental participants, more than control participants, believed that other cyclists supported their use of a helmet while cycling to and from school. As with Subjective Norm 1, the level of endorsement amongst message recipients fell in the five months between Time 2 and Time 3 towards that seen amongst the control group. There was also a significant difference between groups in the endorsement of Control Belief 1 ($F = 13.1$, $df = 1{,}95$; $p < 0.001$) across times of assessment. This main effect for group suggests that the persuasive message regarding the difficulty of doing up and adjusting the helmet straps was effective in lessening the salience of this problem amongst message recipients (relative to control participants).[50] There was however, no significant difference between groups with respect to the levels of endorsement for control belief 2 suggesting that the persuasive message was not effective in reducing the salience of this belief. Both groups equally and positively endorsed having nowhere to store the helmet as a significant barrier to helmet use.

Table 4.2 also shows a significant main effect for group on Behavioural Belief 1 ($F = 11.3$, $df = 1,95$; $p < 0.001$) suggesting that as a result of the persuasive message, experimental participants were significantly more likely than control participants to believe that wearing a helmet while cycling to and from school would make them take care. Across times of assessment, both groups show a fall in levels of endorsement and this is greater amongst the experimental group. The experimental group nevertheless returned a higher mean score than the control group. There was no main effect for behavioural belief 2 ('My wearing a helmet while cycling to and from school would protect my head') with both groups positively endorsing this behavioural outcome. Experimental participants did however show marginally higher mean scores than control participants across times of assessment indicating a slight experimental effect.

There were also significant differences between experimental and control groups across times of assessment for the intention 'to wear a helmet while cycling to and from school at some time in the future' ($F = 6.7$, $df = 1,95$; $p < 0.05$). It can be seen that behavioural intentions became less positive amongst the experimental group over time though this change was not significant

[50] These items were reverse scored in the analysis: a high score indicates high perceived control.

largely due to a similar fall in intentions amongst the control group. There was also a significant main affect for group on the item 'Do you expect to wear a helmet ... at some time in the future' ($F = 11.6$, $df = 1,95$; $p < 0.001$). This suggests that by raising the salience of beliefs about behavioural and normative outcomes and enhancing perceptions of behavioural control, the persuasive advocacy led to the formation of positive behavioural intentions and expectations amongst message recipients. Despite falling from post–intervention levels, these remained positive five months later and were notable higher amongst message recipients.

Differences in behaviour at Time 3

The next step was to determine whether there were any changes in behaviour at the five month follow up. This analysis examined the hypothesis that the persuasive advocacy would lead to an increase in helmet use amongst the experimental group through its influence on beliefs. To investigate any association between helmet wearing at Time 3 and experimental group at Time 2, a chi square test was performed (Table 4.3).

The result revealed a significant association between experimental group and helmet use (Chi square = 11.8; $df = 1$, $p < 0.001$). Of the 48 experimental participants who received the persuasive messages, 25% wore a helmet at Time 2. Of the control group who did not receive these messages, none wore a helmet, a highly significant difference indicating that the persuasive advocacy presented to the experimental participants was effective in increasing helmet use. The question this poses is, can the differences in helmet use amongst the experimental group be explained by differences in levels of belief endorsement, that is, do the twelve experimental participants whose behaviour has changed, differ significantly in their beliefs from the experimental participants whose behaviour has remained the same? The final step in the analysis was to examine this question and determine whether changes in behaviour were supported by changes in beliefs.

Table 4.3: Number and percentage of cyclists wearing a helmet at Time 3 by experimental group

		Helmet use	
		Wears a helmet at Time 3	**Does not wear a helmet at Time 3**
Group	**Experimental Group** (n = 48)	12 (25%)	36 (75%)
	Control Group (n = 49)	0	49

Chi square = 11.8; df = 1, $p < 0.001$

Differences in beliefs between helmet wearers and non–wearers at Time 2 and Time 3

To determine whether helmet use was supported by the positive endorsement of salient beliefs and by positive behavioural intentions and expectations, a series of individual t–tests (using student's t) were computed to examine the differences in mean scores between helmet users and non–

users. These are shown in table 4.4. It can be seen that helmet users had significantly more positive intentions and expectations than non–users and also endorsed five of the seven expectancy–value beliefs significantly more than non-users. In fact, the beliefs associated with helmet use amongst this group, are also those which significantly discriminated between control and experimental participants in the analysis of variance. Helmet users were significantly more likely than non–users to have a positive behavioural *intention* towards helmet use (at some time in the future) at both Time 2 ($t = 2.8$, $df = 46$; $p < 0.01$) and Time 3 ($t = 4.4$, $df = 46$; $p < 0.001$). They were also significantly more likely than non–users to have a positive *expectation* towards helmet use (at some time in the future) at Time 2 ($t = 2.2$, $df = 46$; $p < 0.05$) and Time 3 ($t = 3.6$, $df = 23.9$; $p < 0.001$). These increases suggest that positive intentions do arise from salient beliefs about the attitude object and that raising the salience of beliefs about the outcomes of helmet use is effective in promoting intentions to use a helmet. That these increase over time suggests a change in the underlying belief structures.

With respect to the two subjective norms, helmet users were significantly more likely than non–users to endorse the belief that parents would want them to wear a helmet. This was true at Time 2 ($t = 3.4$, $df = 46$; $p < 0.01$) and more so at Time 3 ($t = 4.1$, $df = 46$; $p < 0.001$) indicating that the perceived normative expectations of parents increased in importance over time. Although helmet users were also significantly more likely than non–users to perceive normative support for their helmet use from other cyclists ($t = 2.6$, $df = 46$; $p < 0.05$), this is only true at Time 2. This indicates that the perceptions of other cyclists' reactions has altered with experience of helmet use. Two other beliefs showed this same pattern. Helmet users were significantly *less* likely than non–users ($t = 2.0$, $df = 46$; $p < 0.05$) to endorse Control belief 1 (which concerned the problem of adjusting the straps) and significantly *more*

Table 4.4: Differences between Helmet Users and Non–Users in the experimental group only at Time 2 and Time 3.

	Time 2					Time 3				
	Helmet users (N = 12)		Non–users (N = 36)			Helmet users (N = 12)		Non–users (N = 36)		
	Mean	s.d.	Mean	s.d.	t	Mean	s.d.	Mean	s.d.	t
Intention										
I intend to wear a helmet while cycling to and from school at some time in the future	5.6	1.7	3.8	2.1	2.8**	5.7	1.6	3.2	1.7	4.4***
Expectation										
I expect to wear a helmet while cycling to and from school at some time in the future	5.8	1.8	4.2	2.2	2.2*	5.7	1.7	3.5	2.1	3.6***
Subjective Norm 1										
My parents think that I should wear a helmet while cycling to and from school	39.3	10.3	25.9	12.2	3.4**	36.4	10.4	21.0	11.5	4.1***
Subjective Norm 2										
Most of the other cyclists at my school think that I should wear a helmet while cycling to and from school	24.2	16.1	11.6	14.0	2.6*	16.3	14.5	10.6	8.4	1.3
Control Belief 1										
Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because adjusting and/ or doing up the straps is too much effort	28.3	15.3	19.1	13.4	2.0*	23.1	13.8	20.7	13.3	0.5
Control Belief 2										
Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because there is nowhere to keep it during lessons	10.2	7.7	10.8	8.5	−0.2	13.3	13.9	10.6	8.9	0.8
Perceived Behavioural Control										
For me to wear a helmet while cycling to and from school would be ... (difficult-easy)	5.6	1.6	4.6	1.8	1.7	5.3	1.8	4.0	1.9	2.1*
Behavioural Belief 1										
My wearing a helmet while cycling to and from school would make me take care	15.8	6.7	9.4	9.2	2.7*	10.7	5.8	7.7	6.7	1.4
Behavioural Belief 2										
My wearing a helmet while cycling to and from school would protect my head if I had an accident	15.6	7.3	10.3	10.9	1.9	14.5	1.4	12.3	9.9	0.7

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

likely than non–users ($t = 2.7$, $df = 26.2$; $p < 0.05$) to endorse behavioural belief 1 (which concerned taking care) at Time 2 (immediately after the intervention) but not at Time 3 (five months later). By way of contrast, perceptions of behavioural control appear to increase over time with helmet users at Time 3 but not Time 2 significantly more likely than non–users to positively endorse the belief that wearing a helmet would be easy (as opposed to difficult). However, this effect is due to a decrease in perceptions of control amongst non–users over time. Even so, helmet users do perceive themselves to have greater control over helmet use than non–users – a belief sustained over time.

DISCUSSION

The study set out to evaluate a longitudinal intervention based upon the Elaboration Likelihood Model of Persuasion (Petty and Cacioppo, 1986a, 1986b) designed to increase the use of protective helmets amongst cyclists while cycling to and from school. Beliefs shown by the Theory of Planned Behaviour (Ajzen, 1985) to predict helmet use were used to inform a series of persuasive messages intended to change the beliefs and behaviour of young non–helmet wearing cyclists. The results show that the persuasive advocacy was successful in promoting a positive evaluation of the behavioural and normative outcomes of helmet use amongst message recipients compared to control participants and in decreasing the salience of factors affecting perceptions of behavioural control. Prior to the intervention, the randomisation check revealed that there were no significant differences between the groups on any of the measures. After the intervention, the experimental group were significantly more positive in their beliefs about, and intentions towards, helmet wearing while cycling to and from school than the control group. Analyses of variance revealed a significant main effect for experimental group on seven of the nine evaluation measures, one main effect for time and no interaction effects. These differences in belief endorsement were evident five months after the intervention, indicating lasting attitude change. As well as the positive behavioural intentions with respect to helmet use, there was a significant increase in helmet use in the experimental group but not the control group: 12 (25%) of experimental participants wore helmets but none of the control participants.

The effects of the intervention on beliefs about helmet use

Subjective norms

Across times of assessment, the experimental group were significantly more likely than the control group to endorse the beliefs that parents and other cyclists at their school would support their use of a helmet. This indicates that the persuasive messages based on these subjective norms effected an increased awareness of the normative expectations of specific referents with parental expectations being endorsed significantly more relative to the control group than the expectations of other cyclists. The message charts relating to these beliefs were first and second in order of presentation in the workbook used in the intervention and would thus have had the greatest impact. However, the influence of these messages is sustained over time suggesting that the experimental effect (belief change) can be attributed to the way in which the messages were presented and to the experimental procedure.

Parental expectations was one of the most powerful discriminators between the groups across times of assessment showing perhaps that normative considerations are of more importance to individuals when performing public behaviours than attitudinal beliefs (but see Brubaker and Fowler, 1990). Parker et al (1996), in their intervention based upon the Theory of Planned

Behaviour, found that messages concerning the normative beliefs of car drivers with respect to speeding, effected the most change compared to messages concerning behavioural and control beliefs. In the two previous studies reported in this thesis, the perceived expectations of referent others were consistently more influential than outcome expectancies. This pattern of results also reflects the findings of the two earlier studies in that parental expectations were more important than those of other cyclists. Pendergrast et al (1992) and Hu et al, (1994) have also found parents to be a powerful influence on children's helmet use although this influence was examined in terms of parental ownership and use rather than the children's perceptions of their wishes (see also Witte et al, 1993). However, a comparison of the studies carried out by Otis et al (1993) and Arnold and Quine (1994) does suggest that parental influence on school–related helmet use is greater than that of other cyclists and that the reverse is true of helmet use while play cycling. Both beliefs show a slight decrease in levels of endorsement over time with the mean score for the belief that other cyclists support helmet use, falling towards that of the control group. This is to be expected since wearing or considering wearing a helmet while cycling to and from school is likely to increase awareness of other cyclists' (real or anticipated) reactions.

Control beliefs

The groups differed in their endorsement of the control belief relating to the problems of adjusting and/or doing up the straps. Message recipients were significantly less likely than control participants to perceive difficulties in adjusting and/or doing up the straps as an impediment to helmet use. Given that the two groups showed no difference prior to the intervention, the persuasive message concerning this issue was clearly effective in increasing respondents' confidence in their ability to overcome this problem. Moreover, this level of endorsement remained at an elevated level (relative to the control group) across times of assessment. The success of the message in effecting a change in beliefs, probably derives partly from the quality of the persuasive message – which provided clear guidance on how to overcome this problem – and partly from the issue itself being highly salient among cyclists. In the preliminary survey used for the study reported in chapter 3, it is apparent that an inability to adjust the straps properly is associated with discomfort as well as being a nuisance and it is possible that many of the reasons given by cyclists for not wearing a helmet – such as discomfort (Elliot and Shanahan Research, 1986; DiGuiseppi et al, 1990; Lennie and Stevensen, 1992), it being a bother (Otis et al, 1992) and forgetting to put it on (DiGuiseppi et al, 1990) – may be a reflection of this problem. If this is the case, then cyclists who are deterred from wearing a helmet will be highly receptive to the message. The longitudinal study in the previous chapter certainly points towards this being a highly salient impediment to helmet use and one that should perhaps be focused upon more frequently in promotional campaigns. It is also possible that the persuasive message made public a difficulty that many children may have been too afraid to raise through fear of peer derision – that they have difficulty with adjusting the straps on their helmets. In this case, helmet owners would find it easier to seek advice from another cyclist.

There were however, no significant differences between groups on Control Belief 2, message recipients being no less likely than control participants to perceive carrying a helmet around during lessons (through having nowhere to store it) as a problem. The failure to persuade participants that they could overcome this problem may derive from the fact that this is a very real impediment (see Sissons–Joshi et al, 1994) and one not easily dealt with. Children in their first year of senior school may find the thought of approaching teaching staff too daunting. There were also comments on the evaluation questionnaires to the effect that chaining the helmet to one's bicycle is not a satisfactory solution since they may be vandalised. However, the mean score for message recipients increased over time suggesting that either levels of confidence increased or perhaps that some of the respondents had persuaded teaching staff at their schools to provide a safe place for them to store their helmets. The group mean also increased for this belief among the control participants over time. This might be due to the intervention having generated discussion at the participating schools or that cyclists who have begun wearing a helmet have shown that storing the helmet somewhere safe during lessons is not such a formidable problem.

Behavioural beliefs

Experimental participants, significantly more than control participants, endorsed the belief that wearing a helmet would make them take care. Although the persuasive message based on this particular behavioural outcome raised the level of its expected utility, there was no difference between groups on the belief that helmet use would make parents worry less. With respect to the first belief, the significance of the between group difference is due in part to the marked and unexpected decline in levels of endorsement among the control group. Immediately after the intervention, the control group positively endorsed the belief yet five months later were almost negative in their appraisal. It is possible that one of the messages regarding the bicycle proficiency and maintenance course raised the salience of this belief which then fell back to pre–intervention levels by the time of the second evaluation session. However, the level of endorsement of this belief is quite high amongst message recipients (both in absolute and relative terms) suggesting again that this particular behavioural outcome is salient for cyclists. Even so, no other researchers investigating or promoting helmet use amongst young cyclists have identified this belief as salient or have used it in an intervention and it is possible that it becomes subsumed under general issues of safety. The results of the intervention indicate that it is a belief, correctly identified by the Theory of Planned Behaviour, which is important to cyclists and should be focused on in interventions.

The belief that wearing a helmet would protect one's head in an accident was endorsed equally and positively by both groups although there was trend in the expected direction with message recipients endorsing the belief marginally more after the intervention and again five months later. Examination of the means shows that the experimental group mean increased over time. This might be due to the way in which the Elaboration Likelihood Model of Persuasion achieves attitude change. According to Petty and Cacioppo (1986a), central route processing of information should effect a change in personal beliefs. There is no reason why this change should be immediate. Nonetheless, it is disappointing that message recipients were not significantly different in their endorsement of this belief than control participants and again, one of the persuasive messages presented to the control group may have made this particular behavioural outcome highly salient.

Perceived behavioural control

The perception that wearing a helmet while cycling to and from school would be easy as opposed to difficult was endorsed significantly more by message recipients than control participants across times of assessment. Because this belief was not specifically targeted by the persuasive advocacy, it can be viewed as an evaluation of the efficacy of the two messages relating to the impediments to helmet use. It was argued earlier that these impediments constitute what Ajzen (1988) and Ajzen and Madden (1986) refer to as belief–based measures of control which inform overall perceptions of behavioural control. In effecting change in perceptions of behavioural control, the intervention reported here supports this contention, providing strong support both for the Theory of Planned Behaviour and for the Elaboration Likelihood Model of Persuasion. In keeping with Petty and Cacioppo's (1986a) proposals, the persuasive messages concerning the problems of straps and storage have provoked a cognitive response which has in turn effected a more general change in overall perceptions of control and confidence.

Behavioural intentions/expectations

In the same way that the efficacy of the persuasive messages concerning impediments to helmet use was corroborated by the increased perceptions of behavioural control among message recipients, so the increase in behavioural intentions and expectations provide an evaluation of the persuasive advocacy. Neither of these beliefs were targeted in the intervention yet show significantly higher levels of endorsement among message recipients than control participants. This supports Ajzen's (1988) claims that beliefs about behavioural and normative outcomes and perceptions of control underlie intentions although this is dependent upon the way in which these beliefs are identified and used in an intervention. Pendergrast et al (1992) report that after their intervention, although cyclists had largely positive attitudes towards helmet use, roughly 85% of them had no intention of wearing a helmet themselves at the next ride (p. 356). However, although they assessed children's beliefs about helmet use (using two global measures), they did not target beliefs or attitudes in their intervention.

On a theoretical note, the experimental participants attained higher mean scores for behavioural expectations than behavioural intentions raising the issue of whether there is a valid argument to be made for the distinction between behavioural expectations and behavioural intention. Ajzen (1985) originally incorporated behavioural expectation in the Theory of Planned

Behaviour, stating that " ... people will expect to perform a behaviour if they intend to try it ... and if they believe (have a high subjective probability) that they can control it ... (1985, p. 33). He later abandoned this idea arguing that the prediction of actual behaviour was no different from the prediction of attempted behaviour (see Ajzen, 1991). According to Warshaw and Davies (1985) however, there is a difference between intentions - which equate to deliberately formulated plans - and expectations - which may be seen as behavioural self-predictions. They believe the latter to be the better predictor of behaviour. The first of these arguments is borne out by the results of the study reported here since it appears that participants do make a distinction between their behavioural plans (intentions) and their self-predictions (expectations) and have endorsed them differentially. This may have arisen as a result of the specificity of the questionnaire items. Fishbein and Stasson (1990), Eagly and Chaiken (1993) and Conner and Sparks (1996) note that because different researchers use different wording for their measures of intentions and expectations, the two are used interchangeably in the literature. In keeping with Warshaw and Davies' (op. cit.) proposal, the participants in the study reported here may have viewed a question about their intentions to wear a helmet as referring to definite plans and the item about expectation as referring to an action under consideration. This would suggest that a measure of behavioural expectation should be incorporated in the Theory of Planned Behaviour to differentiate between individuals who plan to carry out an action, and those who expect to.

The effects of the intervention on behaviour

The persuasive intervention succeeded in persuading twelve of the 48 message recipients to wear a helmet. This compares favourably with other promotional interventions, many of which have used repeated intervention sessions or ongoing programmes to promote helmet use among young cyclists (see for example, Pendergrast et al, 1992; Towner and Marvel, 1992; Rouke, 1994). Moreover, helmet use among the participants in the study reported here was measured some time after the intervention suggesting that it was sustained over time. The reasons for this success may be due to the fact that a persuasive advocacy was used which set out to change beliefs rather than the more traditional education and advisory campaign normally used. Runyan and Runyan (1991), examining the issue of helmet promotion amongst young cyclists, point out that behaviour change is rarely effected solely by the providing education and this is borne out by the failure of many promotional campaigns. It was pointed out earlier, that one of the most successful promotional campaigns which increased helmet use among young cyclists, specifically addressed the issue of peer pressure in addition to the more typical educational approach described above (see Morris et al, 1994). By way of contrast, Winn et al (1994), using an educational and advisory approach, effected only a short lived change in behaviour among young cyclists as a result of their intervention, user rates falling back to zero shortly after the end of the programme. This strongly suggests that in order to promote helmet use among children, we need to change beliefs using a belief–based persuasive intervention. It is noticeable that in the study reported here, changes in behaviour were supported by changes in beliefs in that many of the beliefs which discriminate statistically between control and experimental participants, also discriminate between helmet users and non–users in the experimental group (see below).

Because eleven of the twelve helmet users owned a helmet prior to the intervention, it could be argued that all the intervention has achieved is to persuade helmet owners who may have worn a helmet in the past to begin wearing again. However, 19 of the 36 non–wearers in the experimental group also owned a helmet (as did 20 of the 49 in the control group), so it does suggest that helmet use had followed a change in beliefs. This is supported by the pattern of belief differences within the experimental group. Furthermore, helmet use in the past is no guarantee of future use without an intervention to overcome low self-confidence and increase the salience of positive behavioural outcomes. This argument touches on the point made earlier, that experience with a health behaviour can in fact be off–putting (see for example, Petosa and Jackson, 1991; Schaalma et al, 1993). In addition to Lennie and Stevensen's (1992) finding that helmet use increased awareness of the barriers, DiGuiseppi et al (1990), note that helmet owners, who had presumably worn a helmet at least once, more frequently judged them too uncomfortable (p. 85).

The findings support the use of the Elaboration Likelihood Model of Persuasion as a framework for persuasion and show that strict adherence to the model's postulates can guide the construction and presentation of an intervention so that it effects lasting change in attitudes and intentions to the extent that behaviour change will follow. In the intervention reported here, participants cycled to and from school on a daily basis and thus the central issue of helmet use was of high personal relevance. In addition, the messages were wholly specific to personal helmet use while cycling to and from school and were likely therefore to provoke 'issue–relevant' responses. Furthermore, argument quality was high since these were derived from a pool of salient beliefs which could be separated into strong, moderate and weak influences. The arguments presented in the persuasive messages were thus 'strong' arguments. These factors increased the likelihood that the information presented in the persuasive messages would travel via the central route and that the elaboration and rehearsal of cognitive responses would promote attitude change in a direction favouring helmet use. In Petty and Cacioppo's terminology, this combination of factors would have increased the 'elaboration likelihood' producing the cognitive responses necessary to produce lasting attitude change.

The effects of the intervention on beliefs of helmet users and non–users in the experimental group

The change in behaviour among experimental participants was supported by a more positive endorsement of beliefs and intentions across times of assessment (relative to non–users in the experimental group) indicating that the beliefs which discriminate between experimental and control participants are those which support helmet use. Helmet users, significantly more than non–users, endorse the beliefs that parents and other cyclists are likely to approve of them wearing a helmet while cycling to and from school and that wearing a helmet is likely to make them take care. They also believe more than non–wearers that they can overcome the problem of adjusting the straps and accordingly, believe that wearing a helmet will be easy (as opposed to difficult). They are also significantly more likely than non–wearers to plan to wear a helmet in the future as shown by their elevated endorsement of behavioural intentions and expectations.

