Moderation of cognition-behaviour consistency by properties of cognition

by

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Summary

The present research investigated the impact of properties of cognitions as moderators of cognition-behaviour consistency within the Theory of Planned Behaviour (TPB: Ajzen, 1991). Study 1 compared accessibility, direct experience and temporal stability as moderators of cognition-behaviour relations for donation behaviour. Temporal stability was the only significant moderator of cognition-behaviour consistency. Study 2 used meta-analysis to quantify the impact of seven properties of cognitions—accessibility, affective-cognitive consistency, ambivalence, certainty, direct experience, involvement and temporal stability—on cognition-behaviour and cognition-intention relations. All variables moderated cognition-behaviour and/or cognition-intention relations. Temporal stability emerged as the most effective moderator of attitude-behaviour and intention-behaviour relations. Study 3 examined the factor structure of properties of intentions and provided a second test of properties of intentions as moderators of intention-behaviour relations. Principal components analysis found a four factor solution for five properties of intentions with accessibility and temporal stability loading on independent factors and the other factors consisting of the other three properties. Temporal stability was the only variable to moderate intention-behaviour relations. Two further studies showed that temporal stability had a direct effect on participants' information processing. In Study 4, participants with more stable intentions had better recognition memory for intention-relevant information whereas Study 5 found that temporal stability moderated the effect of a rating scale manipulation on participants' ratings such that participants with more stable intentions were unaffected by the manipulation, whereas participants with less stable intentions were affected by the manipulation. Overall, the findings demonstrate that temporal stability (a) is a conceptually distinct property of participants' cognitions, (b) is the most effective moderator of cognition-behaviour relations in previous research, and (c) affects participants' information processing and social judgment. These findings have important implications both for the TPB and health-promotion interventions.

CONTENTS

CHAPTER 1: INTRODUCTION

1.1 Predicting Behaviour from Cognitions

Social psychologists are interested in a number of questions related to human action in a social environment. One of the most researched questions is 'Why do people behave as they do?' or more specifically 'What factors influence a person's behaviour in a given social setting?' Research has focussed on a number of potential influences on behaviour, with a substantial body of research investigating the influence of a person's *cognitions* (e.g., thoughts, beliefs, and values associated with behavioural performance) on behaviour. In the past, researchers believed that asking a sample of the population to indicate their attitudes toward a certain behaviour would provide an accurate measure of the sample's likely behaviour, with more positive attitudes indicating a greater likelihood of performing the behaviour compared to more negative attitudes. However, this hypothesis has been revised on basis of empirical evidence that demonstrates that attitudes are not always a good predictor of behaviour (e.g., La Pierre, 1934; Wicker, 1969).

The finding that attitudes do not always predict behaviour lead researchers to rethink what they were measuring (e.g., a move from asking questions about general attitudes concerning general behaviour, to specific attitudes concerning a particular behaviour) and the use of a construct that provides more accurate prediction of behaviour than attitudes, e.g., behavioural intention (Ajzen & Fishbein, 1973). Meta-analytic reviews indicate that intention is a strong predictor of behaviour (Sheeran, 2002). Although this relationship is far from perfect, the relationship is stronger than that reported between attitudes and behaviour (Kraus, 1995). The aim of this thesis is to describe and test a set of variables that may improve the prediction of behaviour from intentions and attitudes.

1.2 The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB; Ajzen, 1985; 1991) is the dominant account of the relationship between cognitions and behaviour in social psychology. The theory posits that the proximal determinant of an individual's behaviour is his/her intention to perform it. Intentions (e.g., "I intend to exercise at least 3 times a week") reflect how hard people are willing to try to achieve their goals and summarise individuals' motivation to perform a behaviour (Ajzen, 1991). Intentions are predicted by attitudes, subjective norms, and perceived behavioural control (PBC). Attitudes are an individual's positive or negative evaluation of performing the behaviour (e.g., "For me to exercise at least 3 times a week would be good/bad"). Subjective norms are an individual's beliefs about what significant others think s/he should do (e.g., "Most people who are important to me think that I should exercise at least 3 times a week"). PBC reflects perceptions of the ease or difficulty of behavioural performance (e.g., "For me to exercise at least 3 times a week would be easy/difficult"). PBC can also directly predict behaviour when PBC accurately reflects the person's *actual* control over behavioural performance (Sheeran, Trafimow, & Armitage, in press).

