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The attitudes and behaviour of adolescent road users: An application of the theory of planned behaviour

Prepared for Road Safety Division, Department for Transport

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CONTENTS

Executive Summary

In 2002 in Britain, there were over 11,700 child pedestrian and cyclist casualties (between the ages of 11-16) and over 2,000 of those children were killed or seriously injured. A better understanding of what makes children and adolescent road users particularly vulnerable is required to develop countermeasures to improve their safety. Interventions may need to be targeted at drivers and riders of motor vehicles in an attempt to change their behaviour (e.g. to make them more aware of child pedestrians and to adopt appropriate behaviour). However, it could also be argued that children in this age group have a large role to play with respect to their own road safety, and desirable improvements may also require changing their behaviour.

TRL was commissioned by the Department for Transport's (DfT) Road Safety Division (RSD) to carry out research into the attitudes and behaviour of adolescent road users (11-16 years old). The project was carried out in two stages. The purpose of stage 1 was to study the road using behaviour that may contribute towards the safety of adolescent road users. In stage 2 (reported here), the theory of planned behaviour (TPB) was used to study adolescents' attitudes towards a selection of specific behaviours identified as being important in terms of road safety.

The TPB is a theoretical account of how a number of variables combine to determine behaviour. The theory posits that people's attitudes (global positive or negative evaluations about performing the behaviour), subjective norms (perceived social pressure to perform the behaviour) and perceptions of control (the perceived ease or difficulty of performing the behaviour) determine intentions to behave. Behavioural intention is then seen, along with perceived control, as the proximal determinant of behaviour. The theory views attitudes, subjective norms and perceived control as each being determined by two interacting sets of beliefs. Attitudes are determined by perceptions about the likelihood of particular outcomes occurring (outcome beliefs) and the evaluation of those outcomes (outcome evaluations). Subjective norm is determined by perceived social pressure from different groups of people (referent beliefs) and motivation to comply with those groups of people. Finally, perceived behavioural control is determined by beliefs about the frequency of encountering factors that may make performing the behaviour easier or more difficult (control frequency beliefs) and beliefs about the power of those factors to inhibit or facilitate the behaviour (control power beliefs). The inherent usefulness of the model is that it can be used to inform the development of remedial measures that aim to alter behaviour through changing beliefs, attitudes, subjective norms, perceived control and intentions.

In this study, the TPB was applied to four target behaviours. These were cycle helmet use, using nearby crossings, crossing from between parked cars, and challenging traffic. The overall aims of the research were to understand why the four target behaviours might be carried out by adolescent road users and to identify specific beliefs which could be targeted in remedial measures to encourage 'safer' behaviour. Specific aims of the study were as follows:

1. To investigate how TPB variables (attitudes, subjective norms, perceptions of control, and behavioural intentions) and reported behaviour (with respect to each target behaviour) vary as a function of demographic variables.

2. To determine the variables (exposure variables and demographic variables as well as TPB variables) that are the independent predictors of behavioural intentions and reported behaviour in order to identify, for each target behaviour, which variables may require changing to bring about desirable corresponding changes in behavioural intentions and behaviour.

3. To identify specific beliefs underlying attitudes, subjective norms and perceived behavioural control that might be useful targets for road safety countermeasures that aim to encourage desirable behaviour and discourage undesirable behaviour.

Four questionnaires (one for each target behaviour) were designed, based on pilot work. Each questionnaire contained items to measure TPB variables, self-reported behaviour, and general exposure and demographic variables. The main part of the study involved a large-scale survey in which a total of 2,457 children aged 11-16 completed the questionnaires. 564 respondents completed the 'cycle helmet use' questionnaire, 657 respondents completed the 'using nearby crossings' questionnaire, 619 respondents completed the 'crossing from between parked cars' questionnaire, and 617 completed the 'challenging traffic' questionnaire.

Multivariate analysis of variance showed that, for each target behaviour, adolescents' attitudes, subjective norms, perceived control, behavioural intentions and reported behaviour differed as a function of demographic characteristics. Generally, male adolescents and older adolescents reported attitudes and behaviour that were more undesirable from a road safety perspective than did female and younger adolescents (e.g. they reported more negative attitudes towards the commission of the more safe behaviours and more positive attitudes towards the less safe behaviours). There were also marked differences between respondents sampled from urban and rural schools with respect to cycle helmet use attitudes and behaviour. Respondents from rural schools reported more positive attitudes and intentions to use cycle helmets when riding a bike than did respondents from urban schools, and they also perceived more social pressure to wear a cycle helmet, perceived that they had more control over their performance of the behaviour and reported wearing a cycle helmet more often.

The results also provided strong support for the relationships posited by the TPB, with respect to each target behaviour. In each case, hierarchical multiple regression analysis showed that adolescents' attitudes, subjective norms and perceptions of control led to large increments to explained variance in behavioural intentions, over and above demographic and exposure variables. Intentions and perceived control led to large increments to explained variance in reported behaviour, again, over and

1

above the demographic and exposure variables. The effects of the demographic/exposure variables on intentions and behaviour were mostly mediated by the TPB, suggesting that age differences in intentions and behaviour, for example, were due to differences in attitudes, subjective norms, perceived control and intentions. The TPB variables were much more strongly associated with intentions and with reported behaviour than were the demographic/exposure variables. Attitudes, subjective norms and perceived control were consistently strong and statistically significant independent predictors of intentions, and intentions were consistently strong and statistically significant predictors of behaviour.

Multiple regression analyses were also conducted to identify specific beliefs predictive of adolescents' attitudes, subjective norms and perceptions of control (e.g. to investigate what beliefs underpin adolescents' attitudes towards cycle helmet use, using crossings, crossing between parked cars and challenging traffic). Across all four behaviours investigated in this study, outcome beliefs and outcome evaluations offered a reasonably good and statistically significant prediction of attitude. Similarly, beliefs about pressure from social referents and motivation to comply with those referents predicted subjective norm;

and control frequency and power beliefs significantly predicted perceived control.

Summary tables below show, for each target behaviour, which beliefs were the main predictors of attitudes and perceived control, respectively. The social referents that were consistently predictive of subjective norms across all behaviours were 'friends' and 'parents'. Thus, the more social pressure adolescents perceived from these referents, the more social pressure to perform the target behaviours they perceived overall. The implication of these findings was that parental and peer delivery of road safety interventions might be an effective method for promoting desirable road safety behaviour.

So long as the relationships posited by the TPB are causal, then the results of the study suggested that changing the beliefs underlying adolescents' attitudes (and subjective norms and perceptions of control) should lead to corresponding changes in attitudes, intentions and behaviour. Persuasive messages or other types of interventions designed to alter the beliefs identified in this study could be easily conceived and the results of this study could potentially feed directly into Government publicity and education countermeasures designed to influence adolescents' road traffic behaviour.

Beliefs important in the prediction attitude

Cycle helmet use	Using crossings	Crossing between parked cars	Challenging traffic
If I wore a cycle helmet when riding a bike…	*If I walked to a nearby crossing…*	*If I crossed between parked cars…*	*If I crossed the road and made the car driver slow down it would…*
It will protect my head.	It will make it easier to cross the road.	It will increase my chances of getting run over.	Make the car driver angry.
It would make me look childish.	It will make me feel safer while crossing the road.	I will not have to go too far out of my way.	Make me feel good.
It would make me feel safer when riding.	It will take me too far out of my way.	I will not be able to see cars coming very well.	Increase the chances of an accident.
It would be annoying because I will have to carry it around with me when I get off my bike.	–	Drivers would not be able to see me.	_
–	–	Parked cars might start to move and hit me.	–

Beliefs important in the prediction of perceived control

Cycle helmet use	Using crossings	Crossing between parked cars	Challenging traffic
Factors believed to make wearing a cycle helmet more or less likely?	*Factors believed to make using crossings more or less likely?*	*Factors believed to make crossing between parked cars more or less likely?*	*Factors believed to make challenging traffic more or less likely?*
Busy traffic conditions.	Fast moving traffic.	The place where you are going is directly opposite you on the other side of the road.	Being late/in a hurry.
Going on long bike rides.	It being dark.	Busy traffic conditions.	Your friends crossing the road.
Going on short bike rides.	–	It being dark.	Being on a busy road.
Riding to school.	–	You can see a gap in traffic.	–

1 Introduction

In Britain, pedestrian and pedal cycle accidents represent the biggest cause of accidental injury death to children and adolescents (e.g. Accidental Injury Task Force, 2002; Avery and Jackson, 1993). Despite a decline in casualty rates for children aged 0-15 over the last ten years, the absolute numbers of casualties remains high and in the 11-16 year old adolescent age group casualty rates have changed little. In 2002, within the 11-16 year old age group there were over 11,700 pedestrian and cyclist casualties in which over 2,000 children were killed or seriously injured (DfT, 2003). Involvement in pedestrian accidents peaked at 12 years of age and for cyclist accidents it peaked at age 13. These ages approximately coincide with moving from primary to secondary school education, when children often start to have greater levels of exposure (Lynam and Harland, 1992).

In March 2000 the Government issued its road safety and casualty reduction strategy for the next 10 years – 'Tomorrow's Roads - Safer for Everyone' (DETR, 2000). This document set a target for halving the number of children killed and injured on Britain's roads by the year 2010.

A better understanding of what makes adolescent road users particularly vulnerable is required to develop remedial action and help achieve this target. Remedial action may need to take place within a legislation, enforcement or engineering context (e.g. more 20mph speed limits in areas where there are often children playing, or the development of vehicles that are more 'pedestrian friendly'). However, changing behaviour via training, education and publicity may also have highly beneficial results. To improve the safety of adolescent road users these interventions may need to be targeted at drivers and riders of motor vehicles in an attempt to change their behaviour (e.g. to make them more aware of child pedestrians and to adopt appropriate behaviour). However, it could also be argued that children in this age group have a large role to play with respect to their own road safety, and desirable improvements may also require changing their behaviour.

Research indicates that, by adolescence, the necessary skills to function safely in the road environment have been acquired (e.g. Whitebread and Neilson, 1996). This has led researchers to suggest that it is not the failure to acquire adequate skills but the failure to employ these skills that may be the major determinant of accident involvement (Evans and Norman, 2002). Tight, Carsten, Kirby, Southwell and Leake (1990) identified three main reasons for the failure of adolescents to employ their 'road' skills: being distracted, being in a hurry and being thoughtless. Previous research studies have also demonstrated that adolescent road users do engage in a number of behaviours relating to deliberate 'risk taking', errors of perception and general deviation from what is considered a 'safe' course of action (e.g. Elliott and Baughan, 2003a, 2003b; System Three, 1998; West, Train, Junger, Pickering, Taylor, and West, 1998). Such behaviour may contribute to adolescents' accidents as road users and it is likely that changing these behaviours would improve safety.

The question then arises, 'How can adolescents' road user behaviour be modified?' To address this question, there is a need to identify behaviours carried out by adolescent road users that represent concerns from a road safety point of view. Once these examples of behaviour have been identified there is then a need to understand why they are carried out so ways can be found to encourage 'safer' behaviour. Research has shown that demographic and exposure variables are related to adolescent road user behaviour (e.g. Elliott and Baughan, 2003). However, this knowledge is of limited use from a practical road safety point of view given variables such as age and sex are not amenable to change via road safety interventions. Therefore, there is a need to identify variables that (a) can explain the relationships between demographic/exposure variables and behaviour, (b) are strongly associated with behaviour - i.e. variables that have good predictive validity and (c) are amenable to being changed. Social cognition models offer useful theoretical approaches to understanding why people carry out (or do not carry out) certain behaviours. One approach that is well suited to understanding behaviour is provided by the theory of planned behaviour (TPB; Ajzen, 1985).

In the TPB (see Figure 1) peoples intentions to pursue a course of action are the main determinants of their behaviour. Behavioural intentions are then determined independently by three variables. First, attitude towards the behaviour is an individual's global positive or negative evaluations about performing the behaviour in question (e.g. the extent to which people think that it is good or bad to perform a behaviour). Second, subjective norm is an individual's perception about the amount of social pressure that they are likely to receive to engage in the target behaviour. Finally, perceived behavioural control is an individual's perception regarding the ease or difficulty of performing the target behaviour. As well as being a determinant of intention, perceived control is, along with intention, held to be a direct predictor of behaviour. The direct relationship between perceived control and behaviour is dependent on perceptions of control being accurate (Ajzen, 1991).

In the TPB, attitudes, subjective norms and perceived control are each, in turn, determined by two interacting sets of beliefs. This is consistent with the literature on expectancy-value theory (e.g. Peak, 1955; Schoemaker, 1982). Attitudes are determined by behavioural beliefs - the product of the perceived likelihood of particular outcomes occurring (outcome beliefs) and the evaluation of those outcomes (outcome evaluations). Normative beliefs are posited as antecedents of subjective norm and are the product of perceived social pressure from different groups of people, or referents, (referent beliefs) and motivation to comply with those referents. Finally, perceived behavioural control is posited to be determined by control beliefs - the product of the perceived frequency of encountering salient inhibiting or facilitating factors (control belief frequency) and the perceived power of those factors to inhibit or facilitate behaviour (control belief power)[1].
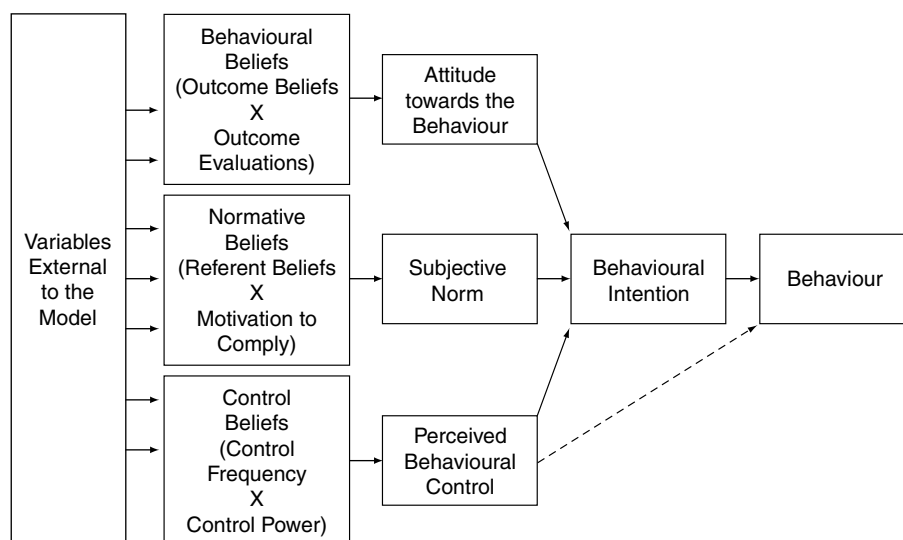
Figure 1 Theory of planned behaviour (Ajzen, 1985)

The effects on behaviour of variables external to the TPB (e.g. demographics and exposure) are thought to be mediated through the components of the model. In other words, people of different ages, for example, are thought to behave differently because of differences in their attitudes, subjective norms, perceptions of control, and intentions.

From an applied perspective, the inherent usefulness of the TPB to road safety is that it can be used to inform interventions that aim to change behaviour. By applying the model to a given behaviour it is possible to identify specific beliefs associated with attitudes, subjective norms and perceived control, which can then be targeted in road safety interventions that aim to bring about desirable changes in these variables. Assuming that reasonably strong support for the model's relationships can be found, changing these variables may then have desirable impacts on intentions and corresponding behaviour[2].

Many studies conducted across a variety of behavioural domains have provided strong support for the TPB (for reviews see Ajzen, 1988, 1991; Armitage and Conner, 2001; Eagly and Chaiken, 1993). Within the domain of traffic psychology support has also been provided for the model with respect to a number of car driving behaviours (e.g. Elliott, Armitage and Baughan, 2003; Manstead and Parker, 1996; Parker, Manstead, Stradling, Reason, and Baxter, 1992; Parker, Manstead, and Stradling, 1995), motorcycle riding behaviours (e.g. Rutter, Quine, and Chesham, 1995), and modal choices (e.g. Verplanken, Aarts, van Knippenberg, and Moonen, 1998; Verplanken, Aarts, van Knippenberg, and van Knippenberg, 1994). However, there are only few examples in the published literature of research studies applying the TPB and other social cognition models to adolescents' behaviour as road users (e.g., Quine, Rutter, and Arnold, 1998; Evans and Norman, 2002). When one considers the potentially large number of safety-related road using behaviours this group of road users carries out (see Elliott and Baughan, 2003a, 2003b), it is reasonable to argue that further research is

needed using the TPB to develop road safety countermeasures in this area.

TRL was commissioned by the Department for Transport's (DfT) Road Safety Division (RSD) to carry out a programme of research into adolescent road users. This research formed part of the DfT's 'Child Development and Road Safety Education Research Programme - Phase III'. The programme of research conducted by TRL encompassed three related projects. One project was concerned with the analysis of police fatal road accident files to explore the factors relating to young adolescent road fatalities (see Sentinella and Keigan, in press). Another was concerned with the behaviour of adolescent children in groups (see Chinn, Elliott, Sentinella and Williams, 2004). The final project involved the study of the attitudes and behaviour of adolescent road users and was carried out in two stages. Stage 1 involved a study adolescents' road using behaviour. The aims of stage 1 were to identify behaviours that may contribute towards the safety of adolescent road users and to investigate how the performance of these behaviours vary as a function of demographic characteristics (see Elliott and Baughan, 2003a for full details). In stage 2, the TPB was used to study a selection of specific behaviours identified as being important in terms of road safety, in an attempt to understand why they are carried out and to identify specific beliefs which can be targeted by remedial measures to to encourage 'safer' behaviour.

This report describes the research carried out in stage 2 of the 'Adolescent Attitudes' project. The report is presented in five main sections. The next section (2) outlines the aims of the survey. Section 3 outlines the method. Section 4 describes the analyses of the data and the results obtained. Finally Section 5 presents the summary and conclusions of the study.

2 Study aims

The main aim of this study was to use the TPB to investigate adolescents' (aged 11-16 years) attitudes towards four specific examples of road using behaviour which were identified as being important in terms of road safety[3]. The four behaviours, described in detail below (see Section 3.2), were:

- Cycle helmet use.
- Using nearby crossings to cross the road.
- Crossing from between parked cars.
- Challenging traffic.

Specific aims of the study were as follows:

1 To investigate the effects of demographic variables on adolescents' attitudes, subjective norms, perceived control, behavioural intentions and reported behaviour with respect to each target behaviour.

2 To determine the variables (exposure variables and demographic variables as well as TPB variables) that are the independent predictors of behavioural intentions and reported behaviour in order to identify, for each target behaviour, which variables may require changing to bring about desirable changes in behavioural intentions and behaviour.

3 To identify specific beliefs underlying attitudes, subjective norms and perceived behavioural control that might be useful targets for road safety countermeasures that aim to encourage desirable behaviour and discourage undesirable behaviour.

3 Method

3.1 Pilot research

Four questionnaires were designed in this study - one for each of the target behaviours: cycle helmet use, using nearby crossings, crossing from between parked cars and challenging traffic. Each questionnaire contained items designed to measure TPB variables, reported frequency of engaging in the behaviour, and demographic variables. Full details of questionnaire measures are provided below (see Section 3.2). The following two sections of this report briefly describe the pilot work that was conducted to develop the four questionnaires.

3.1.1 Eliciting salient behavioural, normative and control beliefs

Following standard procedure for conducting TPB research (see Ajzen, 2000), semi-structured pilot interviews were carried out with a sample of children from the target population (N=20) to elicit the behavioural, normative and control beliefs held by 11-16 year old children with respect to each of the four target behaviours. The interview sample comprised eight 11-12 year olds (4 males and 4 females), eight 13-14 year olds (4 males and 4 females) and four 15-16 year olds (2 males and 2 females). Each interview lasted approximately 50 minutes.

Children taking part in the pilot interviews were sampled from a local secondary school in Crowthorne, near TRL.

In the interviews, each of the target behaviours were described to the participants in turn. Then, in line with standard procedures used in TPB research, the behavioural beliefs, normative and control beliefs associated with these behaviours were elicited. Behavioural beliefs for each target behaviour were elicited by asking participants the following questions:

- What advantages are there (or would there be) for you in [performing the target behaviour]?
- What disadvantages are there (or would there be) for you in [performing the target behaviour]?
- Is there anything else you think is good or bad about [performing the target behaviour]?

Normative beliefs for each target behaviour were elicited by asking these questions:

- Is there anyone who would approve of you [performing the target behaviour]?
- Is there anyone who would disapprove of you [performing the target behaviour]?
- Is there anyone else who would approve or disapprove of you [performing the target behaviour]?

Finally, control beliefs for each target behaviour were elicited by asking the following questions:

- What would make you [perform the target behaviour] more often?
- What would make you [perform the target behaviour] less often?
- Are there any other things you can think of that would make you [perform the target behaviour] more often/less often?

The elicited beliefs were incorporated into the questionnaires used in the main part of this study (see - Section 3.2).

3.1.2 Question testing

Following the design of the four questionnaires, a small question testing study was carried out to determine whether children in the target population could easily and meaningfully interpret and respond to the questionnaire items. The question testing exercise was carried out in three focus groups with children aged 11-16. One focus group was carried out with 11-12 year olds (N=10; 6 males and 4 females), one was carried out with 13-14 year olds (N=7; 3 males and 4 females), and one was carried out with 15-16 year olds (N=8; 4 males and 4 females). Each focus group lasted approximately 50 minutes. Participants for this question testing exercise were sampled from a local secondary school in Wokingham, near TRL.

In each focus group, questionnaires were administered and participants were told to complete the questionnaires on their own, after reading the instructions given to them. Participants were told to mark on their questionnaires any items that were difficult to understand. Following

completion of the questionnaires, participants were asked the following questions:

- Were there any questions that you could not understand, could not answer or found difficult to answer?
- If so, what were the questions?
- Why could you not understand/answer the questions?
- How could the problems be solved? (participants were asked for their opinions on how the items that were difficult to understand should be worded).

To understand how the questionnaire items were being interpreted, participants were also asked, for each, question:

- What do you think the question meant?
- What information did you base your answer on? / How did you decide what answer to give?

Overall, children had no problems understanding the questionnaire items and seemed to be interpreting the items appropriately. Minor problems that children raised with understanding and responding to the questionnaire items were addressed by making a small number of amendments to the questionnaires.

3.2 Questionnaires and measures

As described above, four questionnaires were designed for this study, one for each of the target behaviours. The four questionnaires are presented in Appendix A, B, C and D. Each questionnaire was similar in content. For the using crossings, crossing from between parked cars and challenging traffic questionnaires, respondents in the main part of this study were required to answer the TPB and behaviour items in relation to a hypothetical scenario - i.e. when answering the questions, respondents had to imagine themselves in the situation that was described to them. For cycle helmet use, no hypothetical scenario was used. The scenarios used for using crossings, crossing from between parked cars and challenging traffic were as follows:

- *Using crossings*

Imagine it is term time in the summer. You are out walking and you need to cross a road. You are at a place on the road where there is no crossing. There is a crossing further up the road, but it would take you a minute or so to walk to it. You could either walk to the crossing to cross the road or you could cross where you are. This questionnaire asks you what you think about walking to the crossing to cross the road.

- *Crossing from between parked cars*

Imagine it is term time in summer. You are out walking and you need to cross a road. You are at a place where there are parked cars. If you cross here you will need to step out from between the parked cars to cross. There is a place to cross a little further up where there are no parked cars, but it would take you a minute or so to walk there. You could either cross from between the parked cars or

you could walk up the road to where there are none and cross there. This questionnaire asks you what you think about crossing from between the parked cars.

- *Challenging traffic*

Imagine it is term time in summer. You are out walking with a group of your friends and you need to cross a road. You can see there is a car coming further down the road. If you cross there and then you will be able to cross but you would make the car driver slow down. You could either cross the road making the car driver slow down or you could wait for the car to pass and then cross. This questionnaire asks you what you think about crossing the road and making the car driver slow down.

The following items were included in all four questionnaires unless specified otherwise. All TPB items used in the questionnaires were standard items used widely in TPB research.

3.2.1 Attitude towards the behaviour

Eight items designed to measure attitude towards the behaviour were used. Respondents were presented with the following statement: 'For me, if I [performed the target behaviour] it would be…' They were then presented with eight pairs of adjectives on semantic differential scales which they used to complete the sentence. Each item was rated on 7-point bipolar scales, scored from -3 to +3. The eight pairs of adjectives were:

- *'Bad / Good',*
- *'Harmful / Beneficial',*
- *'Negative / Positive'*
- *'Unnecessary / Necessary'*
- *'Unsafe / Safe'*
- *'Worthless / Valuable'*
- *'Stupid / Sensible'*
- *'Unenjoyable / Enjoyable''*

3.2.2 Behavioural beliefs

Outcome beliefs were measured by asking respondents to rate the extent to which they agreed or disagreed with a number of statements about whether certain outcomes would arise from performing the target behaviours. Outcome evaluations were measured by asking respondents to rate how good or bad these various outcomes would be for them. All outcome beliefs and outcome evaluations were measured using 7-point bipolar scales (-3 to +3), anchored *'Strongly disagree/Strongly agree'* and *'Bad/Good'*, respectively. The outcome belief and outcome evaluation items were different across the four types of questionnaires. All the outcome belief and evaluation items used in each of the questionnaires are presented in Table 1.