It is noticeable among helmet users, that the intention to wear a helmet increased marginally over time. This is to be expected since if a cyclist has been persuaded by the intervention to wear a helmet, then he or she is likely to make that choice with reference to the outcome beliefs focused on in the persuasive messages. Once a cyclist has started wearing a helmet due to a positive evaluation of its utility (rather than through the advice/insistence of others), he or she is likely to continue to wear one in the future. The endorsement of behavioural expectations though declines over time which refutes the claim, made by Warshaw and Davies (1985) that behavioural expectations are better predictors of behaviour than intentions. Another explanation however is that those cyclists who wear a helmet at Time 3 were particularly susceptible to the persuasive intervention, and having decided to wear a helmet have made the transition from expecting to wear a helmet (immediately after the intervention) to planning to do so sometime later. This transition is similar in conception to Prochaska and DiClemente's (1984) notion of contemplation and pre–contemplation in their stage model of change.

Amongst helmet users, there is also a decrease in perceptions of control between Times 2 and 3 with respect to adjusting the straps but an increase in perceptions of control regarding storing the helmet. There are two explanations for this. Cyclists who wear, or have attempted to wear, a helmet after the intervention will be exposed to the problem of doing up the straps on a daily basis. This might increase the salience of this particular barrier and lessen confidence in the ability to deal with this problem. Lennie and Stevensen (1992) also found barriers to helmet use to increase amongst children who wore a helmet for the first time. This supports the argument that the costs associated with a health behaviour increase with experience of that behaviour (e.g. King, 1982; Clarke et al, 1991; Reinecke et al, 1996). In comparison, although having nowhere to store the helmet at school is a major concern reflected in the low levels of endorsement across both groups, this is a problem easily dealt with by approaching teaching staff as suggested in the intervention, or by locking the helmet to the wearer's bicycle. It is noticeable that among helmet wearers, the belief that this is controllable increases over time suggesting that in reality, once they start wearing a helmet, problems such as those of storage, are either easily dealt with, or are not as much of a problem as supposed. This suggests that anticipated barriers to helmet use may be more easily reduced than actual barriers which has direct implications for helmet promotion among children. It also shows that once again, the Theory of Planned Behaviour has allowed us to focus attention on a salient barrier which if addressed, seems to encourage helmet use. Encouraging children to consider solutions to some of the more common impediments to helmet use can indirectly increase their perceptions of behavioural control and thus facilitate helmet wearing.

Finally, there is evidence that those cyclists in the experimental group who do not wear a helmet, are more aware of doing up the straps as an impediment and that this decreases their perceptions of control. This group show an increase in levels of endorsement of the control belief relating to the problem of doing up the straps over time and a corresponding decrease in their belief that helmet use is easy. This might indicate that these cyclists have been made to actively consider helmet use (by the persuasive messages) and are thus more aware of the anticipated problems. Their belief that a helmet would protect their head also increases over time which is understandable if they are actively considering wearing a helmet although it might be also be explained in terms of the 'sleeper effect' (Hovland, Lumsdaine and Sheffield, 1949) whereby the change in belief measured immediately after an intervention are smaller than that measured at some later point in time (Eagly and Chaiken, 1993., p. 612).

The implications of the study for attempts to promote helmet use among young cyclists

The study has practical implications for promoting helmet use amongst children since it effected a change in beliefs and behaviour, sustained over time through use of a short 'one–off' intervention. Moreover, it enjoyed more success than many other school–based campaigns (e.g. Pendergrast et al, 1992; Towner and Marvel, 1992) and achieved this through use of a persuasive intervention rather than the long–term educational and advisory campaigns more often used (see for example, Moore and Adair, 1990; Pendergrast et al, 1992; Rouke, 1994). Moreover, many school–based interventions have involved elementary school children (e.g. Rouke, 1994) and may not be entirely appropriate for use with teenagers (who are the group most at risk). Rouke notes that his educational programme had virtually no effect on secondary school children and increased helmet use amongst the elementary school children more. The intervention here was successful in promoting intention to wear a helmet and the use of helmets among secondary school cyclists. Finally, although it is well documented that helmet use among school–age cyclists decreases as they grow older (see Lennie and Stevensen, 1992; Sissons–Joshi et al, 1994; Hu et al, 1994), researchers interested in promoting helmet use among children have not taken this into account and searched for a strategy which will produce consistent long–term wearing. The intervention reported here may present a solution to this problem since it appears to have instilled in recipients a lasting appreciation of helmet use and positive intentions to wear one while cycling to and from school.

Summary

The study set out to promote a positive evaluation of helmet use while cycling to and from school among a sample of young, non–helmeted cyclists leading to the formation of positive intentions to wear a helmet and actual helmet wearing. Beliefs identified by the Theory of Planned Behaviour were used to inform a small number of highly specific persuasive messages used in a persuasive intervention based upon the Elaboration Likelihood Model of

Persuasion. By the end of the intervention, experimental participants, who received the persuasive messages concerning the outcomes of helmet use, were significantly more positive than participants in the control group in their beliefs (behavioural, normative and control) about helmet use and their intentions to wear one. Five months later these differences remained suggesting that lasting attitude change had been achieved. Moreover, there had also been a highly significant effect on behaviour with 12 (25%) of the 48 in the experimental group sufficiently motivated by their beliefs to take up helmet wearing. None of the 49 children in the control condition wore a helmet. This shows that exposure, in small supervised groups, to a limited number of salient messages, designed according to the principles expounded by Petty and Cacioppo (1986a), can influence respondents' beliefs in the desired direction. The messages, framed in such a way to maximise personal relevance and argument quality, resulted in message recipients endorsing both subjective norms, one of the control beliefs and one of the behavioural beliefs significantly more than control participants. These results support the hypotheses that persuasive messages based upon salient beliefs concerning the outcomes of helmet use would effect a favourable and stable evaluation of helmet use leading to an increase in behavioural intentions and the uptake of helmet use. As well as endorsing the Elaboration Likelihood Model of Persuasion as a means of promoting health behaviour amongst adolescents, the study supports the utility of the Theory of Planned Behaviour as a means to identify the beliefs to use in health promotion. This study thus supports Conner and Norman's (1996) belief that social cognitive models fulfil a useful role in health promotion by providing a means for identifying useful targets for persuasion (p.16).

CHAPTER FIVE
IMPLICATIONS FOR THEORY AND PRACTICE

INTRODUCTION

This thesis has been concerned with examining and comparing the Health Belief Model (Rosenstock, 1966, 1974a, 1974b) and the Theory of Planned Behaviour (Ajzen, 1985, 1991; Ajzen and Madden, 1986) in terms of their utility in investigating and predicting health behaviours. To this end, the models were used to investigate the beliefs associated with the use or non-use of protective helmets among school-age cyclists and compared on the basis of their conceptual strengths, predictive ability and sufficiency. In addition to these investigations, the beliefs shown by the models to be most strongly associated with intention and behaviour were used in an intervention to promote the use of safety helmets by children while cycling to and from school. This provided a test of the predictive utility of the models, and allowed examination of the claims made by Rosenstock (1966) – on behalf of the Health Belief Model – and by Ajzen (1988) – on behalf of the Theory of Planned Behaviour – that the structure of each model, the concepts measured, and methodology employed, reflects the actual decision-making process that people engage in with respect to health behaviour. The present discussion reviews this research and discusses the practical and theoretical implications for the models. First, each of the three research studies is reviewed in turn and the implications of their findings for the Health Belief Model and the Theory of Planned Behaviour are discussed. Second, the findings of the study are compared with previous research. Finally, the practical implications of the research for promoting helmet use among school-age cyclists are examined.

TESTING THE MODELS

Investigating salient beliefs

The first study

The first study, presented in Chapter 2, set out to examine and compare the ability of the models to predict helmet use amongst 162 secondary school boys and identify beliefs discriminating between helmet users and non–users. To facilitate comparison, the structural and conceptual differences between the models was limited by using a measure of behavioural intention to mediate between beliefs and behaviour in the Health Belief Model in the same way that it is used in the Theory of Planned Behaviour. This allowed the same statistical procedure to be used in the analysis. In addition, the same belief set was used, though in the Health Belief Model analysis they were presented as benefits and barriers while in the Theory of Planned Behaviour analysis they were presented as outcome expectancies each paired with a corresponding belief strength. Both models were able to explain substantial amounts of the variance in intentions and behaviour, and succeeded in identifying beliefs which discriminated between helmet users and non–users. Moreover, they were able to cast fresh light upon the findings of previous investigative research in this area and extend our understanding of helmet use among young cyclists.

In the study, the Theory of Planned Behaviour showed the normative expectations of important others and perceptions of control over the behaviour (but not attitude towards the behaviour) to be important influences on cyclists' decisions. The Health Belief Model showed that beliefs about the positive and negative behavioural outcomes of helmet wearing were also important. However, contrary to expectations, the emotional arousal variables of the Health Belief Model (i.e. perceptions of vulnerability and severity and cues to action) were not important influences.

Nonetheless, the study established the suitability of the models for investigating helmet use amongst young cyclists and in doing so, confirmed their predictive and conceptual utility. However, in comparing the performance of the models, the Theory of Planned Behaviour was shown to be the more reliable and parsimonious of the two, using half the number of variables to predict intention than the Health Belief Model yet explaining a greater proportion of the variance. In addition, two of the three components of the Theory of Planned Behaviour were associated with intention compared with only two of the six used by the Health Belief Model. The Theory of Planned Behaviour was also the more sufficient model in that it assessed beliefs not measured by the Health Belief Model which proved to be extremely salient among the sample and was the more theoretically cohesive in that neither of the two components of the Health Belief Model said to instigate a consideration of preventive action – vulnerability and severity – were associated with the criterion. In predicting outcome behaviour, both models explained equivalent amounts of the variance in helmet use although again, the Theory of Planned Behaviour was the more parsimonious, using two components compared to the Health Belief Model's three. Once again, the Theory of Planned Behaviour performed as hypothesised (see Ajzen, 1988) with both components expected to predict behaviour doing so. The study thus supported the predictive utility and cohesion of the Theory of Planned Behaviour while casting doubt upon the theoretical basis of the Health Belief Model.

The study also confirmed the utility of restructuring the Health Belief Model by incorporating a measure of behavioural intention mediating between beliefs and behaviour (see Norman and Fitter, 1989; Stein et al (1992). Comparing the results with those reported by Arnold and Quine (1994) suggests that the inclusion of behavioural intention identifies causal pathways more effectively than the direct prediction of outcome behaviour (see also Champion and Miller, 1991). This was especially true of perceived vulnerability. However, the major problem that emerged, and one with potentially serious implications for both models, was that past behaviour, as represented by prior and/or current helmet use, had an extreme impact on future helmet use. Although Ajzen (1991), Arnold and Quine (1994) and Sutton (1996) suggest this to be less of a problem than it at first appears (see for example, Champion and Miller, 1991; Norman and Smith, 1995), it was decided to address this issue in a second study by attempting to limit the influence of prior helmet use on beliefs and behaviour. In addition, the roles of perceived vulnerability and the practical and psychological costs associated with helmet use were examined to determine their roles in cyclists' decisions *vis-`a-vis* helmet use.

The second study

The second study, presented in Chapter Three, was conducted in response to concerns raised by the previous study and involved the longitudinal prediction of behaviour. The principle aim was to limit the effects of past or prior behaviour on outcome behaviour by assessing the beliefs held by children about helmet use (while cycling to and from school) before they were able to travel to school by bicycle. The roles of perceived vulnerability and severity and the influence of perceived and actual impediments were also investigated. In addition, the research examined the ability of the models to investigate the beliefs and behaviour of schoolgirls as well as schoolboys thus extending the research beyond its initial premise. To achieve these aims, beliefs about the use of cycle helmets while cycling to and from senior school, were assessed among 97 junior school children and used to predict their actual helmet use while cycling to and from senior school a year later.

The results provided support for the predictive utility of both models in that a year after the initial questionnaire session, both explained a substantial proportion of the variance in concurrent intention and future behaviour, and identified a number of salient beliefs which predicted helmet use. This confirmed the ability of the models to predict helmet use over an extended time period unconfounded with past behaviour, and to identify beliefs which discriminated between children who wore a helmet at a later date and those who did not. It also found girls more positive in their attitude towards helmet use than boys, thus supporting previous studies which show that girls are more enthusiastic about helmet use (e.g. Lennie and Stevensen, 1992) and have higher user rates than boys (e.g. Hu et al, 1994). The study also corroborated many of the findings of the previous study by confirming the importance of individual normative and behavioural outcome beliefs and showing these to influence cyclists' subsequent decisions. In particular, the Theory of Planned Behaviour showed the normative expectations of others to be a powerful influence on cyclists' decisions although, unlike the previous study, perceptions of behavioural control were not. However, a measure of practical and psychological impediments to helmet use, assessed as suggested by Ajzen (1988) and Ajzen and Madden (1986) was associated with non–use. There was also more evidence than in the previous study that attitudinal beliefs (about the expected behavioural outcomes of helmet use) were important. In the Health Belief Model, perceptions of benefits were shown to influence the intention to use a helmet while beliefs about the costs associated with helmet use (i.e. perceived barriers) impacted directly on helmet use itself. However, once again, children were not motivated in their decisions by worries about personal vulnerability or severity and were not influenced in their behaviour by cues to action although these concerned bicycling accidents. This suggests that the decision–making process thought to underlie the Health Belief Model needs to be re–evaluated.

If we compare the models in terms of predictive ability and parsimony, the Theory of Planned Behaviour was a more reliable predictor of intention than the Health Belief Model although only one of its three components was associated with the variance. This compares favourably with the Health Belief Model analysis in which only one of the four components was associated with the intention to use a helmet. In predicting actual helmet use at Time 3, the two models performed equally well and can only be distinguished in terms of parsimony and sufficiency. The Theory of Planned Behaviour was again the more parsimonious, predicting helmet use from two out of the three variables used. The Health Belief Model used five variables to predict helmet use, three of which were not associated with the behaviour.

In summary, the results of the two studies showed that the models successfully predicted helmet use among school–age cyclists and were able to identify beliefs discriminating between helmet users and non–users. Moreover, their properties were examined over an extended time period as well as by a short–term prospective study. However, while confirming the predictive utility and cohesion of the Theory of Planned Behaviour, they cast doubts upon the theoretical basis and sufficiency of the Health Belief Model thus questioning its ability to identify suitable targets for health promotion. As a result, the final study, which set out to examine the investigative and explanatory ability of the models through use of a persuasive intervention, was based upon beliefs identified as salient by the Theory of Planned

Behaviour alone. This strategy ensured that the intervention was based upon beliefs shown to be strongly and consistently associated with helmet use.

Using the salient beliefs in an intervention

The third study

The third study, reported in Chapter 4, involved designing and evaluating a persuasive intervention based upon the Elaboration Likelihood Model of Persuasion (Petty and Cacioppo, 1986a, 1986b) intended to promote helmet use among a sample of secondary school pupils. The purpose of this was to validate the explanatory power of the Theory of Planned Behaviour by examining whether the beliefs shown to be associated with children's decisions to wear or not wear a helmet, could be used to promote helmet use amongst non-helmeted cyclists. The intervention used beliefs identified by the Theory of Planned Behaviour as strongly associated with helmet use, to inform a series of persuasive messages intended to promote helmet use by influencing behavioural and normative beliefs and perceptions of control.

Immediately after the intervention, and again five months later, the participants in the experimental group, who received the persuasive messages, were found to be significantly more positive in their endorsement of the behavioural, normative and control beliefs associated with helmet use than the participants in the control condition. They also displayed a more positive intention and expectation to wear a helmet. These differences were still evident five months later, suggesting that lasting attitude change had been achieved. In addition, 12 of the 48 children exposed to the persuasive advocacy reported wearing a helmet while cycling to and from school against none of the 49 children in the control condition - a highly significant statistical difference.

These results showed that a small number of specific persuasive messages based upon salient beliefs concerning the outcomes of helmet use could be presented in such a way that they would bring about a favourable evaluation of helmet use leading to an increase in behavioural intention and the uptake of helmet use. As well as endorsing the Elaboration Likelihood Model of Persuasion as a means of promoting health behaviour amongst adolescents, the study supports the utility of the Theory of Planned Behaviour as a means of identifying the beliefs to be used in health promotion.

Methodological and practical issues

Despite the success of the intervention, there are methodological and practical issues arising from the design and research setting which have implications for the findings and which a replication would need to consider. In the first case, it is possible that the influence of extraneous variables was not adequately controlled for; such variables can be considered sources of secondary variance (see Matheson, Bruce and Beauchamp, 1978). In the second case, sampling constraints imposed by a number of the schools used for the intervention restricted the age range of participants. These issues are discussed in turn below and the extent of their influence considered.

Extraneous variables: order effects and experimental contamination.

One of the problems with presenting information to experimental participants and then analysing the effects is that the results might reflect the order of the exposure to the stimulus material (Sheridan, 1979; Harris, 1989). In the intervention, the six persuasive message charts were presented in a fixed non–random order to all experimental participants – subjective norms, control beliefs and behavioural beliefs. This presentation order is reflected in the order of significance of the results since in general, the magnitude of the between group (experimental vs. control) belief differences is greatest for subjective norms, less for control beliefs and least for behavioural beliefs. However, this order of significance was also found in the two investigative studies reported in chapter 2 and 3 and may indicate a naturally occurring order of children's concerns *vis–a–vis* helmet use. Moreover, order effects would only have exerted their influence within, rather than between groups suggesting that the magnitude of the between–group belief differences and the differences in behaviour were due to the experimental manipulation rather than artifact. Nonetheless, order effects could be controlled for in a replication by randomising the stimulus material (as recommended by for example, Sheridan (op. cit.) and Harris (op. cit.). This would ensure that the order of the six messages differed from booklet to booklet.

Another problem might be considered under the more general heading of 'experimental contamination' (see Cook and Campbell, 1979 for a discussion). Because participants were assigned to control and experimental conditions within rather than between schools, participants in the experimental group, exposed to the persuasive message charts about the use of cycle helmets, might have mixed with and influenced control participants between Time 2 and Time 3. This possible source of secondary variance was the price paid for controlling for the effects of between–school variance (see Moore and Adair, 1980). However, it is doubtful that cross–contamination influenced the cyclists beliefs and thus the findings adversely, since the analysis showed clear and significant differences in the beliefs of the two groups across times of assessment. If anything, experimental contamination should have reduced the experimental effect such that between groups differences were reduced. It would have been possible to have controlled for contamination by "blinding" participants to the purpose of the persuasive advocacy (see Matheson et al, 1979). The persuasive messages (concerning the outcomes of helmet use) could for example, have been hidden amongst dummy messages presented to both control and experimental participants. However, this technique would have the disadvantage of diluting the effects of the intervention. Presenting a small number of messages of proven salience is preferable to using a large number of messages concerning a range of topics.

A final methodological concern, discussed (by for example, Matheson et al, 1979) as a type of experimental contamination is 'pre–test sensitisation'. This refers to the risk of alerting respondents to the nature of the study by exposing them to information, such as for example baseline data collection, prior to the experimental manipulation. It is possible that experimental participants were influenced by the baseline data collection and that their responses to the persuasive messages and to the post–intervention evaluation questionnaire were a reflection of this. However, pre–test sensitisation was controlled for in the study by leaving six months between baseline data collection (at Time 1) and the intervention (at Time 2). Furthermore, the belief differences were still in evidence at Time 3, five months after the intervention, by which time all participants had been exposed to a questionnaire explicitly concerning helmet use. It is unlikely therefore, that the type of prompting suggested by pre–test sensitisation had any effect on the results.

Sampling restrictions.

At several schools, access to cyclists was restricted by age due to examination time–table and syllabus demands. Such restrictions meant that pupils over the age of 14 years had to be excluded from the study thus limiting the age range of the whole sample. This does not detract from the overall findings (i.e. that a persuasive intervention changed beliefs and behaviour), but does mean that they may be more difficult to generalise to populations involving a wider age range. Future research would need to address this and, given that helmet use decreases with age, could specifically target older children.

THE THEORETICAL IMPLICATIONS OF THE RESEARCH

The implications for the Health Belief Model

The research reported here draws attention to several conceptual and methodological weaknesses that detract from the utility of the Health Belief Model as a means of investigating health behaviour. Although its poor predictive performance (in comparison to that of the Theory of Planned Behaviour) was not sufficient grounds on its own for discarding the model after two studies, its inability to confirm the decision–making process which it was designed to represent – a process which Rosenstock believes to underlie health behaviour (see Rosenstock, 1960; 1966) – undermined its explanatory power. There was thus little to be gained from examining its claims of sufficiency in an intervention study.

The most significant finding, and the one which has the most serious implications for the model, was that neither of the perceived threat variables (i.e. perceived vulnerability or severity) were found to influence the intention to use a helmet while perceived benefits and barriers were both significant predictors. According to Rosenstock (1966), an individual will only consider a course of action if the magnitude of a perceived threat to health – as measured by perceived vulnerability and severity – provides sufficient motive force or 'readiness'. In this case, a 'psychologically ready' individual will be motivated to weigh up the costs (barriers) and benefits of a particular action. However, in the first empirical study reported in Chapter 2, while perceived benefits and barriers were associated with intentions, the vulnerability and severity measures failed to reach significance. It was suggested from a comparison of previous research in this area (see Chapter 2) that the failure of perceived vulnerability to predict intentions might be due to the fact that the scale items related to the perceived likelihood of head injury rather than accident probability. Otis et al (1994), using an expanded Theory of Reasoned Action, also found perceptions of vulnerability to head injury non–significant. In contrast, Sissons–Joshi et al (1994), whose vulnerability measure did assess accident probability, found it significantly associated with children's intentions to wear a helmet. However, assessing both types of vulnerability in the second (longitudinal study) reported in chapter 3, was no more successful. Neither vulnerability to head accidents or to bicycling accidents were helpful in predicting intentions to use helmets. This suggests that cyclists' motivation to actively consider helmet use while cycling to and from school does not arise from concerns about personal vulnerability. These results not only detract from the Health Belief Model's ability to explain cyclists' behaviour, but undermine its theoretical premise. This is not to say however, that vulnerability has no role at all but it may (as suggested by Conner and Norman, 1994), be a more 'distal' predictor of health behaviour exerting its influence on benefits and barriers (see for example, Aiken et al, 1992; Ronis, 1992). There was correlational evidence to support this in both of the investigative studies (Chapters 2 and 3). This however, supports those critics who maintain that the Health Belief Model is more a loose collection of variables than a fully developed model (see for example Sutton, 1987; Weinstein, 1993).