Meta-analyses indicate that the TPB provides a good explanation of a wide range of behaviours. For example, attitudes, subjective norms, and PBC account for 39% to 42% of the variance in intentions (Armitage & Conner, 2001; Godin & Kok, 1996; Sheeran & Taylor, 1999), while intentions and PBC predict between 28% and 34% of the variance in behaviour (Armitage & Conner, 2001; Godin & Kok, 1996; Trafimow, Sheeran, Conner, & Finlay, 2002). Notwithstanding the success of the TPB, there remains a substantial proportion of variance in intentions/behaviour that is not explained by TPB variables (Sheeran, 2002). One approach researchers have taken to reduce the gap between intention and behaviour is to investigate properties of intention

(such as how stable an intention is over time) as moderators of intention-behaviour consistency.

1.3 Properties of Cognitions as Moderator Variables

A *moderator variable* affects the relationship between two other variables (cf. Baron & Kenny, 1986). For example, the relationship between smoking and developing lung cancer may be moderated by age such that older smokers are more likely to develop lung cancer compared to younger smokers. Properties of attitudes were first employed as moderators of the attitude-behaviour relationship in response to Wicker's (1969) suggestion that attitudes were only weakly associated with behaviour. For example, Warland and Sample (1973) found that participants who were more *certain* of their voting attitudes possessed greater attitude-behaviour consistency than participants who were less certain of their voting attitudes.

Properties of cognitions improve prediction of behaviour by providing additional information concerning the *strength* of the cognitions that are measured, and it is assumed that stronger cognitions are better predictors of behaviour than weaker cognitions (cf. Krosnick & Petty, 1995). For example, imagine that two people possess identical, positive, attitudes towards exercise, but one person exercises while the other person does not. The difference in their behaviour cannot be explained by examining their attitudes, as these are equal and would predict equivalent behaviour. However, if the first person possesses attitudes that she considers high in certainty, whereas the second person believes that his attitudes are low in certainty, then the variable certainty can identify which attitudes are likely to be enacted, and thus improve the prediction of behaviour from attitudes by moderating this relationship. In the above scenario, it can be said that the first person possesses *stronger* attitudes than the second person and this may explain the differential prediction of behaviour (cf. Krosnick & Petty, 1995).

Results from studies that have investigated various properties of attitudes as moderator variables have shown them to increase attitude-behaviour consistency (Fazio, Chen, McDonel & Sherman, 1982; Fazio & Zanna, 1978a; Norman, 1975). Raden (1985) reviewed the literature on ten properties—accessibility, affective-cognitive consistency, certainty, crystallization, direct experience, importance, intensity, latitude of rejection, stability and vested interest—and concluded that

> 'It is apparent that a number of the dimensions are successful moderators. None of the properties, however is clearly the most effective moderator.' (p. 323).

Raden also highlighted the low intercorrelations between the dimensions, which suggests that the properties are nonredundant and argues against the hypothesis that the various properties could be reduced into a single measure of 'attitude strength'. To provide an empirical test of Raden's hypothesis, Krosnick, Boninger, Chuang, Berent, and Carnot (1993) used confirmatory factor analysis and found that a single factor model provided an inadequate description of the structure of ten attitudinal properties, despite significant correlations between the properties. Exploratory factor analyses found the best fit for a five factor model, with no more than three properties loading on any one factor (see also Bassili, 1996; Erber, Hodges, & Wilson, 1995; Prislin, 1996). Thus, although properties of attitudes may be correlated with one another, they are conceptually distinct constructs.

More recently, Krosnick and Petty (1995) completed a comprehensive review of research on properties of attitudes. They propose that there are four defining features of strong attitudes—persistence over time, resistance to persuasion, impact on information processing and impact on behaviour—and that properties of attitudes are correlated with these four features. Thus, properties of attitudes are indirect measures of the strength of attitudes, e.g., more accessible attitudes should also be stronger attitudes. In addition to

employing properties of attitudes to moderate attitude-behaviour consistency, research has also examined properties of intentions as moderators of the intention-behaviour relationship (Bassili, 1995; Conner, Norman, & Bell, 2002; Conner, Sheeran, Norman, & Armitage, 2000; Sheeran, Orbell, & Trafimow, 1999).