3.2.3 Subjective norm

Four items designed to measure subjective norm were used in each questionnaire. Each item was rated on 7-point unipolar scales (+1 to +7). The four items were:

Table 1 Outcome belief and outcome evaluation items used in the questionnaires

Outcome beliefs	*Outcome evaluations*
Cycle helmet use	
If I wore a cycle helmet while riding a bike, it would…	*How good or bad do you think the following things are?*
1 Protect my head (e.g. if I had an accident or if I fell off my bike).	1 Having protection for your head (e.g. in the event of an accident or falling off your bike).
2 Be annoying because I'd have to carry the cycle helmet around with me when I got off my bike.	2 Having to carry a cycle helmet around with you when you get off your bike.
3 Be uncomfortable to wear.	3 Being uncomfortable while riding a bike.
4 Make me more visible to other road users.	4 Being visible to other road users while riding a bike.
5 Make me feel safer while riding.	5 Feeling safer while riding a bike.
6 Make me look unfashionable.	6 Looking unfashionable while riding a bike.
7 Make me look childish.	7 Looking childish while riding a bike.
Using crossings	
If I walked to the crossing to cross the road it would …	*How good or bad do you think the following things are?*
1 Reduce my chances of getting run over.	1 Reducing your chances of getting run over.
2 Take me longer to get to where I am going.	2 Taking longer to get to where you are going.
3 Make it easier to cross the road.	3 It being easier to cross the road.
4 Make me feel safer while crossing.	4 Feeling safe when crossing the road.
5 Take me too far out of my way.	5 Having to go out of your way.
Crossing between parked cars	
If I crossed the road from between the parked cars …	*How good or bad do you think the following things are?*
1 It would increase my chances of getting run over.	1 Increasing your chances of getting run over.
2 I would not have to go out of my way to cross the road.	2 Not having to go out of your way.
3 I would not be able to see cars coming very well.	3 Not being able to see cars coming very well.
4 It would take me less time to get to where I am going.	4 Taking less time to get to where you are going.
5 Drivers would not be able to see me.	5 Drivers not being able to see you.
6 The parked cars might start to move and hit me.	6 Parked cars starting to move when I am stood between them waiting to cross the road.
7 I would have to step out into the road to see clearly.	7 Having to step out into the road from between parked cars to see clearly before crossing.
Challenging traffic	
If I crossed the road making the car driver slow down …	*How good or bad do you think the following things are?*
1 It would make the car driver angry.	1 Making the car driver angry.
2 It would make me feel good to make the driver have to slow down.	2 Making myself feel good by making the driver have to slow down.
3 My friends and I would get to where we were going quicker than if we waited for the car to pass.	3 My friends and I getting to where we are going quicker.
4 The car driver would have a go at us.	4 The car driver having a go at us.
5 It would increase the chances of my friends and I being involved in an accident.	5 Increase the chances of my friends and I being involved in an accident.
6 I would enjoy making the car driver slow down.	6 Getting enjoyment by making the car driver slow down.

- 'I would feel under social pressure to [perform the target behaviour]' (*'Strongly disagree/Strongly agree'*).
- 'How much would the people who are important to you want you to [perform the target behaviour]?' (*'Not at all/Very much'*).
- 'How often do you think the people who are important to you would [perform the target behaviour]?' (*'Never/Always'*).
- 'Would the people who are important to you approve or disapprove of you [performing the target behaviour]?' (*'Disapprove/Approve'*).

3.2.4 Normative beliefs

Referent beliefs were measured by asking respondents to rate how much different groups of people (or *referents*) would want them to perform the target behaviours.

Motivation to comply was measured by asking respondents to rate how much they wanted to go along with the views of these people. Referent belief and motivation to comply items were both measured using 7-point scales ranging from +1 (*'Not at all'*) to +7 (*'Very much so'*). The same referent belief and motivation to comply items were used in each of the four questionnaires and they are presented in Table 2.

3.2.5 Perceived behavioural control

Four items, which were designed to measure perceived control, were used in each questionnaire. Each item was rated by respondents on 7-point unipolar scales (+1 to +7). The items were:

- 'If I [performed the target behaviour] it would be…' (*'Difficult/Easy'*);

Table 2 Referent belief and motivation to comply items used in the questionnaires

Referent beliefs	Motivation to comply
How much do you think the following people want you to [perform the target behaviour]?	*How much do you want to go along with what these people want you to do?*
1 School teachers.	1 School teachers.
2 Your friends.	2 Your friends.
3 Other people at school.	3 Other people at school.
4 The police.	4 The police.
5 Car drivers.	5 Car drivers.
6 Your parents.	6 Your parents.
7 Other people in your family.	7 Other people in your family.

- 'It would be entirely up to me whether or not I [performed the target behaviour]' (*'Strongly disagree/Strongly agree'*);
- 'I would be able to [perform the target behaviour]' (*'Strongly disagree/Strongly agree'*); and
- 'If you wanted to, could you easily [perform the target behaviour]' (*'Definitely no/Definitely yes'*).

3.2.6 Control beliefs

Control frequency beliefs were measured by asking respondents to rate how often they thought they would encounter various facilitating and inhibiting factors in future. Control power was assessed by asking respondents to rate how much more or less likely their performance of the target behaviours would be if these factors were encountered. Both the control frequency and control power items were measured using 7-point scales (+1 to +7) and they were anchored *'Never/Very often'* and *'Less likely/More likely'*, respectively. The control frequency and control power items were different across the four types of questionnaires. All the control frequency and control power items used in each of the questionnaires are presented in Table 3.

3.2.7 Behavioural intention

In each questionnaire, four items were used to measure intention to perform the target behaviours. Each item was rated on a 7-point bipolar scale (-3 to +3). The four items were:

- 'Do you intend to [perform the target behaviour]?' (*'Definitely no/Definitely yes'*);
- 'Will you try to [perform the target behaviour]?' (*'Definitely no/Definitely yes'*);
- 'How likely or unlikely is it that you will [perform the target behaviour]?' (*'Unlikely/Likely'*); and
- 'I want to [perform the target behaviour]?' (*'Strongly disagree/Strongly agree'*).

3.2.8 Reported behaviour

In each questionnaire, one item was used to measure respondents reported behaviour. This item was measured on a 7-point unipolar scale (+1 to +7) and was:

- 'How often do you [perform the target behaviour]?' (*'Never/Nearly all the time'*).

3.2.9 General Exposure items

One item, which was used in the stage 1 study to measure overall exposure, was included in each questionnaire in this study. This item was measured on a 5-point Likert scale. For cycle helmet use, the item was:

- 'How often do you go out and ride a bike' (*'Never/Every day'*).

For the remaining three road-crossing behaviours, the item was worded as:

- 'How often do you go out on foot (e.g. go out walking, going for a walk, just hanging around?)' (*'Never/Every day'*).

A further three items, also used in the stage 1 research, to elicit information about how often respondents are accompanied by different types of people when they go out on foot or on a bike were included in the questionnaires. These items were measured on 5-point Likert scales and were:

- 'When you go out on a bike/on foot, how often are you:

1 With adults' (*'Never/Every day'*).
2 With friends' (*'Never/Every day'*).
3 On your own' (*'Never/Every day'*).

3.2.10 Demographics

Measures of the following demographic variables were included in each of the questionnaires: age (coded as 1 = *11-12 years old*, 2 = *13-14 years old*, and 3 = *15-16 years old*) and sex (coded as 1 = *Male* and 2 = *Female*).

3.2.11 Additional cycle helmet questions

Respondents answering the cycle helmet questionnaire were asked, in addition to the above mentioned questions:

- 'Do you own a cycle helmet?' (*'Yes/No'*); and
- 'If you do not own a cycle helmet is it because:

1 You don't want one' (*'Yes/No'*).
2 You can't afford one' (*'Yes/No'*).
3 You haven't got around to buying one' (*'Yes/No'*).

3.3 Main study

Pupils from six secondary schools, all located within England, completed the questionnaires. The sample of

Table 3 Control frequency belief and control power belief items used in the questionnaires

Control frequency beliefs Control power beliefs

Cycle helmet use

In future, how often do you expect to:

1 Ride a bike in busy traffic conditions.
2 Ride a bike around roads close to home.
3 Go on long bike rides.
4 Go on short bike rides.
5 Go out on you bike when you are in a hurry.
6 Ride a bike to school.
7 Not have or not be able to find your cycle helmet.

Would the following things make you more likely or less likely to wear a cycle helmet while riding a bike?

1 If you were riding in busy traffic conditions.
2 If you were riding around roads close to home.
3 If you were going on long bike rides.
4 If you were going on short bike rides.
5 If you were about to go out on your bike and you were in a hurry.
6 If you were riding to school.
7 If you did not have or could not find your cycle helmet.

Using crossings

In future, how often do you expect to be in a similar situation to that described in the example when:

1 Traffic is moving fast (e.g. the road has a fast speed limit).
2 The place you are going to (e.g. a shop) is just on the other side of the road - directly opposite you.
3 You are in a hurry or late for something.
4 It is dark.
5 People are waiting for you on the other side of the road.
6 There is a lot of traffic around.

Would the following things make you more likely or less likely to walk to the crossing to cross the road if you were in a similar situation to that described in the example?

1 If the traffic was moving fast (e.g. the road had a fast speed limit).
2 If the place you were going to was just on the other side of the road - directly opposite you.
3 If you were in a hurry or late for something.
4 If it was dark.
5 If people were waiting for you on the other side of the road.
6 If there was a lot of traffic.

Crossing between parked cars

In future, how often do you expect to be in a similar situation to that described in the example when:

1 Traffic is moving fast (e.g. the road has a fast speed limit).
2 The place you are going to (e.g. a shop) is just on the other side of the road - directly opposite you.
3 You are in a hurry or late for something.
4 There is a lot of traffic around.
5 It is dark.
6 People are waiting for you on the other side of the road.
7 You will be able to see there is a gap in traffic.

Would the following things make you more likely or less likely to walk to cross the road from between the parked cars if you were in a similar situation to that described in the example?

1 If the traffic was moving fast (e.g. the road had a fast speed limit).
2 If the place you were going to was just on the other side of the road - directly opposite you.
3 If you were in a hurry or late for something.
4 If there was a lot of traffic.
5 If it was dark.
6 If people were waiting for you on the other side of the road.
7 If you could see a gap in the traffic.

Challenging traffic

In future, how often do you expect to be in a similar situation to that described in the example when:

1 You and your friends are in a hurry or late for something.
2 Your friends cross the road and make the car driver slow down.
3 The car is going really fast.
4 You are dared to cross by one of your friends.
5 You and your friends are on a busy road.

Would the following things make you more likely or less likely to walk to cross the road and make the car driver slow down if you were in a similar situation to that described in the example?

1 If my friends and I were in a hurry or late for something.
2 If my friends crossed.
3 If the car was going really fast.
4 If I was dared to cross by one of my friends.
5 If we were on a busy road.

schools comprised three schools from urban areas and three schools from rural areas. The three 'urban schools' were selected from three different areas in the country: Manchester, Bristol, and Birmingham. The three 'rural schools' were also selected from three areas: rural areas in Lancashire, Berkshire and Hampshire. Schools received a £250 gratuity payment for their participation in the study.

Within each school participating in the study, pupils from Year 7 (11-12 year olds), Year 9 (13-14 year olds) and Year 11 (15-16 year olds) self-completed questionnaires under pseudo exam conditions. TRL staff visited the schools and administered the questionnaires in lesson time to pupils. Children completed one questionnaire only. Thus approximately a quarter of the sample were given the 'cycle helmet use' questionnaire to complete, approximately a quarter were given the 'using crossings' questionnaire, approximately a quarter were given the 'crossing between parked cars' questionnaire and approximately a quarter were given the 'challenging traffic' questionnaire. Instructions on how to complete the questionnaires were contained on the first page of each questionnaire (see Appendices A-D). In addition teachers gave verbal instructions to pupils. The main parts of these verbal instructions are summarised below (see Appendix E for the full protocol used in the main survey):

We want you all to complete a questionnaire about your road safety attitudes and behaviour. IT IS NOT A TEST ABOUT ROAD SAFETY. Researchers from the Transport Research Laboratory just want to find out what pupils of your age honestly think about a number

of issues. It is therefore very important that you are honest when answering the questions. This is completely confidential - You are not required to give your name on the questionnaire.

Please complete the questionnaire on your own. Do not talk to other people when completing the questionnaire. You need to answer the questions by ticking boxes to show your answers.

*To help you complete your questionnaires, there is an example question on the first page along with instructions on how to answer it. You, therefore, need to read the instructions on the first page of the questionnaire carefully before completing it. [Note: pupils completing the using crossings, crossing between parked cars and challenging traffic questionnaires were also instructed to read the hypothetical scenario on the first page of the questionnaire which they had to imagine the*mselves in].

A target was set to achieve 2,000 questionnaire responses from the present survey, with at least 500 questionnaires being completed for each of the four target behaviours. This target was exceeded with data being collected for a total of 2,457 respondents. 23% of the total sample (n=564) completed the 'cycle helmet use' questionnaire, 27% (n=657) completed the 'using crossings' questionnaire, 25% (n=619) completed the 'crossing between parked cars' questionnaire and 25% (n=617) completed the 'challenging traffic' questionnaire. Tables 4 and 5 respectively show the age and sex distribution of the total sample, and the distribution of the total sample across area type (rural versus urban). Distributions across age, sex and area type for the four target behaviours individually are presented in Appendix F.

Table 4 Distribution across age and sex (%)

	Sex		
	Male	Female	Total
Age group (years)			
11-12	17.3	17.1	34.4
13-14	16.7	17.7	34.4
15-16	15.1	16.1	31.2
Total	49.1	50.9	100

Table 5 Distribution across area type (%)

Area type	% of sample
Urban	46.7
Rural	53.3
Total	100

4 Results

4.1 Analyses

The data were analysed using techniques common in TPB research: correlation and multiple regression. In addition,

factor analysis was used to inform the computation of TPB variables for use in the data analysis (see below) and multivariate analysis of variance (MANOVA) was used to investigate the demographic effects on TPB and behaviour variables.

4.2 Producing TPB scales

Standard procedures were used to produce composite TPB scales for use in subsequent data analyses. First, it was necessary to test whether the sets of items used to measure the independent variables within the TPB (i.e. attitude, subjective norm and perceived control) were independent from one another. Therefore, for each target behaviour, the items used to measure attitude, subjective norm and perceived control were subjected to a principal components factor analysis with varimax rotation. As expected, in each of the four analyses, three factors emerged from the data. However, across the four analyses, one attitude item did not consistently load onto the same factor as the other attitude items ('If I [performed the target behaviour] it would be *Unenjoyable/Enjoyable*'). Similarly, one subjective norm item did not consistently load onto the same factor as the other subjective norm items ('I would feel under social pressure to [perform the target behaviour]') and two perceived control items did not consistently load onto the same factor as the other perceived control items ('It would be entirely up to me whether or not I [performed the target behaviour]' and 'For me, [performing the target behaviour] would be *Difficult/Easy*'). The analyses were therefore re-run with these items removed, and the results provided strong evidence for the independence of the measures of attitude, subjective norm and perceived control. In each analysis, the remaining attitude items loaded onto one factor, the remaining subjective norm items loaded onto a second factor and the remaining perceived control items loaded onto the third factor. In each case, the three rotated factors accounted for reasonably large proportions of the variance (62.91% for cycle helmet use, 62.04% for using crossings, 64.67% for crossing between parked cars and 69.34% for challenging traffic). The results of the factor analyses conducted are presented in Appendix G.

The second step in producing TPB variables for use in subsequent analyses was to calculate global measures of attitude, subjective norm and perceived control. For each target behaviour, the mean of the attitude items that consistently loaded together in the factor analyses reported above was calculated to produce the global measure of attitude towards the behaviour. Similarly, for each target behaviour, the means of the subjective norm items that loaded together and the means of the perceived control items that loaded together were calculated to produce composite scales. The mean of the items used to measure respondents' intention to perform each target behaviour was also calculated to produce measures of behavioural intention. Cronbach's Alpha statistics were calculated to determine the internal reliability of each composite scale. These statistics are presented in Table 6 and show that each scale had acceptable to good internal reliability.

Table 6 Internal reliabilities of the TPB scales

		Cronbach's Alpha			
Measure	No. of items	Cycle helmet use	Using crossings	Crossing between parked cars	Chall-enging traffic
Attitude	7	0.87	0.87	0.87	0.90
Subjective norm	3	0.72	0.70	0.76	0.84
Perceived control	2	0.64	0.64	0.77	0.73
Intention	4	0.92	0.88	0.85	0.86

4.3 Descriptive statistics and demographic effects on the TPB and behaviour variables

Table 7 shows the mean scores for each component of the TPB across each target behaviour. It can be seen that, for cycle helmet use and using crossings, the samples of respondents generally had positive attitudes towards performing the behaviours, perceived social pressure to perform the behaviours and perceived that they had considerable control over whether they themselves performed the behaviours (i.e. scores on these composite scales were above the midpoints). Intentions towards cycle helmet use and using crossings were relatively neutral (i.e. the overall mean scores were close to the midpoints of the intention scales). The mean behaviour score for respondents in the cycle helmet sample was below the midpoint of the scale (indicating that, overall, respondents reported wearing a cycle helmet relatively infrequently when riding a bike) and the mean behaviour score for respondents in the using crossings sample was close to the mid-point.

Table 7 TPB variables and reported behaviour: means and standard deviations

	Attitude (Scored -3 to +3)	Subjective norm (Scored +1 to +7)	Perceived control (Scored +1 to +7)	Intention (Scored -3 to +3)	Reported behaviour (Scored +1 to +7)
Cycle helmet use					
M	1.22	4.83	5.35	-0.26	2.96
SD	1.39	1.50	1.65	1.86	2.13
Using crossings					
M	1.47	5.57	5.88	0.50	4.28
SD	1.24	1.15	1.24	1.54	1.72
Crossing between parked cars					
M	-0.90	3.22	4.90	0.15	4.34
SD	1.32	1.37	1.57	1.47	1.64
Challenging traffic					
M	-0.65	3.09	4.59	-0.25	3.97
SD	1.45	1.54	1.62	1.57	1.74

Attitudes towards crossing between parked cars and challenging traffic were slightly negative, indicating that overall, respondents perceived these behaviours to be 'bad', 'harmful', 'unsafe' and so on. Scores on the subjective norm scale fell below the mid-point for both these behaviours. This indicated that, overall, respondents did not perceive much social pressure to cross between parked cars and

'challenge traffic'. For both these behaviours, scores on the perceived control and reported behaviour scales fell close to the midpoints (although for crossing between parked cars, intention and behaviour scores fell slightly above the midpoints and for challenging traffic they fell slightly below). Means and standard deviations for each individual questionnaire item designed to measure TPB and behaviour variables are presented in Appendix H.

MANOVA analyses were conducted to address the first main aim of the study – to investigate the effects of the demographic variables on the TPB scales and the reported behaviour variables. One MANOVA was conducted for each target behaviour and in each analysis five dependent variables were used – attitude, subjective norm, perceived control, intention and reported behaviour – and three between-subjects factors were used – age (11-12 years old, 13-14 years old, 15-16 years old), sex (males, females) and area (urban, rural). The statistically significant univariate effects were examined only when the relevant multivariate effect was significant (thus avoiding inflating the Type I error).

Table 8 shows the univariate effects due to age and the associated F ratios. It can be seen that, with one or two exceptions, age had a statistically significant effect on each component of the TPB across all four target behaviours. From a road safety perspective, younger adolescents had more desirable attitudes and behaviour than did older adolescents. Their attitudes and intentions towards using a cycle helmet

Table 8 Age effects: Means (standard deviations) and F ratios

	Cycle helmet use	Using crossings	Crossing between parked cars	Challenging traffic
Attitude (Scored -3 to +3)				
F ratios	8.25[#]	9.77[#]	5.12[†]	6.21[†]
11-12 years	1.51 (1.29)	1.80 (1.19)	-1.12 (1.35)	-0.81 (1.52)
13-14 years	1.01 (1.44)	1.40 (1.12)	-0.87 (1.29)	-0.75 (1.38)
15-16 years	1.05 (1.38)	1.23 (1.24)	-0.73 (1.30)	-0.39 (1.43)
Subjective norm (Scored +1 to +7)				
F ratios	4.44[*]	11.60[#]	4.02[*]	2.89
11-12 years	5.05 (1.47)	5.86 (1.14)	3.03 (1.46)	2.95 (1.64)
13-14 years	4.75 (1.54)	5.49 (1.16)	3.34 (1.33)	3.06 (1.50)
15-16 years	4.60 (1.44)	5.36 (1.08)	3.30 (1.31)	3.27 (1.48)
Perceived control (Scored +1 to +7)				
F ratios	0.35	0.02	16.28[#]	13.96[#]
11-12 years	5.43 (1.73)	5.90 (1.34)	4.50 (1.74)	4.11 (1.72)
13-14 years	5.35 (1.63)	5.90 (1.13)	4.92 (1.47)	4.68 (1.49)
15-16 years	5.25 (1.54)	5.86 (1.26)	5.31 (1.37)	4.98 (1.51)
Intention (Scored -3 to +3)				
F ratios	12.48[#]	18.50[#]	15.08[#]	6.92[#]
11-12 years	0.20 (1.76)	1.01 (1.53)	-0.23 (1.56)	-0.62 (1.64)
13-14 years	-0.41 (1.94)	0.41 (1.47)	0.14 (1.44)	-0.14 (1.53)
15-16 years	-0.76 (1.75)	0.09 (1.47)	0.53 (1.33)	-0.01 (1.49)
Reported behaviour (Scored +1 to +7)				
F ratios	7.82[#]	6.61[†]	12.06[#]	9.99[#]
11-12 years	3.37 (2.12)	4.64 (1.85)	3.89 (1.73)	3.59 (1.82)
13-14 years	2.93 (2.22)	4.12 (1.71)	4.62 (1.63)	4.05 (1.70)
15-16 years	2.42 (1.93)	4.10 (1.55)	4.49 (1.44)	4.28 (1.64)

[*] = p < .05   [†] = p < .01   [#] = p < .001

11

and towards using crossings were more positive than were older adolescents' attitudes and intentions. Compared with older adolescents, they perceived more social pressure to wear a cycle helmet and use crossings and they reported carrying out these behaviours more often than older children did. For the crossing between parked cars and challenging traffic behaviours, older respondents had less negative attitudes than younger respondents did. They also perceived more social pressure to perform these behaviours and perceived that they had more control over their performance of these behaviours than did the younger respondents. Older adolescents reported that they crossed between parked cars and 'challenged traffic' more often than did younger adolescents.

As can be seen from Table 9, females had slightly more positive attitudes and intentions towards cycle helmet use than males. They also perceived more social pressure to wear a cycle helmet, had greater perceptions of control over wearing a cycle helmet and reported wearing a cycle helmet more often than male respondents did. However, the MANOVA analysis showed that, overall, these differences between males and females in the 'cycle helmet use' sample were not statistically significant. There were statistically significant effects of sex for the remaining three target behaviours, however. The univariate effects relating to these results are also presented in Table 9. The results showed that, compared with males, females had significantly more positive attitudes and intentions towards using crossings, perceived significantly more social pressure to use crossings and reported using

crossings significantly more often. Males had significantly more positive attitudes and intentions towards crossing between parked cars than did females. Also, compared with females, they perceived significantly more social pressure to cross between parked cars, perceived that they themselves had greater control over their performance of the behaviour and reported carrying out the behaviour more often. For the challenging traffic behaviour the only statistically significant univariate effect due to sex was that males perceived significantly more control over their performance of the behaviour than did females.

MANOVA results indicated that there were no statistically significant area effects on the using crossings and crossing between parked cars behaviours. However, adolescents sampled from schools in rural areas had more positive attitudes and intentions towards using cycle helmets when riding a bike than did adolescents sampled from schools in urban areas. Adolescents from rural schools also perceived significantly more social pressure to use a cycle helmet, had greater perceptions of control over wearing a cycle helmet and reported using cycle helmets more often when riding a bike than did adolescents from urban schools. For the challenging traffic behaviour the only statistically significant univariate effect of area was on the attitude scores. Adolescents from rural schools had a less negative attitude towards challenging traffic (as described in the scenario that was used) than did adolescents from urban schools. The significant univariate effects due to area are shown in Table 10.

Table 9 Sex effects: Means (standard deviations) and F ratios

	Cycle helmet use	Using crossings	Crossing between parked cars	Challenging traffic
Attitude (Scored –3 to +3)				
F ratios	n/a	8.56[†]	5.91[*]	2.29
Males	1.15 (1.36)	1.35 (1.22)	-0.79 (1.30)	-0.55 (1.42)
Females	1.33 (1.43)	1.59 (1.22)	-1.00 (1.33)	-0.71 (1.47)
Subjective norm (Scored +1 to +7)				
F ratios	n/a	6.18[*]	17.67[#]	0.37
Males	4.82 (1.49)	5.43 (1.21)	3.50 (1.41)	3.15 (1.58)
Females	4.89 (1.49)	5.68 (1.07)	3.02 (1.31)	3.03 (1.48)
Perceived control (Scored +1 to +7)				
F ratios	n/a	0.24	15.63[#]	13.31[#]
Males	5.33 (1.68)	5.89 (1.29)	5.14 (1.53)	4.84 (1.62)
Females	5.41 (1.58)	5.88 (1.19)	4.71 (1.57)	4.42 (1.57)
Intention (Scored –3 to +3)				
F ratios	n/a	20.05[#]	9.43[†]	2.83
Males	-0.36 (1.89)	0.23 (1.54)	0.32 (1.46)	-0.15 (1.61)
Females	-0.08 (1.78)	0.73 (1.50)	0.02 (1.48)	-0.34 (1.54)
Reported behaviour (Scored +1 to +7)				
F ratios	n/a	19.27[#]	3.84[*]	3.07
Males	2.86 (2.13)	4.00 (1.77)	4.45 (1.66)	4.08 (1.84)
Females	3.14 (2.13)	4.54 (1.64)	4.24 (1.62)	3.88 (1.65)

[*] = p < .05   [†] = p < .01   [#] = p < .001

n/a = Univariate effects not examined because multivariate effect was not statistically significant.