The failure of perceived vulnerability to predict intentions also explains the redundancy of perceived severity. Janz and Becker (1984) point out that unless individuals believe they are susceptible to a health threat, they are unlikely to consider its severity. This undermines the Health Belief Model still further, since if perceptions of severity are dependent upon the degree of personal vulnerability to what amounts to potential health threats, then it is unlikely that perceived severity will very often be found to be salient amongst the target population. This is borne out in reviews by Janz and Becker (1984) and Sheeran and Abraham (1996) which show severity to be the least significant of the Health Belief Model's core components.

Another shortcoming of the Health Belief Model, noted by Maddux (1993) amongst others, concerns the measurement of beliefs about the behavioural outcomes expected to follow from a behaviour. In the Theory of Planned Behaviour, behavioural outcomes are assessed as outcome expectancies and evaluated by a separate evaluation measure in keeping with expectancy–value theory. In the Health Belief Model, these beliefs are simply assessed as benefits and barriers and no assessment of their value to responded, that is, of the degree to which people will be motivated to seek those outcomes, are made. This is more noticeable in comparative studies such as the two reported here (in Chapters 2 and 3) where the same belief set is used by both models to assess benefits and barriers in one model and outcome expectancies in the other. The research reported here shows that this evaluative procedure was helpful in identifying the individual beliefs which discriminated between helmet users and non–users since their importance and relative saliency was easier to establish. This was particularly useful when determining which beliefs to use in the intervention. In practical terms, this means that the Theory of Planned Behaviour is more suitable than the Health Belief Model for investigating salient beliefs to use in health promotion since it allows the intervention to focus either on the utility of an outcome itself, or on the evaluation of that outcome (see Fishbein and Ajzen, 1980; Eiser and Van der Pligt, 1987: Eagly and Chaiken, 1993). In contrast, the simple assessment of beliefs used by the Health Belief Model is not very helpful in identifying the differential importance of individual beliefs and their relationship to a criterion or in helping us to understand a behaviour.

The research also confirmed the utility of restructuring the Health Belief Model by incorporating a measure of behavioural intention mediating between beliefs and behaviour. This limited the differences between the models for the purposes of comparison and also improved the Health Belief Model by allowing (as suggested by Norman and Fitter, 1989) causal pathways to be examined which might otherwise have been overlooked. For example, in the study reported in Chapter 3, perceived benefits were shown to predict intentions and not behaviour while the reverse was true of perceived barriers (see also Aiken et al, 1992). Similarly, Champion and Miller (1991) used intention in the Health Belief Model and identified a different set of salient beliefs to those identified in two earlier studies in which beliefs were used to directly predict behaviour (Champion, 1984, 1988). Using intention in the Health Belief Model is especially useful with respect to perceived vulnerability since it is often shown to exert its influence on intentions or on other components of the model (see for example Champion and Miller, 1991; Aiken et al, 1992; Ronis, 1992). In view of the criticisms of the model's cohesion, and its lack of structural and operational guidelines (see Weinstein, 1993; Sheeran and Abraham, 1996), incorporating a measure of intention may well provide the basis for a more defined formulation. In summary, the Health Belief Model was lacking in predictive and explanatory power as regards this particular behavioural domain and is perhaps better at predicting preventive health actions when these are directly related to a medical condition with severe consequences such as practising breast self-examination. This is likely to be a more emotive issues and the simple measures used by the Health Belief Model more appealing. Behaviours in which the preventive action concerns a distant health threat such as helmet use may be responded to in a more measured manner and involve more the sorts of cognitive elements (than emotional ones) utilised by the Theory of Planned Behaviour.

The implications for the Theory of Planned Behaviour

The research reported in this thesis strongly supported the utility of the Theory of Planned Behaviour as a means of investigating and understanding helmet wearing amongst young cyclists and, in particular, showed the importance of the behavioural prescriptions of referent others (as measured by the subjective norm components) and beliefs concerning the ability to exercise control over the behaviour. The model correctly identified the most salient beliefs associated with intention to wear a helmet and with helmet use and was shown to be capable of identifying beliefs which were used to promote helmet use. Nevertheless, the three empirical studies raise some questions about the sufficiency and operationalisation of the model and question the distinction between attitudinal and normative beliefs.

The normative expectations of referent others were consistently the most powerful influences on helmet use endorsed significantly and positively in all three studies. The Health Belief Model has no comparable measure, an omission criticised by Oliver and Berger (1979) and Hecker and Ajzen (1983). As a result, the Theory of Planned Behaviour was shown to be the more sufficient model identifying influential sources of normative pressure supporting or undermining helmet use. It is more usual though for attitude to be the stronger predictor of the two (see Ajzen, 1988) although this may depend upon the type of behaviour in question. It was pointed out earlier (see Chapter 2) that in general, attitude is more important than subjective norm when the behaviour is performed in private (e.g. breast/testicular self examination) but that the reverse is true when the behaviour is performed publicly, as in wearing a seat belt (Wittenbraker et al, 1983) and driving safely (Parker et al, 1996). Wearing a cycle helmet is very much a public behaviour and is thus subject to a variety of normative influences, particularly those of parents and other cyclists. However, the correlations between attitude and subjective norm were extremely high raising the issue of whether there is a distinction between normative and behavioural beliefs as Fishbein and Ajzen argue (Fishbein, 1980; Ajzen, 1988). Miniard and Cohen (1981) for example, argue that since both kinds of beliefs are concerned with consequences, a distinction is not very meaningful (see also Ryan, 1982). For example, a belief about parental expectations regarding helmet use can be operationalised as either a normative belief or a behavioural belief in which case it would form part of the attitude measure. This issue remains contentious although Eagly and Chaiken (1993) point out that maintaining the distinction between subjective norm and attitude as separate determinants of behaviour allows researchers to address a variety of questions concerning the attitudinal versus normative regulation of behaviour. The results of the research reported here would suggest though that the distinction is at the very least blurred.

Another measure, also unique to the Theory of Planned Behaviour and shown to be a powerful influence on helmet use and intentions is perceived behavioural control. However, it was pointed out earlier that some researchers operationalise perceived behavioural control in a way that assesses how much control they anticipate being able to exercise over the behaviour and how much confidence they have in their abilities to perform it in a satisfactory manner (see for example, Netemeyer and Burton, 1990; Netemayer, Burton and Johnston, 1991; Madden et al, 1992; Reinecke et al, 1996). Ajzen refers to these as direct measures of perceived behavioural control. Others operationalise it as suggested by Ajzen (1988) and Ajzen and Madden (1986), to assess beliefs about anticipated practical and psychological impediments (see for example, Ajzen and Driver, 1991; Kimiecik, 1992; Corneya, 1995; Norman and Smith, 1995; Parker et al, 1995). Ajzen (1988) refers to these as belief–based measures. In the research reported here, both sorts of measures were used and were found to assess important beliefs influencing the use or non use of helmets. However, in the second study (see chapter 3), the belief–based measures of perceived behavioural control were assessed separately from the direct measures and were akin to Ajzen and Madden's (1986) conception of actual behavioural control.

However, although the direct measure of perceived behavioural control predicted intention and behaviour in the first study (see Chapter 2) and contained items which discriminated between helmet users and non–users, in the second study (Chapter 3), perceived behavioural control predicted neither, suggesting that children are unable to anticipate with any accuracy, their degree of control over a behaviour they are not likely to practice for several months. The study did however, show that practical and psychological impediments to helmet use were associated with non–use (i.e. the belief–based measures). The final study (Chapter 4) provided strong support for Ajzen's (1988) argument that the belief–based measures of control inform overall perceptions of behavioural control. Decreasing the importance of the two impediments to helmet use increased overall perception of perceived behavioural control amongst message recipients. The findings of the three empirical studies strongly suggest that firstly, both sorts of measures should be used routinely in prospective studies, and secondly, that in longitudinal studies, the belief–based measures should be assessed *after* the behaviour has been attempted since it seems that people are unable to anticipate the influence of practical and psychological impediments to a behaviour which will affect their perceptions of control.

There are also implications for the sufficiency of the model in the way in which it assesses behavioural intention. It was pointed out in Chapter 4 that there is an unresolved debate over whether behavioural intentions are conceptually different from behavioural expectations (see Warshaw and Davies, 1985; Eagly and Chaiken, 1993; Conner and Sparks, 1996) and whether one or both should be assessed. Although Ajzen (1991) has argued against its inclusion believing there to be no advantage in using a measure of expectation, Warshaw and Davies (op. cit.) argue that questions about behavioural expectations are construed by respondents as relating to desires, that is, actions they are favourably considering, while intention items are viewed as questions about definite plans. There was evidence from the intervention study (see Chapter 4) to support this in that immediately after the intervention, participants exposed to the messages about helmet use and whose behavioural, normative and control beliefs were elevated, endorsed behavioural expectations more than they did intentions. This suggests that at this stage they had responded positively to the persuasive advocacy and were considering wearing a helmet. Five months later, by the second evaluation session, it seems that some of the participants had made the transition from expectation to intention as reflected in the similar levels of endorsement of intention and expectations. These participants were probably those who had begun wearing a helmet. This suggests that researchers using the Theory of Planned Behaviour should recognise the distinction between expectation and intention and measure them both.

Lastly, the influence of past behaviour has important implications for the sufficiency of the Theory of Planned Behaviour. In the first investigative study, it seems that prior helmet use was the most powerful predictor of subsequent helmet use rather than the beliefs assessed by the models. Although this affects the Health Belief Model as well as the Theory of Planned Behaviour, Ajzen (1985; 1991) has until recently denied that the influence of past behaviour has implications for the Theory of Planned Behaviour and has made strong claims for the model's sufficiency (see Beck and Ajzen, 1992). Moreover, because of its components, the influence of past behaviour is more of an issue for the Theory of Planned Behaviour than the Health Belief Model (see Ajzen, 1988; Eagly and Chaiken, 1993) through its influence on perceived behavioural control. It was pointed out in Chapter 3 that the effect of past behaviour was twofold, as a predictor in the multivariate analysis and as an influence on beliefs. Several longitudinal studies were cited to illustrate these effects. The argument expounded by Sutton (1994) – that there is a distinction between routines and habits – was also reviewed since this implies that helmet use by young cyclists, is a routine carried out with reference to their underlying belief structure rather than a habit. Nonetheless, the second study reported in Chapter 3 was designed to limit the influence of past behaviour. This has several implications for the Theory of Planned Behaviour in that it was able to predict behaviour from belief assessed a year earlier and identify beliefs antecedent to the behaviour. However, perceived behavioural control was not as influential as in the first study and a measure of behavioural control was used similar in conception to the barriers measure of the Health Belief Model.

Despite these issues, the Theory of Planned Behaviour was clearly superior to the Health Belief Model on a range of criteria when used to investigate helmet use amongst young cyclists and was able to identify beliefs which informed a successful intervention. This differs from previous comparative research which seldom provides unequivocal support for one model. Conner and Norman (1994) and Sissons–Joshi et al (1994) for example, show the Health Belief Model and Theory of Planned Behaviour to be roughly equivalent in predictive power. However, steps were taken in the research reported here both to limit the differences between the models and to operationalise them as originally suggested by Rosenstock (1966) and Ajzen (1985). In addition, the models were standardised methodologically. In contrast, Sissons–Joshi et al (1994) used expanded versions of both models and did not use intention as a mediator. Ried and Christensen (1988) used intention as a mediator in one model and not the other. Other researchers have also used different versions of the Health Belief Model from the one used here by adding variables or computing variables in different ways (see for example, Oliver and Berger, 1979; Hill et al, 1985; Mullen et al, 1987; Conner and Norman, 1994). Few of these studies concentrate on a single preventive practice.

Despite these differences, the results of the studies reported here are broadly consistent with the literature to the extent that analysis of the zero order correlations shows greater redundancy amongst the components of the Health Belief Model than amongst the components of the Theories of Reasoned Action and Planned Behaviour (see Ried and Christensen, 1988; Oliver and Berger, 1979; Conner and Norman, 1994). In addition, as in the research reported here, the simple correlations between the predictor variables of the Theories of Reasoned Action/Planned Behaviour and the criterion measures (i.e. intention and/or behaviour) in such studies are generally stronger than the same correlations found in analyses using the Health Belief Model.

THE PRACTICAL IMPLICATIONS OF THE RESEARCH

The programme of research presented here has practical implications for promoting helmet use among school–age children. Beliefs identified by the Theory of Planned Behaviour as being associated with children's decisions to wear or not wear helmets while cycling to and from school were used successfully to promote helmet use among a sample of non–helmeted secondary school children. The intervention used the Elaboration Likelihood

Model of Persuasion to guide the intervention and was able to change behaviour by changing beliefs. In doing this, it took a novel approach to helmet promotion, validating the use of the Theory of Planned Behaviour as a means of identifying targets for persuasion and establishing a means of health promotion which could be applied in a wider context. More specifically, it showed that small, school-based interventions can succeed in promoting helmet use if they adopt a theory-driven approach and use a persuasive advocacy in which a small number of highly specific messages are presented to groups of children in the manner suggested by the Elaboration Likelihood Model.

The intervention differed radically from previous promotional campaigns in that it viewed cyclists as active decision-makers whose co-operation could be obtained by promoting a favourable evaluation of helmet use so that they would want to wear one. This suggests that a social psychological approach to the promotion of helmet use, in which the primary interest is to identify and use the beliefs that cyclists hold, is a substantial improvement over the educational and advisory campaigns more typically used (e.g. Moore and Adair, 1990; Pendergrast et al, 1992; Towner and Marvel, 1992; Rouke, 1994). These have been largely ineffective (see Chapter 4 for reviews) or have achieved limited success among elementary school children only (Rouke, 1994). In contrast, the intervention conducted here was successful amongst older children and thus of greater utility. In bringing about lasting attitude change, it also addressed the problem of decreased helmet use amongst older children (see Hu et al, 1994; Sissons-Joshi et a, 1994).

The success of the intervention supports the theoretical premise of the Elaboration Likelihood Model and shows that it can be adapted for use in promoting health behaviours among children. It also suggests that the role of the Theory of Planned Behaviour may be in establishing the decision–making processes underlying behaviour rather than in being use as a model of persuasion (see Eagly and Chaiken 1993). In summary, the implications for health promotion are that the Theory of Planned Behaviour and the Elaboration Likelihood Model are complementary models and should be used in tandem: the first shows how to identify salient beliefs and the second how to use them to change behaviour.

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APPENDIX 1

STUDY ONE

CYCLING SAFETY QUESTIONNAIRE (TIME 1)

			1

CYCLING SAFETY QUESTIONNAIRE

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

This questionnaire is part of a series of studies about the attitudes and behaviour of pupils who cycle to and from school. It asks you your views about cycle safety-helmets and about several other aspects of cycling.

Some of the questions may seem similar to each other, but it is important that you answer all of them.

All information is strictly confidential.

Name: ______________________________

Age: __________

The term "Helmet" refers to any protective headgear designed to be worn whilst cycling.

Please respond to each statement by ticking a box to indicate whether you agree or disagree. You should only tick **one** box for each question.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

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SECTION 1

To start with I would like to ask about your views on safety while cycling. Please answer by putting a tick (✓) in the boxes to show whether you agree or disagree.

		Strongly disagree	Disagree	Neither	Agree	Strongly agree
1.	If I had an accident while cycling to school I would be likely to hit my head ______	☐	☐	☐	☐	☐
2.	If I had an accident while cycling to school it would more than likely result in head injury ______	☐	☐	☐	☐	☐
3.	If I had an accident while cycling to school and hit my head, I would be likely to suffer brain damage ______	☐	☐	☐	☐	☐
4.	As a cyclist, I would not be going fast enough to need head protection if I had an accident ______	☐	☐	☐	☐	☐
5.	If I had an accident while cycling, I would not be going fast enough to hurt my head seriously ______	☐	☐	☐	☐	☐
6.	Most cyclists do not go fast enough to need head protection even if involved in accidents ______	☐	☐	☐	☐	☐
7.	Most cyclists do not go fast enough to sustain serious head injury even if involved in accidents ______	☐	☐	☐	☐	☐

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SECTION 1 (continued)

8. If you had a serious accident involving head injury and hospital treatment, how seriously do you think it would affect . . .

	Very little	Not much	Neither	Quite a lot	Very much
. . . your school life__________	☐	☐	☐	☐	☐
. . . your family life__________	☐	☐	☐	☐	☐
. . . your social and personal life (sports, clubs, hobbies)______	☐	☐	☐	☐	☐
. . . your physical and mental well-being ___	☐	☐	☐	☐	☐

SECTION 2

Now we would like to tell us what you intend to do in the future. Please answer by putting a tick (✓) in one of the boxes provided.

1. I intend to wear a helmet while cycling to and from school **in the next four weeks.**

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

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SECTION 3

Here are some statements that people have made about wearing cycling helmets. Please answer by putting a tick (✓) in the boxes to show whether you agree or disagree.

1. My wearing a helmet whilst cycling to school would make me feel safe.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. My wearing a helmet whilst cycling to school would make me look silly.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. My wearing a helmet whilst cycling to school would make my parents worry less.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. My wearing a helmet whilst cycling to school would make me take care.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. My wearing a helmet whilst cycling to school would mean having to spend too much money.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 3 (continued)

6. My wearing a helmet whilst cycling to school would protect my head if I had an accident.

UNLIKELY ☐ ☐ ☐ ☐ ☐ ☐ ☐ LIKELY
Extremely Quite Slightly Neither Slightly Quite Extremely

7. My wearing a helmet whilst cycling to school would make me too conspicuous if no one else wore one.

UNLIKELY ☐ ☐ ☐ ☐ ☐ ☐ ☐ LIKELY
Extremely Quite Slightly Neither Slightly Quite Extremely

8. My wearing a helmet whilst cycling to school would make me physically uncomfortable.

UNLIKELY ☐ ☐ ☐ ☐ ☐ ☐ ☐ LIKELY
Extremely Quite Slightly Neither Slightly Quite Extremely

9. My wearing a helmet whilst cycling to school would make me aware of the dangers of cycling.

UNLIKELY ☐ ☐ ☐ ☐ ☐ ☐ ☐ LIKELY
Extremely Quite Slightly Neither Slightly Quite Extremely

10. My wearing a helmet whilst cycling to school would mean having to carry it around with me during lessons.

UNLIKELY ☐ ☐ ☐ ☐ ☐ ☐ ☐ LIKELY
Extremely Quite Slightly Neither Slightly Quite Extremely

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SECTION 4

This section contains some brief statements. Please indicate your views by putting a tick (✓) in the boxes provided.

1. Feeling safe is . . .

BAD	☐	☐	☐	☐	☐	☐	☐	GOOD
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. Looking silly is . . .

BAD	☐	☐	☐	☐	☐	☐	☐	GOOD
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. Parents worrying less is . . .

BAD	☐	☐	☐	☐	☐	☐	☐	GOOD
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. Taking care whilst cycling is . . .

BAD	☐	☐	☐	☐	☐	☐	☐	GOOD
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. Having to spend too much money on helmets is . . .

BAD	☐	☐	☐	☐	☐	☐	☐	GOOD
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 4 (continued)

6. Protecting my head is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

7. Being too conspicuous is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

8. Being physically uncomfortable while wearing a helmet is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

9. Being aware of danger is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

10. Carrying my helmet around during lessons is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

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SECTION 5

In sections 5 and 6 we would like to know how you think other people would like you to act. Please indicate your views by putting a tick (✓) in the boxes provided.

1. My close friends think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. My parents think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. Most other members of my family (brothers/sisters/grandparents) think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. Most of my teachers think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. Most of the other cyclists at school think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

6. Most road safety experts think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

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SECTION 6

1. Generally speaking, I want to do what my close friends think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. Generally speaking, I want to do what my parents think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. Generally speaking, I want to do what most other members of my family (brothers/sisters/grandparents) think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. Generally speaking, I want to do what most of my teachers think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. Generally speaking, I want to do what most other cyclists think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

6. Generally speaking, I want to do what most road safety experts think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 7

Cyclists are sometimes unable to wear helmets for a variety of reasons. Please tick (✓) the boxes to show whether you agree or disagree with the following statements.

I might not be able to wear a helmet while cycling to and from school...

		Strongly disagree	Disagree	Neither	Agree	Strongly agree
1.	because I'd forget to put it on ______	☐	☐	☐	☐	☐
2.	because there'd be nowhere to put it during lessons ______	☐	☐	☐	☐	☐
3.	because I'm not sure which is the best one to buy ______	☐	☐	☐	☐	☐
4.	because my family are unwilling or unable to help towards the cost ______	☐	☐	☐	☐	☐
5.	because it's too much effort ______	☐	☐	☐	☐	☐

If you have other reasons why you might not be able to wear a helmet while cycling to school, please write them in the box below.

SECTION 7 (continued)

Here are some questions about wearing helmets while cycling to and from school. For each statement, please tick the box that most applies to you.

6. How much control do you have over whether you do or do not wear a helmet while cycling to school?

Very little control	☐
Little control	☐
Uncertain	☐
Some control	☐
Complete control	☐

7. For me to wear a helmet while cycling to school would be . . .

Very difficult	☐
Difficult	☐
Uncertain	☐
Easy	☐
Very easy	☐

8. If I wanted to I could easily wear a helmet whenever I cycled to school.

Very unlikely	☐
Unlikely	☐
Uncertain	☐
Likely	☐
Very likely	☐

CONFIDENTIAL

SECTION 8

Finally, some questions about your past and present behaviour. Please answer each question by putting a tick (✓) in the boxes provided.

		Yes	No
1.	Do you own a helmet?	☐	☐
2.	Do you wear a helmet while cycling to and from school?	☐	☐

In the past year

		Yes	No
3.	Have you ever had an accident while cycling to or from school?	☐	☐
4.	Has a friend, classmate or relative ever had an accident while cycling to or from school?	☐	☐

THAT IS THE END OF THE QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR HELP

Could you now spend a few minutes checking through to make sure that you have not missed any questions.

If you there are any comments you wish to make, please write them in the space below.

LAURENCE ARNOLD
Centre For Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

APPENDIX 2

STUDY ONE

CYCLING SAFETY QUESTIONNAIRE (TIME 2)

			2

CYCLING SAFETY QUESTIONNAIRE

TIME 2

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

This questionnaire is part of a series of studies about the attitudes and behaviour of pupils who cycle to and from school. It asks you about your recent behaviour while cycling to and from school and about things that may have happened to you or other people.

All information is strictly confidential.

Name: ________________________________

Age: __________

The term "Helmet" refers to any protective headgear designed to be worn whilst cycling.

Please respond to each statement by ticking a box to indicate your answer. You should only tick **one** box for each question.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

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SECTION 1

To start with, a question about your recent cycling behaviour. Please answer by putting a tick (✓) in one of the boxes.

In the past four weeks

1. Have you worn a helmet **while cycling to and from school?**
(if sometimes-tick **Yes**).

Yes ☐

No ☐

Now turn to the next page

CONFIDENTIAL

SECTION 2

Here are two questions about what may have happened to you or other people while cycling to and from school. Please tick a box to indicate if the following have happened to you or to someone you know.