The present thesis primarily focuses on accessibility of intentions in memory and temporal stability of intentions over time. The focus is on these two variables for three reasons. First, both variables are important aspects of models of cognition-behaviour consistency: Accessibility is a critical aspect of the MODE model (Fazio, 1990a; 1995) while temporal stability underpins the TPB (Ajzen, 1996). Thus, examining these moderators allows insight into the models proposed. Second, these variables have been defined as operative measures, which are measures computed as part of the process of calculating a response to a question about cognitions (see Bassili, 1996). Therefore, further tests of these variables should increase understanding of the mechanisms that lay behind participants' calculation of cognitions in response to question about their cognitions, i.e. is accessibility or stability more likely to affect the relationship between participants' cognitions and their behaviour. Third, the existing literature shows that accessibility and temporal stability are both highly successful moderator variables although there is a lack of research that compares the two variables.

1.4 Moderation of Cognition-Behaviour Consistency by Accessibility and Temporal Stability

1.4.1 Accessibility

Accessibility refers to the strength of the association in memory between a cognition (e.g., attitude) and the object of that cognition (e.g., exercise) and is usually measured by the latency between presentation of a question designed to measure the cognition and the participant's response (Fazio, 1995). Alternatively, some studies have

manipulated accessibility by asking one group of participants to repeatedly express their attitudes and another group of participants to express their attitudes once; this procedure is assumed to make the attitudes of the repeated expression group more accessible compared to the single expression group. Studies have shown that both indices of accessibility moderate cognition-behaviour relations. For example, Fazio et al. (1982) found that participants who repeatedly expressed their attitudes towards puzzle types were more likely to act in accordance with these attitudes than were participants who expressed their attitudes once. Using a response latency measure, Fazio and Williams (1986) found that participants with highly accessible attitudes possessed greater attitude-voting behaviour consistency than participants with less accessible attitudes in the 1984 US presidential election. Other research has supported and extended these findings (Bassili, 1995; Fazio, Powell, & Williams, 1989; Kokkinaki & Lunt, 1997; 1999).

One factor that seems to determine the accessibility of cognitions is the amount of direct experience that participants have with the behaviour. Direct experience refers to participants who have performed a behaviour prior to measurement of cognitions and behaviour, whereas indirect experience is characterised by activities such as reading about behavioural performance or observing someone else performing the behaviour. Fazio et al. (1982) found that participants given direct experience with completing puzzles possessed more accessible attitudes compared to participants who received indirect experience. Similarly, Doll and Ajzen (1992) found that participants who were given direct experience of playing video games possessed more accessible cognitions about the games compared to participants who received indirect experience. Findings indicate that direct experience produces more frequent behavioural performance (e.g., Millar & Millar, 1996) and stronger cognition-behaviour relations (e.g., Fazio et al.,

1982) compared to indirect experience. However, it may be that direct experience affects behaviour and cognition-behaviour relations through its effects on the accessibility of cognitions. Direct experience may also affect the temporal stability of cognitions (see below).

Within the attitude literature, accessibility has been conceptualised as a critical variable that mediates the impact of other properties of attitudes on behaviour. According to Fazio's MODE model (Fazio, 1990a; Fazio & Towles-Schwen, 1999), there are two types of processing that participants engage in when deciding how to act; spontaneous and deliberative. When participants employ a spontaneous process, they rely on highly accessible attitudes to aid decision-making, and Fazio argues that the influence of other moderators should be mediated by accessibility. In contrast, a deliberative process involves more cognitive processing and may be less affected by the accessibility of attitudes, because participants are likely to consider a number of sources of information before arriving at a behavioural decision. Research supports this distinction between modes of processing (Jamieson & Zanna, 1989; Sanbonmatsu & Fazio, 1990; Schuette & Fazio, 1995), although, most research in this area has focused on spontaneous processing. Fazio (1990a; 1995) suggests that models such as the TPB effectively capture deliberative processing. Under deliberative processing different properties may moderate cognition-behaviour relations.

1.4.2 Temporal Stability

Temporal stability can be defined as the extent to which cognitions remain consistent over time (Sheeran et al., 1999) and is generally measured by the within-participants correlation between cognition items taken at two different timepoints. According to Krosnick and Petty (1995), temporal stability is a defining feature of strong attitudes. The other defining feature of attitude strength is impact and there is

evidence that temporal stability may be antecedent to behavioural impact (Sheeran et al., 1999). Temporal stability should moderate cognition-behaviour relations because as Ajzen (1996) has argued:

> "...to obtain accurate prediction of behaviour, intentions and perceptions of behavioural control must remain reasonably stable over time until the behaviour is performed." (p. 389).