Table 10 Area effects: Means (standard deviations) and F ratios

	Cycle helmet use	Using crossings	Crossing between parked cars	Challenging traffic
Attitude (Scored –3 to +3)				
F ratios	22.47[#]	n/a	n/a	4.42[*]
Urban	0.92 (1.38)	1.39 (1.24)	-0.79 (1.32)	-0.55 (1.50)
Rural	1.46 (1.34)	1.55 (1.24)	-0.99 (1.31)	-0.74 (1.40)
Subjective norm (Scored +1 to +7)				
F ratios	12.64[#]	n/a	n/a	0.98
Urban	4.56 (1.53)	5.57 (1.13)	3.22 (1.33)	3.00 (1.55)
Rural	5.06 (1.43)	5.57 (1.16)	3.22 (1.41)	3.17 (1.53)
Perceived control (Scored +1 to +7)				
F ratios	13.86[#]	n/a	n/a	0.06
Urban	5.05 (1.74)	5.89 (1.23)	5.04 (1.51)	4.56 (1.56)
Rural	5.60 (1.53)	5.88 (1.25)	4.79 (1.61)	4.62 (1.66)
Intention (Scored –3 to +3)				
F ratios	20.65[#]	n/a	n/a	2.72
Urban	-0.70 (1.79)	0.46 (1.50)	0.32 (1.47)	-0.15 (1.57)
Rural	0.11 (1.83)	0.53 (1.57)	.01 (1.47)	-0.34 (1.57)
Reported behaviour (Scored +1 to +7)				
F ratios	19.38[#]	n/a	n/a	2.92
Urban	2.46 (1.92)	4.33 (1.70)	4.43 (1.57)	4.07 (1.74)
Rural	3.38 (2.21)	4.25 (1.75)	4.25 (1.69)	3.88 (1.74)

[*] = p < .05   [†] = p < .01   [#] = p < .001

n/a = Univariate effects not examined because multivariate effect was not statistically significant.

Although these effects of demographic variables on TPB and behaviour variables are of interest, it is of more applied value to investigate the strength of the relationships between TPB variables and behaviour, and to investigate the extent to which the demographic-behaviour relationships are mediated by the TPB. This is because the variables within the TPB are potentially amenable to being changed via road safety countermeasures. This was the second aim of the study and it is dealt with in the following sections of this report.

4.4 Associations between TPB variables and behaviour: Correlation coefficients

As a first step in investigating the relationships between TPB variables and reported behaviour, correlation matrices for each target behaviour were calculated. Table 11 shows the zero order correlation coefficients for cycle helmet use and using crossings and Table 12 shows the correlations for crossing between parked cars and challenging traffic. Across the four target behaviours it can be seen that, in line with the theoretical predictions of the TPB, attitude, subjective norm and perceived control were all positively and statistically significantly associated with intentions, and intentions and perceived control were significantly associated with reported behaviour. There were also significant attitude-behaviour and subjective norm-behaviour relationships. Thus, the more positive respondents' attitudes were to performing the behaviours, the more social pressure they perceived to perform the behaviours and the more perceived control over the behaviours they had, the more likely they were to have positive intentions and the more likely they were to report performing the target behaviours. Also, the more positive respondents' intentions were, the more likely respondents were to report performing the target behaviours.

Table 11 Zero order correlation coefficients: Cycle helmet use and using crossings

Variable	1	2	3	4	5
1 Attitude	–	.59	.46	.72	.54
2 Subjective norm	.47	–	.44	.68	.61
3 Perceived control	.48	.36	–	.52	.44
4 Intention	.58	.49	.37	–	.83
5 Reported behaviour	.37	.41	.27	.70	–

Correlation coefficients above the diagonal relate to cycle helmet use and coefficients below the diagonal relate to using crossings.
$p < .001$ for all correlation coefficients.

Table 12 Zero order correlation coefficients: Crossing between parked cars and challenging traffic

Variable	1	2	3	4	5
1 Attitude	–	.36	.44	.57	.35
2 Subjective norm	.51	–	.35	.55	.51
3 Perceived control	.38	.33	–	.68	.48
4 Intention	.65	.56	.60	–	.68
5 Reported behaviour	.43	.53	.43	.73	–

Correlation coefficients above the diagonal relate to crossing between parked cars and coefficients below the diagonal relate to challenging traffic.
$p < .001$ for all correlation coefficients.

4.5 Predictors of behavioural intentions and reported behaviour

The next step in investigating the relationships posited by the TPB was to use hierarchical multiple regression (see Baron and Kenny, 1986; Cohen and Cohen, 1975) to identify the independent contributors towards behavioural intentions and reported behaviour. To identify the (demographic, exposure and TPB) variables predictive of behavioural intentions four regression analyses were conducted, one for each target behaviour. In each analysis, intention was regressed on the demographic and exposure variables in the first step. The TPB predictors were added to each regression equation in step 2. A similar procedure was used to identify the predictors of reported behaviour. For each target behaviour, the reported behaviour variable was regressed on the demographic and exposure variables (in step 1 of each analysis) and on the TPB variables (in step 2 of each analysis).

Step 1 of these analyses allowed the independent effects of the demographic and exposure variables on intentions and on reported behaviour to be assessed. Step 2 allowed the effects of the TPB variables to be assessed, having taken the effects of the demographic and exposure variables into account. In addition, this analysis procedure allowed the strength of the relationships between the demographic/exposure predictors and intentions/reported behaviour to be assessed before the addition of the TPB variables to the analyses and after their addition. This was necessary to establish the extent to which the demographic and exposure effects on intentions and reported behaviour were mediated by the TPB variables (e.g. the extent to which age differences in intentions and behaviour occurred because of age differences in TPB variables). To demonstrate mediation, the effects of the demographic/exposure predictors in step 1 should not be statistically significant in step 2 (i.e. after having taken the TPB variables into account). If the step 1 demographic/exposure predictors were still statistically significant predictors of intentions or reported behaviour in step 2, then the decrease in their predictive validity was tested for statistical significance in an attempt to demonstrate that the TPB variables significantly mediated their impact on intentions and reported behaviour. The standard procedure recommended by Edwards (1984) was used to test this effect. Briefly, this involved testing the differences between the unstandardised beta weights for each demographic/exposure variable before and after the addition of the TPB variables to the regression analyses.

4.5.1 Cycle helmet use
4.5.1.1 Predicting intentions: Cycle helmet use
Table 13 shows the analysis conducted to identify the independent predictors of intention to use a cycle helmet. The demographic and exposure variables accounted for 19% of the variance. An inspection of the step 1 standardised beta weights showed that the statistically significant independent predictors of intentions were age, area, overall exposure, 'how often do you go out with adults' and 'how often do you go out with friends'. The

Table 13 Cycle helmet use: Predictors of behavioural intentions

Predictor	R^2	R^2_{change}	F_{change}	β by step	Final β
Step 1	.19	.19	16.65[#]		
Age				-.19[#]	-.09[†]
Sex				-.03	.02
Area				.21[#]	.04
Overall exposure				-.11*	.01
How often do you go out with adults?				.28[#]	.13[#]
How often do you go out with friends?				-.09*	-.03
How often do you go out on your own?				-.01	.04
Step 2	.67	.48	238.74[#]		
Attitude				.40[#]	.40[#]
Subjective norm				.33[#]	.33[#]
Perceived control				.16[#]	.16[#]

* $= p < .05$ † $= p < .01$ # $= p < .001$

addition of the TPB variables to the regression analysis, in step 2, led to a substantial and statistically significant improvement in the prediction of intention (48%), over and above the effects of the demographic and exposure variables. Attitude, subjective norm and perceived control were all positively and statistically significantly associated with intention in the final regression equation. Inspection of the final standardised beta weights also showed that all TPB variables were much more important predictor variables than were the demographic and exposure variables. In the final regression equation, the only demographic/exposure variables to be statistically significant independent predictors were age and 'how often do you go out with adults?' In both cases, the predictive power of these variables was significantly weaker than it was before the TPB variables were taken into account (t(1004) = -2.03, p <. 05 and t(1004) = -2.99, p <. 01 for age and 'how often do you go out with adults?', respectively). These results suggested that the demographic/exposure predictors of intention to use a cycle helmet were mediated by the TPB variables.

The final standardised beta weights indicated that attitude and subjective norm were more powerful predictors of intention than was perceived control, suggesting interventions that effectively target these variables might have the most impact on intentions to use a cycle helmet. However, perceived control was still a relatively strong and statistically significant predictor, thus interventions which effectively change this component may also be useful for bringing about desirable changes in cycle helmet use intentions.

4.5.1.2 Predicting behaviour: Cycle helmet use

Table 14 shows the regression analysis conducted for reported cycle helmet use. When regressed on the demographic and exposure variables, 19% of the variance in cycle helmet use behaviour was accounted for. The statistically significant independent predictors at this stage of the analysis were age, area, 'how often do you go out with adults?' and 'how often do you go out with friends?' The addition of the TPB variables to the regression

equation (step2) resulted in an additional 50% of the variance in reported behaviour being accounted for. In line with the TPB, intention to use a cycle helmet was a powerful predictor of cycle helmet use. Perceived control, however, was not a statistically significant predictor, suggesting that its effect on reported behaviour was mediated by behavioural intention. In the final regression equation, the only step 1 variable to be a statistically significant predictor of cycle helmet use behaviour was 'how often do you go out with adults?' However, this variable was a significantly weaker predictor of behaviour than it was in step 1 (i.e. before taking the TPB variables into account; t(1052) = 4.52, p <. 001). Thus, the effects of the demographic and exposure predictors of cycle helmet use behaviour were mediated by the TPB. Intention was by far the strongest predictor of behaviour in the final regression equation. These results suggest that bringing about changes in adolescents' intentions to use a cycle helmet (i.e. by changing the attitudinal predictors identified in the previous section) may bring about corresponding changes in cycle helmet usage.

Table 14 Cycle helmet use: Predictors of reported behaviour

Predictor	R^2	R^2_{change}	F_{change}	β by step	Final β
Step 1	.19	.19	17.83[#]		
Age				-.15[#]	.00
Sex				-.05	.00
Area				.22[#]	-.02
Overall exposure				-.09	.05
How often do you go out with adults?				.30[#]	.09[†]
How often do you go out with friends?				-.10*	-.03
How often do you go out on your own?				.00	.00
Step 2	.69	.50	413.99[#]		
Intention				.78[#]	.78[#]
Perceived control				.01	.01

* $= p < .05$ † $= p < .01$ # $= p < .001$

4.5.2 Using crossings

4.5.2.1 Predicting intentions: Using crossings

Table 15 shows the results of the hierarchical regression analysis conducted to identify the key predictors of intentions to walk to a nearby crossing to cross the road. In step 1, the demographic and exposure variables accounted for 14% of the variance in behavioural intention. Age, sex, 'how often do you go out with adults?' and 'how often do you go out with friends?' were the statistically significant independent predictors in step 1 of the analysis. When the TPB variables were added to the regression model, they led to a 30% increment to explained variance and all TPB variables were statistically significant predictor variables. The effects of all demographic and exposure variables remained statistically significant in step 2 of the analysis. The effect of 'how often do you go out with adults?' on adolescents' intentions to use crossings was significantly weaker (at the 10% level) than it was in step 1 of the analysis (t(1150) = 1.83, p < .10). These results suggest that

the TPB did not fully mediate the effects of the demographic/exposure variables on intentions to use crossings. However, similar to the results for cycle helmet use, described above, the final standardised beta weights showed that attitude and subjective norm were the strongest predictors of intentions to use a crossing to cross the road, much stronger than any of the demographic or exposure predictors. Thus, effectively targeting these variables in road safety countermeasures may bring about desirable changes in adolescents' intentions to use crossings.

Table 15 Using crossings: Predictors of behavioural intentions

Predictor	R^2	R^2_{change}	F_{change}	β by step	Final β
Step 1	.14	.14	12.93[#]		
Age				-.16[#]	-.09[†]
Sex				.16[#]	.11[†]
Area				.03	.00
Overall exposure				.04	.01
How often do you go out with adults?				.19[#]	.09[†]
How often do you go out with friends?				-.13[†]	-.08[*]
How often do you go out on your own?				-.03	-.01
Step 2	.44	.30	97.93[#]		
Attitude				.37[#]	.37[#]
Subjective norm				.22[#]	.22[#]
Perceived control				.10[†]	.10[†]

[*] = p < .05   [†] = p < .01   [#] = p < .001

4.5.2.2 Predicting behaviour: Using crossings
When the reported behaviour variable for using crossings was regressed on the demographic and exposure variables (see Table 16), 8% of the variance was accounted for. Sex, 'how often do you go out with adults?' and 'how often do you go out with friends?' were the significant independent predictors of using crossings behaviour at this step of the analysis. The addition of the TPB variables resulted in a large and statistically significant increment to explained variance (41%). Intention to use a crossing was the only statistically significant independent predictor of reported behaviour in the final regression equation. Its effect on the

Table 16 Using crossings: Predictors of reported behaviour

Predictor	R^2	R^2_{change}	F_{change}	β by step	Final β
Step 1	.08	.08	7.77[#]		
Age				-.08	.04
Sex				.14[#]	.04
Area				.00	-.03
Overall exposure				.02	.00
How often do you go out with adults?				.17[#]	.04
How often do you go out with friends?				-.10[*]	-.02
How often do you go out on your own?				.01	.03
Step 2	.49	.41	241.04[#]		
Intention				.68[#]	.68[#]
Perceived control				.02	.02

[*] = p < .05   [†] = p < .01   [#] = p < .001

behaviour variable was large as indicated by the standardised beta weight, suggesting that changing adolescents' intentions to use crossing to cross the road might bring about corresponding changes in behaviour.

4.5.3 Crossing between parked cars
4.5.3.1 Predicting intentions: Crossing between parked cars
The demographic and exposure variables accounted for 15% of the variance in intentions to cross between parked cars (see Table 17). With the exception of overall exposure, all demographic and exposure variables were statistically significant independent predictors of intention. When added to the regression model, in step 2, the TPB variables significantly improved the prediction of intention to cross between parked cars by 49%. All TPB variables were strong and statistically significant predictors of intention, as indicated by the final standardised beta weights. In the final regression equation, area and 'how often do you go out with adults?' were the only statistically significant demographic/exposure predictors of intention. In both cases, the predictive validity of these variables decreased following the addition of the TPB variables, although only the 'how often do you go out with adults?' variable significantly decreased (t(1112) = 1.88, p < .10). The final standardised beta weights showed that the TPB variables were much more powerful predictors of intentions than were any of the demographic or exposure variables. These results again highlight the potential usefulness of targeting adolescents' attitudes, subjective norms and perceived control in road safety countermeasures in an attempt to bring about changes in intentions.

Table 17 Crossing between parked cars: Predictors of behavioural intentions

Predictor	R^2	R^2_{change}	F_{change}	β by step	Final β
Step 1	.15	.15	13.34[#]		
Age				.14[†]	.03
Sex				-.13[†]	.01
Area				-.12[†]	-.06*
Overall exposure				.01	.02
How often do you go out with adults?				-.21[#]	-.12[#]
How often do you go out with friends?				.14[†]	.05
How often do you go out on your own?				.09*	.02
Step 2	.64	.49	239.40[#]		
Attitude				.25[#]	.25[#]
Subjective norm				.28[#]	.28[#]
Perceived control				.42[#]	.42[#]

[*] = p < .05   [†] = p < .01   [#] = p < .001

4.5.3.2 Predicting behaviour: Crossing between parked cars
When the reported behaviour variable for crossing between parked cars was regressed on the demographic and exposure variables, 13% of the variance was accounted for. With the exception of age and 'how often do you go out on your own?' all these variables were statistically significant predictors in step 1 of this regression analysis. When the TPB variables were added in step 2, they led to a large and statistically significant (36%)

increment to explained variance. Intention was the statistically significant independent TPB predictor of behaviour. Overall exposure and 'how often do you go out with adults?' remained statistically significant independent predictors of behaviour in the final regression, but the effect of 'how often do you go out with adults?' significantly decreased (t(1158) = -2.60, p < .01) and intention was by far the strongest predictor of behaviour in the final model.

Table 18 Crossing between parked cars: Predictors of reported behaviour

Predictor	R^2	R^2_{change}	F_{change}	β by step	Final β
Step 1	.13	.13	12.44[#]		
Age				.06	-.02
Sex				-.09*	.00
Area				-.08*	.00
Overall exposure				.09*	.09[†]
How often do you go out with adults?				-.21[#]	-.07[*]
How often do you go out with friends?				.16[#]	.06
How often do you go out on your own?				.07	.01
Step 2	.49	.36	200.04[#]		
Intention				.61[#]	.61[#]
Perceived control				.05	.05

[*] = p < .05   [†] = p < .01   [#] = p < .001

4.5.4 Challenging traffic

4.5.4.1 Predicting intentions: Challenging traffic

Table 19 shows the results of the hierarchical regression analysis conducted to identify the predictors of adolescents' intentions challenge traffic when crossing a road (as described in the scenario that was used). In step 1, the demographic and exposure variables accounted for a small but statistically significant proportion of the variance in behavioural intention (7%). 'How often do you go out with adults?' and 'how often do you go out with friends?' were the only statistically significant independent predictors in step 1 of the analysis. When the TPB variables were added to the regression equation, they led to

Table 19 Challenging traffic: Predictors of behavioural intentions

Predictor	R^2	R^2_{change}	F_{change}	β by step	Final β
Step 1	.07	.07	5.91[#]		
Age				.08	-.04
Sex				-.05	.03
Area				-.08	-.05
Overall exposure				-.03	-.01
How often do you go out with adults?				-.16[#]	-.11[#]
How often do you go out with friends?				.10[*]	.03
How often do you go out on your own?				.08	.05
Step 2	.61	.54	256.92[#]		
Attitude				.38[#]	.38[#]
Subjective norm				.23[#]	.23[#]
Perceived control				.36[#]	.36[#]

[*] = p < .05   [†] = p < .01   [#] = p < .001

a large (50%) increment to explained variance. 'How often do you go out with friends?' was not a statistically significant predictor of intentions once the TPB variables were added to the regression analysis and the effect of 'how often do you go out with adults?' diminished, but not by a statistically significant amount. All TPB variables were strong and statistically significant predictor variables as indicated by the final standardised beta weights.

4.5.4.2 Predicting behaviour: Challenging traffic

The results of the regression analysis conducted for reported behaviour with respect to challenging traffic are shown in Table 20. The demographic and exposure variables accounted for 12% of the variance in step 1. Sex and overall exposure were the only demographic/exposure variables that were not statistically significant predictors of behaviour. When the TPB variables were added to the regression equation (step2) an additional 45% of the variance in reported behaviour was accounted for. As was the case in all other regression analyses conducted for reported behaviour, reported above, intention was a powerful predictor but perceived control was not, suggesting that its effect on reported behaviour was mediated by behavioural intention. In the final regression equation, 'how often do you go out with adults?' and 'how often do you go out with friends?' remained statistically significant predictors in the final regression model. However, the predictive validity of 'how often do you go out with adults?' decreased significantly from step 1 (t(1152) = -2.05, p < .05). Although not a statistically significant decrease, the predictive validity of 'how often do you go out with friends?' did decrease from step 1 to step 2. Intention contributed to the prediction of reported behaviour much more than either of these exposure variables.

Table 20 Challenging traffic: Predictors of reported behaviour

Predictor	R^2	R^2_{change}	F_{change}	β by step	Final β
Step 1	.12	.12	10.57[#]		
Age				.09[*]	.03
Sex				-.04	-.01
Area				-.08[*]	-.03
Overall exposure				.03	.04
How often do you go out with adults?				-.20[#]	-.10[†]
How often do you go out with friends?				.16[†]	.08[*]
How often do you go out on your own?				.08[*]	.04
Step 2	.57	.45	295.72[#]		
Intention				.71[#]	.71[#]
Perceived control				-.03	-.03

[*] = p < .05   [†] = p < .01   [#] = p < .001

Overall, the results of the analyses presented above provided strong support for the relationships postulated by the TPB, with respect to each target behaviour. In each case, adolescents' attitudes, subjective norms and perceptions of control led to large increments to explained variance in behavioural intentions, over and above the demographic and exposure variables. Intentions and perceived control led to large increments to explained

variance in reported behaviour, again, over and above the demographic and exposure variables. Also, the effects of the demographic/exposure variables on intentions and behaviour were mostly mediated by the TPB variables, suggesting that age differences in intentions and behaviour, for example, were due to age differences in attitudes, subjective norms, perceived control and intentions. Across all analyses the general conclusion was that the TPB variables were much more strongly associated with intentions and with reported behaviour than were the demographic/exposure variables. Attitudes, subjective norms and perceptions of control were consistently strong and statistically significant independent predictors of intentions, and intentions were consistently strong and statistically significant predictors of behaviour. So long as the relationships posited by the TPB are causal, then these results support the argument that changing adolescent road users' attitudes, subjective norms and perceptions of control should lead to corresponding changes in intentions and behaviour. The next aim of the present study was to identify specific beliefs held by adolescent road users that underpin these TPB components, which could be targeted in road safety interventions that aim to bring about desirable changes attitudes.

4.6 Identifying belief targets for road safety interventions: Assessing the belief-TPB relationships

As described in the introduction of this report, it is hypothesised in the TPB that attitude, subjective norm and perceived control are each based on interacting beliefs. Typically in TPB research, these beliefs are rated by respondents on 7-point bipolar (scored -3 to +3) or 7-point unipolar (scored +1 to +7) scales. Corresponding belief scores (e.g. the likelihood that 'wearing a cycle helmet will make me look childish' and the extent to which 'looking childish' is rated as being bad or good) are then multiplied to derive a number of behavioural, normative and control belief terms. These multiplicative terms are then typically regressed on the global measures of attitude, subjective norm or perceived control to demonstrate their predictive validity.

Unfortunately, this method has led to difficulties in practice, stemming from the fact that when the individual belief terms (e.g. outcome beliefs and outcome evaluations) are multiplied, the scoring system which is used can affect the results obtained. Since this has important practical implications for how to identify beliefs which can be targeted in road safety interventions, it is discussed briefly below. [Note: In the following paragraphs the problem will be illustrated using examples relating to behavioural beliefs underpinning attitudes. However, given the procedure for treating all types of beliefs in the TPB is the same, these problems can be generalised to the relationships between normative beliefs and subjective norm and between control beliefs and perceived control].

To demonstrate how the scoring of beliefs can affect the relationship between multiplicative scores and other variables, imagine a participant who rates a particular outcome of performing a behaviour is both highly unlikely and very bad and another participant who rates that same outcome as being

highly likely and very good. If a bipolar scoring system were used to measure these responses, then the participant believing that the outcome is unlikely (scored -3) and bad (scored -3) would achieve the same composite score when the belief terms are multiplied as the participant rating the outcome as being likely (scored +3) and good (scored +3). They would both achieve a score of +9. Clearly, very different composite scores would arise if unipolar scales (e.g., +1 to +7) were used to measure these outcome and evaluation items. The participant rating the outcome as being unlikely (scored +1) and bad (scored +1) would achieve a multiplicative score of +1 and the participant rating the outcome as being likely (scored +7) and good (scored +7) would achieve a multiplicative score of 49. Different scores still would be obtained if unipolar scoring was used for one scale (e.g., outcome beliefs) and bipolar scoring used for the other (e.g., outcome evaluations).

Studies have shown that varying the scoring system can greatly affect the ability of the belief items to explain attitudes (see French and Hankins, 2003 for a review), so it becomes important to know which system is correct. This is, however, not an easy issue to address. On a theoretical level Ajzen and Fishbein (1980) have used the 'psychology of the double negative' to defend the scoring system involving multiplication of bipolar scales. The argument is that person who rates an outcome of performing a behaviour as being highly unlikely (e.g. 'wearing a cycle helmet will not make me conspicuous to other road users') and very bad (e.g. 'being highly conspicuous is bad for me') is likely to have a positive attitude towards performing the behaviour in just the same way as a person who rates the same outcome as being highly likely (e.g. 'wearing a cycle helmet will make me conspicuous to other road users') and very good bad (e.g. 'being highly conspicuous is good for me') is likely to have a positive attitude. However, while it is true that both people might have similar overall attitudes, the responses of one indicate a truly positive attitude while the responses of the other may merely indicate the absence of a negative attitude (see Bagozzi, 1984). While this somewhat undermines the justification for a bipolar scoring system, it is far from clear that a unipolar scoring system would provide a better account. In a sense, both types of scales are arbitrary.

Given the difficulties described above, Evans (1991) has concluded that the analysis of multiplicative expectancy-value composites is statistically uninterpretable. There have been a number of proposed solutions to this problem, which were reviewed by French and Hankins (2003). One approach is to use 'optimal scoring' procedures (see Holbrook, 1977). This involves using the scoring system that maximises the correlation between the expectancy-value composites and attitudes. This approach, however, has been heavily criticised on a number of levels (see French and Hankins, 2003) – including the fact that it can lead to very different scoring systems for different survey samples[4].

Another approach is to use hierarchical multiple regression analysis (e.g. Cohen and Cohen, 1975; Schmidt, 1973), in which the contribution of expectancy beliefs, value beliefs and expectancy-value interactions to the

prediction of attitudes are estimated in sequence. It should be noted that in this type of analysis the amount of variance accounted for by the three components is not affected by the scoring system used. The amount of variance accounted for by the multiplicative terms (e.g. outcome beliefs × outcome evaluations) over and above that accounted for by the individual belief terms (outcome beliefs and outcome evaluations) is uniquely attributable to an expectancy-value interaction. French and Hankins (2003) concluded that this method is effective for estimating the contribution of expectancy and value beliefs to attitudes, but that large sample sizes are needed to detect interaction effects. However, if an expectancy-value interaction is not found in the analysis, it leads to a psychological model that is less than fully satisfactory – in that attitudes to a behaviour can apparently depend on whether the respondent believes an outcome to be good or bad, while not being influenced by whether he/she believes that the behaviour is likely to lead to that outcome.