In the past week

		Yes	**No**
1.	Have you had an accident while cycling to or from school?	☐	☐
2.	Has a friend or someone you know had an accident while cycling to and from school?	☐	☐

CONFIDENTIAL

THAT IS THE END OF THE QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR HELP

Could you now spend a few minutes checking through to make sure that you have not missed any questions.

If you have any comments about wearing helmets or about cycling to and from school in general, please write them in the box below.

Laurence Arnold
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

APPENDIX 3

STUDY TWO

CYCLING QUESTIONNAIRE
(PRELIMINARY SURVEY)

			1

CYCLING QUESTIONNAIRE

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

The questions on these pages are to do with your thoughts and feelings about wearing **cycle helmets** while cycling to and from school.

What I would like you to do is to read each question and then write your answers in the box provided.

All information is strictly confidential.

Name: ______________________________

Age: ______________________________

Make sure that your answers are your own:
Do not ask your friends for their ideas.

Section 1

1). What do you think would be the **good things** about wearing a helmet while cycling **to and from senior school**? In the box below, write down as many reasons as you can in favour of the idea.

2). What do you think would be the **bad things** about wearing a helmet while cycling to and from **senior school?** In the box below, write down the sorts of things that would put **you** off doing this.

Section 2

4. Who do you know who would think it a **good thing** if **you** were to wear a helmet while cycling to and from **senior school?** In the box below, write down the people who would be likely to think it a good idea if you were to wear a helmet while cycling to and from senior school.

5. Who do you know who would think it a **bad thing** if **you** were to wear a helmet while cycling to and from **senior school?** In the box below, write down the people who would be likely to think it a bad idea if you were to wear a helmet while cycling to and from senior school.

THAT IS THE END OF THE QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR HELP

Could you now spend a few minutes checking through to make sure that you have not missed anything.

If you have any comments about wearing helmets or about cycling to and from school in general, please write them in the box below.

Laurence Arnold
Centre for Research in Health behaviour
Department of Psychology
The University of Kent at Canterbury

APPENDIX 4

STUDY TWO

TRANSRIPTS OF RESPONSES TO PRELIMINARY SURVEY

TRANSCRIPTS OF RESPONSES TO THE PRELIMINARY QUESTIONNAIRE

Girl (001)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It can save your life: Stop your head from getting injured.	People make fun of them because the shape is different.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family, Teachers, friends and generally most adults.	Some friends might (think it is bad).

Girl (002)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off your bike it can save you from hitting your head on the ground	It could block you from seeing. Could be too small and fall off.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Grandparents; Head–Teacher; Proficiency Teacher; Friends.	Bullies.

Girl (003)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off your bike you can do less damage than if not wearing one.	They look silly and people make fun of you. I fell off my bike and my helmet fell off.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Teacher, some friends.	Some friends; Older children.

Girl (004)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They're safer and make you feel safe: Helps protect your head if you fall off. Helmets are a good idea as they could prevent head injury:	The price: How they look: It makes you feel silly if you're the only one wearing: People laugh at you sometimes.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Teachers; Traffic Wardens; Car and motor bike drivers.	Some other people who think it's funny.

Girl (005)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If they have luminous stickers you are more visible at night: If you fall off your helmet might save your life.	They don't look very good-the shape looks silly and the colours can be too bright: Friends might think you are a baby.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; most adults; Teachers.	Some children: Some older children. Normally, other friends put you off helmets.

Girl (006)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It protects your head if you fall off your bike or someone hits you or something.	People laughing at you or if it makes you head look too big or if no one else wears one.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Parents;	Some people at school.

Girl (007)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It protects you if you have a crash.	People might make fun of you: If you don't have it on right it won't help.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Head Teacher.	

Girl (008)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They can save your life: If coloured, people can see you more.	People think they look stupid in helmet but...(unfinished).
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; family; Best friend.	People might make fun of you.

Girl (009)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They can save your life if you hit your head on the ground: Most of them look nice.	Sometimes they don't fit and go over your eyes so you can't see: Some might be too heavy.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Nan and Granddad; Friends; Head Teacher.	

Girl (010)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They can save your life.	They look stupid and (?are) uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Head Teacher; Relations; Proficiency Teacher.	Bullies (might tease you): Insurance people.

Girl (011)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Because they can save your life.	Not many colours and the ones available are not very nice.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Nan and Granddad; Head Teacher; Best friend.	

Girl (012)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They can save your life if you have an accident.	If you wear a helmet and it's naff then people would laugh at you: Most of the helmets I've tried are uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Parents; Old people; Adults; Car drivers.	People (children) that you know from school.

Girl (013)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They save your life.	You might not know how to put the padding in.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Friends (3 named).	

Girl (014)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They save your life if you crash.	They sometimes put you off when you cycle because they are heavy, uncomfortable, and sometimes come loose.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Head Teacher; Teachers.	Other children going to and from school.

Girl (015)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They can save life: Protect your head from stones etc.	It could fall down onto eyes.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Teachers; ambulance people; Police; Drivers.	My sister and friends.

Girl (016)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	I've got a helmet to keep me safe: They protect you from falling off and hurting head.	People might laugh at you.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Nan and Granddad; Teacher.	People laugh at you.

Girl (017)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Can save your life and some– times if you crash into a wall can prevent brain damage: They protect you from stones.	I think people don't like to wear because how you look in them and because of people take the micky
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Any Teachers; Head Teacher; Parents because they saw a programme in which a boys life was saved his helmet.	

Girl (018)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Makes people see you easily: Protects head if you fall off: Stops you getting wet in rain.	People will take the micky; You look stupid; You feel embarrassed.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; brother; Teachers; all of my family; Some friends; Next–door–neighbours	Some of my friends; Teenagers.

Girl (019)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Can save you from cracking your skull: Can save your life if you fall off your bike.	If it is too big it could fall down over your eyes and you would not be able to see where you were going and crash.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Parents; Police; Drivers; People walking along.	Children at school because they will laugh at you.

Girl (020)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Can save your life and if you fall off your bike and bang your head it will save your head from getting injured.	Some people might call you names cause you look an idiot.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Police; Most adults; Lots of drivers in case they make you fall off!	Your friends might think it's bad because they think it's dumb.

Girl (021)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They can save your life: I feel safer.	Makes my hair come out of the holes.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents think it a good idea to wear a helmet because of all the traffic in Whitstable	My friend thinks a bad thing is that her helmet makes her head itch.

Girl (022)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It makes me feel safe: I like wearing a helmet: It makes me feel as if I belong on the road.	Some helmets are ugly: They can be hard to get on and off: Sometimes they make me feel embarrassed: If I get up late sometimes there's not enough time to put it on: They should be more stylish then more people would buy them: They shouldn't cost so much
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Traffic Wardens; Mums and Dads; Cycling instructors; Police; Drivers.	Friends; Bullies; People who think it tough not to wear one or think it unfashionable. (Also) Bullies might tease me– Some helmets don't look nice.

Girl (023)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They can save your life: Sometimes they have 'glo in the dark' stickers on the front (so you can be seen).	It makes my head itch.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Proficiency Teacher: Parents.	My best friend said it makes her head itch.

Girl (024)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They're safe and fun to wear, and can save your life.	They're hot and sweaty and can sometimes hurt.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents: Teachers: Hospitals.	Friends, brothers, sisters-as they don't look nice on you.

Girl (025)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off your bike you won't hurt your head: It's safe on the road: If you like the style.	If the helmet was too big it would fall down over your eyes and wouldn't be very safe: If it was too tight and you didn't like the style.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Parents/family; Police.	Some friends.

Boy (026)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Stops you from being hurt on your head in an accident:	They can be uncomfortable and people laugh about them
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Parents; Most of my friends	

Boy (027)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They're safe if you get knocked off your bike because they can save your life or if you crash in any way	(i) Make you hot and sweaty: They are too big and bulky which annoys me. (ii) Make me sweaty and hot. They're too big.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family; Police; Friends; Drivers.	Teenagers like 15 – 19.

Boy (028)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Make it easier to be seen: Protect you from hitting your head hard.	Mess up my hair and make me look stupid.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family; Police; Teachers; Friends.	Older friends (15, 16, 17 year olds).

Boy (029)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Could save your life: If bright they could help show you up.	Some helmets are and can be heavy: They are also uncomfortable sometimes: The things that put me off are people who make fun off me.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	All the Teachers in our school; My Mum and Dad.	Some friends.

Boy (030)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Can absorb the hit of a crash: Keeps your head warm.	It can come down over your eyes and block your sight: It hurts your chin. They don't protect the back of your head.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Head Teacher; Parents; Form Teacher.	None.

Boy (031)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It keeps your head warm: It keeps you safe.	It hurts your head: Makes you look like a prat: Expensive. Don't protect back of head
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Head Teacher; Teacher; Grandparents	My Sister.

Boy (032)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you have a crash it might save your life and It's sensible.	The price: If it's uncomfortable: They might look silly. It might get damaged.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parent; Teachers; Grand–parents; Other adults.	Other kids–they may say you look stupid.

Boy (033)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Stops the risk of dying if you hit car: Keeps head warm: Is fashion accessory while being safe. It's fun; it should be a rule to wear helmets to school.	People taking the piss! Not always cool: Chunky accessory.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Police; Parents; Cyclists; Bicycle whole sellers; Drivers.	Braindead idiots who don't wear cycle helmets.

Boy (034)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you should fall off you stand more chance of protecting your head.	The price of them is quite dear and sometimes they're uncomfortable if the straps aren't right.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	*Left blank*	*Left blank*

Boy (035)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Could save a persons life and save your head. I just think cycling helmets are a good idea.	The straps get in your way.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family; Friends; Mum, Dad.	Only some cars people driving (sic).

Boy (036)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	(i)For safety (ii) To keep rain off (iii) To keep head warm (iv) For comfort.	People taking the micky: It's not the fashion.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum and Dad; School; Police; Teachers; Cyclists; Drivers; Bike shops.	People who don't wear helmets.

Boy (037)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They could save your life: You can stick reflectors on them so you are more easily seen.	Most of the helmets don't look very good.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Head Teacher; Parents; Police; Most friends.	Teenagers walking down the High street.

Boy (038)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Protect head: Can have reflective tape.	They can be heavy: The clip can catch your chin: The shape is very silly.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teacher; Cycling Teacher; Parent; Relative; Policeman; Traffic warden.	Watchdog! Stranger? Friends. (*They should have a shell, not just a nylon cover and hardened polystyrene*).

Boy (039)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Wearing a helmet makes your head safer if you have an accident. (*It would be safer to wear a helmet*).	When you wear a helmet it is normally uncomfortable, makes your head hot and the strap is uncomfortable: If it is a funny shape people say you look silly: The price.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Head Teacher; Teachers; Mum and dad.	

Boy (040)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They protect your head and stay on just right.	You look silly in them and they are not comfortable. Should be more comfortable and a better shape
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers and Head Teacher; Traffic Wardens; Police; Mum and Dad.	

Boy (041)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They are good for safety and reflection: Some look good.	Some are uncomfortable and are too dark. (*They should be more trendy*).
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Council; Police; Hospitals; Parents; Teachers.	

Boy (042)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It keeps you safe and you are more easily seen.	They don't look good and are uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Friends; Teachers; Mum, Dad, Brother and Sister; Rest of family.	

Boy (043)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Protects head if you fall off.	People will say silly things.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teacher; Head Teacher Mother; Police.	My friends.

Boy (044)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It's safe for us on the roads.	It's too hot in the helmet.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Friends and class mates.	

Boy (045)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It will protect your head if you fall off your bike.	If too loose it won't help you protect head.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; H/M; Form Teacher.	

Boy (046)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you wear a helmet it keeps your head safer if you fall off.	People will think you are silly.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Head Master and all other Teachers at this school.	

Boy (047)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off it will not hurt.	
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum.	

Girl (048)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	You are less likely to suffer bruising: They are very good protection, especially the ones with padding.	The strap underneath it. If you fall off it can give you an awful scratch as my friend had one ages ago. (*Some people say it's like having a marshmallow on your head; others say it's very heavy or very light*)
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Granddad parents; Form Teacher; Teachers; Hospital.	(*I've never worn one yet so I don't know what it feels like*)

Girl (049)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It makes you feel safer: It might save your head.	
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Rest of family – even my brother!	

Girl (050)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Will be safe and prevent lots of accidents.	Cars might catch your helmet if you lean over and knock you off!
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum (she knows I am safe).	

Girl (051)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off on a hard surface, your head is protected.	In the summer it makes your head sweat.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Grand–parents; Rest of family; Teachers; Cycle instructors.	

Girl (052)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It protects your head if you fall off; It's a good idea to wear a helmet because of the sponge inside it.	It isn't very comfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Head Teacher.	

Girl (053)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fell off your bike and landed on your head it would help protect it.	People saying nasty things about you while you were wearing it.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Teachers; Police	Some of my friends think it looks silly.

Girl (054)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fell off your bike on the way to school it can stop you getting brain damage or some other injury .	Velcro tag inside helmet gets stuck to my hair and pulls it out.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Rest of family; Teachers.	People along the street laugh.

Girl (055)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	To make me safe. It is good to wear a helmet as they can save your life and save you getting brain damage	Helmets heat/hurt your head and they look really silly but it's better to be safe than sorry. They make me uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Most Teachers.	My friend think it a bad idea to wear a helmet and thinks it is very silly having to.

Girl (056)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you do have an accident and land on your head, it would have saved your life: Makes you feel safe.	The things that put me off wearing a helmet is that they look like a marshmallow on your head.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Dad, Mum; Teacher; Police; Friends (probably).	Bullies at school.

Girl (057)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you wear a helmet you will not hurt your head because of how the helmet is made: It can save your life.	I have never worn one but it might put people off cycling. Fastening up the strap underneath the helmet.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family; Teachers; Ambulance drivers	Bullies at school.

Girl (058)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It would be safe to wear one: If you fall off your bike it will protect your head: People will be safe wearing a helmet: I I have a helmet that protects my head when I am cycling	My helmet has nothing bad about it but if it did I would not wear it often.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Friends; Brother, Sister; Mum, Dad.	No one.

Girl (059)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off your bike you won't bang your head because the helmet will protect you.Wearing a helmet while cycling to school would stop me having head injuries.	People will take the micky.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Nan; Mum, Dad; Mum's friend; Grandparents.	People older than me; People who are stupid.

Girl (060)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Cycle helmets are for safety: I like wearing mine as I feel safe and know that my head is protected.	Gives me a headache: Makes my neck sore due to the straps rubbing: It keeps slipping forward. Vehicle drivers would not worry so much if they knocked you off if you were wearing a helmet.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum and Dad; Teachers; Rest of family; Friends.	Stupid people and children.

Girl (061)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you were hit by a car or fell off it could save you from head injuries or even death: If more people wore helmets there would be less cycling deaths.	Straps are sometimes uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Family; Teachers; Car drivers; My Doctor. *Helmets can make drivers relax more.*	Can't think of anyone.

Girl (062)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off, you won't hurt yourself so much.	I don't like wearing helmet at all but if you don't you will hurt yourself more.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Mums and Dads; Teacher who teaches cycling.	

Girl (063)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It will keep my head safe and if I have an accident while cycling it will protect me.	I think some helmets look a bit ugly and I don't want to wear it. Sometimes it makes my head ache
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Teacher; Relatives; Head Teacher.	

Girl (064)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off you don't hurt your head as much as when not wearing one.	Helmets are very uncomfortable: You have to have your hair loose loose: They are not cut away enough at the back for a pony tail:
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Dad; Mum; Sister; Mums friends	Some of my friend's helmets have cracked

Girl (065)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off your bike when wearing a helmet you will not hurt yourself: If you don't wear it and fall off your bike you will hurt yourself	It's quite heavy and very uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?		

Girl (066)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	You should wear one because (i) if you didn't you could fall and crack your head open (ii) because it is much safer.	Sometimes I don't feel right: I feel like a wally
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family; Police.	

Boy (067)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They shield your head and could save your life.	
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	My family.	My Great Gran but she is Gumbey (*perhaps Gummy*).

Boy (068)	GOOD TIIINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	So you won't crack your head open and you can stay safe.	A helmet is quite heavy and it may wriggle about: People laugh at me: I'm sweaty.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Dad.	Friend and class–mates.

Boy (069)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off your bike, the helmet will get hit but not your skin so you can save the skin on your head.	Your helmet will crack in some places and the shell.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers: Mum and Dad.	My Dad; My friends at school because they don't have one on and they start laughing.

Boy (070)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you crash without a helmet on you'd be badly injured: Some look pretty good.	They're very bulky and some are quite heavy: Some look stupid.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum and Dad; Friend.	No one.

Boy (071)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They can protect you if you crash with your head.	Cost a lot of money and people call you mushroom head and they're quite heavy: People calling me safety–conscious
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family; Friends; Teachers.	Classmate: Brother; Mr Stupid from the Mr Men

Boy (072)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you hit your head on the pavement your helmet will stop you cracking your head open: If you go down a pot–hole in the woods you will not hurt your head.	My helmet has netting over it and doesn't look very good: Your head gets sweaty.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Teachers; Friend; Brother, Sister.	

Boy (073)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you're not wearing a helmet and have an accident you can die so a helmet is good.	
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family; Teachers; Friends (2).	

Boy (074)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you crash it won't hurt your head as much (if wearing).	If riding a long way a helmet might start to get heavy: They might be uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad and family.	

Boy (075)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	The good thing about a helmet is the thought of not banging my head: Wearing a helmet is very safe. It makes you take care: It would protect you. It does not look stupid	The strap may be too tight: Nothing would put me off a helmet.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?		

Boy (076)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It is a good thing to have. Makes me happy.	I don't like the helmet with the thing wot stick down.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	My Mum and Dad.	Older and Younger Brothers.

Boy (077)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It is very good as it can save brain damage or maybe a life.	It is a bit uncomfortable and sometimes it pulls your hair.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Relatives; Friends	Two class–mates (1 boy, 1 girl)

Boy (078)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall or crash you could fall and crack your head open: They can also save your life.	People taking the micky out of me because I am wearing one.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Teachers.	

Boy (079)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you didn't wear a helmet you could be killed.	They look like a babies toilet and they're uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Mum and Dad.	My mates would laugh at me

Boy (080)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Protects your head.	It's hot: It may look stupid on. (later – It makes me sweat; it looks stupid on me).
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Drivers; Cyclists; Teachers; Mum, Dad, Brother.	

Boy (081)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	*Unfinished comment*	My mum will spend a lot of money on it.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum and Dad; Friend; Teacher; Brothers.	

Boy (082)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you hit your head falling off your bike it may prevent big injuries.	Some look very silly: The strap is very itchy and some just feel uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum and Dad; Step parents; Teachers; Staff of bike shops; Policemen. Everyone I know.	Some times friends say they look silly.

Girl (083)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They are a perfect solution to the problem of being safe: If you have an accident you'd have more chance of surviving.	They are itchy and uncomfortable and putting it on hurts. You look stupid.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers; Mum.	

Girl (084)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They protect your head if you have an accident.	Sometimes they make your head itch and people laugh at you because you look silly.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Family and Friends.	Friends would laugh at you.

Girl (085)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	In case of accidents, the extent of bodily injury would not be so great: Fluorescent helmets help drivers see you on road.	I have a helmet and the strap is so tight that I have to keep stopping to adjust it: Friends laugh at me when I wear it so that would put me off.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Teachers; Guardian; Brother and Sister; Relatives.	Friends.

Girl (086)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Protects you so you don't crack your head.	What puts people off is that it might be uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum. Dad and Friends.	Your friends will laugh at you.

Boy (087)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you wear a helmet you will be safe on the road:	The strap gets in the way: If you fall over your head goes forward and the strap will catch you around the neck.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Police; Teachers.	

Boy (088)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?		It is too much money: It is too uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?		

Boy (089)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Could keep the rain off and protect your head.	The style looks stupid and I find it uncomfortable: When I look up when I'm wearing a helmet, all I see is the tip of the helmet.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad, Teachers; Shop.	Friends.

Boy (090)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It is safe: It can save your life: Cars can see you in the dark.	Some helmets have netting on them which could catch on branches and pull you off your bike.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Teacher; Dad.	

Boy (091)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Helmets should be worn at all times: If you get hit or crash it will save you from brain damage or head injury: It is a good and safe idea.	If the helmet slipped down and stopped you from seeing you may crash.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Friends (2 named).	

Boy (092)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Wear a helmet on a windy day : Cars will see you on the road.	The strap because...?
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Police.	

Boy (093)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Stops you from breaking your skull and brain damage.	(i) The strap can be too tight: (ii) They're too much money.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Nan; Mum and Dad; Police; Teachers.	

Boy (094)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They stop you getting hurt: Cars can see you when you .	
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Police.	

Boy (095)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They're safe on the road and should be worn: They can save your life sometimes.	The straps get in my way and are too tight: It slips off your head.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Friend; Police.	Gangs?

Boy (096)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They're good because they're supposed to keep you safe from injuries and they stand out well for drivers. Look quite good while on your head: Could save your life.	Some helmets are fairly uncomfortable. They would call you a wimp
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad, teacher, police and relatives.	*Left blank.*

Boy (097)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you're involved in a car accident and sent flying off your bike, your head would be much safer. Helmets make you much safer if you're in an accident	In some helmets there is not enough padding to give you a soft landing.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	My Family	My Mum thinks it's a bad thing (to wear a helmet) if it's too tight.

Boy (098)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Safety in case you fall off going to school: Looking good whilst riding to/from school.	They are too hard, make my head sweat: My friends think I am silly wearing a helmet. They could make it fit more and make it more comfortable by putting more padding inside the helmet
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum and Dad; Grandparents; Mum and Dad's friends; Next–door neighbours	Friends

Boy (099)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It protects your head from a nasty accident	They are sometimes luminous and might distract a driver and cause an accident. If it comes down over eyes when cycling it could cause accident.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teacher; Mum, Dad; Mr Venn?	Mr Schofield (teacher); Friend

Boy (100)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They are (i) safe (ii) look all right (iii) can save lives of people wearing them.	(i) They irritate you and if you get one with a strap they are hard to do up (ii) some people say you are a sissy because you wear one.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Aunt; Grandparents; Mum and Dad; Sister; Cousin.	They could improve the way they fit. They could make them plain and let people decorate them themselves. They should be able to be clipped onto the bike. They should have a lot more padding and maybe a new design.

Boy (101)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Helmets protect your head if you fall off cycling to/from school. If you fall off during busy times you will not knock your head so hard.	Because most of the other children will not be wearing helmets. They might get stolen if you leave them around.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum and Dad and rest of family: Friends because if I fall off I might get brain damage.	Some of my friends

Boy (102)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It is good to wear a helmet in case you fall off your bike.	Nothing would put me off wearing even if people called me names because at least I would stay safe.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	All of the teachers and grown–ups and maybe some sensible children would recommend wearing a cycle helmet.	Can't think of anyone.