Hierarchical multiple regression was used in this study to test, for each target behaviour, the multiplicative expectancy-value underpinnings of the beliefs in the TPB. In each analysis, the global TPB measures (e.g. attitude) were regressed on the individual belief components (e.g. outcome beliefs and outcome evaluations) in steps 1 and 2, respectively, followed by the multiplicative terms in step 3. In each analysis, the data were mean centred before the interaction terms were computed to reduce the possible effects of multicollinearity between the individual belief components and the multiplicative terms (see Aiken and West, 1991; Dunlap and Kemery, 1987). [Note: this procedure does not affect the variance explained at any step of the regression model]. In only two cases did the multiplicative terms significantly increase the prediction of the global TPB measures, above and beyond the prediction provided by the individual belief components. The few statistically significant results were for the control belief – perceived control relationship for cycle helmet use and for crossing between parked cars. In both cases the additional prediction by the multiplicative terms was small (a 2% increase in the amount of variation accounted for in perceived control).

Given this lack of support for multiplicative relationships between belief components in the present study, the following sections of this report present the results of hierarchical multiple regressions in which multiplicative beliefs terms were not used. Thus, for each target behaviour, the global measure of attitude was regressed on all outcome belief terms (step 1) and outcome evaluation items (step 2) that were rated by respondents in the questionnaires. Similarly, the global measure of subjective norm was regressed on all referent beliefs (step 1) and motivation to comply items (step 2) and the global measure of perceived control was regressed on all the control frequency beliefs (step 1) and the control power beliefs (step 2). As noted above, this approach may not be completely satisfactory from a psychological perspective. However, from an applied perspective, it serves as an easily interpretable way of identifying those individual beliefs that predicted attitude, subjective norm and

perceived control (i.e. beliefs that may be useful to target in road safety countermeasures in an attempt to change these variables).

Means and standard deviations for all belief terms by age, sex and area are presented in Appendix I.

4.6.1 Cycle helmet use
4.6.1.1 Predictors of attitude
Table 21 shows the regression analysis conducted to investigate the belief predictors of attitude towards wearing a cycle helmet. Outcome beliefs (i.e. beliefs about the likelihood that wearing a cycle helmet will lead to a particular outcome) accounted for 46% of the variance in attitude (p < .001). Outcome evaluations (i.e. beliefs about whether the outcome is good or bad) when added to the regression analysis accounted for a 3% increment to explained variance (p < .001).

Table 21 Cycle helmet use: Belief predictors of attitude

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre-lation
Step 1: Outcome beliefs	.46	.46	61.50[#]		
'Wearing a cycle helmet will…'					
Protect my head				.15[#]	.42[#]
Be annoying because I would have to carry it around when I get off my bike				-.13[†]	-.35[#]
Be uncomfortable to wear				-.02	-.36[#]
Make me more visible to other road users				.00	.22[#]
Make me feel safer while riding				.34[#]	.57[#]
Make me look unfashionable				.01	-.21[#]
Make me look childish				-.15[#]	-.32[#]
Step 2: Outcome evaluations	.49	.03	4.61[#]		
'How bad/good are the following things?'					
Having protection for my head				.08[*]	.40[#]
Having to carry a cycle helmet around when I get off my bike				.07	.33[#]
Being uncomfortable when riding a bike				.01	.18[#]
Being visible to other road users				.09[*]	.34[#]
Feeling safer while riding a bike				.10[*]	.46[#]
Looking unfashionable when riding a bike				.04	.16[#]
Look childish when riding a bike				-.05	.13[†]

[*] = p < .05   [†] = p < .01   [#] = p < .001

Inspection of the zero order correlation coefficients showed that all outcome beliefs and outcome evaluations were significantly associated with attitude. The outcome belief predictors of attitude, as indicated by the final standardised beta weights in the regression analysis, were:

● The likelihood of a cycle helmet protecting my head in the event of an accident or a fall off the bike.

● The likelihood of being annoyed due to having to carry the cycle helmet around when not riding.

● The likelihood of wearing a cycle helmet making me feel safer when riding.

● The likelihood of wearing a cycle helmet making me look childish.

The outcome evaluation predictors were:

- Protecting my head in the event of an accident or fall off the bike being bad/good.
- Being more visible to other road users being bad/good.
- Making myself feel safer when riding being bad/good.

The likelihood of 'being annoyed due to carrying the cycle helmet around when not riding' and the likelihood of a cycle helmet 'making me look childish' were negatively associated with attitude. This indicated that the more likely adolescents thought these outcomes were, the more negative their attitude was towards wearing a cycle helmet. All other beliefs were positively associated with attitude showing that the more adolescents rated these outcomes as being likely or good, the more positive their attitude was[5].

4.6.1.2 Predictors of subjective norm

The regression analysis conducted to investigate the belief predictors of perceived social pressure to wear a cycle helmet (subjective norm) showed that referent beliefs accounted for 40% of the variance (p < .001). When added to the regression analysis, motivation to comply accounted for an additional 5% of the variance (p < .001). These results are summarised in Table 22.

Table 22 Cycle helmet use: Belief predictors of subjective norm

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre -lation
Step 1: Referent beliefs	.40	.40	51.27[#]		
'How much do you think the following people would want you to wear a cycle helmet?'					
School teachers				.02	.17[#]
Your friends				.25[#]	.40[#]
Other people at school				-.06	.22[#]
The police				.12[†]	.24[#]
Car drivers				-.07	.28[#]
Your parents				.35[#]	.54[#]
Other people in your family				.10[*]	.51[#]
Step 2: Motivation to comply	.45	.05	7.36[#]		
'How much do you want to go along with what these people want you to do?'					
School teachers				.10[*]	.38[#]
Your friends				-.05	.07
Other people at school				.07	.09[*]
The police				.15[†]	.39[#]
Car drivers				-.07	.30[#]
Your parents				-.09	.32[#]
Other people in your family				.18[†]	.37[#]

[*] = p < .05　　[†] = p < .01　　[#] = p < .001

With the exception of motivation to comply with 'friends', all zero order correlation coefficients for the belief-subjective norm relationships were statistically significant. The final standardised beta weights in the regression analysis showed that the independent predictors of subjective norm were perceived social pressure from 'friends', 'the police', 'parents', and 'other people in your family'. Motivation to comply with the 'the police', 'other people in your family' and 'school teachers' were also statistically significant predictors of subjective norm. These beliefs were all positively associated with subjective norm. Thus, the more adolescents perceived social pressure from these referents, and the more they wanted to comply with these referents, the more social pressure they perceived overall to wear a cycle helmet[6].

4.6.1.3 Predictors of perceived control

Table 23 shows that control frequency beliefs accounted for a small proportion of the variance in adolescents' perceived control over wearing a cycle helmet (7%). Control power beliefs, when added to the regression equation increased the amount of variance accounted for in perceived control to 22%[7].

Table 23 Cycle helmet use: Belief predictors of perceived control

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre -lation
Step 1: Control frequency beliefs	.07	.07	6.15[#]		
'In future, how often do you expect to...'					
Ride a bike in busy traffic conditions				-.02	-.05
Ride a bike around roads close to home				.03	.01
Go on long bike rides				-.01	.05
Go on short bike rides				-.02	-.01
Go out on a bike when you are in a hurry				.06	-.01
Ride a bike to school				.00	.04
Not have or not be able to find your cycle helmet				-.15[#]	-.26[#]
Step 2: Control power beliefs	.22	.14	13.81[#]		
'Would the following things make you more likely or less likely to wear a cycle helmet?'					
Riding in busy traffic conditions				.10*	.32[#]
Riding around roads close to home				-.06	.19[#]
Going on long bike rides				.22[#]	.39[#]
Going on short bike rides				.15[#]	.32[#]
If you were in a hurry				-.03	.22[#]
Riding to school				.11*	.31[#]
Not having or not being able to find your cycle helmet				-.02	.15[#]

[*] = p < .05　　[†] = p < .01　　[#] = p < .001

The zero order correlation coefficients indicated that all control power beliefs were significantly associated with adolescents' perceptions of control over wearing a cycle helmet. Only one control frequency belief was significantly associated with perceived control ('if you didn't have or could not find your cycle helmet'). The results of the regression analysis showed that this belief was a statistically significant independent predictor. The direction of this relationship was negative, indicating that the more often adolescents believed they would not have or not be able to find their cycle helmet in the future, the less perceived control they had over wearing a cycle

helmet. For control power beliefs, the statistically significant independent predictors in the regression analysis were the perceived power of 'busy traffic conditions', 'going on long bike rides', 'going on short bike rides' and 'riding to school' to facilitate/inhibit the performance of the behaviour. All these beliefs were positively associated with perceived control. This indicated that the more respondents believed that these conditions would facilitate the behaviour, the greater perceptions of control they had over wearing a cycle helmet.

4.6.2 Using crossings

4.6.2.1 Predictors of attitude

When regressed on the global measure of attitude, outcome beliefs and outcome evaluations accounted for 40% of the variance in attitude towards using crossings (see Table 24). Outcome beliefs accounted for 37% of the variance in step 1 of the analysis ($p < .001$). When added to the analysis in step 2, outcome evaluations accounted for a 3% increment to explained variance ($p < .001$)[8].

Table 24 Using crossings: Belief predictors of attitude

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre -lation
Step 1: Outcome beliefs	.37	.37	71.21[#]		
'Walking to the crossing will…'					
Reduce my chances of getting run over				.07	.37[#]
Take me longer to get to my destination				-.07	-.22[#]
Make it easier to cross the road				.18[#]	.45[#]
Make me feel safer while crossing				.24[#]	.53[#]
Take me too far out of my way				-.12[†]	-.30[#]
Step 2: Outcome evaluations	.40	.03	5.29[#]		
'How bad/good are the following things?'					
Reducing my chances of getting run over				.07	.29[#]
Taking longer to get to my destination				.02	.18[#]
It being easier to cross the road				.02	.36[#]
Feeling safe while crossing				.14[†]	.48[#]
Going too far out of my way				.04	.19[#]

$^* = p < .05$ $^† = p < .01$ $^\# = p < .001$

It can be seen that all outcome beliefs and evaluations were significantly associated with attitude towards using crossings as indicated by the zero order correlation coefficients. The statistically significant independent outcome belief predictors as indicated by the final standardised beta weights in the regression analysis were:

- The likelihood of using a nearby crossing making it easier to cross the road.
- The likelihood of using a nearby crossing making me feel safer while crossing the road.
- The likelihood of using a nearby crossing taking me too far out of my way.

One outcome evaluation was a statistically significant independent predictor. This was 'making myself feel safer while crossing the road being bad/good'.

With the exception of the outcome belief, 'take me too far out of my way', all these beliefs were positively associated with attitude. Thus, positive attitudes towards using crossings were associated with beliefs that using a crossing would 'make it easier to cross the road', it would 'make me feel safer', it would not 'take me too far out of my way' and 'making myself feel safer while crossing the road' is a good thing.

4.6.2.2 Predictors of subjective norm

Referent beliefs accounted for 32% of the variance in perceived social pressure to use crossings ($p < .001$). Motivation to comply items, when added to the regression analysis, accounted for an additional 8% of the variance in subjective norm. The results of the analysis to identify the normative belief predictors of subjective norm are presented in Table 25[9].

Table 25 Using crossings: Belief predictors of subjective norm

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre -lation
Step 1: Referent beliefs	.32	.32	43.12[#]		
'How much do you think the following people would want you to walk to the crossing?'					
School teachers				.07	.36[#]
Your friends				.09*	.30[#]
Other people at school				-.01	.17[#]
The police				.06	.36[#]
Car drivers				.01	.30[#]
Your parents				.28[#]	.51[#]
Other people in your family				.01	.47[#]
Step 2: Motivation to comply	.40	.08	12.47[#]		
'How much do you want to go along with what these people want you to do?'					
School teachers				.14[†]	.41[#]
Your friends				.03	.17[#]
Other people at school				.04	.16[#]
The police				.00	.40[#]
Car drivers				-.01	.33[#]
Your parents				.16[†]	.47[#]
Other people in your family				.08	.46[#]

$^* = p < .05$ $^† = p < .01$ $^\# = p < .001$

The statistically significant independent belief predictors were perceived social pressure from 'friends' and 'parents', and the motivation to comply with 'schoolteachers' and 'parents'. These beliefs were positively associated with subjective norm. Table 25 also shows that all zero order correlation coefficients for the beliefs-subjective norm relationships were statistically significant.

4.6.2.3 Predictors of perceived control

Control frequency and power beliefs accounted for 16% of the variance in adolescents' perceptions of control over using crossings. The results of this regression analysis are presented in Table 26. It can be seen that control frequency

Table 26 Using crossings: Belief predictors of perceived control

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre-lation
Step 1: Control frequency beliefs	.05	.05	5.05[#]		
'In future, how often do you expect to be in a similar situation to that described when...'					
Traffic is moving fast (e.g. the road has a fast speed limit)				-.05	.10[*]
The place you are going to is directly opposite you on the other side of the road				-.01	.00
You are in a hurry or late				-.02	.00
It is dark				-.06	.00
People are waiting for you on the other side of the road				.00	-.02
There is a lot of traffic around				.19[#]	.20[#]
Step 2: Control power beliefs	.16	.11	13.46[#]		
'Would the following things make you more likely or less likely to walk to the crossing?'					
Fast moving traffic (e.g. the road has a fast speed limit)				.23[#]	.31[#]
The place you are going to being directly opposite you on the other side of the road				.03	.06
You being in a hurry or late				.06	.07
It being dark				.12[†]	.23[#]
People waiting for you on the other side of the road				-.02	.05
There being a lot of traffic around				.07	.25[#]

[*] = p < .05   [†] = p < .01   [#] = p < .001

Table 27 Crossing between parked cars: Belief predictors of attitude

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre-lation
Step 1: Outcome beliefs	.31	.31	35.22[#]		
'If I cross between parked cars...'					
I will increase my chances of getting run over				-.28[#]	-.43[#]
I will not have to go out of my way				.09[*]	.19[#]
I will not be able to see cars coming very well				-.12[*]	-.40[#]
It will take me less time to get to where I am going				.05	.14[†]
Drivers would not be able to see me				-.16[†]	-.42[#]
Parked cars might move and hit me				-.10[*]	-.35[#]
I will have to step into road to see clearly				.03	-.31[#]
Step 2: Outcome evaluations	.33	.02	3.20[†]		
'How bad/good are the following things?'					
Increasing my chances of getting run over				.01	.15[#]
Not having to go out of my way				.09[*]	.21[#]
Not being able to see cars coming very well				.06	.20[#]
Taking less time to get to where I am going				.06	.14[†]
Drivers not being able to see me				-.07	.15[#]
Parked cars moving and hitting me				-.01	.17[#]
Having to step into road to see clearly				.11[*]	.24[#]

[*] = p < .05   [†] = p < .01   [#] = p < .001

beliefs accounted for 5% of the variance (p < .001) and control power beliefs added 11% to explained variance (p < .001)[10].

One control frequency belief and two control power beliefs were statistically significant independent predictors of perceived control. All three were positively associated with perceived control. The more often adolescents believed they would be in a similar situation to that described in the scenario when 'there is a lot of traffic around', and the more they believed that 'fast moving traffic' and it 'being dark' would facilitate their performance of the behaviour, the more control to use a nearby crossing they perceived.

4.6.3 Crossing between parked cars

4.6.3.1 Predictors of attitude

Table 27 shows that 31% of the variance in attitude to cross between parked cars was accounted for by outcome beliefs (p < .001). Outcome evaluations resulted in a 2% increase to explained variance (p < .01)[11].

Zero order correlation coefficients showed that all outcome beliefs and evaluations were significantly associated with attitude to cross between parked cars. The statistically significant independent outcome belief predictors in the final regression equation were:

- The likelihood of crossing between parked cars increasing the chances of getting run over.

- The likelihood of not being able to see cars coming very well when crossing between parked cars.
- The likelihood of avoiding going out of my way (e.g. not having to find a safer place to cross the road elsewhere).
- The likelihood of drivers not being able to see me when crossing between parked cars.
- The likelihood of parked cars moving and hitting me.

The following two outcome evaluation items were also statistically significant predictors of attitude to cross between parked cars.

- Not having to go out of my way being bad/good.
- Having to step out into the road to see clearly being bad/good.

The outcome beliefs, 'it would increase my chances of getting run over', ' I would not be able to see cars coming very well', 'drivers would not be able to see me' and 'parked cars might move and hit me' were negatively associated with attitude. Thus, the more likely these outcomes were rated by respondents, the more negative their attitudes towards crossing between parked cars were. The outcome belief 'not having to go out of my way' was positively associated with attitude as was the outcome evaluation for 'not having to go out of my way' and 'having to step out into the road to see clearly'.

4.6.3.2 Predictors of subjective norm

Referent beliefs and motivation to comply accounted for 33% of the variance in subjective norm, with referent beliefs accounting for 31% of the variance in step 1 of the analysis (p < .001) and motivation to comply adding 2% to

explained variance in step 2 (p < .05). The results of this regression analysis conducted to investigate the relationships between normative beliefs and perceived social pressure to crossing between parked cars is presented in Table 28[12].

Table 28 Crossing between parked cars: Belief predictors of subjective norm

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre-lation
Step 1: Referent beliefs	.31	.31	37.73[#]		
'How much do you think the following people would want you to cross between parked cars?'					
School teachers				.19[#]	.39[#]
Your friends				.12[†]	.25[#]
Other people at school				.03	.21[#]
The police				-.05	.31[#]
Car drivers				-.09	.32[#]
Your parents				.32[#]	.51[#]
Other people in your family				.14[#]	.49[#]
Step 2: Motivation to comply	.33	.02	2.49[*]		
'How much do you want to go along with what these people want you to do?'					
School teachers				-.01	-.10[*]
Your friends				.15[#]	.11[†]
Other people at school				-.05	.05
The police				.02	-.12[†]
Car drivers				.01	-.10[*]
Your parents				.01	-.14[†]
Other people in your family				-.12[*]	-.14[†]

[*] = p < .05   [†] = p < .01   [#] = p < .001

With the exception of motivation to comply with 'other people at school' all referent beliefs and motivation to comply items were significantly associated with subjective norm, as indicated by the zero order correlations. The statistically significant independent referent belief predictors in the regression analysis were 'schoolteachers', 'friends', 'parents' and 'other people in your family'. All these beliefs were positively associated with subjective norm, showing that the more social pressure adolescents in the sample perceived from these referents, the more social pressure to cross between parked cars they felt overall. Motivation to comply with 'friends' and 'other people in your family' were also statistically significant belief predictors in the regression analysis. Motivation to comply with 'friends' was positively associated with subjective norm and motivation to comply with 'other people in your family' was negatively associated with subjective norm.

4.6.3.3 Predictors of perceived control

The results of the regression analysis to investigate the belief predictors of perceived control over crossing between parked cars are summarised in Table 29. It can be seen that control frequency beliefs accounted for 16% of the variance in perceived control (p < .001). Control power beliefs accounted for an additional 13% of the variance in perceived control, when added to the regression equation (p < .001)[13].

Table 29 Crossing between parked cars: Belief predictors of perceived control

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre-lation
Step 1: Control frequency beliefs	.16	.16	15.38[#]		
'In future, how often do you expect to be in a similar situation to that described when...'					
Traffic is moving fast (e.g. the road has a fast speed limit)				-.01	.11[†]
The place you are going to is directly opposite you on the other side of the road				-.03	.24[#]
You are in a hurry or late				.02	.26[#]
There is a lot of traffic around				-.06	.16[#]
It is dark				.10[*]	.23[#]
People are waiting for you on the other side				.05	.27[#]
You can see a gap in the traffic				.16[#]	.33[#]
Step 2: Control power beliefs	.29	.13	15.32[#]		
'Would the following things make you more likely or less likely to walk to cross between parked cars?'					
Fast moving traffic (e.g. the road has a fast speed limit)				-.03	.11[†]
The place you are going to is directly opposite you on the other side of the road				.20[#]	.41[#]
Being in a hurry or late				.09	.36[#]
There being a lot of traffic around				.17[#]	.26[#]
It being dark				.11[†]	.29[#]
People waiting for you on the other side of the road				.09	.35[#]
Being able to see a gap in the traffic				.00	.31[#]

[*] = p < .05   [†] = p < .01   [#] = p < .001

The zero order correlation coefficients showed that all control frequency and power beliefs were significantly associated with perceived control over crossing between parked cars. The independent predictors of perceived control were the perceived frequency of being in a similar situation to that described in the scenario when 'it is dark' and when 'you can see a gap in the traffic' and the perceived power of the following factors to facilitate or inhibit the target behaviour: 'the place you are going being directly opposite you on the other side of the road', 'being a lot of traffic' and 'it being dark'. These beliefs were positively associated with perceived control. Thus, as adolescents' perceptions of encountering these situations in the future increased and as perceptions that these factors will facilitate the target behaviour increased, so did perceived control.

4.6.4 Challenging traffic

4.6.4.1 Predictors of attitude

Table 30 shows the regression analysis conducted to investigate the belief predictors of the global measure of attitude to 'challenge traffic' (as defined in the scenario in Section 3.2). In step 1 of the analysis, outcome beliefs accounted for 26% of the variance (p < .001) and in step 2 outcome evaluations added 4% to explained variance (p < .001)[14].

Table 30 Challenging traffic: Belief predictors of attitude

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order correlation
Step 1: Outcome beliefs	.26	.26	34.18[#]		
'Crossing the road and making the car slow down will…'					
Make the car driver angry				-.12[†]	-.26[#]
Make me feel good				.21[#]	.38[#]
Get me to my to destination quicker				.04	.16[#]
Car driver would have a go at us				-.07	-.17[#]
Increase the chances of an accident				-.17[#]	-.32[#]
I would enjoy making the car driver slow down				.01	.31[#]
Step 2: Outcome evaluations	.30	.04	5.79[#]		
'How bad/good are the following things?'					
Making the car driver angry				.11[*]	.32[#]
Making me feel good				.08	.38[†]
Getting to my destination quicker				.14[†]	.29[#]
The car driver having a go at us				-.08	.17[#]
Increasing the chances of an accident				.12[†]	.26[#]
Getting enjoyment by making the car driver slow down				-.03	.32[#]

[*] = $p < .05$ [†] = $p < .01$ [#] = $p < .001$

All belief terms were significantly associated with attitude as indicated by the zero order correlations. The statistically significant independent outcome belief predictors of attitude towards crossing the road and making the car driver slow down, as indicated by the regression analysis, were:

- The likelihood of making the car driver angry.
- The likelihood of making me feel good.
- The likelihood of increasing the chances of an accident.

There were also three statistically significant independent outcome evaluation predictors of attitude. These were:

- Making the car driver angry being bad/good.
- Getting to your destination quicker being bad/good.
- Increasing the chances of an accident being bad/good.

The direction of the relationships between these beliefs and attitude indicated that positive attitudes towards 'challenging traffic' were associated with the belief that performing the behaviour would not 'make the car driver angry', it would 'make me feel good', it would not 'increase the chances of an accident' and the outcome that 'making the car driver angry', 'getting to my destination quicker' and 'increasing the chances of an accident' is a good thing.

4.6.4.2 Predictors of subjective norm

With respect to the challenging traffic behaviour, Table 31 shows that 37% of the variance in the global measure of subjective norm was accounted for by referent beliefs ($p < .001$). The motivation to comply items resulted in a 4% increase to explained variance in subjective norm ($p < .001$)[15].

Table 31 Challenging traffic: Belief predictors of subjective norm

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order correlation
Step 1: Referent beliefs	.37	.37	50.13[#]		
'How much do you think the following people would want you to cross the road and make the car slow down?'					
School teachers				.15[†]	.45[#]
Your friends				.16[#]	.32[#]
Other people at school				-.02	.21[#]
The police				.01	.38[#]
Car drivers				.02	.37[#]
Your parents				.32[#]	.56[#]
Other people in your family				.09	.54[#]
Step 2: Motivation to comply	.41	.04	5.94[#]		
'How much do you want to go along with what these people want you to do?'					
School teachers				-.03	-.15[#]
Your friends				.03	.17[#]
Other people at school				.11[†]	.20[#]
The police				-.12[†]	-.22[#]
Car drivers				.02	-.12[†]
Your parents				-.05	-.15[#]
Other people in your family				.01	-.12[†]

[*] = $p < .05$ [†] = $p < .01$ [#] = $p < .001$

The statistically significant independent belief predictors of subjective norm were perceived social pressure from 'friends', 'parents' and 'schoolteachers', and motivation to comply with 'other people at school' and 'the police'. With the exception of motivation to comply with the police, all these beliefs were positively associated with subjective norm. Thus, the more pressure adolescents' perceived from these referents, the more social pressure to perform the behaviour they perceived overall. Adolescents perceiving social pressure to perform the target behaviour were motivated to comply with 'other people at school' but not 'the police'.

4.6.4.3 Predictors of perceived control

Control frequency beliefs accounted for 12% of the variance in perceived control ($p < .001$). Control power beliefs, when added to the regression analysis, accounted for an additional 7% of the variance in perceived control. The results of the analysis to identify the control belief predictors of perceived control over the challenging traffic behaviour are presented in Table 32[16].

The control frequency belief 'your friends cross the road' was a statistically significant independent predictor of perceived control. The direction of the relationship was positive showing that the more often respondents believed they would be in a similar situation to the challenging traffic scenario when their friends crossed the road, the higher perceived control they had over performing the target behaviour. The power of the following factors to facilitate/inhibit performance of the target behaviour were also significantly associated with perceived control in the

Table 32 Challenging traffic: Belief predictors of perceived control

Predictor	R^2	R^2_{change}	F_{change}	Final β	Zero order corre-lation
Step 1: Control frequency beliefs	.12	.12	15.67[#]		
'In future, how often do you expect to be in a similar situation to that described when...'					
You and your friends are in a hurry or late				.01	.21[#]
Your friends cross the road				.21[#]	.33[#]
The car is going really fast				.06	.14[#]
You were dared to cross the road				-.01	.12[#]
You are on a busy road				-.03	.13[#]
Step 2: Control power beliefs	.19	.07	10.38[#]		
'Would the following things make you more likely or less likely to walk to cross the road and make the car slow down?'					
You and your friends being in a hurry or late				.21[#]	.32[#]
Your friends crossing the road				.09[*]	.25[#]
The car going really fast				.04	.15[†]
You being dared to cross the road				-.01	.14[†]
You being on a busy road				.09[*]	.21[#]

[*] = p < .05   [†] = p < .01   [#] = p < .001

regression analysis: 'you and your friends are in a hurry or late', your friends crossed the road' and ' you are on a busy road'. The more likely these factors were rated as facilitating the target behaviour, the greater levels of control over performing the behaviour were perceived.

4.6.5 Additional cycle helmet questions

As mentioned in Section 3.2.11, respondents completing the 'cycle helmet' questionnaires were asked to state whether they owned a cycle helmet. The results showed that 39.4% of the sample did not own a cycle helmet. These respondents were then asked to indicate whether this was because they did not want one, whether it was because they could not afford one or whether it was because they haven't got around to buying one. The vast majority of respondents who did not own a cycle helmet, 71%, reported that they did not want one. Only 14% reported that they could not afford one and 32% reported that they had not got around to buying one. This might suggest that ways need to be found of not only persuading adolescent cyclists to use cycle helmets when they own one, but also to encourage them to own a cycle helmet. The beliefs identified in Tables 21-23 may also be useful beliefs to target in interventions designed to persuade adolescent cyclists to want to own a cycle helmet.

5   Summary of results, discussion and conclusions

5.1 Demographic effects on TPB variables and adolescents' self-reported road using behaviour

This study involved the application of the TPB to four specific behaviours within a sample of adolescent road

users: cycle helmet use, using nearby crossings, crossing between parked cars and challenging traffic. The results showed that, for each behaviour, adolescents' attitudes, subjective norms, perceived control, behavioural intentions and reported behaviour differed as a function of demographic characteristics. Generally, male adolescents and older adolescents reported attitudes and behaviour that were more undesirable from a road safety point of view than did female and younger adolescents. Compared with younger adolescents and female adolescents, older adolescents and male adolescents generally had more negative attitudes and intentions towards the commission of the safer behaviours (i.e. cycle helmet use and using crossings) and less negative attitudes and intentions towards the commission of the less safe behaviours (crossing between parked cars and challenging traffic). Older adolescents and male adolescents also perceived more social pressure to perform the less safe behaviours and they perceived that they had greater control over their performance of these behaviours than did younger adolescents and female adolescents. Younger adolescents and female adolescents perceived more social pressure to perform the safer behaviours and perceived that they had greater control over their performance of these behaviours than did older and male adolescents. Although the sex effects on cycle helmet use attitudes and behaviour were not statistically significant, the results were in line with this general pattern.

There were also marked differences between respondents sampled from urban and those sampled from rural schools with respect to cycle helmet use attitudes and behaviour. Respondents from rural schools had more positive attitudes and intentions towards using cycle helmets when riding a bike than did respondents from urban schools. They also perceived more social pressure to wear a cycle helmet, perceived that they had more control over their performance of the behaviour and reported that they wore a cycle helmet more often than did respondents from urban schools.

These results might be potentially useful for targeting remedial measures. However, of more applied value is knowledge about the TPB variables that are related to behavioural intentions and behaviour. This is because TPB variables are potentially amenable to being changed via road safety interventions whereas demographic variables are not.

5.2 Support for the TPB relationships

Strong supporting evidence for the TPB was found in the present study. There were statistically significant independent effects of the demographic and exposure variables on adolescents' intentions to perform each target behaviour, and on reported behaviour. However, the TPB variables added large increments to explained variance in intentions and behaviour over and above these variables and the standardised beta weights in the regression analyses indicated that the TPB variables were generally much more powerful predictors of intentions and behaviour than were the demographic/exposure variables. Adolescents' attitudes, subjective norms and perceptions

of control were all powerful and statistically significant independent predictors of behavioural intentions, and behavioural intentions were powerful predictors of reported behaviour. It was also found that the effects of demographic and exposure variables were largely mediated by the TPB. Thus, the TPB was able to explain the demographic/exposure-behaviour relationships.

Fishbein and Ajzen (e.g. Ajzen and Fishbein, 1980; Ajzen, 1985; Fishbein and Ajzen, 1975) argued that changing the beliefs that underlie attitudes (and subjective norm and perceived control) would lead to corresponding changes in attitudes, intentions and behaviour. Specific beliefs predictive adolescents' attitudes, subjective norms and perceptions of control were also identified in the present study. For each target behaviour, outcome beliefs and outcome evaluations offered a reasonably good and statistically significant prediction of attitude. Similarly, referent beliefs and motivation to comply significantly predicted subjective norm, and control frequency and control power beliefs predicted perceived control.

5.3 Changing adolescent road user behaviour: Implications for road safety interventions

In 2002, the Government published an action plan for achieving the 2010 road safety and casualty reduction target for child road users – 'Child Road Safety: Achieving the 2010 Target' (DfT, 2002). As part of this plan, the Government identified the need to target adolescent road users as well as younger children and identified the key objective of publicity and education programmes 'to raise awareness of road safety and influence positively road traffic behaviours to help prevent death and injury on the roads, through the strategic use of a range of communication' (p.23).

The results of the present study could potentially feed directly into the Government's plan. They have clear implications for the design of publicity and education programmes that aim to encourage desirable traffic behaviour in adolescent road users. For example, persuasive messages designed to alter many of the beliefs identified as predicting adolescents' attitudes, subjective norms and perceptions of control could be easily conceived. Also, other ways (apart from publicity and education) of bringing about desirable changes in adolescents' attitudes towards cycle helmet use, using crossings, crossing between parked cars and challenging traffic could be sought. For example, it might be difficult, through publicity alone, to alter the belief of adolescent cyclists that 'wearing a cycle helmet would be inconvenient because I would have to carry the cycle helmet around with me when I get off my bike'. Altering this belief might warrant the need for changes to the environment in which adolescent road users operate. For example, schools could be encouraged to provide secure storage facilities for cycle helmets when pupils are at school. Once these are in place, publicity could then be used to encourage the use of these facilities.

The results of the present study also showed that across the four behaviours, adolescents' perceptions about what their friends and parents wanted them to do were

significantly predictive of their subjective norms. The more they thought that their friends and parents would want them to perform these behaviours, the more social pressure they perceived overall to perform each one. These results might suggest that using friends and parents to deliver road safety interventions (e.g. road safety education) would be an effective strategy. In the case of 'friends', there is some supporting evidence for this argument. Telch, Miller, Killen, Cooke and Maccoby (1990) conducted a longitudinal study in which they evaluated an intervention that involved 'peer teachers' leading a number of sessions to help younger students in schools develop strategies to resist social pressures to smoke cigarettes. There was no significant increase in smoking behaviour over a 33-month time gap for students receiving the intervention. However, for a control sample, that did not receive the intervention (note: the control and experimental samples did not significantly differ in terms of reported smoking behaviour at the beginning of the study), smoking behaviour increased significantly and there were statistically significant differences between experimental and control subjects after 9 months following intervention. Evans and Norman (2002) suggested three reasons for why a peer-led intervention might be particularly effective. First, the level of understanding between similar age participants is better than between child 'learners' and adult 'teachers'. Second, there are no language barriers because participants use and understand the same colloquial words and expressions. Third, participants are likely to be more receptive and responsive to suggestions from their peers than to suggestions from older 'teachers'. Evans and Norman (2002), therefore, suggested that a road safety intervention developed and administered by similar aged students might have the requisite characteristics to motivate and enable recipients to reconsider their attitudes towards road safety. Although this approach might be a potentially useful way to encourage safer road user behaviour, it should be noted that 'peers' are not always 'friends'. Thus, a peer-led intervention might not be exactly what is required to increase the amount of social pressure adolescents perceive from their friends. However, it is acknowledged that attempts to increase perceived social pressure from friends might be difficult.

Using parents to encourage the performance of certain road user behaviours might be as equally difficult. For example, crossing between parked cars and not using nearby crossings are behaviours that are regularly engaged in by adults. Therefore, for these behaviours, it might be beneficial to use more global campaigns which target all road users, not only adolescents. Furthermore, TRL research by Chinn, Elliott, Sentinella and Williams (2004) suggested that some adolescent road users believe that parents are mainly concerned about other aspects of the personal safety of their children when in the road environment (e.g. 'stranger danger') and give less attention to road safety (e.g. encouraging safer crossing behaviours). This might suggest that to increase perceived social pressure from parents to perform safer road using behaviours, we need to seek ways of increasing parents'

perception of the importance of adolescent road safety and encouraging parents to give the right messages to their children. This could be accomplished through publicity and education interventions targeting parents. Many of the beliefs identified in the present study could be used to develop these interventions to help make parents aware of the messages they should be giving to their children.

Although the notion of changing behaviour via changes in beliefs and attitudes is an attractive one, it should be noted that evaluation studies conducted across a range of behavioural domains in which attempts have been made to change underlying beliefs have produced little evidence systematic change in attitudes, intentions and behaviour (e.g. Armitage, 1997; Brubaker and Fowler, 1990; Evans and Norman, 2002; Meadows and Stradling, 1999; Parker, Stradling, and Manstead, 1996). However, this does not mean that attempting to change adolescents' attitudes to road safety behaviour, or attitudes any other social behaviour for that matter, is a worthless endeavour. After all, it is widely recognised that long term attitude change is difficult to achieve (Cook and Flay, 1978). Changing peoples' attitudes may require many different forms of remedial action that are reinforced over many years to create a climate in which safer behaviour in accepted as the norm. In the domain of car driving, drink-driving behaviour serves as a particularly good case in point, where desirable attitudes and behaviour have been achieved through many years of remedial action. Furthermore, evaluation studies can be criticised on a number of levels and these criticisms might help to explain the relatively weak support for the impact of attitude change interventions. First, many evaluations are laboratory based (e.g. Parker *et al.*, 1996) and attitude change brought about in artificial situations may not be sufficient to bring about corresponding changes in intentions and behaviour. Second, many studies have used relatively small sample sizes (e.g. Meadows and Stradling, 1999), making it difficult to detect significant changes in beliefs, attitudes, intentions and behaviour. Third, as Parker (2002) notes, interventions to alter attitudes are rarely grounded in the theoretical principles of psychology and they typically owe much more to the imagination and inspiration of the advertising agency concerned. In the present study a strong theoretical account of behaviour was applied to the study of adolescents' road user behaviour with much success and the results may prove to be useful for guiding the development of road safety interventions. However, any intervention designed on the basis of this study will need to be comprehensively evaluated to determine its effectiveness, and further empirical research is required to investigate methods for effectively changing adolescents' beliefs, attitudes, intentions and behaviour. The beliefs identified in this study could be used to guide such research.

5.4 Limitations of the present study

A possible limitation of the present study is that self-reported measures of behaviour were used. However, across a number of social behaviours, research has shown that significant and reasonably strong relationships can be found between self-reported and more objectively measured behaviour variables, and that the TPB can predict, with reasonable accuracy, objectively measured behaviour (e.g. Aberg, Larsen, Glad and Beilinsson, 1997; Armitage and Conner, 2001; De Waard and Rooijers, 1994). Self-report is also widely recognised a valuable methodology in social research (e.g. Corbett, 2001) and there is little reason to assume that adolescent road users do not have enough insight into their own behaviour to enable them to give reasonably accurate assessments via self-report. Furthermore, in the context of the present study, obtaining more objective measures of behaviour would be costly and difficult. Despite this, it is always desirable to use more objective measures of behaviour when possible. Perhaps an avenue for further research would be to identify ways of objectively measuring adolescent road user behaviour that are reliable and valid, and that are relatively simple to use so adequate sample sizes can be achieved.

5.5 Conclusions

The present study showed that adolescents' intentions to use cycle helmets, to use nearby crossings to cross the road, to cross the road between parked cars and to challenge traffic were strong predictors of their behaviour. Their attitudes to perform these behaviours, their subjective norms and their perceptions of control were, in turn, powerful predictors of intentions, much more so than demographic and exposure variables. Specific belief targets for road safety interventions that aim to influence these behaviours were also identified in the present study. Further research is required to investigate methods for effectively changing adolescents' beliefs, attitudes, intentions and behaviour. Also, any intervention (publicity/education) designed on the basis of the results of this study should be fully evaluated to determine its effectiveness. Further research applying the TPB to investigate its predictive utility with respect to more objective measures of behaviour than self-report would also be valuable, assuming reliable and valid ways of measuring adolescent road user behaviour objectively can be found.

6 Acknowledgements

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Notes

1   It should be noted that the multiplicative ways in which the beliefs underpinning the TPB are hypothesised to combine has proved problematical in practice and has been the subject of debate in the literature (e.g. French and Hankins, 2003). This is discussed further in Section 4.6 of this report.

2   The TPB is a causal model of behaviour in that it postulates attitudes, subjective norms and perceived control have a causal effect on intentions and intentions have, in turn, a causal impact on behaviour. These cause and effect relationships are essential to the idea that changes in behaviour can be brought about by changes in attitudes. If the relationships posited by the TPB are not causal (e.g. if attitudes are only associated with intentions) or if the direction of causality is not in the direction postulated by the model, then interventions designed to change attitudes may not have an impact on intentions and behaviour. Establishing the causality of attitude-behaviour relations, however, is difficult and outside the scope of this research project. It should be noted, however, that research studies using prospective designs have provided some support for the postulated cause and effect relationships. Studies using cross-lag correlational analyses and variants of structural equation modelling have shown reciprocal effects between attitudes and behaviour, but suggest that the effect of attitudes on behaviour is stronger than is the impact of behaviour on attitudes (e.g. Armitage and Conner, 1999; Bentler and Speckart, 1981; Kahle and Berman, 1979).

3   The selection of the four target behaviours was based on a number of different sources of information. This included the findings of the stage 1 study (see Elliott and Baughan, 2003a). In addition, there was strong policy input from the DfT in deciding on the behaviours for inclusion in the research. The behaviours chosen: (1) were thought to have important implications for road safety and (2) were thought to be potentially amenable to change via changes in attitudes.

4   The effects of optimal scoring procedures were explored in this study. In the case of behavioural beliefs (i.e. the beliefs underlying attitude towards the behaviour), mutliplicative terms were derived based on (1) outcome beliefs multiplied by outcome evaluations, both scored -3 to +3, (2) outcome beliefs multiplied by outcome evaluations, both scored +1 to +7, (3) outcome beliefs, scored -3 to +3, multiplied by outcome evaluations, scored +1 to +7, and (4) outcome beliefs, scored +1 to +7, multiplied by outcome evaluations scored, -3 to +3. Regression analyses were then conducted to test which method produced the best statistical prediction of the global attitude measure. The same procedure was used for normative and control beliefs (i.e. the beliefs underlying subjective norm and perceived control, respectively). The results showed that the overall predictive validity of the beliefs terms differed depending on the scoring system used, though not by any significant amount. However, depending on the scoring system applied there were slight differences in the specific beliefs that predicted the global TPB measures.

5   The fact that outcome evaluations provided very little extra prediction of attitude over and above outcome evaluations could be taken to imply that only the outcome beliefs need to be addressed in safety interventions. The view taken here is that there is little to lose, and there is likely to be some gain in addressing the statistically significant outcome evaluation items as well. This view is strongly supported by a second analysis in which the global attitude measure was regressed on the outcome evaluations only. This showed that, alone, the outcome evaluations accounted for 34% of the variance in attitude ($p < .001$). Clearly, there is a certain amount of collinearity between the outcome belief and outcome evaluation items. From an applied perspective, road safety interventions might be most effective if they target both types of belief in a mutually reinforcing way. This issue is also applicable to the behavioural belief predictors of the other target behaviours investigated in this study.

6   A similar issue to that described in footnote 5 applies here. The fact that the motivation to comply items added a relatively small proportion of variance explained to subjective norm, over and above the variance explained by referent beliefs, does not necessarily mean that these types of beliefs do not need to be addressed in road safety countermeasures. This is supported from the results of an analysis in which the global measure of subjective norm was regressed on the motivation to comply items only, and 21% of the variance was accounted for ($p < .001$).

7   Control power beliefs accounted for 20% of the variance in perceived control ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

8   Outcome evaluations accounted for 27% of the variance in attitude towards using crossings ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

9   The motivation to comply items accounted for 29% of the variance in subjective norm ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

10 Control power beliefs accounted for 13% of the variance in perceived control ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

11 Outcome evaluations accounted for 10% of the variance in attitude to cross between parked cars ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

12 The motivation to comply items accounted for 5% of the variance in subjective norm ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

13 Control power beliefs accounted for 26% of the variance in perceived control ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

14 Outcome evaluations accounted for 21% of the variance in attitude towards challenging traffic ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

[15] The motivation to comply items accounted for 10% of the variance in subjective norm ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

[16] Control power beliefs accounted for 15% of the variance in perceived control ($p < .001$) in an analysis in which these beliefs were used as the only predictor variables.

PLEASE DO <u>NOT</u> WRITE YOUR NAME ON THIS QUESTIONNAIRE

TRL

REF:	CYC

PLEASE READ <u>ALL</u> THE INSTRUCTIONS ON THIS PAGE

ATTITUDES OF YOUNG ROAD USERS

IF YOU <u>NEVER</u> RIDE A BIKE, PLEASE ASK FOR A DIFFERENT QUESTIONNAIRE. YOU MUST BE A BIKE RIDER TO COMPLETE THIS QUESTIONNAIRE

This questionnaire asks you about what you think about wearing a cycle helmet when riding a bike. We are interested in what people think about wearing cycle helmets whether they wear them or not, so please complete this questionnaire even if you never wear a cycle helmet. When answering the questions think about what you do **during term time in the summer**.

Please make sure you answer <u>ALL</u> of the questions in this questionnaire. After each question, there will be a row of 7 boxes with a word at each end. You need to tick one of the boxes to show your answer. Here is an example:

Do you think wearing a cycle helmet when riding a bike is:
(Please tick ONE box)

    Good ☐ ☐ ☐ ☐ ☐ ☐ ☐ Bad

Here, the closer you place your tick to the word "good", the more you think it is a good thing to wear a cycle helmet when riding a bike. The closer you place your tick to the word "bad", the more you think it is a bad thing to wear a cycle helmet when riding a bike. If you are not sure, or you think that wearing a cycle helmet is neither a good thing or a bad thing, or that it is equally good as it is bad, then you would tick the middle box.

Please answer all of the questions in this questionnaire as honestly as you can. **This is not a test about road safety**. It is important that you let us know exactly what you think.

THIS QUESTIONNAIRE IS CONFIDENTIAL, YOU CANNOT BE IDENTIFIED!

SECTION 1: YOUR ATTITUDES AND OPINIONS

Please tick ONE box on EACH line to show your answers to the following statement

Q1   For me, when I ride my bike, wearing a cycle helmet is:

Bad	☐	☐	☐	☐	☐	☐	☐	Good
Beneficial	☐	☐	☐	☐	☐	☐	☐	Harmful
Positive	☐	☐	☐	☐	☐	☐	☐	Negative
Necessary	☐	☐	☐	☐	☐	☐	☐	Unnecessary
Safe	☐	☐	☐	☐	☐	☐	☐	Unsafe
Worthless	☐	☐	☐	☐	☐	☐	☐	Valuable
Stupid	☐	☐	☐	☐	☐	☐	☐	Sensible
Unenjoyable	☐	☐	☐	☐	☐	☐	☐	Enjoyable
Easy	☐	☐	☐	☐	☐	☐	☐	Difficult

Please show how you feel about ALL these statements by ticking ONE box for EACH statement

Q2   I want to wear a cycle helmet while riding a bike

Strongly agree   ☐ ☐ ☐ ☐ ☐ ☐ ☐   Strongly disagree

Q3   I feel under social pressure to wear a cycle helmet while riding a bike

Strongly agree   ☐ ☐ ☐ ☐ ☐ ☐ ☐   Strongly disagree

Q4   It is entirely up to me whether or not I wear a cycle helmet while riding a bike

Strongly agree   ☐ ☐ ☐ ☐ ☐ ☐ ☐   Strongly disagree

Q5   I would be able to wear a cycle helmet while riding a bike

Strongly agree   ☐ ☐ ☐ ☐ ☐ ☐ ☐   Strongly disagree

Q6   Will you try to wear a cycle helmet when you ride a bike in future?

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

Q7   If you wanted to, could you easily wear a cycle helmet while riding a bike?

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

Q8   If I wore a cycle helmet while riding a bike it would ...

		Strongly agree					Strongly disagree	
(A)	Protect my head (e.g. if I had an accident or if I fell off my bike)	☐	☐	☐	☐	☐	☐	☐
(B)	Be annoying because I'd have to carry the cycle helmet around with me when I got off my bike	☐	☐	☐	☐	☐	☐	☐
(C)	Be uncomfortable to wear	☐	☐	☐	☐	☐	☐	☐
(D)	Make me more visible to other road users	☐	☐	☐	☐	☐	☐	☐
(E)	Make me feel safer while riding	☐	☐	☐	☐	☐	☐	☐
(F)	Make me look unfashionable	☐	☐	☐	☐	☐	☐	☐
(G)	Make me look childish	☐	☐	☐	☐	☐	☐	☐

Q9   How good or bad do you think the following things are?

		Very Good						Very Bad
(A)	Having protection for your head (e.g. in the event of an accident or falling off your bike)	☐	☐	☐	☐	☐	☐	☐
(B)	Having to carry a cycle helmet around with you when you get off your bike	☐	☐	☐	☐	☐	☐	☐
(C)	Being uncomfortable while riding a bike	☐	☐	☐	☐	☐	☐	☐
(D)	Being visible to other road users while riding a bike	☐	☐	☐	☐	☐	☐	☐
(E)	Feeling safe while riding a bike	☐	☐	☐	☐	☐	☐	☐
(F)	Looking unfashionable while riding a bike	☐	☐	☐	☐	☐	☐	☐
(G)	Looking childish while riding a bike	☐	☐	☐	☐	☐	☐	☐

Q10   Would the following things make you more likely or less likely to wear a cycle helmet while riding a bike?

		More Likely to wear a cycle helmet						Less Likely to wear a cycle helmet
(A)	If you were riding in busy traffic conditions	☐	☐	☐	☐	☐	☐	☐
(B)	If you were riding around roads close to home	☐	☐	☐	☐	☐	☐	☐
(C)	If you were going on long bike rides	☐	☐	☐	☐	☐	☐	☐
(D)	If you were going on short bike rides	☐	☐	☐	☐	☐	☐	☐
(E)	If you were about to go out on your bike and you were in a hurry	☐	☐	☐	☐	☐	☐	☐
(F)	If you were riding to school	☐	☐	☐	☐	☐	☐	☐
(G)	If you did not have or could not find your cycle helmet	☐	☐	☐	☐	☐	☐	☐

34

Q11   In future, how often do you expect to:

		Very Often						Never
(A)	Ride a bike in busy traffic conditions	☐	☐	☐	☐	☐	☐	☐
(B)	Ride a bike around roads close to home	☐	☐	☐	☐	☐	☐	☐
(C)	Go on long bike rides	☐	☐	☐	☐	☐	☐	☐
(D)	Go on short bike rides	☐	☐	☐	☐	☐	☐	☐
(E)	Go out on you bike when you are in a hurry	☐	☐	☐	☐	☐	☐	☐
(F)	Ride a bike to school	☐	☐	☐	☐	☐	☐	☐
(G)	Not have or not be able to find your cycle helmet	☐	☐	☐	☐	☐	☐	☐

Q12   How likely or unlikely Is it that you will wear a cycle helmet while riding a bike in future?

Very likely   ☐   ☐   ☐   ☐   ☐   ☐   ☐   Very unlikely

SECTION 2: OTHER PEOPLE

Q13   How much do you think the following people would want you to wear a cycle helmet while riding a bike?

		Very much						Not at all
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q14   **How much do you want to go along with what these people want you to do?**

		Very much						Not at all
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q15   **How often do you think these people themselves wear a cycle helmet while riding a bike?**

		Always						Never
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q16 **Think about the people who are important to you.**

(A) **How much would they want you to wear a cycle helmet while riding a bike?**

Very much ☐ ☐ ☐ ☐ ☐ ☐ ☐ Not at all

(B) **How often do you think <u>they</u> wear a cycle helmet while riding a bike**

Always ☐ ☐ ☐ ☐ ☐ ☐ ☐ Never

(C) **Would they approve or disapprove of you wearing a cycle helmet while riding a bike?**

Approve ☐ ☐ ☐ ☐ ☐ ☐ ☐ Disapprove

SECTION 3: YOUR BEHAVIOUR

Q17 **How often do you wear a cycle helmet when you ride a bike?**

Always ☐ ☐ ☐ ☐ ☐ ☐ ☐ Never

Q18 **Do you intend to wear a cycle helmet while riding a bike in future?**

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

		Never	Less than once a week	1-3 days a week	4-6 days a week	Every day
Q19	How often do you go out and ride a bike?	☐	☐	☐	☐	☐
Q20	When you go out and ride a bike, how often are you with ADULTS?	☐	☐	☐	☐	☐
Q21	When you go out and ride a bike, how often are you with FRIENDS?	☐	☐	☐	☐	☐
Q22	When you go out and ride a bike, how often are you ON YOUR OWN?	☐	☐	☐	☐	☐

Q23   **Do you own a cycle helmet?**
Yes   ☐
No   ☐

If you own a cycle helmet, please go to question 25.

Q24   **If you do not have a cycle helmet is it because:**

		YES	NO
(A)	You don't want one	☐	☐
(B)	You can't afford one	☐	☐
(C)	You haven't got round to buying one	☐	☐

Q25   **How old are you?**
11-12 years old   ☐
13-14 years old   ☐
15-16 years old   ☐

Q26   **Are you?**
Male   ☐
Female   ☐

Please now check to make sure you have completed EVERY question in this questionnaire. Thank you for your help.