Boy (103)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	(i) Protect your head (ii) Fun to wear (iii) are bright and colourful (iv) Comfortable.	If it keeps having light knocks and weakens then you have a bad knock, the protection won't be there.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Police; ambulance; family; friends; Teacher. *If you cycle to and from school and people see you, they may start to wear a helmet more.*	Bullies.

Boy (104)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	The helmet protects you head if you have a minor accident. If more people wore them there would be less serious accidents. *(If there reflectors on them, people will see them)*	They are not hard enough and some of the insides are very itchy: Because they 're light they don't offer enough protection: Most helmets are over–priced: They're not bright enough and not hard enough when you are going to have a serious accident
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Next door neighbour; Dad; Grandparents; Uncle and Aunt; other Aunt.	My friend because his got stolen because he could not lock it on his bike.

Boy (105)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It protects you when you have an accident on your bike: Without it, it could kill you. When I wear a helmet I will know I am being sensible and responsible.	Can't think of anything that would be really bad except being a little uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Most friends; Teachers; Relations.	Some friends because they might think it doesn't look good on you.

Boy (106)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you brake sharply you would go over the handlebars and fall on your head and the helmet would save you from hurting yourself: It could save you from a lot of things.	People calling you names because they think you look stupid: I think they should not be so big: It might get stolen *(also troubled about helmet fitting properly)*
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	I think my parents would think it a good idea because it would be safer to have one	People who didn't like you would say it was a bad idea

Boy (107)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Wearing a helmet is good because if you fall off your bike you won't hurt yourself as much as if you didn't have one: If riding at night some helmets are luminous so cars can see you.	Some helmets don't look good: If it's too big it might wobble about and put you off. Some people may call you a wimp if you are the only one wearing one.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum and Dad, Teachers: Sisters; Grandma.	Some friends, brothers and not friends.

Boy (108)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Wearing a helmet is good because If you fall off you won't cut your head.	The thing that would put me off wearing one is if it looks 'gurny' and people tease you
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum, Dad; Granddad; Nan; Aunt; Uncle; Teachers.	Some friends.

Boy (109)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It is always safer to wear a helmet: They protect you if you fall.	The helmets are always quite bulky and they do not adjust well and slip over your eyes. If the helmets were not so bulky I would wear one all the time. Some helmets are quite fragile if you drop them.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Most adults advise you wear helmet but not all my friends.	Some friends but not many.

Boy (110)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	A helmet can protect our heads sometimes save lives.	(i) How much a helmet costs (cheap ones are not very good). (ii) They can be heavy which can make your head lean (iii) They can get a bit tight (iv) When you do them up they can pinch your chin.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Police because helmets can save NHS lives; Parents.	Bullies. Bullies can call you wimps if you get seen with one on

Boy (111)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It is good to wear one because a helmet can save your life if you crash and it can prevent brain damage and concussion.	Things that may put me off are what it looks like but it doesn't really matter: Also it might get stolen. They have to fit properly or at high speed they are useless because they come off, and if cheap they might not work or cave in. If you drop it and it might smash.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	The teachers think it a good thing because they imply that you should wear one. Your Mum and Dad would also think it a good thing as they save lives.	Your friends might call you names but that also is of no consequence.

Girl (112)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Would help keep you safe in accident. Keep head warm. It could be a life saver	(i) people might make fun of it (ii) It might get stolen.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Friend; Parents; Sister; Aunt.	*Left blank*

Girl (113)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Protect you head from getting injured and save your life.	(i) Looks silly (ii) Feels strange when first worn (iii) The strap under the chin rubs and makes it sore.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teachers (2); Parents; Sister; (named) friends.	People (the drivers) think they look silly and sometimes laugh or make you lose concentration.

Girl (114)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Its safer: can save lives.	(i) If it's loose and you fall off it's worse than not wearing one (ii) It's tight (iii) it can be uncomfortable.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Dad; Mum; Friend (named).	*Left blank*

Girl (115)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	They are good. If I have a bad crash on my bike when not wearing one I could damage my brain, but If I was wearing one I wouldn't. They are brilliant and save lives. They come in stylish colours to match the bike.	The shape would because it makes you look stupid: Also the way it fits under the chin. If you have it where it doesn't pull on the chin it tends to wobble so you have to tighten it and it hurts.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teacher; Neighbour; Friends Mum; Mum and Dad; Sister; Olympic cyclists.	Show–offs (two boys named)

Girl (116)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off on you bike it won't damage your head. A helmet would make me feel safe when cycling.	(i) It will hurt you head (ii) the strap will hurt your chin
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Sisters.	*Left blank*

Girl (117)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Wearing a helmet is a good idea because if I fell off my bike it would protect my head.	The bad things are they make your head sweaty.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Teachers (named) Friend (named)	*Left blank*

Girl (118)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fell off your bike your head would be in less danger. Make you feel safe	(i) I don't like wearing a helmet sometimes because it makes my head feel very hot (ii) My helmet is too big without the pads and too small with them in: If I put the pads in it goes lop–sided.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents.	*Left blank*

Girl (119)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	(i) Don't hit your head if you fall off (ii) Keeps head warm.	They might be uncomfortable and heavy.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Dad; Nan.	*Left blank*

Girl (120)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	The good things are: if I fall off I wouldn't hurt my head.	The hat might be heavy and uncomfortable. I think wearing a cycling helmet should not look silly. I think they should be less expensive and that would encourage people to wear them.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Dad; Grandparents; Two (named) teachers; Brother.	*Left blank*

Girl (121)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It could save your life–the road hits the helmet, not your head. You could have a really nice helmet and everyone would want you to wear it.	It might be heavy Some other people don't wear helmets and you want to be like them.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Dad; Sister; Friend	(named) cousin.

Girl (122)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It protects your head from the road when you fall off and could save you life.	It would make (i) me look silly (ii) my head hot. (iii) I don't like the straps under my chin: they dig in.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum Dad; Gran; Sisters; Friends	One sister; Bullies; Show–offs.

Girl (123)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	The good thing about wearing is that it protects your head if you fall off. I think it is safe to wear a cycle helmet when cycling.	They are heavy and sometimes give you headache and are hard to take off.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Friend; Mum; Dad; Brother.	

Boy (124)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	(i) It protects your head in an accident (ii) it gives you a sense of security.	People making fun of me. I would get bullied if I did wear a helmet.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Brother; Form Teachers; Mum and Dad; All other teachers.	Bullies; show–offs.

Boy (125)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It's safe.	They hurt my head. Some helmets don't fit your head
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Friends (named); Mum; Dad.	*Left blank*

Boy (126)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Wearing a helmet is good because if you fell off your bike and you did not have a helmet on then you could cause yourself very bad injuries.	I do not like wearing a cycling helmet because it is heavy: Also it does not fit my head even with the biggest pads because my head is so small.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Teacher; Mum; Dad; Brother; Aunt and Uncle; 2 friends.	Friends (same as before!)

Boy (127)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It could save your life. If your head hit a tree, the helmets in the way. It makes riding safer. You look smart in it. You could die without them.	It could get in front of your eyes: It only lasts for one bang usefully: It doesn't always save your life.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Friends (named); Teacher.	Friend (Mark)

Boy (128)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If it's loose it might slip over your eyes and you wont be able to see and might crash. You get made fun of but the people who don't wear them are silly.	Wearing one embarrasses me but I'm not the silly one.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	*Left blank*	*Left blank*

Boy (129)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	I think helmets are a good idea because they keep your head safe.. Gives protection to forehead. Makes you look sensible. Sometimes people think they look silly wearing a helmet but it makes you look good.	Some helmets are not very good because they fall over your eyes: They're sometimes too tight: It only lasts once: When you crash you have to buy a new one.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	3 named friends; Form Teacher	*Left blank.*

Boy (130)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you crash you face worse head injuries without a helmet than if wearing one.	Cycle helmets usually make you hot and heavy when you go on a long journey. If you didn't try it for size wouldn't you get more dangerous injuries if it slipped off.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Parents; Teacher.	Teenagers may take the mick or be unkind for your safety.

Boy (131)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off your bike you won't hurt your head.	The helmet might be loose and it might drop in front of your eyes and you might crash.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Dad; 2 Teachers; Sister.	

Boy (132)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	Safety.	Hot days.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Dad.	

Boy (133)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It could save your life.	The helmets are itchy and make you hot.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Dad; Brother.	no one.

Boy (134)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	It is safer to wear a helmet than not to.	They are uncomfortable. They are life saving but make you hot and sweaty and take a long time to put on and get off.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Dad; Mum.	*Left blank*

Boy (135)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you brake too hard and you go over the handlebars there's less chance of getting a head injury.	It hurts: The polystyrene hurts your head.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Dad; named friends.	*Left blank*

Boy (136)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	The good thing about wearing a helmet is that it protects your skull. Cycle helmets will save your skull breaking and having brain damage.	*Left blank*
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Class teacher; Both mums; Brother	

Boy (137)	GOOD THINGS	BAD THINGS
What do **you** think would be the good/bad things about wearing a helmet while cycling to and from senior school?	If you fall off you won't hurt your head. It would make me feel safe.	It might be too tight.
Who is likely to think it would be a good/bad thing if **you** were to wear a helmet while cycling to and from senior school?	Mum; Dad; Other Mum.	A boy at my other school would think it a stupid idea.

APPENDIX 5

STUDY TWO

CYCLING SAFETY QUESTIONNAIRE (TIME 1)

			1

CYCLING SAFETY QUESTIONNAIRE

Centre for Research in Health Behaviour
Institute of Social and Applied Psychology
University of Kent at Canterbury

This questionnaire is part of a series of studies about the attitudes and behaviour of pupils who cycle to and from school. It asks you your views about cycle safety-helmets and about several other aspects of cycling.

Some of the questions may seem similar to each other, but it is important that you answer all of them.

All information is strictly confidential.

Name: ______________________________

Age: _________

The term "Helmet" refers to any protective headgear designed to be worn whilst cycling.

Please respond to each statement by ticking a box to indicate whether you agree or disagree. You should only tick **one** box for each question.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

CONFIDENTIAL

SECTION 1

Firstly, some questions about cycling accidents and injury. Please answer each question by placing a tick (✓) in one of the boxes.

		Very unlikely	Unlikely	Possible	Likely	Very likely
1.	If you had a cycling accident and hit your head (**and you were not wearing a helmet**), how likely do you think it is that you would suffer head injury? ________________	☐	☐	☐	☐	☐
2.	If you had a cycling accident and hit your head (**and you were not wearing a helmet**), how likely do you think it is that you would suffer **serious** head injury? ____________	☐	☐	☐	☐	☐

3. If you ride your bike to school every day (or most days), how likely are you to have an accident sometime in the future? Please circle a number to show your answer.

Very unlikely									Very likely
1	2	3	4	5	6	7	8	9	10

SECTION 1 (continued)

4. If you had a serious accident involving head injury and hospital treatment, how seriously do you think it would affect

		Very little	Not much	Neither	Quite a lot	Very much
a)	your school life? ____________	☐	☐	☐	☐	☐
b)	your family life? ____________	☐	☐	☐	☐	☐
c)	your social and personal life (sports, clubs, hobbies)? ______	☐	☐	☐	☐	☐
d)	your physical and mental well-being? _______________	☐	☐	☐	☐	☐

5. On a scale of **1 to 10**, how serious do you think hitting your head would be **if you were not wearing a helmet**? Please circle a number to show your answer.

Not serious									Very serious
1	2	3	4	5	6	7	8	9	10

SECTION 2

Now we would like to ask some questions about what you **plan to do in the future**. Please answer by placing a tick (✓) in one of the boxes to show how much you agree or disagree with each statement.

1. I intend to wear a helmet while cycling **to and from senior school.**

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 3

Here are some statements that people have made about wearing cycle helmets. Please respond to each item by putting a tick (✓) in one of the boxes to show how much you agree or disagree.

1. My wearing a helmet whilst cycling to school would make me feel safe.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. My wearing a helmet whilst cycling to school would make me look silly.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. My wearing a helmet whilst cycling to school would make my parents worry less.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. My wearing a helmet whilst cycling to school would make me look as if I was being over-cautious.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. My wearing a helmet whilst cycling to school would make me take care.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

6. My wearing a helmet whilst cycling to school would mean having to spend too much money on preventing possible head injury.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 3 (continued)

7. My wearing a helmet whilst cycling to school would protect my head if I had an accident.

UNLIKELY	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	LIKELY

8. My wearing a helmet whilst cycling to school would make me look different from other cyclists if no one else wore one.

UNLIKELY	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	LIKELY

9. My wearing a helmet whilst cycling to school would make me physically uncomfortable.

UNLIKELY	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	LIKELY

10. My wearing a helmet whilst cycling to school would make me aware of the dangers of cycling.

UNLIKELY	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	LIKELY

11. My wearing a helmet whilst cycling to school would mean having to carry it around with me during lessons.

UNLIKELY	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	LIKELY

12. My wearing a helmet whilst cycling to school would mean taking responsibility for my own safety.

UNLIKELY	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	LIKELY

CONFIDENTIAL

SECTION 4

This section contains some brief statements. Please indicate your views by ticking one box for each item.

1. Feeling safe is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

2. Looking silly is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

3. Parents worrying less is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

4. Being over-cautious whilst cycling is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

5. Taking care whilst cycling is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

6. Having to spend too much money on helmets to prevent possible head injury is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

SECTION 4 (continued)

7. Protecting my head is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

8. Looking different from other cyclists is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

9. Being physically uncomfortable while wearing a helmet is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

10. Being aware of danger is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

11. Carrying my helmet around during lessons is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

12. Taking responsibility for my own safety whilst cycling is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

CONFIDENTIAL

SECTION 5

In sections five and six we would like to know how you think other people would like you to act.

1. My close friends think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. My parents think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. Most other members of my family (brothers/sisters/grandparents) think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. Most of my teachers think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. Most of the other cyclists at school think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

6. Most cycling proficiency teachers think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 6

1. Generally speaking, I want to do what my close friends think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. Generally speaking, I want to do what my parents think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. Generally speaking, I want to do what most other members of my family (brothers/ sisters/grandparents) think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. Generally speaking, I want to do what most of my teachers think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. Generally speaking, I want to do what most other cyclists think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

6. Generally speaking, I want to do what most cycling proficiency teachers think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 7

Here are some questions about wearing helmets to school. Please tick the box that most applies to you.

1. How much control do you have over whether or not you wear a helmet while cycling to school?

Very little control	☐
Little control	☐
Uncertain	☐
Some control	☐
Complete control	☐

2. For me to wear a helmet while cycling to school would be . . .

Very difficult	☐
Difficult	☐
Uncertain	☐
Easy	☐
Very easy	☐

3. If I wanted to I could easily wear a helmet whenever I cycled to school.

Very unlikely	☐
Unlikely	☐
Uncertain	☐
Likely	☐
Very likely	☐

CONFIDENTIAL

THAT IS THE END OF THE QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR HELP

Could you now spend a few minutes checking through to make sure that you have not missed any questions.

If you have any comments about wearing helmets or about cycling to and from school in general, please write them in the box below.

Laurence Arnold
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

APPENDIX 6

STUDY TWO

CYCLING SAFETY QUESTIONNAIRE (TIME 2)

			2

CYCLING SAFETY QUESTIONNAIRE

TIME 2

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

This questionnaire asks you your views about the wearing of cycle safety-helmets while cycling to and from school. You may have answered some of these questions before but I should like you to answer them for me again.

It is important that you answer all of the questions.

All information is strictly confidential.

Name: ________________________________

Age: __________

The term "Helmet" refers to any protective headgear designed to be worn whilst cycling.

Please respond to each statement by ticking a box to indicate your answer. You should only tick **one** box for each question.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

CONFIDENTIAL

SECTION 1

In this first section are some statements that people have made about wearing cycle helmets. Please respond to each item by putting a tick (✓) in one of the boxes to show how much you agree or disagree.

1. My wearing a helmet whilst cycling to school would make me feel safe.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. My wearing a helmet whilst cycling to school would make me look silly.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. My wearing a helmet whilst cycling to school would make my parents worry less.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. My wearing a helmet whilst cycling to school would make me look as if I was being over-cautious.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. My wearing a helmet whilst cycling to school would make me take care.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

6. My wearing a helmet whilst cycling to school would mean having to spend too much money on preventing possible head injury.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 1 (continued)

7. My wearing a helmet whilst cycling to school would protect my head if I had an accident.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

8. My wearing a helmet whilst cycling to school would make me look different from other cyclists if no one else wore one.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

9. My wearing a helmet whilst cycling to school would make me physically uncomfortable.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

10. My wearing a helmet whilst cycling to school would make me aware of the dangers of cycling.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

11. My wearing a helmet whilst cycling to school would mean having to carry it around with me during lessons.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

12. My wearing a helmet whilst cycling to school would mean taking responsibility for my own safety.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 2

This section contains some brief statements. Please indicate your views by ticking one box for each item.

1. Feeling safe is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

2. Looking silly is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

3. Parents worrying less is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

4. Taking care whilst cycling is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

5. Having to spend too much money on helmets to prevent possible head injury is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

CONFIDENTIAL

SECTION 2 (continued)

6. Protecting my head is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

7. Looking different from other cyclists is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

8. Being physically uncomfortable while wearing a helmet is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

9. Being aware of danger is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

10. Carrying my helmet around during lessons is . . .

BAD	☐ Extremely	☐ Quite	☐ Slightly	☐ Neither	☐ Slightly	☐ Quite	☐ Extremely	GOOD

CONFIDENTIAL

SECTION 3

In sections 3 and 4 e would like to know how you think other people would like you to act.

1. My close friends think that I should wear a helmet while cycling to and from school.

UNLIKELY ☐ Extremely ☐ Quite ☐ Slightly ☐ Neither ☐ Slightly ☐ Quite ☐ Extremely LIKELY

2. My parents think that I should wear a helmet while cycling to and from school.

UNLIKELY ☐ Extremely ☐ Quite ☐ Slightly ☐ Neither ☐ Slightly ☐ Quite ☐ Extremely LIKELY

3. Most other members of my family (brothers/sisters/grandparents) think that I should wear a helmet while cycling to and from school.

UNLIKELY ☐ Extremely ☐ Quite ☐ Slightly ☐ Neither ☐ Slightly ☐ Quite ☐ Extremely LIKELY

4. Most of my teachers think that I should wear a helmet while cycling to and from school.

UNLIKELY ☐ Extremely ☐ Quite ☐ Slightly ☐ Neither ☐ Slightly ☐ Quite ☐ Extremely LIKELY

5. Most of the other cyclists at school think that I should wear a helmet while cycling to and from school.

UNLIKELY ☐ Extremely ☐ Quite ☐ Slightly ☐ Neither ☐ Slightly ☐ Quite ☐ Extremely LIKELY

6. Most cycling proficiency teachers think that I should wear a helmet while cycling to and from school.

UNLIKELY ☐ Extremely ☐ Quite ☐ Slightly ☐ Neither ☐ Slightly ☐ Quite ☐ Extremely LIKELY

CONFIDENTIAL

SECTION 4

1. Generally speaking, I want to do what my close friends think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

2. Generally speaking, I want to do what my parents think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

3. Generally speaking, I want to do what most other members of my family (brothers/sisters/grandparents) think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

4. Generally speaking, I want to do what most of my teachers think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

5. Generally speaking, I want to do what most other cyclists think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

6. Generally speaking, I want to do what most cycling proficiency teachers think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	Extremely	Quite	Slightly	Neither	Slightly	Quite	Extremely	

CONFIDENTIAL

SECTION 5

Finally, I should like you what you plan to do in the future.

1. Can you tell me the name of the senior school that you will be going to after leaving this school?

   (Please write in): ____

THAT IS THE END OF THE QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR HELP

Could you now spend a few minutes checking through to make sure that you have not missed any questions.

If you have any comments about wearing helmets or about cycling to and from school in general, please write them in the box below.

Laurence Arnold
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

APPENDIX 7

STUDY TWO

CYCLING SAFETY QUESTIONNAIRE (TIME 3)

			3

CYCLING SAFETY QUESTIONNAIRE

TIME 3

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

This questionnaire is the last in the series. It asks you about your behaviour while cycling to and from school and also you your views about wearing cycle safety-helmets while cycling to and from school. Some of the questions may seem similar to ones that you have answered before but it is important that you answer them all.

All information is strictly confidential.

Name: ________________________________

Age: ________________________________

The term "Helmet" refers to any protective headgear designed to be worn whilst cycling.

You should only tick one box for each question. Please follow the instructions on each page carefully (especially those in **bold type**).

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

CONFIDENTIAL

SECTION 1

Firstly, some questions about you, cycling, and cycling helmets. Please answer by putting a tick (√) in one of the boxes.

1. Do you cycle **to and from school**? (if you cycle to school sometimes, tick **yes**)

Yes ☐ (If **yes**, you do cycle to school, go on to question **2,** below)

No ☐ (If **no**, you do not cycle to school, go to question **1, page 2**)

2. Do you wear a helmet when cycling **to and from school**? (If sometimes, tick **yes**)

Yes ☐ (Now go to question **3**)

No ☐ (Now go to question **3**)

	Yes	**No**
3. Have **you** been involved in an accident while cycling to and from school **in the past year?**	☐	☐
4. Has a close **friend** or someone you know been involved in an accident while cycling to and from school **in the past year?**	☐	☐

<u>CONFIDENTIAL</u>

SECTION 2.

* Answer these questions whether you cycle to school or not

Cyclists are sometimes <u>unable</u> or <u>unwilling</u> to wear helmets for a variety of reasons. Please answer the following questions by putting a tick (√) in one of the boxes.

I might not be able to wear a helmet while cycling to school...

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
1. Because I'd forget to put it on	☐	☐	☐	☐	☐
2. Because there is nowhere to put it during lessons	☐	☐	☐	☐	☐
3 Because it's too much effort to put it on	☐	☐	☐	☐	☐
4. Because it feels uncomfortable (too heavy/tight/large/hot)	☐	☐	☐	☐	☐
5. Because if I do the straps up so that the helmet fits properly, the straps hurt my neck/chin	☐	☐	☐	☐	☐
6. Because I'd be in too much of a hurry in the morning to use it	☐	☐	☐	☐	☐

<u>CONFIDENTIAL</u>

THAT IS THE END OF THE QUESTIONNAIRE

<u>Thank you very much for your help</u>

Could you now spend a few minutes checking through to make sure that you have not missed any questions

If you have any comments about wearing helmets or about cycling to and from school in general, please write them in the box below.

Laurence Arnold
Centre for Research in Health behaviour
Department of Psychology
The University of Kent at Canterbury

APPENDIX 8

STUDY THREE

PERSUASIVE MESSAGE BOOKLET
(EXPERIMENTAL CONDITION)

CYCLING SAFETY QUESTIONNAIRE

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

This booklet asks you your views about the use of cycle safety–helmets while cycling to and from school.

On each page there are some statements about cycle helmets. Please read these statements and answer the questions about them. Make sure that you follow the instructions carefully **(especially those written in bold type).** After this, the assistant at your table will tell you what to do next.

All information is strictly confidential.

Name: ________________________________

Age: ________________________________

Please make sure that your responses are you own

<u>This is not a test</u>

WHO THINKS THAT WEARING A HELMET WHILE CYCLING TO AND FROM SCHOOL IS A GOOD IDEA?

Parents like their sons and daughters to wear a helmet while cycling to and from school

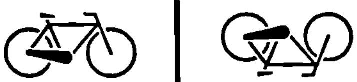
WHY?

Because it makes them **worry less**

Reason 1
They know that a helmet will make you more **easily seen** by car drivers

Reason 2
They know that a helmet will **protect your head** if you have an accident

Reason 3
It will show them that you are **aware of the dangers** of cycling



Which of these 3 reasons for wearing a helmet while cycling to school would stop your parents **worrying about you** the most?

*Put 1, 2 or 3 in the boxes below to show the order of importance

Reason 1
Being more easily seen
Number _____

Reason 2
Protecting your head
Number _____

Reason 3
Being aware of the dangers
Number _____

1. How **much less** do you think your parents would worry if you were to wear a helmet while cycling to and from school? **(Tick one box only)**

Not much less ❒ Quite a lot less ❒ Very much less ❒

WHAT WOULD OTHER CYCLISTS THINK IF YOU WORE A HELMET?

What would the <u>other cyclists at your school</u> think about you wearing a helmet while cycling to and from school?

Cyclists who wear a helmet think it's a good idea no matter what other cyclists think or say **<u>AND</u>...** are not put off even if they **think** that other cyclists regard it as silly

Many cyclists who *do not* wear a helmet think they are a good idea and would quite like to wear one **<u>BUT</u>...** *are* put off because they **think** that other cyclists regard it as silly

So why do some cyclists wear a helmet and others decide not to?

Cyclists have to **weigh up** which of these is more important to them...

what they **think** *other cyclists may say*

protecting their head in case of an accident

YOU HAVE TO DECIDE FOR YOURSELF WHICH IS MORE IMPORTANT

1. If other cyclists at your school say that wearing a helmet while cycling to school is silly... do you think they ...

(a) Really mean it? ❒

(b) Are only saying it because others do? ❒

2. If you were to start wearing a helmet while cycling to and from school, how many of the other cyclists might also think it a good idea and follow your example?

None ❒ Not many ❒ Quite a few ❒ Most ❒ All ❒

SOME PROBLEMS AND SOLUTIONS

Wearing a cycle helmet while cycling to and from school is too much effort

WHY?

The **straps** seem hard to adjust at first so the helmet might not fit properly and may feel uncomfortable

There might be nowhere to **store** the helmet at school which could mean having to carry it around all day

At most shops, the assistants are trained to show you **how to adjust the straps** so that the helmet fits properly and is comfortable

You and other cyclists could **ask one of your teachers** if there is a cupboard or room at school where you could leave the helmet during lessons

Remember, you only have to **adjust the straps once---** when you first buy the helmet!

Once the straps are adjusted and the helmet fits, putting it on will **only take a few minutes**

Once the helmet is safely stored, you won't have to carry it around or worry about it being stolen

If you use a **chain or d-lock,** fix the helmet to your bike when you lock it up!

PROBLEM SOLVED!

<u>SOME QUESTIONS ABOUT PROBLEMS AND THEIR SOLUTIONS</u>

(For each question, tick *one* box only)

1. How much help would it be if a shop assistant was able to show you how to adjust the straps so that the helmet fits properly and is comfortable.

Not much help ❒ Quite helpful ❒ Very helpful ❒

2. Would knowing **how to adjust the straps** (so that the helmet fits properly and is comfortable) make wearing a helmet to school less of an effort?

Not much less effort ❒ A little less effort ❒ A lot less effort ❒

3. How easy would it be for you (and some other cyclists) to talk to one of your teachers about having somewhere to store your helmet once at school?

Not very easy ❒ Fairly easy ❒ Very easy ❒

4. How easy would it be for you to chain or lock your helmet to your bike?

Not very easy ❒ Fairly easy ❒ Very easy ❒

5. Would knowing that there was somewhere to **store** the helmet or that it was **chained** to your bike (*so that you would not have to carry it around during lessons*) make wearing one while cycling to school seem less of an effort?

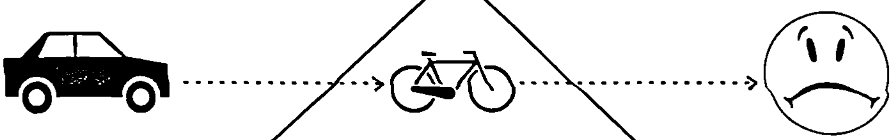
Not much less effort ❒ A little less effort ❒ A lot less effort ❒

WHY WEAR A HELMET WHILE CYCLING TO AND FROM SCHOOL? (1)

Cyclists who wear a helmet while cycling to and from school say it *makes them take care.*

WHY?

Wearing a helmet makes them aware that they need to take care while cycling to school in case they are **knocked off their bike by a car.**



QUESTION 1

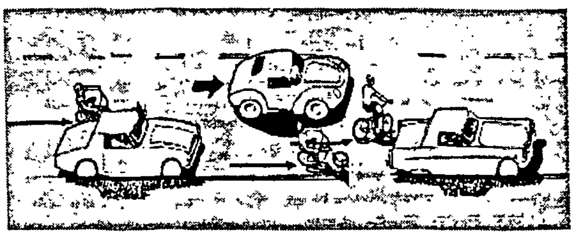
Out of all the accidents involving cyclists aged 11 to 14, how many do you think happen on the **way to or from school?**

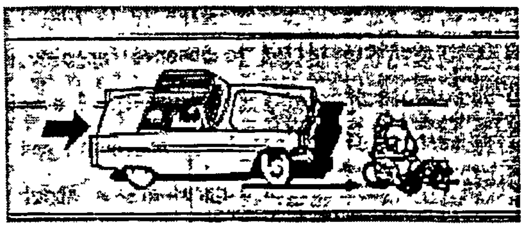
25% | 65% | 45%

QUESTION 2

Out of all the cyclists who have accidents while cycling to school, how many do you think **are knocked of their bike by a car?**

75% | 40% | 50%

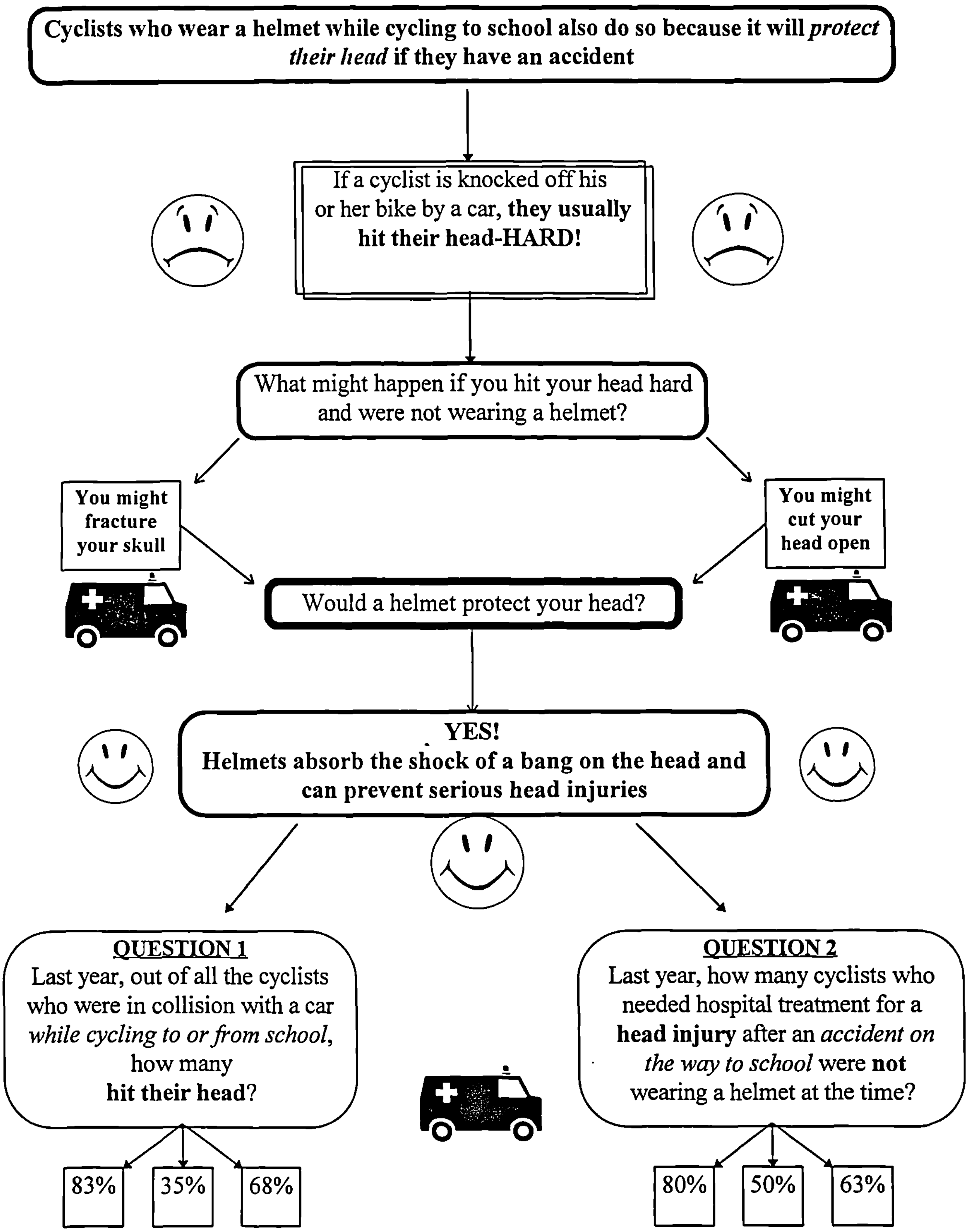




3. How much would wearing a helmet while cycling to and from school make you take care? **(Tick only one box)**

No more care ❐ A little more care ❐ Much more care ❐

WHY WEAR A HELMET WHILE CYCLING TO AND FROM SCHOOL? (2)



3. If you had a cycling accident and hit your head, how much do you think that a helmet would protect your head? **(Tick one box only)**

Not very much ☐ A little ☐ Very much ☐

ALL YOU HAVE TO DO ON THE FOLLOWING PAGES IS TO WRITE DOWN YOUR THOUGHTS ABOUT WEARING CYCLE HELMETS WHILE CYCLING TO AND FROM SCHOOL.

FIRST, NAME SOME PEOPLE WHO **YOU THINK** WOULD LIKE IT IF YOU WERE TO WEAR A HELMET.

NEXT, LIST SOME WAYS TO OVERCOME THE DIFFICULTIES ASSOCIATED WITH HELMET USE.

FINALLY, LIST SOME GOOD THINGS ABOUT HELMET USE.

PLEASE MAKE SURE THAT THESE ARE YOUR OWN IDEAS

WHO MIGHT THINK IT A GOOD IDEA IF YOU WEAR A HELMET?

List the people (or groups of people) **known to you**, who might think it a good idea if you were to wear a helmet while cycling to school. Please write your answers on the lines provided.

i.e. who would *worry about you* if you did not wear a helmet? Who else might think it best for you to wear a helmet than not to wear one?

*Try to name at least *three* people or groups of people

1. ______________________________ would

want me to wear a helmet while cycling to and from school

2. ______________________________ would

want me to wear a helmet while cycling to and from school

3. ______________________________ would

want me to wear a helmet while cycling to and from school

4. ______________________________ would

want me to wear a helmet while cycling to and from school

5. ______________________________ would

want me to wear a helmet while cycling to and from school

6. ______________________________ would

want me to wear a helmet while cycling to and from school

DEALING WITH DIFFICULTIES

Some cyclists are put off wearing a helmet while cycling to school because they **think** it will be *too much effort* and don't know how to overcome any difficulties that may arise. Can you write down possible ways of overcoming any difficulties.

Problem 1.
Adjusting the straps

Some cyclists are put off **getting** a helmet because they think the **straps** will be hard to adjust properly and do up.

Some cyclists have **tried wearing** a helmet but found it uncomfortable because the straps are adjusted badly.

List ways of dealing with these problems

1. ______________________________

____

____

...Would be a way to overcome these difficulties

2. ______________________________

____

____

...Would be a way to overcome these difficulties

3. ______________________________

____

____

...Would be a way to overcome these difficulties

DEALING WITH DIFFICULTIES

Some cyclists are put off wearing a helmet while cycling to school because they **think** it will be *too much effort* and don't know how to overcome any difficulties that may arise. Can you write down possible ways of overcoming any difficulties.

Problem 2.
Where to put the helmet

Some cyclists are put off **wearing** a helmet while cycling to school because they think they may have to carry it around during lessons.

Some cyclists are put off **wearing** a helmet while cycling to school because they think it may get stolen if they leave it with their bike.

List ways of dealing with these problems

1. ______________________________

____

____

...Would be a way to overcome these difficulties

2. ______________________________

____

____

...Would be a way to overcome these difficulties

3. ______________________________

____

____

...Would be a way to overcome these difficulties

GOOD THINGS ABOUT WEARING A HELMET

Could you now list as many **good things** about wearing a helmet **while cycling to and from school** as you can think of. Try to think *at least three*. (Please write on the lines provided).

1. Wearing a helmet while cycling to school would be a good thing because...

 ____

 ____

2. Wearing a helmet while cycling to school would be a good thing because...

 ____

 ____

3. Wearing a helmet while cycling to school would be a good thing because...

 ____

 ____

4. Wearing a helmet while cycling to school would be a good thing because...

 ____

 ____

5. Wearing a helmet while cycling to school would be a good thing because...

 ____

 ____

6. Wearing a helmet while cycling to school would be a good thing because...

 ____

 ____

THAT IS THE END OF THIS BOOKLET

I WOULD NOW LIKE YOU TO COMPLETE A **GROUP TASK** IN WHICH ALL FOUR (OR FIVE) OF YOU MAKE...

- **one list of people who would like you to wear a helmet**
- **one list of solutions to problems**
- **and one list of good things about helmet use**

<u>THEN, PUT THESE LISTS IN ORDER OF IMPORTANCE.</u>

The assistant at your table will help you to do this but it is up to you and not her to decide upon the lists.

AFTER YOU HAVE DONE THIS, THERE IS ANOTHER <u>**VERY SHORT**</u> QUESTIONNAIRE WHICH I WOULD ALSO LIKE YOU TO COMPLETE

<u>YOU WILL THEN HAVE FINISHED THE EXPERIMENT</u>

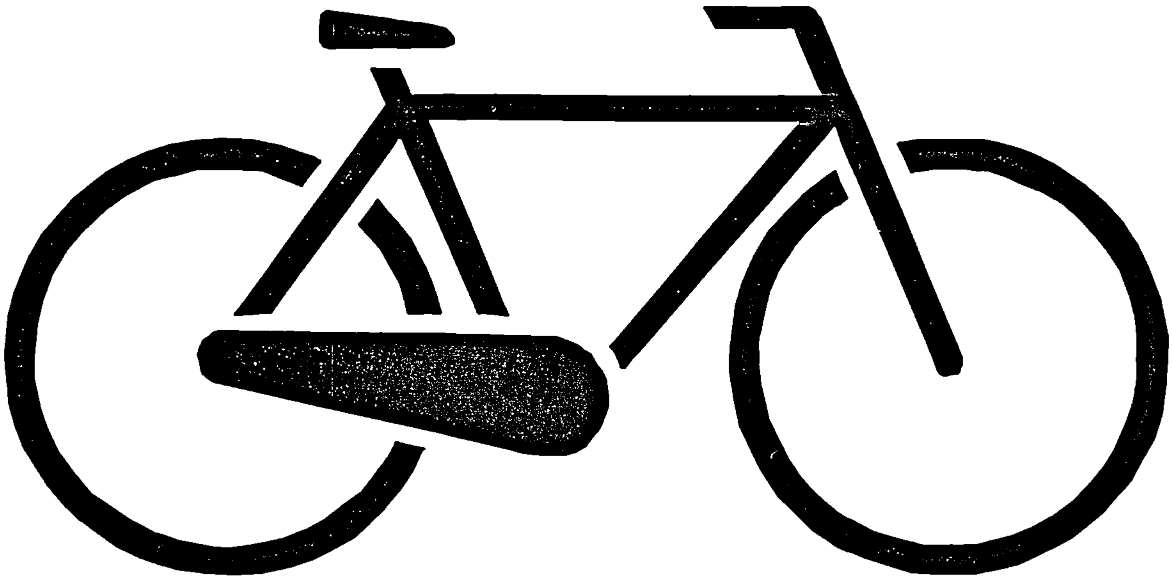
LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

APPENDIX 9

STUDY THREE

PERSUASIVE MESSAGE BOOKLET
(CONTROL CONDITION)

CYCLING PROFICIENCY QUESTIONNAIRE



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Department of Psychology
University of Kent at Canterbury

This booklet asks you your views about **a cycling proficiency training and bicycle maintenance course** which people interested in promoting cycling are thinking about offering in the future. **These courses are not available now**, but if they start, they will cater for 11 to 15 year old cyclists who would like to increase their cycling proficiency and learn how to maintain their bicycles.

On each page there are statements about the proposed course. Please read these statements and answer the questions about them. Make sure that you follow the instructions carefully **(especially those written in bold type)**. After this, the assistant at your table will tell you what to do next.

All information is strictly confidential.

Name: ______________________________

Age: ______________________________

Please make sure that your responses are you own

<u>This is not a test</u>

WHO THINKS YOU SHOULD ATTEND A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE?

Most road-safety experts would like pupils who cycle to school to attend a cycling proficiency and bicycle maintenance course

WHY?

Because it would make them better cyclists and encourage them to cycle to and from school

Reason 1
If they had extra training they would be better cyclists and learn about the Highway Code

Reason 2
If they felt more confident about cycling, then they would be more likely to cycle to and from school

Which of these 2 reasons in favour of attending a cycling proficiency and bicycle maintenance course would **road-safety experts think is the most important?**

Knowing the Highway Code

Number____

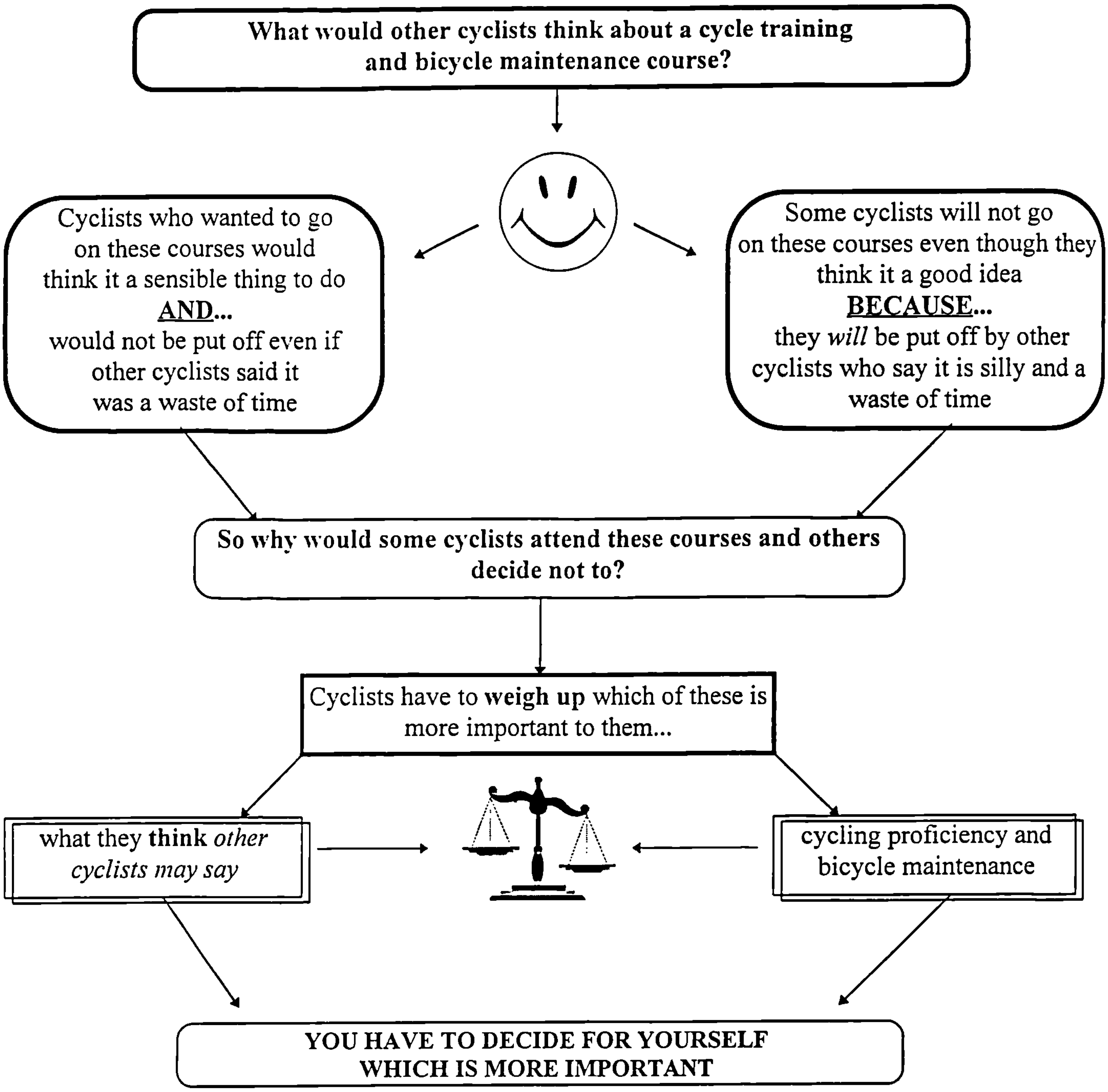
Being encouraged to cycle to school

Number____

1. How much happier would road-safety experts be if you were to attend a cycling proficiency and bicycle maintenance course? **(Tick one box only)**

Not much happier ☐ A bit happier ☐ A lot happier ☐

WHAT WOULD OTHER CYCLISTS THINK IF YOU WENT ON A CYCLE PROFICIENCY TRAINING AND BICYCLE MAINTENANCE COURSE?



1. If other cyclists at your school were to say that attending a cycling proficiency training and bicycle maintenance course is a silly idea... do you think they ...

(a) ...would really mean it? ❒

(b) ...would be saying it to be copy other people ? ❒

2. If you were to start attending a cycle training and maintenance course, how many of the other cyclists at your school might also think it a good idea and follow your example?