PLEASE DO <u>NOT</u> WRITE YOUR NAME ON THIS QUESTIONNAIRE

REF:	CROSS1

ꓕ꒡⅃ (TRL)

PLEASE READ <u>ALL</u> THE INSTRUCTIONS ON THIS PAGE

ATTITUDES OF YOUNG ROAD USERS

Please read this example of a road crossing situation:

Imagine it is term time in the summer. You are out walking and you need to cross a road. You are at a place on the road where there is no crossing. There is a crossing further up the road, but it would take you a minute or so to walk to it. You could either walk to the crossing to cross the road or you could cross where you are. This questionnaire asks you what you think about walking to the crossing to cross the road.

Please make sure you answer **<u>ALL</u>** of the questions in this questionnaire. After each question there will be a row of 7 boxes with a word at each end. You need to tick one of the boxes to show your answer. Here is an example:

If you were in a similar situation to that described in the example, do you think walking to the crossing to cross the road would be:
(Please tick ONE box)

Good ☐ ☐ ☐ ☐ ☐ ☐ ☐ Bad

Here, the closer you place your tick to the word "good", the more you think it is a good thing to walk to the crossing to cross the road. The closer you place your tick to the word "bad", the more you think it is a bad thing to walk to the crossing to cross the road. If you are not sure, or you think that walking to the crossing to cross the road is neither a good thing or a bad thing, or that it is as equally good as it is bad, then you would tick the middle box.

Please answer all of the questions in this questionnaire as honestly as you can. **This is not a test about road safety**. It is important that you let us know exactly what you think.

THIS QUESTIONNAIRE IS CONFIDENTIAL, YOU CANNOT BE IDENTIFIED!

SECTION 1: YOUR ATTITUDES AND OPINIONS

Please tick ONE box on EACH line to show your answers to the following statement

Q1 For me, if I were in a similar situation to that described in the example, my walking to the crossing to cross the road would be...

Bad	☐	☐	☐	☐	☐	☐	☐	Good
Beneficial	☐	☐	☐	☐	☐	☐	☐	Harmful
Positive	☐	☐	☐	☐	☐	☐	☐	Negative
Necessary	☐	☐	☐	☐	☐	☐	☐	Unnecessary
Safe	☐	☐	☐	☐	☐	☐	☐	Unsafe
Worthless	☐	☐	☐	☐	☐	☐	☐	Valuable
Stupid	☐	☐	☐	☐	☐	☐	☐	Sensible
Unenjoyable	☐	☐	☐	☐	☐	☐	☐	Enjoyable
Easy	☐	☐	☐	☐	☐	☐	☐	Difficult

Please show how you feel about ALL these statements by ticking ONE box for EACH statement

Q2 I would want to walk to the crossing to cross the road if I was in a similar situation to that described in the example

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q3 I would feel under social pressure to walk to the crossing to cross the road if I was in a similar situation to that described in the example

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q4 It would be entirely up to me whether or not I walked to the crossing to cross the road if I was in a similar situation to that described in the example

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q5 I would be able to walk to the crossing to cross the road if I was in a similar situation to that described in the example

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q6 **Would you try to walk to the crossing to cross the road if you were in a similar situation to that described in the example?**

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

Q7 **If you wanted to, could you easily walk to the crossing to cross the road if you were in a similar situation to that described in the example?**

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

Please show how you feel about **ALL** the following statements by ticking **ONE** box on **EACH** line

Q8 **If I was in a similar situation to that described in the example and I walked to the crossing to cross the road it would ...**

		Strongly agree						Strongly disagree
(A)	Reduce my chances of getting run over	☐	☐	☐	☐	☐	☐	☐
(B)	Take me longer to get to where I am going	☐	☐	☐	☐	☐	☐	☐
(C)	Make it easier to cross the road	☐	☐	☐	☐	☐	☐	☐
(D)	Make me feel safer while crossing	☐	☐	☐	☐	☐	☐	☐
(E)	Take me too far out of my way	☐	☐	☐	☐	☐	☐	☐

41

Q9   How good or bad do you think the following things are?

		Very Good						Very Bad
(A)	Reducing your chances of getting run over	☐	☐	☐	☐	☐	☐	☐
(B)	Taking longer to get to where you are going	☐	☐	☐	☐	☐	☐	☐
(C)	It being easier to cross the road	☐	☐	☐	☐	☐	☐	☐
(D)	Feeling safe when crossing the road	☐	☐	☐	☐	☐	☐	☐
(E)	Having to go out of your way	☐	☐	☐	☐	☐	☐	☐

Q10   Would the following things make you more likely or less likely to walk to the crossing to cross the road if you were in a similar situation to that described in the example?

		More Likely to walk to the crossing						Less Likely to walk to the crossing
(A)	If the traffic was moving fast (e.g. the road had a fast speed limit)	☐	☐	☐	☐	☐	☐	☐
(B)	If the place you were going to was just on the other side of the road - directly opposite you	☐	☐	☐	☐	☐	☐	☐
(C)	If you were in a hurry or late for something	☐	☐	☐	☐	☐	☐	☐
(D)	If it was dark	☐	☐	☐	☐	☐	☐	☐
(E)	If people were waiting for you on the other side of the road	☐	☐	☐	☐	☐	☐	☐
(F)	If there was a lot of traffic	☐	☐	☐	☐	☐	☐	☐

Q11 **In future, how often do you expect to be in a similar situation to that described in the example when:**

		Very Often						Never
(A)	Traffic is moving fast (e.g. the road has a fast speed limit)	☐	☐	☐	☐	☐	☐	☐
(B)	The place you are going to (e.g. a shop) is just on the other side of the road - directly opposite you	☐	☐	☐	☐	☐	☐	☐
(C)	You are in a hurry or late for something	☐	☐	☐	☐	☐	☐	☐
(D)	It is dark	☐	☐	☐	☐	☐	☐	☐
(E)	People are waiting for you on the other side of the road	☐	☐	☐	☐	☐	☐	☐
(F)	There is a lot of traffic around	☐	☐	☐	☐	☐	☐	☐

Q12 **How likely or unlikely is it that you would walk to the crossing to cross the road if you were in a similar situation to that described in the example?**

Very likely   ☐   ☐   ☐   ☐   ☐   ☐   ☐   Very unlikely

SECTION 2: OTHER PEOPLE

Q13 **How much do you think the following people would want you to walk to the crossing to cross the road if you were in a similar situation to that described in the example?**

		Very much						Not at all
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q14 **How much do you want to go along with what these people want you to do?**

		Very much						Not at all
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q15 **How often do you think these people would <u>themselves</u> walk to the crossing to cross the road if they were in a similar situation to that described in the example?**

		Always						Never
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q16 **Think about the people who are important to you.**

(A) **How much would they want you to walk to the crossing too cross the road if you were in a similar situation to that described in the example?**

Very much ☐ ☐ ☐ ☐ ☐ ☐ ☐ Not at all

(B) **How often do you think <u>they</u> would walk to the crossing too cross the road if they were in a similar situation to that described in the example**

Always ☐ ☐ ☐ ☐ ☐ ☐ ☐ Never

(C) **Would they approve or disapprove of you walking to the crossing too cross the road if you were in a similar situation to that described in the example?**

Approve ☐ ☐ ☐ ☐ ☐ ☐ ☐ Disapprove

SECTION 3: YOUR BEHAVIOUR

Q17 **How often do you walk to crossings to cross the road in similar situations to that described in the example?**

Always ☐ ☐ ☐ ☐ ☐ ☐ ☐ Never

Q18 **Would you intend to walk to the crossing to cross the road if you were in a similar situation to that described in the example?**

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

		Never	Less than once a week	1-3 days a week	4-6 days a week	Every day
Q19	How often do you go out on foot (e.g. go out walking, going for a walk, just hanging around?	☐	☐	☐	☐	☐
Q20	When you go out on foot, how often are you with ADULTS?	☐	☐	☐	☐	☐
Q21	When you go out on foot, how often are you with FRIENDS?	☐	☐	☐	☐	☐
Q22	When you go out on foot, how often are you ON YOUR OWN?	☐	☐	☐	☐	☐

Q23 **How old are you?**

11-12 years old ☐

13-14 years old ☐

15-16 years old ☐

Q24 **Are you?**

Male ☐

Female ☐

Please now check to make sure you have completed EVERY question in this questionnaire. Thank you for your help.

PLEASE DO <u>NOT</u> WRITE YOUR NAME ON THIS QUESTIONNAIRE

REF:	CROSS2

⌒JRL

PLEASE READ <u>ALL</u> THE INSTRUCTIONS ON THIS PAGE

ATTITUDES OF YOUNG ROAD USERS

Please read this example of a road crossing situation:

Imagine it is term time in summer. You are out walking and you need to cross a road. You are at a place where there are parked cars. If you cross here you will need to step out from between the parked cars to cross. There is a place to cross a little further up where there are no parked cars, but it would take you a minute or so to walk there. You could either cross from between the parked cars or you could walk up the road to where there are none and cross there. This questionnaire asks you what you think about crossing from between the parked cars.

Please make sure you answer **ALL** of the questions in this questionnaire. After each question there will be a row of 7 boxes with a word at each end. You need to tick one of the boxes to show your answer. Here is an example:

If you were in a similar situation to that described in the example, do you think crossing the road from between parked cars would be:
(Please tick ONE box)

Good ☐ ☐ ☐ ☐ ☐ ☐ ☐ Bad

Here, the closer you place your tick to the word "good", the more you think it is a good thing to cross the road from between the parked cars. The closer you place your tick to the word "bad", the more you think it is a bad thing to cross the road from between the parked cars. If you are not sure, or you think that crossing the road from between the parked cars is neither a good thing or a bad thing, or that it is as equally good as it is bad, then you would tick the middle box.

Please answer all of the questions in this questionnaire as honestly as you can. **This is not a test about road safety**. It is important that you let us know exactly what you think.

THIS QUESTIONNAIRE IS CONFIDENTIAL, YOU CANNOT BE IDENTIFIED!

SECTION 1: YOUR ATTITUDES AND OPINIONS

*Please tick **ONE** box on **EACH** line to show your answers to the following statement*

Q1 **For me, if I were in a similar situation to that described in the example, my crossing the road from between the parked cars would be...**

Bad	☐	☐	☐	☐	☐	☐	☐	Good
Beneficial	☐	☐	☐	☐	☐	☐	☐	Harmful
Positive	☐	☐	☐	☐	☐	☐	☐	Negative
Necessary	☐	☐	☐	☐	☐	☐	☐	Unnecessary
Safe	☐	☐	☐	☐	☐	☐	☐	Unsafe
Worthless	☐	☐	☐	☐	☐	☐	☐	Valuable
Stupid	☐	☐	☐	☐	☐	☐	☐	Sensible
Unenjoyable	☐	☐	☐	☐	☐	☐	☐	Enjoyable
Easy	☐	☐	☐	☐	☐	☐	☐	Difficult

*Please show how you feel about **ALL** these statements by ticking **ONE** box for **EACH** statement*

Q2 **I would want to cross the road from between the parked cars if I was in a similar situation to that described in the example**

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q3 **I would feel under social pressure to cross the road from between the parked cars if I was in a similar situation to that described in the example**

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q4 **It would be entirely up to me whether or not I crossed the road from between the parked cars if I was in a similar situation to that described in the example**

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q5 **I would be able to cross the road from between the parked cars if I was in a similar situation to that described in the example**

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q6 **Would you try to cross the road from between the parked cars if you were in a similar situation to that described in the example?**

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

Q7 **If you wanted to, could you easily cross the road from between the parked cars if you were in a similar situation to that described in the example?**

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

Please show how you feel about **ALL** the following statements by ticking **ONE** box on **EACH** line

Q8 **If I was in a similar situation to that described in the example and I crossed the road from between the parked cars ...**

		Strongly agree						Strongly disagree
(A)	It would increase my chances of getting run over	☐	☐	☐	☐	☐	☐	☐
(B)	I would <u>not</u> have to go out of my way to cross the road	☐	☐	☐	☐	☐	☐	☐
(C)	I would <u>not</u> be able to see cars coming very well	☐	☐	☐	☐	☐	☐	☐
(D)	It would take me less time to get to where I am going	☐	☐	☐	☐	☐	☐	☐
(E)	Drivers would not be able to see me	☐	☐	☐	☐	☐	☐	☐
(F)	The parked cars might start to move and hit me	☐	☐	☐	☐	☐	☐	☐
(G)	I would have to step out into the road to see clearly	☐	☐	☐	☐	☐	☐	☐

Q9   How good or bad do you think the following things are?

		Very Good						Very Bad
(A)	Increasing your chances of getting run over	☐	☐	☐	☐	☐	☐	☐
(B)	Not having to go out of your way	☐	☐	☐	☐	☐	☐	☐
(C)	Not being able to see cars coming very well	☐	☐	☐	☐	☐	☐	☐
(D)	Taking less time to get to where you are going	☐	☐	☐	☐	☐	☐	☐
(E)	Drivers not being able to see you	☐	☐	☐	☐	☐	☐	☐
(F)	Parked cars starting to move when I am stood between them waiting to cross the road	☐	☐	☐	☐	☐	☐	☐
(G)	Having to step out into the road from between parked cars to see clearly before crossing	☐	☐	☐	☐	☐	☐	☐

Q10   Would the following things make you more likely or less likely to cross the road from between the parked cars if you were in a similar situation to that described in the example?

		More Likely to cross from between the parked cars						Less Likely to cross from between the parked cars
(A)	If the traffic was moving fast (e.g. the road had a fast speed limit)	☐	☐	☐	☐	☐	☐	☐
(B)	If the place you were going to was just on the other side of the road - directly opposite you	☐	☐	☐	☐	☐	☐	☐
(C)	If you were in a hurry or late for something	☐	☐	☐	☐	☐	☐	☐
(D)	If there was a lot of traffic	☐	☐	☐	☐	☐	☐	☐
(E)	If it was dark	☐	☐	☐	☐	☐	☐	☐
(F)	If people were waiting for you on the other side of the road	☐	☐	☐	☐	☐	☐	☐
(G)	If you could see a gap in the traffic	☐	☐	☐	☐	☐	☐	☐

Q11 **In future, how often do you expect to be in a similar situation to that described in the example when:**

Very Often   Never

(A) Traffic is moving fast (e.g. the road has a fast speed limit) ☐ ☐ ☐ ☐ ☐ ☐ ☐

(B) The place you are going to (e.g. a shop) is just on the other side of the road - directly opposite you ☐ ☐ ☐ ☐ ☐ ☐ ☐

(C) You are in a hurry or late for something ☐ ☐ ☐ ☐ ☐ ☐ ☐

(D) There is a lot of traffic around ☐ ☐ ☐ ☐ ☐ ☐ ☐

(E) It is dark ☐ ☐ ☐ ☐ ☐ ☐ ☐

(F) People are waiting for you on the other side of the road ☐ ☐ ☐ ☐ ☐ ☐ ☐

(G) You will be able to see there is a gap in traffic ☐ ☐ ☐ ☐ ☐ ☐ ☐

Q12 **How likely or unlikely is it that you would cross the road from between parked cars if you were in a similar situation to that described in the example?**

Very likely ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very unlikely

SECTION 2: OTHER PEOPLE

Q13 **How much do you think the following people would want you to cross the road from between parked cars if you were in a similar situation to that described in the example?**

Very much   Not at all

(A) School teachers ☐ ☐ ☐ ☐ ☐ ☐ ☐

(B) Your friends ☐ ☐ ☐ ☐ ☐ ☐ ☐

(C) Other people at school ☐ ☐ ☐ ☐ ☐ ☐ ☐

(D) The police ☐ ☐ ☐ ☐ ☐ ☐ ☐

(E) Car drivers ☐ ☐ ☐ ☐ ☐ ☐ ☐

(F) Your parents ☐ ☐ ☐ ☐ ☐ ☐ ☐

(G) Other people in your family ☐ ☐ ☐ ☐ ☐ ☐ ☐

Q14   How much do you want to go along with what these people want you to do?

		Very much						Not at all
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D) . The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q15   How often do you think these people would <u>themselves</u> cross the road from between the parked cars if they were in a similar situation to that described in the example?

		Always						Never
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q16 **Think about the people who are important to you.**

(A) **How much would they want you to cross the road from between parked cars if you were in a similar situation to that described in the example?**

Very much ☐ ☐ ☐ ☐ ☐ ☐ ☐ Not at all

(B) **How often do you think <u>they</u> would cross the road from between parked cars if they were in a similar situation to that described in the example**

Always ☐ ☐ ☐ ☐ ☐ ☐ ☐ Never

(C) **Would they approve or disapprove of you crossing the road from between parked cars if you were in a similar situation to that described in the example?**

Approve ☐ ☐ ☐ ☐ ☐ ☐ ☐ Disapprove

SECTION 3: YOUR BEHAVIOUR

Q17 **How often do you cross the road from between parked cars in similar situations to that described in the example?**

Always ☐ ☐ ☐ ☐ ☐ ☐ ☐ Never

Q18 **Would you intend to cross the road from between the parked cars if you were in a similar situation to that described in the example?**

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

53

		Never	Less than once a week	1-3 days a week	4-6 days a week	Every day
Q19	How often do you go out on foot (e.g. go out walking, going for a walk, just hanging around?	☐	☐	☐	☐	☐
Q20	When you go out on foot, how often are you with ADULTS?	☐	☐	☐	☐	☐
Q21	When you go out on foot, how often are you with FRIENDS?	☐	☐	☐	☐	☐
Q22	When you go out on foot, how often are you ON YOUR OWN?	☐	☐	☐	☐	☐

Q23 **How old are you?**

11-12 years old ☐

13-14 years old ☐

15-16 years old ☐

Q24 **Are you?**

Male ☐

Female ☐

Please now check to make sure you have completed EVERY question in this questionnaire. Thank you for your help.

PLEASE DO <u>NOT</u> WRITE YOUR NAME ON THIS QUESTIONNAIRE

REF:	CROSS3

PLEASE READ <u>ALL</u> THE INSTRUCTIONS ON THIS PAGE

ATTITUDES OF YOUNG ROAD USERS

Please read this example of a road crossing situation:

Imagine it is term time in summer. You are out walking with a group of your friends and you need to cross a road. You can see there is a car coming further down the road. If you cross there and then you will be able to cross but you would make the car driver slow down. You could either cross the road making the car driver slow down or you could wait for the car to pass and then cross. This questionnaire asks you what you think about crossing the road and making the car driver slow down.

Please make sure you answer **ALL** of the questions in this questionnaire. After each question there will be a row of 7 boxes with a word at each end. You need to tick one of the boxes to show your answer. Here is an example:

If you were in a similar situation to that described in the example, do you think crossing the road and making the car driver have to slow down would be:
(Please tick ONE box)

Good ☐ ☐ ☐ ☐ ☐ ☐ ☐ Bad

Here, the closer you place your tick to the word "good", the more you think it is a good thing to cross the road and make the car driver slow down. The closer you place your tick to the word "bad", the more you think it is a bad thing to cross the road and make the car driver slow down. If you are not sure, or you think that crossing the road and making the car driver slow down is neither a good thing or a bad thing, or that it is as equally good as it is bad, then you would tick the middle box.

Please answer all of the questions in this questionnaire as honestly as you can. **This is not a test about road safety**. It is important that you let us know exactly what you think.

THIS QUESTIONNAIRE IS CONFIDENTIAL, YOU CANNOT BE IDENTIFIED!

SECTION 1: YOUR ATTITUDES AND OPINIONS

*Please tick **ONE** box on **EACH** line to show your answers to the following statement*

Q1 **For me, if I were in a similar situation to that described in the example, my crossing the road and making the car driver slow down would be...**

Bad	☐	☐	☐	☐	☐	☐	☐	Good
Beneficial	☐	☐	☐	☐	☐	☐	☐	Harmful
Positive	☐	☐	☐	☐	☐	☐	☐	Negative
Necessary	☐	☐	☐	☐	☐	☐	☐	Unnecessary
Safe	☐	☐	☐	☐	☐	☐	☐	Unsafe
Worthless	☐	☐	☐	☐	☐	☐	☐	Valuable
Stupid	☐	☐	☐	☐	☐	☐	☐	Sensible
Unenjoyable	☐	☐	☐	☐	☐	☐	☐	Enjoyable
Easy	☐	☐	☐	☐	☐	☐	☐	Difficult

*Please show how you feel about **ALL** these statements by ticking **ONE** box for **EACH** statement*

Q2 **I would want to cross the road and make the car driver slow down if I was in a similar situation to that described in the example**

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q3 **I would feel under social pressure to cross the road and make the car driver slow down if I was in a similar situation to that described in the example**

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q4 **It would be entirely up to me whether or not I crossed the road and made the car driver slow down if I was in a similar situation to that described in the example**

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q5 **I would be able to cross the road and make the car driver slow down if I was in a similar situation to that described in the example**

Strongly agree ☐ ☐ ☐ ☐ ☐ ☐ ☐ Strongly disagree

Q6   **Would you try to cross the road and make the car driver slow down if you were in a similar situation to that described in the example?**

Definitely yes   ☐   ☐   ☐   ☐   ☐   ☐   ☐   Definitely no

Q7   **If you wanted to, could you easily cross the road and make the car driver slow down if you were in a similar situation to that described in the example?**

Definitely yes   ☐   ☐   ☐   ☐   ☐   ☐   ☐   Definitely no

Please show how you feel about **ALL** the following statements by ticking **ONE** box on **EACH** line

Q8   **If I were in a similar situation to that described in the example and I crossed the road making the car driver slow down ...**

		Strongly agree						Strongly disagree
(A)	It would make the car driver angry	☐	☐	☐	☐	☐	☐	☐
(B)	It would make me feel good to make the driver have to slow down	☐	☐	☐	☐	☐	☐	☐
(C)	My friends and I would get to where we were going quicker than if we waited for the car to pass	☐	☐	☐	☐	☐	☐	☐
(D)	The car driver would have a go at us	☐	☐	☐	☐	☐	☐	☐
(E)	It would increase the chances of my friends and I being involved in an accident	☐	☐	☐	☐	☐	☐	☐
(F)	I would enjoy making the car driver slow down	☐	☐	☐	☐	☐	☐	☐

Q9   **How good or bad do you think the following things are?**

		Very Good						Very Bad
(A)	Making the car driver angry	☐	☐	☐	☐	☐	☐	☐
(B)	Making myself feel good by making the driver have to slow down	☐	☐	☐	☐	☐	☐	☐
(C)	My friends and I getting to where we are going quicker	☐	☐	☐	☐	☐	☐	☐
(D)	The car driver having a go at us	☐	☐	☐	☐	☐	☐	☐
(E)	Increase the chances of my friends and I being involved in an accident	☐	☐	☐	☐	☐	☐	☐
(F)	Getting enjoyment by making the car driver slow down	☐	☐	☐	☐	☐	☐	☐

Q10   **Would the following things make you more likely or less likely to cross the road and make the car driver slow down if you were in a similar situation to that described in the example?**

		More Likely to cross and make the driver slow down						Less Likely to cross and make the driver slow down
(A)	If my friends and I were in a hurry or late for something	☐	☐	☐	☐	☐	☐	☐
(B)	If my friends crossed	☐	☐	☐	☐	☐	☐	☐
(C)	If the car was going really fast	☐	☐	☐	☐	☐	☐	☐
(D)	If I was dared to cross by one of my friends	☐	☐	☐	☐	☐	☐	☐
(E)	If we were on a busy road	☐	☐	☐	☐	☐	☐	☐

Q11 **In future, how often do you expect to be in a similar situation to that described in the example when:**

		Very Often						Never
(A)	You and your friends are in a hurry or late for something	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends cross the road and make the car driver slow down	☐	☐	☐	☐	☐	☐	☐
(C)	The car is going really fast	☐	☐	☐	☐	☐	☐	☐
(D)	You are dared to cross by one of your friends	☐	☐	☐	☐	☐	☐	☐
(E)	You and your friends are on a busy road	☐	☐	☐	☐	☐	☐	☐

Q12 **How likely or unlikely is it that you would cross the road and make the car driver slow down if you were in a similar situation to that described in the example?**

Very likely ☐ ☐ ☐ ☐ ☐ ☐ ☐ Very unlikely

SECTION 2: OTHER PEOPLE

Q13 **How much do you think the following people would want you to cross the road and make the car driver slow down if you were in a similar situation to that described in the example?**

		Very much						Not at all
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q14 **How much do you want to go along with what these people want you to do?**

		Very much						Not at all
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q15 **How often do you think these people would <u>themselves</u> cross the road and make the car driver slow down if they were in a similar situation to that described in the example?**

		Always						Never
(A)	School teachers	☐	☐	☐	☐	☐	☐	☐
(B)	Your friends	☐	☐	☐	☐	☐	☐	☐
(C)	Other people at school	☐	☐	☐	☐	☐	☐	☐
(D)	The police	☐	☐	☐	☐	☐	☐	☐
(E)	Car drivers	☐	☐	☐	☐	☐	☐	☐
(F)	Your parents	☐	☐	☐	☐	☐	☐	☐
(G)	Other people in your family	☐	☐	☐	☐	☐	☐	☐

Q16 **Think about the people who are important to you.**

(A) **How much would they want you to cross the road and make the car driver slow down if you were in a similar situation to that described in the example?**

Very much ☐ ☐ ☐ ☐ ☐ ☐ ☐ Not at all

(B) **How often do you think they would cross the road and make the car driver slow down if they were in a similar situation to that described in the example**

Always ☐ ☐ ☐ ☐ ☐ ☐ ☐ Never

(C) **Would they approve or disapprove of you crossing the road and making the car driver slow down if you were in a similar situation to that described in the example?**

Approve ☐ ☐ ☐ ☐ ☐ ☐ ☐ Disapprove

SECTION 3: YOUR BEHAVIOUR

Q17 **How often do you cross the road and make car drivers slow down in similar situations to that described in the example?**

Always ☐ ☐ ☐ ☐ ☐ ☐ ☐ Never

Q18 **Would you intend to cross the road and make the car driver slow down if you were in a similar situation to that described in the example?**

Definitely yes ☐ ☐ ☐ ☐ ☐ ☐ ☐ Definitely no

		Never	Less than once a week	1-3 days a week	4-6 days a week	Every day
Q19	How often do you go out on foot (e.g. go out walking, going for a walk, just hanging around?	☐	☐	☐	☐	☐
Q20	When you go out on foot, how often are you with ADULTS?	☐	☐	☐	☐	☐
Q21	When you go out on foot, how often are you with FRIENDS?	☐	☐	☐	☐	☐
Q22	When you go out on foot, how often are you ON YOUR OWN?	☐	☐	☐	☐	☐

Q23 How old are you?

11-12 years old   ☐

13-14 years old   ☐

15-16 years old   ☐

Q24 Are you?

Male   ☐

Female   ☐

Please now check to make sure you have completed EVERY question in this questionnaire. Thank you for your help.

Appendix E: Instructions and procedure for administering questionnaires

INTRODUCTION

Questionnaires about road safety behaviour are to be administered to pupils in class time at school. The whole process involves handing out the questionnaires, giving instructions and collecting the questionnaire at the end. This process should take between 25-35 minutes.

There are 4 different questionnaires that need completing. The type of questionnaire is clearly marked in the 'REF' box in the top left-hand corner of the first page of each questionnaire. The different types are CYC, CROSS1, CROSS2, and CROSS3.

Each pupil in the class must complete 1 questionnaire only.

A teacher MUST be present to give instructions to pupils (see below for instructions). We need pupils' answers on the questionnaire to be honest and to remain confidential - we DO NOT want pupils to answer questions in a way they think their teacher would approve of just because they think their teacher will see their answers. Therefore, when pupils are completing the questionnaires the teacher MUST NOT walk around the class looking at pupils' answers to the questions or influence them in any other way.

If a pupil has a problem with understanding any question, the teacher must ask the pupil to 'close your questionnaire so I cannot see your answers'. He/she should then ask the pupil to come to the front of the class with their questionnaire. Teachers will be given blank questionnaires which they can use to refer to the 'problem' question.

HANDING OUT QUESTIONNAIRES TO THE CLASS:

Teachers will be given a pile of questionnaires at the beginning of the lesson by the TRL interviewer. These questionnaires will be arranged in a particular order (CYC, CROSS1, CROSS2, CROSS3, CYC, CROSS1, CROSS2, CROSS3, ETC) so they are not to be re-arranged.

Hand out the questionnaires to the pupils (at this point tell pupils not to open questionnaire until given instruction). Start at the person at the front left-hand side of class / exam hall and work your way around. If this is done there should not be anyone sat next to each other with the same questionnaire.

After handing out questionnaires to everyone in the class, ask pupils who have been given CYC questionnaires (cycle helmet use) whether they ride a bike. The CYC questionnaires must only be completed by pupils who ride a bike (either to school and / or outside of school). This is clearly written on the CYC questionnaire on the first page. If anyone has been given a CYC questionnaire and does not ride a bike, swap their questionnaire with someone in the class who does ride a bike and has got a CROSS1, CROSS2, or CROSS3 questionnaire.

TEACHER INSTRUCTIONS TO PUPILS

These are the instructions that teachers need to give to pupils before completing questionnaires:

Before handing out questionnaires tell pupils:

- We want you all to complete a questionnaire. Do NOT open the questionnaire until I tell you to. The questionnaire is about your road safety attitudes and behaviour. IT IS NOT A TEST ABOUT ROAD SAFETY - researchers from the Transport Research Laboratory just want to find out what pupils of your age honestly think about a number of issues. It is therefore very important that you are honest when answering the questions. This is completely confidential - You are not required to give your name on the questionnaire. Although I [teacher] am here, I will not look at your answers.

- Please complete the questionnaire on your own. Do not talk to other people when completing the questionnaire.

- You need to answer the questions by ticking boxes to show you answers - use a pen, NOT a pencil

Hand out questionnaires at this point. Then tell pupils:

● Different questionnaires have been given out to the class (check to make sure that pupils with a CYC - cycle helmet questionnaire - do ride a bike - see above). On some questionnaires there is a grey box on the first page. If you have a questionnaire with a grey box on the first page, it is very important that you read what is in it before completing the questionnaire.

● To help you complete your questionnaires, there is an example question on the first page along with instructions on how to answer it. You, therefore, need to read the instructions on the first page of the questionnaire carefully before completing it. If the instructions are not clear to you please put your hand up and ask [the TRL interviewer / teacher] to explain.

● If you make a mistake when answering a question and you want to change your answer, please clearly cross out your first answer and tick another box.

● It is also very important that you answer EVERY SINGLE QUESTION in the questionnaire. If you get to a question that is difficult to answer or you are not sure what it means, please put you hand up, and [teacher/TRL interviewer] will explain (refer to bullet point 5 in 'Introduction' section of this document).

● Please now read the instructions on the first page of the questionnaire and complete it. Put your hand up when you have finished and your questionnaire will be collected from you and put in this box (show box - provided by TRL - Note. the purpose of this is to demonstrate that the teacher will not look at their answers on the questionnaire - i.e. anonymity will be maintained).

COLLECTING QUESTIONNAIRES

Pupils are told to put their hands up when they have finished their questionnaire (see instructions above).

Teacher / TRL interviewer to collect questionnaires from the pupils (DO NOT OPEN QUESTIONNAIRES AND LOOK AT ANSWERS).

When collecting questionnaires from each pupil, ask them whether they have answered ALL of the questions. Remind them that it is very important for our research that EVERY SINGLE QUESTION has been answered.

If all questions have been answered, take the questionnaire from the pupil.

Put all the questionnaires in a box at the front of the class.

Appendix F: Age, sex and area distributions by target behaviour

Table F1 Cycle helmet use: Sample distribution across age and sex (%)

	Sex		
	Male	Female	Total
Age group (years)			
11-12	23.1	16.1	39.2
13-14	20.6	13.1	33.7
15-16	19.9	7.2	27.1
Total	63.6	34.4	100

Table F2 Cycle helmet use: Sample distribution across area type (%)

Area type	% of sample
Urban	45.9
Rural	54.1
Total	100

Table F3 Using crossings: Sample distribution across age and sex (%)

	Sex		
	Male	Female	Total
Age group (years)			
11-12	15.6	17.3	32.9
13-14	16.0	18.4	34.4
15-16	14.1	18.6	32.7
Total	45.7	54.3	100

Table F4 Using crossings: Sample distribution across area type (%)

Area type	% of sample
Urban	47.2
Rural	52.8
Total	100

Table F5 Crossing between parked cars: Sample distribution across age and sex (%)

	Sex		
	Male	Female	Total
Age group (years)			
11-12	16.0	17.2	33.2
13-14	14.5	19.8	34.3
15-16	12.6	19.9	32.5
Total	43.1	56.9	100

Table F6 Crossing between parked cars: Sample distribution across area type (%)

Area type	% of sample
Urban	46.2
Rural	53.8
Total	100

Table F7 Challenging traffic: Sample distribution across age and sex (%)

	Sex		
	Male	Female	Total
Age group (years)			
11-12	15.2	17.5	32.7
13-14	16.1	19.0	35.0
15-16	14.2	18.0	32.2
Total	45.5	54.5	100

Table F8 Challenging traffic: Sample distribution across area type (%)

Area type	% of sample
Urban	47.5
Rural	52.5
Total	100

Appendix G: Results of factor analyses

Table G1 Principle components analysis of attitude, subjective norm and perceived control items (varimax rotation): Cycle helmet use

Item	Attitude	Subjective norm	Perceived control
Wearing a cycle helmet is bad/good	.67	.43	.22
Wearing a cycle helmet is harmful/beneficial	.69	.04	.21
Wearing a cycle helmet is negative/positive	.70	.28	.06
Wearing a cycle helmet is unnecessary/necessary	.72	.40	-.04
Wearing a cycle helmet is unsafe/safe	.74	.01	.18
Wearing a cycle helmet is worthless/valuable	.68	.29	.13
Wearing a cycle helmet is stupid/sensible	.68	.35	.19
How much would the people important to you want you to wear a cycle helmet?	.27	.77	.19
How often do the people important to you want you to wear a cycle helmet?	.15	.74	.17
Would the people important to you approve or disapprove of you wearing a cycle helmet?	.21	.70	.13
I would be able to wear a cycle helmet	.27	.28	.73
If you wanted to, could you easily wear a cycle helmet	.12	.15	.87
% variance explained	30.26	19.67	12.98

Table G2 Principle components analysis of attitude, subjective norm and perceived control items (varimax rotation): Using crossings

Item	Attitude	Subjective norm	Perceived control
Walking to the crossing is bad/good	.73	.20	.27
Walking to the crossing is harmful/beneficial	.61	-.01	.24
Walking to the crossing is negative/positive	.76	.11	.16
Walking to the crossing is unnecessary/necessary	.74	.31	-.09
Walking to the crossing is unsafe/safe	.65	.09	.34
Walking to the crossing is worthless/valuable	.74	.31	-.02
Walking to the crossing is stupid/sensible	.71	.17	.31
How much would the people important to you want you to walk to the crossing?	.22	.78	.22
How often do the people important to you walk to the crossing?	.15	.80	-.04
Would the people important to you approve or disapprove of you walking to the crossing?	.14	.68	.28
I would be able to walk to the crossing	.31	.18	.71
If you wanted to, could you easily walk to the crossing?	.13	.14	.83
% variance explained	30.93	16.98	14.13

Table G3 Principle components analysis of attitude, subjective norm and perceived control items (varimax rotation): Crossing between parked cars

Item	Attitude	Subjective norm	Perceived control
Crossing between parked cars is bad/good	.76	.17	.17
Crossing between parked cars is harmful/beneficial	.62	.12	.27
Crossing between parked cars is negative/positive	.77	.17	.17
Crossing between parked cars is unnecessary/necessary	.73	.03	.08
Crossing between parked cars is unsafe/safe	.81	.16	.03
Crossing between parked cars is worthless/valuable	.61	.06	.17
Crossing between parked cars is stupid/sensible	.82	.15	.11
How much would the people important to you want you to cross between parked cars?	.18	.83	.02
How often do the people important to you cross between parked cars?	.05	.77	.25
Would the people important to you approve or disapprove of you crossing between parked cars?	.20	.80	.12
I would be able to cross between parked cars	.26	.15	.84
If you wanted to, could you easily wear a cycle helmet	.19	.18	.86
% variance explained	32.85	17.60	14.22

Table G4 Principle components analysis of attitude, subjective norm and perceived control items (varimax rotation): Challenging traffic

Item	Attitude	Subjective norm	Perceived control
Making the driver slow down is bad/good	.76	.22	.31
Making the driver slow down is harmful/beneficial	.66	.16	.18
Making the driver slow down is negative/positive	.83	.16	.19
Making the driver slow down is unnecessary/necessary	.76	.20	.09
Wearing a cycle helmet is unsafe/safe	.77	.28	.06
Making the driver slow down is worthless/valuable	.76	.09	.02
Making the driver slow down is stupid/sensible	.76	.19	.09
How much would the people important to you want you to make the driver slow down?	.23	.86	.04
How often do the people important to you make the driver slow down?	.15	.84	.21
Would the people important to you approve or disapprove of you making the driver slow down?	.32	.79	.13
I would be able to make the driver slow down	.23	.10	.85
If you wanted to, could you easily make the driver slow down	.10	.17	.86
% variance explained	35.39	19.78	14.17

Appendix H: Means and standard deviations for all TPB items

Table H1 Individual TPB items used in the questionnaires: Means (standard deviations)

Item	Cycle helmet use	Using crossings	Crossing between parked cars	Challenging traffic
Attitude items (scored -3 to +3)				
For me [performing the target behaviour] is bad/good	0.81 (1.92)	1.45 (1.68)	-1.07 (1.76)	-0.58 (1.85)
For me [performing the target behaviour] is harmful/beneficial	1.64 (1.61)	1.61 (1.58)	-0.49 (1.79)	-0.27 (1.80)
For me [performing the target behaviour] is negative/positive	0.91 (1.86)	1.44 (1.57)	-0.74 (1.70)	-0.41 (1.76)
For me [performing the target behaviour] is unnecessary/necessary	0.90 (2.03)	0.86 (1.88)	-0.83 (1.89)	-0.92 (1.88)
For me [performing the target behaviour] is unsafe/safe	2.29 (1.29)	2.12 (1.48)	-1.43 (1.73)	-0.94 (1.91)
For me [performing the target behaviour] is worthless/valuable	0.84 (2.00)	0.96 (1.83)	-0.53 (1.85)	-0.58 (1.86)
For me [performing the target behaviour] is stupid/sensible	1.19 (2.05)	1.79 (1.63)	-1.20 (1.60)	-0.85 (1.77)
For me [performing the target behaviour] is unenjoyable/enjoyable	-1.55 (1.75)	-0.86 (1.81)	-0.92 (1.55)	-0.68 (1.71)
Subjective norm items (scored +1 to +7)				
I feel under social pressure to [perform the target behaviour]	3.66 (2.11)	3.08 (1.76)	3.29 (1.83)	3.52 (1.88)
How much would the people important to you want you to [perform the target behaviour]?	5.39 (1.88)	5.90 (1.36)	2.84 (1.77)	2.75 (1.84)
How often do the people important to you [perform the target behaviour]?	3.68 (1.97)	5.10 (1.39)	3.83 (1.56)	3.47 (1.67)
Would the people important to you approve or disapprove of you [performing the target behaviour]?	5.42 (1.74)	5.72 (1.58)	3.01 (1.66)	3.04 (1.79)
Perceived control items (scored +1 to +7)				
For me [performing the target behaviour] is difficult/easy	4.71 (2.03)	5.23 (1.76)	4.32 (2.11)	4.67 (1.91)
It is entirely up to me whether or not I [perform the target behaviour]	5.73 (1.73)	5.99 (1.50)	5.82 (1.66)	5.73 (1.70)
I would be able to [perform the target behaviour]	5.22 (1.91)	5.74 (1.51)	4.86 (1.75)	4.40 (1.83)
If you wanted to, could you easily [perform the target behaviour]?	5.47 (1.93)	6.03 (1.39)	4.95 (1.73)	4.78 (1.81)
Intention items (scored -3 to +3)				
I want to [perform the target behaviour]	-0.33 (2.02)	0.60 (1.72)	-0.24 (1.81)	-0.32 (1.84)
Will you try to [perform the target behaviour]?	0.04 (2.03)	0.53 (1.83)	0.20 (1.88)	-0.15 (1.88)
How likely or unlikely is it that you will [perform the target behaviour]?	-0.40 (2.12)	0.29 (1.87)	0.50 (1.74)	-0.12 (1.88)
Do you intend to [perform the target behaviour]?	-0.43 (2.09)	0.54 (1.70)	0.13 (1.66)	-0.37 (1.85)
Behaviour item (scored +1 to +7)				
How often do you [perform the target behaviour]?	2.96 (2.13)	4.28 (1.72)	4.34 (1.64)	3.97 (1.74)

Appendix I: Means and standard deviations for all belief items by age, sex and area

Table 11 Cycle helmet use behavioural beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	*13-14*	*15-16*	*Male*	*Female*	*Urban*	*Rural*
Outcome beliefs – 'Wearing a cycle helmet will…'							
Protect my head (e.g. if I had an accident or if I fell off my bike)	2.51 (1.06)	2.44 (1.23)	2.70 (0.68)	2.52 (1.00)	2.56 (1.11)	2.48 (1.12)	2.58 (0.96)
Carrying cycle helmet around is annoying	1.01 (2.01)	1.32 (1.96)	1.66 (1.64)	1.35 (1.91)	1.17 (1.94)	1.55 (1.85)	1.06 (1.95)
Be uncomfortable to wear	0.97 (2.02)	1.24 (1.91)	1.46 (1.71)	1.22 (1.95)	1.17 (1.84)	1.59 (1.67)	0.86 (2.04)
Make me more visible to other road users	0.58 (2.05)	0.65 (2.05)	0.19 (2.02)	0.40 (2.07)	0.67 (2.00)	0.60 (2.08)	0.42 (2.01)
Make me feel safe while riding	1.44 (1.76)	0.96 (2.02)	0.67 (1.99)	0.94 (2.02)	1.31 (1.78)	0.76 (1.98)	1.35 (1.85)
Make me look unfashionable	0.69 (2.14)	1.07 (2.08)	1.11 (2.00)	0.76 (2.15)	1.20 (1.94)	1.22 (1.99)	0.68 (2.14)
Make me look childish	0.43 (2.20)	0.57 (2.24)	0.74 (2.12)	0.47 (2.22)	0.69 (2.14)	0.84 (2.15)	0.32 (2.20)
Outcome evaluations – 'How bad or good are the following things?'							
Having protection for my head (e.g. if I had an accident or if I fell off my bike)	2.46 (1.11)	2.46 (1.13)	2.53 (1.18)	2.40 (1.23)	2.61 (0.95)	2.43 (1.16)	2.52 (1.12)
Having to carry a cycle helmet around when I get off my bike	-1.38 (1.56)	-1.44 (1.66)	-1.45 (1.53)	-1.44 (1.61)	-1.37 (1.55)	-1.44 (1.57)	-1.39 (1.60)
Being uncomfortable when riding a bike	-1.55 (1.72)	-1.52 (1.65)	-1.76 (1.62)	-1.58 (1.70)	-1.64 (1.62)	-1.79 (1.55)	-1.43 (1.75)
Being visible to other road users	1.75 (1.61)	1.57 (1.70)	1.91 (1.47)	1.70 (1.61)	1.83 (1.59)	1.57 (1.76)	1.87 (1.45)
Feeling safe while riding a bike	2.20 (1.42)	1.74 (1.58)	2.05 (1.42)	1.87 (1.58)	2.26 (1.24)	1.88 (1.59)	2.11 (1.38)
Looking unfashionable when riding a bike	-1.21 (1.63)	-1.15 (1.76)	-1.19 (1.60)	-1.15 (1.70)	-1.24 (1.62)	-1.34 (1.65)	-1.05 (1.67)
Looking childish when riding a bike	-1.42 (1.61)	-1.45 (1.64)	-1.24 (1.63)	-1.39 (1.66)	-1.37 (1.57)	-1.48 (1.61)	-1.29 (1.64)

Outcome beliefs scored –3 (strongly disagree) to +3 (Strongly agree).
Outcome evaluations scored – 3 (bad) to +3 (good).

Table 12 Cycle helmet use normative beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Referent beliefs – 'How much do you think the following people want you to wear a cycle helmet while riding a bike?'							
School teachers	5.76 (1.83)	5.54 (1.78)	5.44 (1.67)	5.71 (1.73)	5.47 (1.79)	5.63 (1.76)	5.57 (1.79)
Your friends	2.89 (1.83)	2.63 (1.76)	2.72 (1.71)	2.65 (1.73)	2.93 (1.83)	2.53 (1.67)	2.95 (1.84)
Other people at school	3.17 (1.69)	2.77 (1.60)	2.66 (1.65)	2.90 (1.68)	2.89 (1.64)	2.82 (1.66)	2.97 (1.67)
The police	6.51 (1.38)	6.44 (1.24)	6.41 (1.33)	6.50 (1.24)	6.41 (1.40)	6.38 (1.44)	6.53 (1.20)
Car drivers	4.67 (2.37)	4.96 (2.08)	5.21 (1.94)	4.85 (2.18)	5.08 (2.12)	4.60 (2.30)	5.16 (2.03)
Your parents	5.31 (2.18)	5.26 (2.08)	5.50 (2.01)	5.36 (2.08)	5.39 (2.10)	5.03 (2.21)	5.61 (1.96)
Other people in your family	5.17 (1.99)	5.02 (1.92)	5.12 (1.99)	5.10 (2.01)	5.15 (1.88)	4.83 (2.00)	5.34 (1.90)
Motivation to comply – 'How much do you want to go along with what these people want you to do?'							
School teachers	3.98 (1.99)	3.22 (2.06)	3.26 (1.86)	3.42 (2.00)	3.78 (1.99)	3.27 (1.95)	3.75 (2.03)
Your friends	4.89 (1.89)	4.56 (1.99)	4.42 (1.92)	4.66 (1.98)	4.70 (1.84)	4.65 (1.92)	4.66 (1.95)
Other people at school	3.76 (1.85)	3.49 (1.98)	3.09 (1.85)	3.46 (1.93)	3.57 (1.79)	3.53 (1.88)	3.46 (1.88)
The police	5.10 (2.12)	4.16 (2.23)	4.02 (2.18)	4.29 (2.32)	4.88 (1.99)	4.34 (2.18)	4.63 (2.26)
Car drivers	4.09 (2.09)	3.48 (2.08)	3.58 (1.98)	3.60 (2.10)	4.05 (1.99)	3.61 (2.03)	3.86 (2.11)
Your parents	5.57 (1.92)	4.91 (2.17)	4.79 (2.02)	5.10 (2.08)	5.28 (1.98)	5.08 (2.05)	5.19 (2.07)
Other people in your family	5.15 (1.96)	4.58 (2.07)	4.32 (1.95)	4.68 (2.03)	4.87 (1.97)	4.71 (2.00)	4.76 (2.05)

Referent beliefs scored +1 (not at all) to +7 (very much).

Motivation to comply scored +1 (not at all) to +7 (very much).

Table 13 Cycle helmet use control beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Control frequency beliefs – 'In future, how often do you expect to…'							
Ride a bike in busy traffic conditions	4.13 (1.84)	4.34 (1.88)	4.50 (1.67)	4.53 (1.79)	3.88 (1.76)	4.48 (1.73)	4.13 (1.86)
Ride a bike around roads close to home	6.15 (1.35)	5.74 (1.65)	5.89 (1.40)	6.04 (1.44)	5.79 (1.53)	6.00 (1.36)	5.90 (1.57)
Go on long bike rides	5.48 (1.57)	5.18 (1.75)	5.07 (1.68)	5.41 (1.63)	5.02 (1.72)	5.21 (1.68)	5.32 (1.66)
Go on short bike rides	5.72 (1.54)	5.55 (1.63)	5.73 (1.44)	5.74 (1.53)	5.55 (1.53)	5.65 (1.54)	5.67 (1.55)
Go out on your bike when you are in a hurry	4.56 (2.01)	4.88 (1.97)	5.13 (1.78)	5.06 (1.88)	4.38 (2.00)	4.67 (2.00)	4.95 (1.89)
Ride a bike to school	2.43 (1.85)	2.26 (1.86)	2.15 (1.81)	2.49 (1.95)	1.94 (1.58)	2.32 (1.81)	2.29 (1.88)
Not have or not be able to find your cycle helmet	3.88 (2.19)	3.85 (2.27)	4.56 (2.39)	4.15 (2.36)	3.88 (2.17)	4.39 (2.34)	3.78 (2.22)
Control power beliefs – 'Would the following things make you more likely or less likely to wear a cycle helmet?'							
Riding in busy traffic conditions	6.12 (1.53)	5.55 (1.91)	5.44 (1.78)	5.59 (1.83)	6.03 (1.57)	5.46 (1.90)	5.99 (1.58)
Riding around roads close to home	2.51 (1.85)	2.30 (1.69)	2.08 (1.58)	2.24 (1.70)	2.47 (1.79)	2.17 (1.59)	2.45 (1.84)
Going on long bike rides	5.12 (2.11)	4.40 (2.14)	4.42 (2.08)	4.57 (2.22)	4.93 (1.98)	4.28 (2.17)	5.05 (2.05)
Going on short bike rides	2.94 (1.97)	2.55 (1.73)	2.29 (1.64)	2.47 (1.76)	2.93 (1.90)	2.17 (1.53)	3.03 (1.96)
If you were in a hurry	3.80 (2.38)	2.79 (2.01)	2.58 (1.92)	2.90 (2.16)	3.56 (2.23)	2.91 (2.07)	3.34 (2.30)
Riding to school	3.91 (2.35)	3.04 (2.17)	2.86 (2.05)	3.28 (2.25)	3.42 (2.29)	3.00 (2.13)	3.61 (2.33)
Not having or being able to find your cycle helmet	2.13 (1.55)	1.88 (1.35)	1.71 (1.34)	1.86 (1.43)	2.04 (1.45)	1.85 (1.34)	2.00 (1.52)

Control frequency beliefs scored +1 (never) to +7 (very often).

Control power beliefs scored +1 (less likely to wear a cycle helmet) to +7 (more likely to wear a cycle helmet).

Table 14 Using crossings behavioural beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Outcome beliefs – 'Walking to the crossing will…'							
Reduce my chances of getting run over	2.15 (1.56)	2.24 (1.28)	2.15 (1.32)	2.13 (1.41)	2.23 (1.36)	2.12 (1.37)	2.24 (1.41)
Take me longer to get to my destination	1.10 (1.86)	1.47 (1.66)	1.64 (1.55)	1.58 (1.67)	1.24 (1.73)	1.47 (1.59)	1.34 (1.81)
Make it easier to cross the road	1.87 (1.69)	1.68 (1.61)	1.72 (1.37)	1.58 (1.71)	1.90 (1.42)	1.68 (1.59)	1.82 (1.54)
Make me feel safer while crossing	2.01 (1.55)	1.52 (1.76)	1.44 (1.62)	1.50 (1.73)	1.81 (1.57)	1.60 (1.66)	1.70 (1.67)
Take me too far out of my way	-0.51 (1.90)	0.05 (1.81)	0.05 (1.74)	0.02 (1.85)	-0.27 (1.81)	0.06 (1.77)	-0.30 (1.88)
Outcome evaluations – 'How bad or good are the following things?'							
Reducing my chances of getting run over	2.17 (1.63)	2.39 (1.28)	2.33 (1.20)	2.28 (1.37)	2.33 (1.37)	2.32 (1.33)	2.28 (1.43)
Taking longer to get to my destination	-0.62 (1.66)	-0.97 (1.58)	-0.91 (1.46)	-1.05 (1.63)	-0.65 (1.51)	-0.81 (1.49)	-0.86 (1.65)
It being easier to cross the road	1.90 (1.60)	1.82 (1.44)	1.72 (1.28)	1.66 (1.54)	1.95 (1.33)	1.81 (1.43)	1.81 (1.46)
Feeling safe while crossing	2.19 (1.32)	1.99 (1.39)	1.89 (1.28)	1.85 (1.44)	2.19 (1.20)	2.00 (1.34)	2.05 (1.34)
Going too far out of my way	-0.67 (1.71)	-1.06 (1.52)	-1.00 (1.47)	-0.96 (1.63)	-0.86 (1.53)	-0.87 (1.51)	-0.95 (1.64)

Outcome beliefs scored –3 (strongly disagree) to +3 (Strongly agree).