None ❒ Not many ❒ Quite a few ❒ Most ❒ All ❒

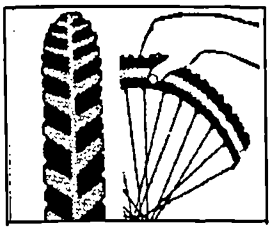
SOME PROBLEMS AND SOLUTIONS

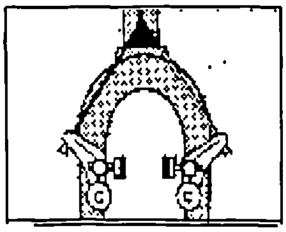
Attending a cycling proficiency training and bicycle maintenance course would be too much effort

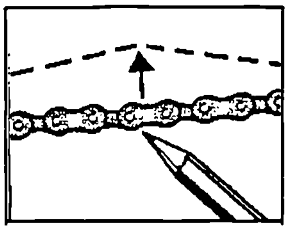
WHY?

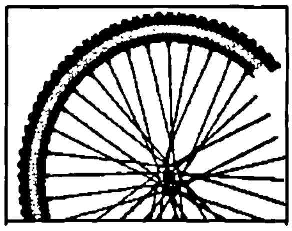
Maintaining my bike properly would be too difficult because I don't know enough about the brakes, tyres and other moving parts

The course might take up so much of my free time that seeing my friends would be difficult









The course instructors are trained to show you how to look after the tyres, brakes and other moving parts

Perhaps other members of your family could help you when you work on your bike at home for the first time

If your friends attended a course with you, then yo could all spend time together and help each other to learn

If the course took place in the summer holidays you would have time to attend and still see your friends

END OF PROBLEM!

SOME QUESTIONS ABOUT PROBLEMS AND THEIR SOLUTIONS

(For each question, tick *one* box only)

Suppose you were to attend a cycling proficiency and bicycle maintenance course...

1. How much help would it be if an instructor taught you how to adjust and repair the brakes and other moving parts on your bike?

   Not much help ❑ Quite helpful ❑ Very helpful ❑

2. Would knowing how to adjust and repair the brakes and other moving parts on your bike make bicycle maintenance less of an effort?

   Not much less effort ❑ A little less effort ❑ A lot less effort ❑

3. How easy would it be for you to attend a cycling proficiency and bicycle maintenance course during the summer holidays?

   Not very easy ❑ Fairly easy ❑ Very easy ❑

4. Would you find it easier if your friends attended the course at the same time as you?

   Not much easier ❑ A bit easier ❑ Much easier ❑

5. Would knowing that you would be able to repair your bike yourself and maintain it properly make attending a course seem worth the effort?

   Not worth the effort ❑ Just about worth the effort ❑ Definitely worth the effort ❑

WHAT ARE THE GOOD THINGS ABOUT ATTENDING A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE?

Attending a cycling proficiency and bicycle maintenance course could save you money and help you get more out of your bike

HOW?

Because it will teach you how to maintain your bike and how to repair it if anything goes wrong

Reason 1
If anything went wrong with your bike you could fix it yourself rather than have to pay a shop to repair it

Reason 2
If you keep your bike in good working order, it will last longer an won't be off the road being fixed so often

Which of these 2 good things about attending a cycling proficiency and bicycle maintenance course do *you* think is the **most important?**

(Put a **1** or **2** in the boxes below to show the order of importance)

Saving money by mending your bike yourself
Number_____

Getting more and longer use out of your bike
Number_____

1. Would you feel happier about cycling knowing that if you had any trouble with your bike, you could deal with it? **(Tick one box only)**

Not much happier ❐ A bit happier ❐ A lot happier ❐

ALL YOU HAVE TO DO ON THE FOLLOWING PAGES IS TO WRITE DOWN YOUR THOUGHTS ABOUT ATTENDING A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE

FIRST, NAME SOME OTHER PEOPLE WHO **YOU THINK** WOULD LIKE IT IF **YOU** WERE TO ATTEND A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE.

NEXT, LIST SOME WAYS TO **OVERCOME** THE DIFFICULTIES ASSOCIATED WITH ATTENDING A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE.

FINALLY, LIST SOME **GOOD THINGS** ABOUT ATTENDING A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE.

PLEASE MAKE SURE THAT THESE ARE YOUR OWN IDEAS

WHO WOULD THINK IT A GOOD IDEA IF YOU WERE TO ATTEND A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE

List the people (or groups of people) **known to you**, who might think it a good idea if **you** were to attend a cycling proficiency and bicycle maintenance course. Please write your answers on the lines provided.

***Try to name at least *three* people or groups of people**

1. ____ would

want me to attend a cycling proficiency and bicycle maintenance course

2. ____ would

want me to attend a cycling proficiency and bicycle maintenance course

3. ____ would

want me to attend a cycling proficiency and bicycle maintenance course

4. ____ would

want me to attend a cycling proficiency and bicycle maintenance course

5. ____ would

want me to attend a cycling proficiency and bicycle maintenance course

6. ____ would

want me to attend a cycling proficiency and bicycle maintenance course

DEALING WITH DIFFICULTIES

Some cyclists might be put off attending a cycle proficiency and bicycle maintenance course because they **think** it will be *too much effort* and may cause difficulties. Can you write down possible ways of overcoming any difficulties.

Problem 1
Maintaining my bike properly would be too difficult because I don't know enough about the brakes, tyres and other moving parts

Problem 2
The course might take up so much of my free time that seeing my friends would be difficult

List ways of dealing with these problems

1. ______________________________

____

____

...Would be a way to overcome these difficulties

2. ______________________________

____

____

...Would be a way to overcome these difficulties

3. ______________________________

____

____

...Would be a way to overcome these difficulties

DEALING WITH DIFFICULTIES

Continue writing down ways of dealing with the problems on this sheet.

Problem 1
Maintaining my bike properly would be too difficult because I don't know enough about the brakes, tyres and other moving parts

Problem 2
The course might take up so much of my free time that seeing my friends would be difficult

List ways of dealing with these problems

4. ______________________________

____

____

...Would be a way to overcome these difficulties

5. ______________________________

____

____

...Would be a way to overcome these difficulties

6. ______________________________

____

____

...Would be a way to overcome these difficulties

GOOD THINGS ABOUT ATTENDING A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE

Could you now list as many **good things** about attending a cycling proficiency and bicycle maintenance course as you can. Try to think *at least three*. (Please write on the lines provided).

1. Attending a proficiency and bicycle maintenance course would be good because...

2. Attending a proficiency and bicycle maintenance course would be good because...

3. Attending a proficiency and bicycle maintenance course would be good because...

4. Attending a proficiency and bicycle maintenance course would be good because...

5. Attending a proficiency and bicycle maintenance course would be good because...

6. Attending a proficiency and bicycle maintenance course would be good because...

THAT IS THE END OF THIS BOOKLET

I WOULD NOW LIKE YOU TO COMPLETE A **GROUP TASK** IN WHICH ALL FOUR (OR FIVE) OF YOU MAKE...

- **one list of people who would like you to attend a cycling proficiency training and bicycle maintenance course**
- **one list of solutions to problems you might encounter if attending a cycling proficiency training and bicycle maintenance course**
- **and one list of good things about attending a cycling proficiency training and bicycle maintenance course**

THEN, PUT THESE LISTS *IN ORDER OF IMPORTANCE.*

The assistant at your table will help you to do this but it is up to you and not her to decide upon the content of the lists.

AFTER YOU HAVE DONE THIS, THERE IS ANOTHER **VERY SHORT** QUESTIONNAIRE WHICH I WOULD ALSO LIKE YOU TO COMPLETE

YOU WILL THEN HAVE FINISHED THE EXPERIMENT

LAURENCE ARNOLD
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APPENDIX 10

STUDY THREE

INSTRUCTIONS AND GUIDELINES FOR ADMINISTERING THE EXPERIMENTAL CONDITION PERSUASIVE MESSAGE BOOKLETS

INSTRUCTIONS AND GUIDELINES FOR ADMINISTERING THE *EXPERIMENTAL* QUESTIONNAIRES

DO NOT (INTENTIONALLY OR INADVERTENTLY) LET PARTICIPANTS READ ANY PART OF THIS DOCUMENT

Contents:

Centre for Research in Health Behaviour
Department of Psychology
The University of Kent at Canterbury

READ THESE INSTRUCTIONS CAREFULLY

1). <u>Purpose of the experiment and participants.</u>

- This experiment is an attempt to promote helmet use amongst school-aged cyclists while cycling to and from school.
- Participants are pupils aged 11 to 14 years who cycle to and from school and do not wear a helmet.
- The participants at your table are in the **"experimental condition"**

<u>2). What the session involves</u>

Materials

Each participant will have **two booklets** to complete **(I will distribute these).**

- The first is a **"workbook"** containing a series of flow charts: These present persuasive messages concerning the *"wearing of cycle helmets while cycling to and from school"*.
- The second is a short standard questionnaire booklet

Procedure

The session requires participants to complete **FOUR tasks**: two written tasks **in the first booklet**, a third group task (in which you write out lists) and fourth written task involving the second questionnaire booklet.

Participants' tasks.

Tasks I and 2 (in the workbook).

- The first task is to read and respond to a the flow-charts in their workbooks.
- The second task is compile three lists relating to these tasks.

Task 3 (Group task).

- The third task involves participants compiling group lists from their individual lists.

Task 4 (Time-3 questionnaire).

- The fourth task requires participants to complete the "Time 3" Questionnaire.

Your role

- Work through the workbook with the participants to ensure that they read the text in the flow-chart boxes, explore the possibilities indicated by the arrows and answer the questions.
- Help the participants at your table with the group task (see instruction below)
- Gather in the completed workbooks, hand each participant a copy of the second questionnaire and supervise them as they complete it.

Make doubly sure that the Participants write their name and age legibly on both booklets

OVERVIEW of EXPERIMENTAL CONDITION WORKBOOK

This relates to the first *three* tasks.

<u>*Task 1.</u> Pages 1 - 5 inc. These pages contain the persuasive messages concerning the outcomes of helmet use while cycling to and from school.

Pages 1 and 2: Normative influences.
Pg. 1 concerns the influence of parents.
Pg. 2 concerns the influence of other cyclists.

Pages 5 and 6: Advantages.
Pg. 5 concerns the issue of taking care.
Pg. 6 concerns the issue of protecting one's head.

<u>*Task 2.</u> Pages 6 to 9 inc. These are for participants to list their thoughts about helmet use.

Page 7: Normative influences.
Pg. 7 is where participants should list other **people** who would want them to wear a helmet while cycling to and from school (i.e. think their wearing one is a good idea).

Pages 8 and 9: Associated problems.
Pg. 8 is where participants should list solutions to the **strap** problem.
Pg. 9 is where participants should list solutions to the **storage** problem

Page 9: Advantages.
Pg. 10 is where participants should list the **good things** about helmet use.

***Task 3. THIS IS A GROUP (THOUGHT-LISTING) TASK (i.e. the collaborative task) in which you take the role of leader (and scribe).**

(i) Each table or group of participants have to compile **one list** from each category of their earlier lists **<u>and</u>** put these in order of importance.
(ii) You are to encourage discussion (about the relative importance) of the ideas and write these lists down on the record sheets provided.

GUIDELINES: RUNNING THE SESSION

Introducing the session

(i) Introduce yourself to your group and explain that the session is concerned with **the use of cycle helmets while cycling to and from school** and that you would like them to look at a booklet and answer a few questions. ***DO NOT USE THE TERM ATTITUDE***

(ii) Explain that it is not a test and that they are not competing with the others in their group or with other tables/groups. You are only interested in their own ideas.

(iii) Stress that the information is confidential and that the only people who see it will be us. **It has nothing to do with the school.**

Working through the Workbooks:

Tell the group that they are to work through the booklets with you so that they all do it at the same time. Don't let one or two get ahead of the others. Explain that there are five charts to look at and a few questions to answer on each.

Task one (pages 1 - 5 inc.,): Flow charts.

For each chart, read the text in the boxes aloud to the group ensuring that participants also read it. Try to keep the presentation informal and "chatty" without straying from the obvious theme. Check that they understand these issues and then ask them to answer the questions. **You will only have about 3-5 minutes for each of these pages.**

Page 1: Enhancing the normative influences of parents:

Amongst children who wear a helmet, there is a recognition that their parents worry less if they wear a helmet and they also evaluate parents worrying less as important. I am trying to encourage these beliefs among non-wearers.

The participants' task here is to put the three reasons (for parents worrying less) in order of importance. **Explain this to the participants.** They should then answer the final question.

Page 2: Enhancing the normative influences of other cyclists:

Helmet users cite other cyclists at the same school as an influence and seem to use other helmet users as a referent (on-wearers relate to other non-wearers). The issue here is that most of the **cyclists who do not wear a helmet nevertheless, do think that they are a good idea.** I am trying to put across the idea then that (i) many non-wearers do not wear because they think that every one else regards helmet use as silly and (ii), that it if one or two begin to wear a helmet-then others may follow suit.

Page 3: *Enhancing perceptions of control over helmet use:*

Low perceptions of behavioural control are related to non-use. Two reasons cited as putting cyclists off helmet use are that wearing one is **too much effort** (which seems to be due to the discomfort of badly adjusted straps and the challenge of having to adjust them initially) and there may be **nowhere to store the helmet once at school.** What I am trying to do is to suggest some solutions to these problems and thus increase the participants perceptions of behavioural control over helmet use.

- **Straps:** The main points are **firstly**, that if cyclists buy their helmet from somewhere like Halford's, they will be shown how to adjust the straps and do them up. Cyclists who already have a helmet could perhaps ask someone who wears one how to adjust these straps; **Secondly**, once the straps are adjusted properly, the helmet can be put on very quickly, will not slip and will be conformable to wear.

- **Storage:** The main points are the **firstly,** participants could approach their form teacher (alone, or with others) and ask if there is somewhere secure in the school where they can leave their helmets. **Secondly**, it is possible to lock the helmet to the bike using thin steel cables and padlocks by passing the cable through vent holes in the helmet.

Page 4: *Questions about difficulties and solutions:*

- These are questions about the issues raised on page 3. Make sure that the participants answer these questions on their own.

Pages 5 and 6: *Enhancing a positive evaluation of helmet use-the good things:*

If you ask young cyclists to rate the good things about wearing a helmet while cycling to and from school, the two beliefs which seem consistently important (amongst helmet wearers) are (i) that wearing a helmet will *protect their head*, and (ii) that wearing a helmet will *make them take care*. What I am trying to do on pages 5 and 6 is to focus participants' attention on these two aspects in the context of the information about the need to protect one's head and take care when cycling to and from school.

Page 5.

The issue here is that many cyclists who wear a helmet while cycling to and from school do so because it **helps them to take care**. The act of putting on and wearing a helmet seems to be a good reminder of the possible dangers of helmet use. The chart attempts to convey this point and to convey the message that there is a need to take care while cycling to and from school.

- Make sure that participants think about and answer the two questions and that they answer the final question.

- After all of the participants in your group have completed this page: tell them the answers to the questions: **question 1 = 65%** **question 2 = 75%.**

Page 6. This message builds on those introduced in page 5. *Given that accidents affecting this age group are school-related*, many cyclists who wear a helmet while cycling to and from school do so because they believe it will **protect their head if** they have an accident. I am trying to convince participants: (i) that helmets need to be worn due to the likelihood of an accident in which the cyclist hits his or her head, and (ii) that helmets do work.

- Make sure that participants think about and answer the two questions and that they answer the final question.

- After all of the participants in your group have completed this page: tell them the answers to the questions: **question 1 = 68% question 2 = 80%.**

This is the end of task one; Hand out a chocolate bar to each participant (They are not to eat these there and then).

Task Two (pages 7 - 10 inc.): Thought listing.

This task is concerned with 'thought-listing' and is designed to encourage participants to think about the messages presented in the flow-charts: **Tell the group (at your table) that they are to do this in silence and work on their own.**

The participants have been asked to list...

- Other people who would think it a good idea if they (the participants) were to wear a helmet while cycling to and from school. **(1 list concerning normative beliefs).**

- Solutions to the problems associated with wearing a helmet while cycling to and from school **(1 list concerning factors which detract from perceptions of behavioural control).**

- The good things about wearing a helmet while cycling to and from school **(1 list of the expected beneficial outcomes of helmet use).**

Explain that the spaces provided are just there to help. **They do not have to fill in all the spaces provided and can write down more if they want.**

***Only spend 3-5 minutes on each list.**

Task 3: Group thought listing task).

This task is the *second* thought-listing task and is a collaborative one deigned to encourage participants to elaborate upon their earlier lists and think about the persuasive messages more.

- **Explain that this is a group task and that you will do the writing**
- **As a group**, they are to compile three lists from the individual lists they made earlier.
- The lists must be put **in order of importance.**
- The lists should include **all** of the referents named on the individual lists (so that each participants has his or her views represented).
- **You** are to lead the discussion and compile the lists using the appropriate pages in your "instruction booklet" (pages 9 to 14).

In their booklet (inside, back page), participants have been asked to make...

- **one group list** of *others who would think it a good idea* if they (the participants) were to wear a helmet while cycling to and from school from the individual lists made in task 2.
- **one group list** of *problems and solutions* associated with) wearing a helmet while cycling to and from school. from the individual lists they made in task 2
- **one group list** of the *advantages of* wearing a helmet while cycling to and from school. from the individual lists they made in task 2.

MAKE SURE THAT PARTICIPANTS UNDERSTAND THE TASK

NB: You should lead the discussion without influencing the groups decision as to order of importance. If you are running over time, take the most commonly occurring name/solution/good thing to be the most important.

THE PAGES FOR YOU TO USE WHEN COMPILING THE THREE GROUP LISTS ARE ON PAGES 9 TO 14 (INC.).

GROUP LIST OF OTHER PEOPLE WHO WOULD WANT THE PARTICIPANTS TO WEAR A HELMET WHILE CYCLING TO AND FROM SCHOOL

From the individual lists that participants made of <u>**other people**</u> who would like them to wear a helmet while cycling to and from school, compile <u>**one list**</u> and put it in order of importance. Put the most important first, and the least important last. **The whole group should all agree on this order: Try not to let one person alone decide.**

1. ____would

   want me to wear a helmet while cycling to and from school

2. ____would

   want me to wear a helmet while cycling to and from school

3. ____would

   want me to wear a helmet while cycling to and from school

4. ____would

   want me to wear a helmet while cycling to and from school

5. ____would

   want me to wear a helmet while cycling to and from school

6. ____would

   want me to wear a helmet while cycling to and from school

Continuation sheet: Group list of other people who would like participants to wear a helmet while cycling to and from school

7. ____would

want me to wear a helmet while cycling to and from school

8. ____would

want me to wear a helmet while cycling to and from school

9. ____would

want me to wear a helmet while cycling to and from school

10. ____would

want me to wear a helmet while cycling to and from school

11. ____would

want me to wear a helmet while cycling to and from school

12. ____would

want me to wear a helmet while cycling to and from school

GROUP LIST OF SOLUTIONS TO THE DIFFICULTIES ASSOCIATED WITH WEARING A HELMET WHILE CYCLING TO AND FROM SCHOOL

From the lists participants made of ways to deal with the difficulties associated with wearing a helmet while cycling to and from school, compile <u>**one list**</u> and put it in order of importance. Put the most important solution first, and the least important last. **The whole group should all agree on this order: Try not to let one person alone decide.**

1. ____

   ____

   ...Would be the best way to overcome these difficulties

2. ____

   ____

   ...Would be the next best way to overcome these difficulties

3. ____

   ____

   ...Would be the third best way to overcome these difficulties

4. ____

   ____

   ...Would be the fourth best way to overcome these difficulties

5. ____

   ____

   ...Would be the fifth best way to overcome these difficulties

Continuation sheet: group list of solutions to the difficulties associated with wearing a helmet while cycling to and from school.

6. ______________________________

____

...Would be the sixth best way to overcome these difficulties

7. ______________________________

____

...Would be the seventh best way to overcome these difficulties

8. ______________________________

____

...Would be the eighth best way to overcome these difficulties

9. ______________________________

____

...Would be the ninth best way to overcome these difficulties

10. ______________________________

____

...Would be the tenth best way to overcome these difficulties

GROUP LIST OF GOOD THINGS ABOUT WEARING A HELMET WHILE CYCLING TO AND FROM SCHOOL

From the lists participants made of the good things about wearing a helmet while cycling to and from school, compile one list and put it in order of importance. Put the most important good thing first, and the least important last. **The whole group should all agree on this order: Try not to let one person alone decide.**

1. Wearing a helmet while cycling to and from school would be a good thing because...____

2. Wearing a helmet while cycling to and from school would be a good thing because...____

3. Wearing a helmet while cycling to and from school would be a good thing because...____

4. Wearing a helmet while cycling to and from school would be a good thing because...____

5. Wearing a helmet while cycling to and from school would be a good thing because...____

Continuation sheet: group list of solutions to the difficulties of wearing a helmet while cycling to and from school.

6. Wearing a helmet while cycling to and from school would be a good thing because...____

   ____

7. Wearing a helmet while cycling to and from school would be a good thing because...____

   ____

8. Wearing a helmet while cycling to and from school would be a good thing because...____

   ____

9. Wearing a helmet while cycling to and from school would be a good thing because...____

   ____

10. Wearing a helmet while cycling to and from school would be a good thing because...____

    ____

Task four (final task-Time 3 questionnaire)

After you have completed task 3, tell the group that you would like them to complete a final short questionnaire.

Give each participant a copy of the questionnaire and ask them to complete it in silence. This is the evaluation questionnaire assessing **beliefs about helmet use.**

- Make sure that participants complete this questionnaire properly.
- Make sure that they write in their names and ages.
- Stress that they are do it on their own.
- Ask them not to disturb others when they have finished.

When they have **all** finished this questionnaire, they can then have their second chocolate bar.

THAT IS THE END OF THE SESSION

Thank the participants and tell them to follow whatever instructions they were given by teaching staff.

DO NOT TELL PARTICIPANTS THAT THEY ARE TO BE SEEN AGAIN FOR A FOLLOW-UP SESSION

APPENDIX 11

STUDY THREE

INSTRUCTIONS AND GUIDELINES FOR ADMINISTERING THE CONTROL CONDITION PERSUASIVE MESSAGE BOOKLETS

INSTRUCTIONS AND GUIDELINES FOR ADMINISTERING THE *CONTROL* QUESTIONNAIRES

DO NOT (INTENTIONALLY OR INADVERTENTLY) LET PARTICIPANTS READ ANY PART OF THIS DOCUMENT

Contents:

Centre for Research in Health Behaviour
Department of Psychology
The University of Kent at Canterbury

READ THESE INSTRUCTIONS CAREFULLY

1). Purpose of the experiment and participants.