Outcome evaluations scored – 3 (bad) to +3 (good).

Table 15 Using crossings normative beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Referent beliefs – 'How much do you think the following people want you to walk to the crossing?'							
School teachers	6.13 (1.58)	6.17 (1.34)	5.81 (1.53)	5.90 (1.65)	6.17 (1.32)	6.00 (1.45)	6.08 (1.53)
Your friends	3.93 (1.88)	3.53 (1.60)	3.60 (1.63)	3.43 (1.77)	3.90 (1.63)	3.81 (1.63)	3.57 (1.78)
Other people at school	3.76 (1.81)	3.29 (1.53)	3.30 (1.42)	3.49 (1.66)	3.41 (1.54)	3.56 (1.54)	3.35 (1.66)
The police	6.40 (1.47)	6.49 (1.09)	6.16 (1.49)	6.25 (1.49)	6.44 (1.25)	6.34 (1.36)	6.36 (1.37)
Car drivers	5.38 (2.00)	5.55 (1.76)	5.41 (1.81)	5.36 (1.93)	5.51 (1.79)	5.41 (1.86)	5.48 (1.86)
Your parents	6.42 (1.39)	6.29 (1.29)	5.98 (1.53)	6.08 (1.54)	6.36 (1.29)	6.29 (1.36)	6.18 (1.47)
Other people in your family	6.01 (1.68)	5.88 (1.46)	5.63 (1.63)	5.60 (1.75)	6.04 (1.41)	5.91 (1.55)	5.78 (1.63)
Motivation to comply – 'How much do you want to go along with what these people want you to do?'							
School teachers	4.72 (1.86)	4.01 (1.87)	3.81 (1.64)	4.07 (1.91)	4.28 (1.76)	4.09 (1.86)	4.25 (1.81)
Your friends	5.19 (1.89)	5.06 (1.52)	4.82 (1.55)	4.96 (1.74)	5.09 (1.58)	4.93 (1.69)	5.11 (1.64)
Other people at school	4.15 (1.98)	4.00 (1.68)	3.71 (1.63)	4.00 (1.83)	3.92 (1.73)	3.91 (1.77)	4.00 (1.78)
The police	5.61 (1.91)	5.06 (1.84)	4.31 (1.81)	4.88 (1.99)	5.13 (1.85)	4.95 (1.88)	5.04 (1.97)
Car drivers	4.73 (1.92)	4.29 (1.78)	4.07 (1.61)	4.31 (1.95)	4.41 (1.64)	4.23 (1.73)	4.48 (1.84)
Your parents	6.15 (1.59)	5.55 (1.72)	5.10 (1.83)	5.56 (1.77)	5.66 (1.74)	5.72 (1.63)	5.50 (1.88)
Other people in your family	5.83 (1.72)	5.18 (1.72)	4.90 (1.74)	5.18 (1.83)	5.42 (1.69)	5.38 (1.72)	5.24 (1.81)

Referent beliefs scored +1 (not at all) to +7 (very much).

Motivation to comply scored +1 (not at all) to +7 (very much).

Table I6 Using crossings control beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Control frequency beliefs – 'In future, how often do you expect to be in a similar situation to that described when…'							
Traffic is moving fast (e.g. the road has a fast speed limit)	5.43 (1.64)	5.38 (1.35)	5.41 (1.28)	5.23 (1.48)	5.55 (1.37)	5.50 (1.43)	5.32 (1.43)
The place you are going to is directly opposite you on other side	5.06 (1.87)	5.14 (1.60)	5.16 (1.51)	5.19 (1.72)	5.05 (1.61)	5.13 (1.65)	5.12 (1.68)
You are in a hurry or late	4.81 (1.78)	5.01 (1.66)	5.07 (1.49)	4.85 (1.73)	5.06 (1.58)	4.99 (1.57)	4.95 (1.72)
It is dark	4.43 (2.20)	4.72 (1.75)	5.11 (1.53)	4.68 (1.90)	4.80 (1.83)	4.70 (1.87)	4.81 (1.86)
People are waiting for you on the other side of the road	4.86 (1.73)	4.98 (1.59)	4.80 (1.49)	4.88 (1.67)	4.87 (1.54)	4.79 (1.56)	4.96 (1.64)
There is a lot of traffic around	5.40 (1.86)	5.50 (1.48)	5.56 (1.44)	5.40 (1.71)	5.55 (1.51)	5.56 (1.54)	5.42 (1.65)
Control power beliefs – 'Would the following things make you more likely or less likely to walk to the crossing?'							
Fast moving traffic (e.g. the road has a fast speed limit)	6.14 (1.68)	6.20 (1.41)	6.29 (1.13)	5.98 (1.54)	6.40 (1.30)	6.23 (1.33)	6.19 (1.51)
The place you are going to is directly opposite you on the other side of the road	3.26 (2.12)	2.68 (1.80)	2.83 (1.88)	2.87 (2.01)	2.96 (1.89)	2.90 (1.93)	2.93 (1.97)
You being in a hurry or late	3.03 (1.89)	2.59 (1.63)	2.60 (1.61)	2.61 (1.75)	2.84 (1.68)	2.84 (1.71)	2.66 (1.73)
It being dark	5.84 (2.04)	5.46 (1.85)	5.01 (1.94)	5.13 (2.06)	5.69 (1.86)	5.34 (2.02)	5.53 (1.93)
People waiting for you on the other side of the road	3.69 (2.16)	2.92 (1.85)	2.92 (1.81)	3.06 (1.99)	3.28 (1.97)	3.21 (1.99)	3.14 (1.96)
There being a lot of traffic around	5.81 (1.87)	5.79 (1.69)	5.70 (1.66)	5.65 (1.79)	5.90 (1.64)	5.63 (1.81)	5.90 (1.66)

Control frequency beliefs scored +1 (never) to +7 (very often).

Control power beliefs scored +1 (less likely to use crossing) to +7 (more likely to use crossing).

Table I7 Crossing between parked cars behavioural beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	*13-14*	*15-16*	*Male*	*Female*	*Urban*	*Rural*
Outcome beliefs – 'If I cross between parked cars…'							
I will increase my chances of getting run over	1.63 (1.86)	1.63 (1.62)	1.57 (1.56)	1.58 (1.77)	1.66 (1.60)	1.57 (1.64)	1.65 (1.72)
I will not have to go out of my way	0.49 (1.88)	0.99 (1.69)	1.02 (1.63)	1.04 (1.73)	0.69 (1.74)	0.93 (1.71)	0.75 (1.78)
I will not be able to see cars coming very well	1.80 (1.91)	1.50 (1.91)	1.18 (1.81)	1.28 (2.02)	1.66 (1.77)	1.35 (1.93)	1.61 (1.86)
It will take me less time to get to where I am going	0.84 (2.02)	1.23 (1.98)	1.21 (1.77)	1.17 (1.97)	1.03 (1.90)	1.18 (1.90)	1.02 (1.95)
Drivers would not be able to see me	1.90 (1.69)	1.60 (1.76)	1.29 (1.67)	1.49 (1.83)	1.71 (1.62)	1.51 (1.68)	1.68 (1.76)
Parked cars might move and hit me	0.81 (2.19)	0.38 (2.13)	0.10 (1.95)	0.06 (2.16)	0.72 (2.03)	0.12 (2.14)	0.70 (2.05)
I will have to step into road to see clearly	1.36 (2.06)	1.24 (1.93)	1.16 (1.77)	1.05 (2.05)	1.41 (1.81)	1.19 (1.93)	1.31 (1.93)
Outcome evaluations – 'How bad or good are the following things?'							
Increasing my chances of getting run over	-1.70 (2.04)	-1.84 (1.88)	-1.81 (1.75)	-1.71 (1.99)	-1.84 (1.81)	-1.74 (1.87)	-1.82 (1.91)
Not having to go out of my way	0.58 (1.82)	0.80 (1.75)	1.01 (1.42)	0.89 (1.68)	0.72 (1.67)	0.87 (1.57)	0.73 (1.77)
Not being able to see cars coming very well	-1.63 (1.99)	-1.57 (1.84)	-1.54 (1.54)	-1.46 (1.93)	-1.68 (1.69)	-1.47 (1.75)	-1.67 (1.83)
Taking less time to get to where I am going	0.69 (2.05)	0.95 (1.80)	0.96 (1.57)	1.09 (1.90)	0.70 (1.73)	0.91 (1.80)	0.83 (1.84)
Drivers not being able to see me	-1.93 (1.88)	-1.66 (1.78)	-1.72 (1.51)	-1.69 (1.83)	-1.82 (1.67)	-1.59 (1.74)	-1.93 (1.71)
Parked cars moving and hitting me	-1.83 (1.76)	-1.57 (1.71)	-1.56 (1.51)	-1.52 (1.76)	-1.77 (1.58)	-1.55 (1.70)	-1.73 (1.63)
Having to step into road to see clearly	-1.63 (1.80)	-1.39 (1.71)	-1.33 (1.56)	-1.31 (1.81)	-1.56 (1.59)	-1.28 (1.71)	-1.60 (1.67)

Outcome beliefs scored –3 (strongly disagree) to +3 (Strongly agree).

Outcome evaluations scored – 3 (bad) to +3 (good).

Table 18 Crossing between parked cars normative beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Referent beliefs – 'How much do you think the following people want you to cross between parked cars?'							
School teachers	2.42 (1.85)	2.58 (1.81)	2.71 (1.81)	2.75 (1.95)	2.43 (1.72)	2.64 (1.76)	2.51 (1.88)
Your friends	5.00 (1.74)	5.04 (1.74)	4.69 (1.50)	5.32 (1.56)	4.62 (1.68)	4.91 (1.59)	4.92 (1.74)
Other people at school	4.70 (1.61)	4.71 (1.58)	4.60 (1.35)	4.87 (1.54)	4.53 (1.47)	4.66 (1.42)	4.69 (1.59)
The police	2.24 (2.02)	2.20 (1.88)	2.03 (1.56)	2.37 (2.00)	1.98 (1.66)	2.26 (1.86)	2.07 (1.80)
Car drivers	2.76 (2.05)	2.81 (2.08)	2.54 (1.85)	2.86 (2.12)	2.58 (1.88)	2.77 (1.91)	2.65 (2.07)
Your parents	2.34 (1.98)	2.79 (1.93)	2.48 (1.84)	2.81 (2.06)	2.34 (1.80)	2.48 (1.84)	2.60 (2.00)
Other people in your family	2.64 (1.93)	3.04 (1.88)	2.76 (1.86)	3.05 (1.97)	2.65 (1.83)	2.81 (1.89)	2.83 (1.91)
Motivation to comply – 'How much do you want to go along with what these people want you to do?'							
School teachers	4.01 (2.02)	3.94 (1.92)	3.63 (1.74)	3.93 (1.88)	3.82 (1.92)	3.74 (1.81)	3.97 (1.97)
Your friends	4.95 (1.78)	4.96 (1.64)	4.86 (1.51)	4.81 (1.67)	5.00 (1.63)	4.80 (1.59)	5.03 (1.69)
Other people at school	3.87 (1.82)	3.90 (1.59)	3.85 (1.55)	3.92 (1.71)	3.85 (1.61)	3.86 (1.57)	3.89 (1.73)
The police	4.91 (2.24)	4.60 (2.02)	4.36 (1.89)	4.62 (2.05)	4.64 (2.08)	4.65 (1.97)	4.60 (2.15)
Car drivers	3.78 (1.95)	4.12 (1.80)	4.06 (1.59)	3.87 (1.83)	4.07 (1.77)	3.97 (1.65)	4.01 (1.91)
Your parents	5.42 (2.07)	5.16 (1.83)	5.03 (1.72)	5.09 (1.95)	5.27 (1.83)	5.20 (1.85)	5.20 (1.91)
Other people in your family	5.11 (1.95)	4.91 (1.82)	4.77 (1.71)	4.82 (1.86)	5.00 (1.82)	4.92 (1.75)	4.94 (1.90)

Referent beliefs scored +1 (not at all) to +7 (very much).

Motivation to comply scored +1 (not at all) to +7 (very much).

Table 19 Crossing between parked cars control beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Control frequency beliefs – 'In future, how often do you expect to be in a similar situation to that described when…'							
Traffic is moving fast (e.g. the road has a fast speed limit)	4.57 (1.92)	4.43 (1.74)	4.49 (1.68)	4.69 (1.77)	4.37 (1.78)	4.61 (1.69)	4.41 (1.86)
The place you are going to is directly opposite you on other side	5.05 (1.68)	5.43 (1.58)	5.32 (1.41)	5.22 (1.66)	5.30 (1.48)	5.25 (1.51)	5.29 (1.62)
You are in a hurry or late	5.05 (1.70)	5.41 (1.56)	5.26 (1.43)	5.34 (1.56)	5.17 (1.57)	5.28 (1.43)	5.21 (1.69)
There is a lot of traffic around	4.09 (2.06)	4.19 (1.94)	4.63 (1.75)	4.35 (1.97)	4.27 (1.90)	4.54 (1.86)	4.10 (1.97)
It is dark	3.25 (2.10)	3.88 (1.98)	4.11 (1.91)	4.00 (2.04)	3.58 (2.00)	3.73 (1.99)	3.76 (2.06)
People are waiting for you on the other side	4.69 (1.80)	5.10 (1.52)	4.98 (1.44)	4.81 (1.68)	5.02 (1.53)	4.81 (1.55)	5.02 (1.64)
You can see a gap in the traffic	4.74 (1.73)	5.07 (1.72)	5.17 (1.48)	5.02 (1.72)	4.98 (1.60)	4.91 (1.57)	5.07 (1.72)
Control power beliefs – 'Would the following things make you more likely or less likely to walk to cross between parked cars?'							
Fast moving traffic (e.g. the road has a fast speed limit)	2.06 (1.74)	1.76 (1.45)	1.94 (1.47)	2.08 (1.70)	1.79 (1.43)	1.97 (1.52)	1.88 (1.59)
The place you are going to is directly opposite you on other side	5.09 (1.83)	5.41 (1.77)	5.67 (1.34)	5.45 (1.70)	5.34 (1.67)	5.54 (1.58)	5.26 (1.75)
Being in a hurry or late	5.46 (1.75)	5.61 (1.60)	5.81 (1.31)	5.78 (1.50)	5.50 (1.60)	5.70 (1.45)	5.56 (1.67)
There being a lot of traffic around	2.93 (2.16)	2.71 (1.92)	2.83 (1.83)	3.03 (2.02)	2.64 (1.91)	3.14 (2.05)	2.55 (1.87)
It being dark	2.40 (1.97)	2.71 (1.99)	2.80 (1.79)	2.87 (2.02)	2.47 (1.84)	2.53 (1.80)	2.73 (2.03)
People waiting for you on the other side of the road	4.89 (1.98)	5.45 (1.68)	5.41 (1.54)	5.35 (1.69)	5.18 (1.80)	5.36 (1.60)	5.16 (1.88)
Being able to see a gap in the traffic	4.76 (2.00)	5.45 (1.66)	5.50 (1.59)	5.34 (1.79)	5.16 (1.78)	5.35 (1.66)	5.15 (1.89)

Control frequency beliefs scored +1 (never) to +7 (very often).

Control power beliefs scored +1 (less likely to cross between parked cars) to +7 (more likely to cross between parked cars).

Table I10 Challenging traffic behavioural beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Outcome beliefs – 'Making the driver slow down will…'							
Make the car driver angry	1.26 (1.68)	1.44 (1.41)	1.36 (1.35)	1.37 (1.54)	1.33 (1.45)	1.41 (1.38)	1.31 (1.57)
Make me feel good	-1.05 (1.95)	-1.00 (2.02)	-0.75 (1.94)	-0.92 (1.99)	-0.94 (1.96)	-0.87 (2.00)	-1.00 (1.94)
Get me to my destination quicker	0.37 (2.08)	0.59 (2.06)	1.00 (1.86)	0.73 (2.13)	0.60 (1.91)	0.69 (2.03)	0.61 (2.01)
Car driver would have a go at us	-0.19 (2.08)	-0.29 (1.83)	-0.09 (1.77)	-0.11 (2.02)	-0.24 (1.80)	-0.10 (1.88)	-0.27 (1.91)
Increase the chances of an accident	1.62 (1.84)	1.58 (1.68)	1.44 (1.72)	1.49 (1.78)	1.60 (1.70)	1.60 (1.66)	1.51 (1.82)
I would enjoy making the car driver slow down	-1.58 (1.72)	-1.36 (1.94)	-1.21 (1.94)	-1.20 (1.93)	-1.53 (1.81)	-1.32 (1.96)	-1.45 (1.79)
Outcome evaluations – 'How bad or good are the following things?'							
Making the car driver angry	-1.88 (1.63)	-1.57 (1.71)	-1.28 (1.76)	-1.34 (1.88)	-1.76 (1.55)	-1.51 (1.72)	-1.64 (1.71)
Making me feel good	-1.13 (1.84)	-0.64 (1.82)	-0.80 (1.76)	-0.78 (1.95)	-0.90 (1.71)	-0.87 (1.88)	-0.84 (1.75)
Getting to my destination quicker	0.59 (1.97)	1.02 (1.69)	1.05 (1.58)	1.15 (1.76)	0.70 (1.73)	0.93 (1.79)	0.86 (1.74)
The car driver having a go at us	-1.76 (1.73)	-1.31 (1.84)	-1.20 (1.72)	-1.12 (1.98)	-1.63 (1.57)	-1.47 (1.67)	-1.37 (1.88)
Increasing the chances of an accident	-1.83 (1.94)	-1.86 (1.84)	-2.09 (1.54)	-1.77 (1.85)	-2.04 (1.74)	-2.07 (1.65)	-1.80 (1.89)
Getting enjoyment by making the car driver slow down	-1.45 (1.77)	-1.00 (1.92)	-1.06 (1.72)	-0.98 (1.94)	-1.31 (1.70)	-1.17 (1.85)	-1.17 (1.79)

Outcome beliefs scored –3 (strongly disagree) to +3 (Strongly agree).

Outcome evaluations scored – 3 (bad) to +3 (good).

Table I11 Challenging traffic normative beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Referent beliefs – 'How much do you think the following people want you to make the car driver slow down?'							
School teachers	5.65 (1.84)	5.69 (1.70)	5.62 (1.70)	5.74 (1.71)	5.60 (1.75)	5.78 (1.61)	5.54 (1.85)
Your friends	3.35 (1.75)	3.27 (1.74)	3.54 (1.83)	3.29 (1.73)	3.43 (1.79)	3.32 (1.77)	3.45 (1.78)
Other people at school	4.56 (1.66)	4.64 (1.60)	4.37 (1.52)	4.70 (1.62)	4.40 (1.56)	4.54 (1.61)	4.51 (1.59)
The police	2.46 (2.26)	2.17 (2.04)	2.22 (1.87)	2.13 (1.93)	2.40 (2.16)	2.23 (2.03)	2.33 (2.09)
Car drivers	2.70 (2.01)	2.30 (1.82)	2.27 (1.75)	2.49 (1.90)	2.35 (1.82)	2.25 (1.77)	2.57 (1.95)
Your parents	2.59 (2.03)	2.60 (2.01)	2.41 (1.81)	2.56 (1.92)	2.50 (1.96)	2.35 (1.83)	2.70 (2.05)
Other people in your family	2.85 (2.00)	2.86 (1.98)	2.71 (1.90)	2.89 (1.96)	2.72 (1.94)	2.72 (1.90)	2.88 (2.00)
Motivation to comply – 'How much do you want to go along with what these people want you to do?'							
School teachers	4.32 (2.08)	3.86 (2.01)	3.66 (1.89)	3.77 (2.11)	4.07 (1.91)	3.89 (2.03)	4.00 (1.99)
Your friends	4.48 (1.93)	4.86 (1.72)	4.77 (1.65)	4.76 (1.82)	4.64 (1.74)	4.64 (1.78)	4.77 (1.78)
Other people at school	3.50 (1.74)	3.73 (1.75)	3.73 (1.74)	3.70 (1.86)	3.62 (1.65)	3.71 (1.76)	3.60 (1.74)
The police	5.16 (2.26)	4.71 (2.21)	4.18 (2.03)	4.48 (2.32)	4.84 (2.09)	4.61 (2.22)	4.76 (2.19)
Car drivers	3.62 (2.08)	3.79 (1.94)	3.78 (1.75)	3.75 (2.01)	3.70 (1.83)	3.72 (1.97)	3.76 (1.89)
Your parents	5.58 (1.98)	5.16 (1.98)	4.92 (1.85)	5.16 (2.01)	5.24 (1.92)	5.27 (1.95)	5.18 (1.97)
Other people in your family	5.15 (2.08)	4.87 (1.87)	4.65 (1.78)	4.89 (1.95)	4.88 (1.91)	5.05 (1.88)	4.76 (1.96)

Referent beliefs scored +1 (not at all) to +7 (very much).

Motivation to comply scored +1 (not at all) to +7 (very much).

Table I12 Challenging traffic control beliefs: Means (standard deviations) by age, sex and area

Item	Age			Sex		Area	
	11-12	13-14	15-16	Male	Female	Urban	Rural
Control frequency beliefs – 'In future, how often do you expect to be in a similar situation to that described when…'							
You and your friends are in a hurry or late	4.71 (1.74)	5.11 (1.70)	5.28 (1.48)	5.00 (1.76)	5.09 (1.57)	5.07 (1.67)	5.00 (1.65)
Your friends cross the road	4.35 (1.87)	4.72 (1.63)	4.86 (1.49)	4.75 (1.73)	4.57 (1.63)	4.74 (1.65)	4.56 (1.71)
The car is going really fast	3.31 (2.16)	3.56 (2.20)	3.93 (2.11)	3.84 (2.18)	3.37 (2.13)	3.55 (2.17)	3.65 (2.17)
You were dared to cross the road	2.65 (1.97)	2.64 (1.77)	2.24 (1.63)	2.73 (1.99)	2.33 (1.61)	2.42 (1.72)	2.60 (1.87)
You are on a busy road	3.53 (2.21)	3.76 (2.19)	3.80 (2.05)	3.96 (2.14)	3.47 (2.14)	3.82 (2.16)	3.59 (2.13)
Control power beliefs – 'Would the following things make you more likely or less likely to make the car driver slow down?'							
You and your friends being in a hurry or late	5.34 (1.88)	5.77 (1.56)	6.14 (1.27)	5.89 (1.59)	5.62 (1.65)	5.88 (1.50)	5.63 (1.72)
Your friends crossing the road	4.63 (2.05)	4.90 (1.87)	4.85 (1.58)	4.76 (1.98)	4.80 (1.72)	4.82 (1.92)	4.77 (1.77)
The car going really fast	1.66 (1.49)	1.66 (1.28)	1.90 (1.61)	1.92 (1.65)	1.58 (1.25)	1.67 (1.40)	1.80 (1.52)
You being dared to cross the road	3.15 (2.16)	3.16 (2.09)	2.64 (1.79)	3.20 (2.15)	2.76 (1.90)	2.96 (2.09)	3.01 (1.97)
You being on a busy road	2.05 (1.78)	2.17 (1.64)	2.23 (1.56)	2.34 (1.77)	2.00 (1.57)	2.24 (1.74)	2.06 (1.58)

Control frequency beliefs scored +1 (never) to +7 (very often).

Control power beliefs scored +1 (less likely to cross and make the car slow down) to +7 (more likely to cross and make the car slow down).

Abstract

The Theory of Planned Behaviour (TPB) was used as a framework to study the attitudes of adolescent road users towards four target behaviours: (1) cycle helmet use, (2) using nearby crossings, (3) crossing from between parked cars, and (4) challenging traffic. Four questionnaires, one for each of the behaviours, were designed based on pilot work. Each questionnaire contained items to measure the TPB variables, self-reported behaviour, and general exposure and demographic characteristics (e.g. age and gender). A total of 2,457 children aged 11-16 completed the questionnaires; 564 respondents completed the 'cycle helmet use' questionnaire; 657 respondents completed the 'using nearby crossings' questionnaire; 619 respondents completed the 'crossing from between parked cars' questionnaire; and 617 completed the 'challenging traffic' questionnaire. Multivariate analyses were conducted for each of the behaviours to explore how adolescents' attitudes, subjective norms, perceived control, behavioural intentions and self-reported behaviour differed as a function of demographic variables. Correlation and multiple regression analyses were then conducted to test the relationships in the TPB and to identify beliefs underpinning adolescents' attitudes that could be targeted in road safety interventions. This report describes all aspects of the study and discusses the theoretical and practical implications.

Related publications

TRL605   *Child and young adolescent's road deaths: An analysis of police fatal accident files* by J Sentinella and M Keigan. 2004 *(In preparation)*

TRL599   *Road safety behaviour of adolescent children in groups* by L Chinn, M Elliott, J Sentinella and K Williams. 2004 (price £40, code JX)

TRL578   *Cycle helmet wearing in 2002* by K Gregory, C Inwood and B Sexton. 2003 (price £25, code AX)

TRL561   *Adolescent road user behaviour: A survey of 11-16 year olds* by M A Elliott and C J Baughan. 2003 (price £20, code A)

TRL156   *Cycle helmet wearing in Great Britain* by S B Taylor and M E Halliday. 1996 (price £25, code E)

TRL154   *Attitudes to cycle helmets - a qualitative study* by M E Halliday C White, H Finch and K Ward. 1996 (price £35, code H)

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