- This experiment is an attempt to promote helmet use amongst school-aged cyclists while cycling to and from school.
- Participants are pupils aged 11 to 14 years who cycle to and from school and do not wear a helmet.
- The participants at your table are in the control condition: DO NOT MENTION CYCLE HELMETS

2). What the session involves

Materials

Each participant will have **two booklets** to complete **(I will distribute these).**

- The first is a **"workbook"** containing a series of flow charts: These present persuasive messages concerning a "*cycling proficiency and bicycle maintenance course*".
- The second is a short standard questionnaire booklet

Procedure

The session requires participants to complete **FOUR tasks**: two written tasks **in the first booklet**, a third group task (in which you write out lists) and fourth written task involving the second questionnaire booklet.

Participants' tasks.

Tasks I and 2 (in the workbook).

- The first task is to read and respond to a the flow-charts in their workbooks.
- The second task is compile three lists relating to these tasks.

Task 3 (Group task).

- The third task involves participants compiling group lists from their individual lists.

Task 4 (Time-3 questionnaire).

- The fourth task requires participants to complete the "Time 3" Questionnaire.

Your role

- Work through the workbook with the children to ensure that they read the text in the flow-chart boxes, explore the possibilities indicated by the arrows and answer the questions.

- Help the participants at your table with the group task (see instruction below)

- Gather in the completed workbooks, hand each participant a copy of the second questionnaire and supervise them as they complete it.

Make doubly sure that the Participants write their name and age legibly on both booklets

OVERVIEW of CONTROL CONDITION WORKBOOK

This relates to the first *three* tasks.

Task 1. **Pages 1 - 5 inc. These pages contain the persuasive messages about the course.**

Pages 1 and 2: Normative influences.

Pg. 1 concerns the influence of road safety experts.
Pg. 2 concerns the influence of other cyclists.

Pages 3 and 4: Problems and solutions.

Pg. 3 concerns problems associated with attending the course.
Pg. 4 asks five (5) questions *about the two problems on page 3*

Pages 5: Advantages.

Pg. 5 concerns the good things about attending such a course.

Task 2. **Pages 7 to 10 inc. These are for participants to list their thoughts.**

Page 7: Normative influences.

Pg. 7 is where participants should list other **people** who would want them to attend the course (or think their attending a good idea).

Pages 8 and 9: Associated problems.

Pg. 8 is where participants should list solutions to the problems/drawbacks.
Pg. 9 is a continuation sheet for solutions to the problems/drawbacks.

Page 10: Advantages.

Pg. 10 is where participants should list the **good things** about attending the proposed course.

Task 3. THIS IS A GROUP TASK (i.e. the collaborative task) in which you take the role of leader (and scribe).

(i) Each table or group of participants have to compile **one list** from each category of their earlier lists **and** put these in order of importance.
(ii) You are to encourage discussion (about the relative importance) of the ideas and write these lists down on the record sheets provided.

GUIDELINES: RUNNING THE SESSION

Introducing the session

(i) Introduce yourself to your group and explain that the session is concerned with **a proposed cycling proficiency and bicycle maintenance course** and that you would like them to look at a booklet and answer a few questions. ***DO NOT MENTION CYCLE HELMETS**

(ii) Explain that it is not a test and that they are not competing with the others in their group or with other tables/groups. You are only interested in their own ideas.

(iii) Tell participants that the proposed course is being planned by **road safety experts:** We have been asked to find out what cyclists think about such a course.

(iv) Stress that the information is confidential and that the only people who see it will be us. **It has nothing to do with the school.**

Working through the Workbooks:

Tell the group that they are to work through the booklets with you so that they all do it at the same time. Don't let one or two get ahead of the others. Explain that there are four charts to look at and a few questions to answer on each.

Task one (pages 1 - 5 inc.,): Flow charts.

For each chart, read the text in the boxes aloud to the group ensuring that the participants also read it. Try to keep the presentation informal and "chatty" without straying from the obvious theme. Check that they understand these issues and then ask them to answer the questions. **You will only have about 3-5 minutes for each of these pages.**

***Page 1:** Normative influences:*
The participants' task is to put the two reasons (why road-safety experts would want them to attend the course) in order of importance. **You may have to explain this**. After this, have them answer the question.

***Page 2:** More normative influences:*
Other cyclists at the same school may be an influence on their behaviour and choices. Some cyclists may decide to go on the course no matter what other cyclists do or say and yet other cyclists may want to go on it yet will be 'put off' because of the reaction of others. **The main point to get participants thinking about is that sometimes we may be influenced by what we think others may say or do.** Cyclists who say that the proposed course is silly may secretly want to go on it but assume that others would laugh at them if they said so.

Page 3: Control beliefs:
Some cyclists say that attending the course would be **too much effort** due to certain drawbacks or difficulties.

The issues here are fairly self explanatory: Cyclists may be put off attending the course because they lack mechanical knowledge and/or fear that the course might interfere with their social life: These difficulties are detailed in the boxes and then some solutions to these difficulties are presented.

- Make sure that they read the proposed solutions before turning to page four.

***Page 4**: Questions about difficulties and solutions:*

- These are questions about the issues raised on page 3. Make sure that the children answer these questions on their own.

***Page 5**: Advantages of attending the proposed course:*
This deals with the good things about attending the course and is fairly self-explanatory. Make sure the participants read the text properly before answering the questions.

This is the end of task one; Hand out a chocolate bar to each participant
(They are not to eat these there and then).

Task Two (pages 7 - 10 inc.): Thought listing.

This task is concerned with 'thought-listing' and is designed to encourage participants to think about the messages presented in the flow-charts: **Tell the group (at your table) that they are to do this in silence and work on their own.**

The participants have been asked to list...
- Other people who would think it a good idea if they (the participants) were to attend the course. **(1 list)**

- Solutions to problems associated with attending the course **(1 list)**

- Good things about attending the course **(1 list).**

Explain that the spaces provided are just there to help. **They do not have to fill in all the spaces provided and can write down more if they want.**

Task 3: Group thought listing task).

This task is the *second* thought-listing task and is a collaborative one deigned to encourage participants to elaborate upon their earlier lists and think about the persuasive messages more.

- **Explain that this is a group task and that you will do the writing**
- **As a group**, they are to compile three lists from the individual lists they made earlier.
- The lists must be put **in order of importance.**
- The lists should include **all** of the referents named on the individual lists (so that each participants has his or her views represented).
- **You** are to lead the discussion and compile the lists using the appropriate pages in your "instruction booklet" (pages 8 to 14).

In their booklet (inside, back page), participants have been asked to make...

- **one group list** of *others who would think it a good idea if they (the participants) were to attend the course* from the individual lists they made in task 2.
- **one group list** of problems and solutions associated with attending the course from the individual lists they made in task 2
- **one group list** of the advantages of attending the course from the individual lists they made in task 2.

MAKE SURE THAT PARTICIPANTS UNDERSTAND THE TASK

NB: You should lead the discussion without influencing the groups decision as to order of importance. If you are running over time, take the most commonly occurring name/solution/good thing to be the most important.

THE PAGES FOR YOU TO USE WHEN COMPILING THE THREE GROUP LISTS ARE ON PAGES 8 TO 13 (INC.).

GROUP LIST OF OTHER PEOPLE WHO WOULD WANT THE PARTICIPANTS TO ATTEND A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE

From the individual lists that participants made of <u>**other people**</u> who would like them to **attend a cycling proficiency and bicycle maintenance course,** compile <u>**one list**</u> and put it in order of importance. Put the most important first, and the least important last. **The whole group should all agree on this order: Try not to let one person alone decide.**

1. ____would

want me to attend a cycling proficiency and bicycle maintenance course

2. ____would

want me to attend a cycling proficiency and bicycle maintenance course

3. ____would

want me to attend a cycling proficiency and bicycle maintenance course

4. ____would

want me to attend a cycling proficiency and bicycle maintenance course

5. ____would

want me to attend a cycling proficiency and bicycle maintenance course

6. ____would

want me to attend a cycling proficiency and bicycle maintenance course

Continuation sheet: Group list of other people who would like participants to attend a cycling proficiency and bicycle maintenance course.

7. ____would

want me to attend a cycling proficiency and bicycle maintenance course

8. ____would

want me to attend a cycling proficiency and bicycle maintenance course

9. ____would

want me to attend a cycling proficiency and bicycle maintenance course

10. ____would

want me to attend a cycling proficiency and bicycle maintenance course

11. ____would

want me to attend a cycling proficiency and bicycle maintenance course

12. ____would

want me to attend a cycling proficiency and bicycle maintenance course

GROUP LIST OF SOLUTIONS TO THE DIFFICULTIES OF BICYCLE MAINTENANCE AND ATTENDING THE CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE

From the lists participants made of ways to deal with the **difficulties of bicycle maintenance and attending a cycling proficiency and maintenance course,** compile <u>one list</u> and put it in order of importance. Put the most important solution first, and the least important last. **The whole group should all agree on this order: Try not to let one person alone decide.**

1. ____

   ____

   ...Would be the best way to overcome these difficulties

2. ____

   ____

   ...Would be the next best way to overcome these difficulties

3. ____

   ____

   ...Would be the third best way to overcome these difficulties

4. ____

   ____

   ...Would be the fourth best way to overcome these difficulties

5. ____

   ____

   ...Would be the fifth best way to overcome these difficulties

Continuation sheet: group list of solutions to the difficulties of bicycle maintenance and attending the cycling proficiency and bicycle maintenance course.

6. ____

____

...Would be the sixth best way to overcome these difficulties

7. ____

____

...Would be the seventh best way to overcome these difficulties

8. ____

____

...Would be the eighth best way to overcome these difficulties

9. ____

____

...Would be the ninth best way to overcome these difficulties

10. ____

____

...Would be the tenth best way to overcome these difficulties

GROUP LIST OF GOOD THINGS ABOUT ATTENDING A CYCLING PROFICIENCY AND BICYCLE MAINTENANCE COURSE

From the lists participants made of the **good things about attending a cycling proficiency and bicycle maintenance course,** compile <u>one list</u> and put it in order of importance. Put the most important good thing first, and the least important last. **The whole group should all agree on this order: Try not to let one person alone decide.**

1. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...______________________________

   ____

2. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...______________________________

   ____

3. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...______________________________

   ____

4. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...______________________________

   ____

5. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...______________________________

   ____

Continuation sheet: group list of solutions to the difficulties of bicycle maintenance and attending the cycling proficiency and bicycle maintenance course.

6. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...____

   ____

7. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...____

   ____

8. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...____

   ____

9. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...____

   ____

10. Attending a cycling proficiency and bicycle maintenance course would be a good thing because...____

    ____

Task four (final task-Time 3 questionnaire)

After you have completed task 3, tell the group that you would like them to complete a final short questionnaire.

Give each participant a copy of the questionnaire and ask them to complete it in silence. This is the evaluation questionnaire assessing beliefs about helmet use.

- Make sure that participants complete this questionnaire properly.
- Make sure that they write in their names and ages.
- Stress that they are do it on their own.
- Ask them not to disturb others when they have finished.

When they have **all** finished this questionnaire, they can then have their second chocolate bar.

THAT IS THE END OF THE SESSION

Thank the participants and tell them to follow whatever instructions they were given by teaching staff.

DO NOT TELL PARTICIPANTS THAT THEY ARE TO BE SEEN AGAIN FOR A FOLLOW-UP SESSION

APPENDIX 12

STUDY THREE

CYCLING SAFETY QUESTIONNAIRE (TIME 1)

			1

CYCLING SAFETY QUESTIONNAIRE

TIME 1

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

This questionnaire asks you your views about wearing cycle safety–helmets while cycling to and from school. Some of the questions may seem similar to each other but it is important that you answer them all.

All information is strictly confidential.

Name: ______________________________

Age: ______________________________

The term "Helmet" refers to any protective headgear designed to be worn whilst cycling.

Please follow the instructions on each page carefully (especially those in **bold type**).

You should only tick <u>one box</u> for each question unless instructed otherwise.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

CONFIDENTIAL

SECTION 1

Firstly, some questions about you, cycling, and cycle helmets, and what you intend to do in the future. Please answer each item by putting a tick (√) in the boxes provided.

1. On average, on how many days of the week do you cycle **to and from school?**

FIVE ☐
FOUR ☐
THREE ☐
TWO ☐
ONE ☐

2. Do you **own** a cycle helmet or **have use** of one belonging to someone else?

Yes ☐ (If **yes**, go to question **3**)
No ☐ (If **no**, go to section **4**)

3. Do you wear a helmet when cycling **to and from school?** (If *sometimes*, tick **yes**)

Yes ☐ (If **yes**, go to question **4**)
No ☐ (If **no**, go to question **4**)

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SECTION 2

In this section there are some statements that cyclists have made about how other people would like them to act. Please answer by placing a tick (√) in the boxes provided to show how much you agree or disagree with each item.

1. My parents think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	LIKELY

2. Most of the other school cyclists at my school think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	LIKELY

3. Generally speaking, I want to do what my parents think I should do.

UNLIKELY	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	LIKELY

4. Generally speaking, I want to do what most of the other cyclists at my school think I should do.

UNLIKELY	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	LIKELY

CONFIDENTIAL

SECTION 3

Next, we would like to ask you some questions about wearing helmets while cycling to and from school. Please answer by putting a tick (√) in the box that most applies to you.

1. Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because adjusting/doing up the straps is too much effort.

DISAGREE	☐ Strongly disagree	☐ Disagree	☐ Slightly disagree	☐ Neither	☐ Slightly agree	☐ Agree	☐ Strongly agree	AGREE

2. Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because there would be nowhere to put it during lessons.

DISAGREE	☐ Strongly disagree	☐ Disagree	☐ Slightly disagree	☐ Neither	☐ Slightly agree	☐ Agree	☐ Strongly agree	AGREE

3. For me to wear a helmet while cycling to and from school would be...

DIFFICULT	☐ Very difficult	☐ Difficult	☐ Slightly difficult	☐ Neither	☐ Slightly easy	☐ Easy	☐ Very easy	EASY

SECTION 4

In this section are some statements that people have made about wearing cycle helmets. Please respond to each item by putting a tick (√) in one of the boxes.

1. My wearing a helmet while cycling to and from school would make me take care.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	extremely	quite	slightly	neither	slightly	quite	extremely	

2. My wearing a helmet while cycling to and from school would protect my head if I had an accident.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	extremely	quite	slightly	neither	slightly	quite	extremely	

3. Taking care while cycling to and from school is...

BAD	☐	☐	☐	☐	☐	☐	☐	GOOD
	extremely	quite	slightly	neither	slightly	quite	extremely	

4. Protecting my head while cycling to and from school is...

BAD	☐	☐	☐	☐	☐	☐	☐	GOOD
	extremely	quite	slightly	neither	slightly	quite	extremely	

<u>CONFIDENTIAL</u>

THAT IS THE END OF THE QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR HELP

Could you now spend a few minutes checking through to make sure that you have not missed any questions.

If you have any comments about wearing helmets or about cycling to and from school in general, please write them in the space below.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

APPENDIX 13

STUDY THREE

CYCLING SAFETY QUESTIONNAIRE (TIME 2)

			2

CYCLING SAFETY QUESTIONNAIRE

TIME 2

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

This questionnaire asks you your views about wearing cycle safety–helmets while cycling to and from school. Some of the questions may seem similar to ones that you have answered before but it is important that you answer them all.

All information is strictly confidential.

Name: ______________________________

Age: ______________________________

The term "bike" refers to pedal cycles. "Helmet" refers to any protective headgear designed to be worn whilst cycling.

Please follow the instructions on each page carefully (especially those in **bold type**).

You should only tick one box for each question unless instructed otherwise.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

CONFIDENTIAL

SECTION 1

Firstly, some questions about you, cycling, and cycle helmets. Please answer by putting a tick (√) in one of the boxes provided.

1. Do you wear a helmet when cycling **to and from school**? (If *sometimes*, tick **yes**).

   Yes ☐

   No ☐

SECTION 2

Next, we would like to ask you a question about what you **intend to do in the future.** Please answer each item by putting a tick (√) in one of the boxes.

2. I intend to wear a helmet while cycling *to and from school* at **some time in the future.**

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	extremely	quite	slightly	neither	slightly	quite	extremely	

3. I expect to wear a helmet while cycling *to and from school* at **some time in the future.**

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	extremely	quite	slightly	neither	slightly	quite	extremely	

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SECTION 3

Here are some statements that people have made about wearing cycle helmets and about other people. Please show how much you disagree or agree with each item by putting a tick (√) in one of the boxes.

1. My parents think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	extremely	quite	slightly	neither	slightly	quite	extremely	

2. Most of the other school cyclists at my school think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	extremely	quite	slightly	neither	slightly	quite	extremely	

3. Generally speaking, I want to do what my parents think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	extremely	quite	slightly	neither	slightly	quite	extremely	

4. Generally speaking, I want to do what most of the other cyclists at my school think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	extremely	quite	slightly	neither	slightly	quite	extremely	

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SECTION 4

Here are some statements that cyclists have made about using a helmet while cycling to and from school. Please answer by putting a tick (√) in one of the boxes provided.

1. Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because adjusting/doing up the straps is too much effort.

DISAGREE	☐ Strongly disagree	☐ Disagree	☐ Slightly disagree	☐ Neither	☐ Slightly agree	☐ Agree	☐ Strongly agree	**AGREE**

2. Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because there would be nowhere to put it during lessons.

DISAGREE	☐ Strongly disagree	☐ Disagree	☐ Slightly disagree	☐ Neither	☐ Slightly agree	☐ Agree	☐ Strongly agree	**AGREE**

3. For me to wear a helmet while cycling to and from school would be...

DIFFICULT	☐ Very difficult	☐ Difficult	☐ Slightly difficult	☐ Neither	☐ Slightly easy	☐ Easy	☐ Very easy	**EASY**

4. The effort involved in adjusting/doing up the straps is...

BAD	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	**GOOD**

5. Having nowhere to store my helmet at school during lessons is ...

BAD	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	**GOOD**

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SECTION 5

This section contains some statements that cyclists have made about using a helmet while cycling to and from school. Please answer by putting a tick (√) in one of the boxes.

1. My wearing a helmet while cycling to and from school would make me take care.

UNLIKELY	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	LIKELY

2. My wearing a helmet while cycling to and from school would protect my head if I had an accident.

UNLIKELY	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	LIKELY

3. Taking care while cycling to and from school is...

BAD	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	GOOD

4. Protecting my head while cycling to and from school is...

BAD	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	GOOD

THAT IS THE END OF THE QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR HELP

Could you now spend a few minutes checking through to make sure that you have not missed any questions.

If you have any comments about wearing helmets or about cycling to and from school in general, please write them in the space below.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

APPENDIX 14

STUDY THREE

CYCLING SAFETY QUESTIONNAIRE (TIME 3)

			3

CYCLING SAFETY QUESTIONNAIRE

TIME 3

Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

This questionnaire asks you your views about wearing cycle safety–helmets while cycling to and from school. Some of the questions may seem similar to ones that you have answered before but it is important that you answer them all.

All information is strictly confidential.

Name: ______________________________

Age: ______________________________

The term "Helmet" refers to any protective headgear designed to be worn whilst cycling.

Please follow the instructions on each page carefully (especially those in **bold type**).

You should only tick <u>one box</u> for each question unless instructed otherwise.

LAURENCE ARNOLD
Centre for Research in Health Behaviour
Department of Psychology
University of Kent at Canterbury

CONFIDENTIAL

SECTION 1

Firstly, some questions about you, cycling, and cycle helmets. Please answer by putting a tick (√) in one of the boxes provided.

1. Do you wear a helmet when cycling **to and from school**? (If *sometimes*, tick **yes**).

Yes ☐ (If **yes**, go to question **2**)

No ☐ (If **no**, go to question **2**)

2. I intend to wear a helmet while cycling *to and from school* at **some time in the future?**

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	extremely	quite	slightly	neither	slightly	quite	extremely	

3. I expect to wear a helmet while cycling *to and from school* at **some time in the future.**

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	extremely	quite	slightly	neither	slightly	quite	extremely	

SECTION 2

Here are some statements that people have made about wearing cycle helmets and about other people. Please show how much you disagree or agree with each item by putting a tick (√) in one of the boxes.

1. My parents think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	extremely	quite	slightly	neither	slightly	quite	extremely	

2. Most of the other school cyclists at my school think that I should wear a helmet while cycling to and from school.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	extremely	quite	slightly	neither	slightly	quite	extremely	

3. Generally speaking, I want to do what my parents think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY
	extremely	quite	slightly	neither	slightly	quite	extremely	

4. Generally speaking, I want to do what most of the other cyclists at my school think I should do.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	LIKELY

SECTION 3

Here are some statements that cyclists have made about using a helmet while cycling to and from school. Please answer by putting a tick (√) in the boxes provided.

1. Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because adjusting/doing up the straps is too much effort.

DISAGREE	☐ Strongly disagree	☐ Disagree	☐ Slightly disagree	☐ Neither	☐ Slightly agree	☐ Agree	☐ Strongly agree	AGREE

2. Even if I wanted to, I might not be able to wear a helmet while cycling to and from school because there would be nowhere to put it during lessons.

DISAGREE	☐ Strongly disagree	☐ Disagree	☐ Slightly disagree	☐ Neither	☐ Slightly agree	☐ Agree	☐ Strongly agree	AGREE

3. For me to wear a helmet while cycling to and from school would be...

DIFFICULT	☐ Very difficult	☐ Difficult	☐ Slightly difficult	☐ Neither	☐ Slightly easy	☐ Easy	☐ Very easy	EASY

4. The effort involved in adjusting/doing up the straps on helmets is...

BAD	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	GOOD

5. Having nowhere to store the helmet at school during lessons is ...

BAD	☐ extremely	☐ quite	☐ slightly	☐ neither	☐ slightly	☐ quite	☐ extremely	GOOD

CONFIDENTIAL

SECTION 4

Here are some statements that cyclists have made about using a helmet while cycling to and from school. Please answer by putting a tick (√) in the boxes provided.

1. My wearing a helmet while cycling to and from school would make me take care.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	extremely	quite	slightly	neither	slightly	quite	extremely	

2. My wearing a helmet while cycling to and from school would protect my head if I had an accident.

UNLIKELY	☐	☐	☐	☐	☐	☐	☐	**LIKELY**
	extremely	quite	slightly	neither	slightly	quite	extremely	

3. Taking care while cycling to and from school is...

BAD	☐	☐	☐	☐	☐	☐	☐	**GOOD**
	extremely	quite	slightly	neither	slightly	quite	extremely	

4. Protecting my head while cycling to and from school is...

BAD	☐	☐	☐	☐	☐	☐	☐	**GOOD**
	extremely	quite	slightly	neither	slightly	quite	extremely	

THAT IS THE END OF THE QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR HELP

Could you now spend a few minutes checking through to make sure that you have not missed any questions.

If you have any comments about wearing helmets or about cycling to and from school in general, please write them in the space below.

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