If a participant's intention or PBC changes before their behaviour is measured, then intention or PBC may not accurately predict behaviour. Support for Ajzen's hypothesis came from Conner et al. (2000) who showed that for both a frequently performed behaviour (eating a low fat diet), and an infrequently performed behaviour (attending a health check up), temporal stability moderated intention-behaviour relations such that more stable intentions were better predictors of behaviour compared to less stable intentions. Similar findings have been obtained in other studies that have tested the moderating effects of temporal stability on attitude-behaviour and PBC-behaviour relations (Davidson & Jaccard, 1979; Doll & Ajzen, 1992; Schwartz, 1978).

In addition to moderating cognition-behaviour relations, temporal stability can mediate the influence of other properties of cognitions on cognition-behaviour consistency. For example, Doll and Ajzen (1992) demonstrated that temporal stability mediated the impact of direct experience on attitude-behaviour, intention-behaviour and PBC-behaviour relations. Ajzen and Fishbein (2001) suggest that because cognitions formed by direct experience develop during performance of the behaviour, participants are well informed about the consequences of behavioural performance. Thus, cognitions formed by direct experience are likely to be used in subsequent performance of the same behaviour which, in turn, means that such cognitions are likely to become stable over time. In contrast, cognitions formed on the basis of indirect experience can involve misjudgements of the consequences of performing the behaviour. These cognitions

might, therefore, have to be revised during subsequent performances, thus reducing the stability of cognitions.

Sheeran and Abraham (in press) found that temporal stability mediated the moderating effects of five other variables (certainty, past behaviour, anticipated regret, attitudinal vs. normative control, and self-schemas) on intention-behaviour relations. These findings suggest that temporal stability may be the mechanism through which other variables exert their influence and may be a critical variable in attempting to bridge the intention-behaviour gap (cf. Sheeran, 2002). One reason for the success of temporal stability and accessibility as moderator variables is that they differ from other properties of cognitions because they are measured *operatively*.

1.4.3 Operative vs. Meta-Judgmental Measures of Properties of Cognitions

Bassili (1996) proposed a distinction between operative and meta-judgmental properties of attitudes. An operative measure is one that is based on the processes involved in calculating a response to an attitude question (e.g., the accessibility of the attitude in memory) or computed from the results of the processing (e.g., measuring temporal stability by calculating the within-participants' correlation between responses to a question on two occasions). In contrast, a meta-judgmental measure is based on a participant's perceptions of their attitudes (e.g., "How accessible are your attitudes toward exercise?").

Bassili found that operative properties were better predictors of the pliability of participants' attitudes (i.e., how likely participants were to change their attitudes when presented with a persuasive message) and he suggested this was due to the greater accuracy afforded by operative measures; because operative measures do not rely on participants' insight, they are more likely to reflect the *actual* accessibility or stability of participants' attitudes. In addition, it is unlikely that participants have access to the

information required to answer meta-judgmental questions (e.g., participants may not know how accessible their attitudes are). Nevertheless, no research has examined meta-judgmental vs. operative measures of properties of *intention*, so it is unclear whether Bassili's findings would be replicated in relation to this cognition. Chapter 4 measures intention accessibility and intention stability both meta-judgmentally and operatively to addresses this issue.

In summary, both accessibility and temporal stability have been shown to moderate cognition-behaviour consistency. In addition, both variables have been advanced as critical elements of the decision-making process, with accessibility considered more important in spontaneous processing and temporal stability crucial in deliberative reasoning. One reason for the success of accessibility and temporal stability as moderator variables is that they are accurate measures of the strength of participants' cognitions. The next section describes research that has compared the two variables.

1.5 Comparing the Effects of Accessibility and Temporal Stability

To date, only one study has investigated the simultaneous impact of temporal stability and accessibility as moderator variables. Doll and Ajzen (1992) examined the impact of accessibility and temporal stability on video game play. They found that temporal stability moderated both attitude-behaviour and intention-behaviour relations whereas accessibility moderated neither relationship. Doll and Ajzen (1992) concluded that their findings showed that temporal stability was a more effective moderator of the relationships between the TPB and behaviour compared to accessibility. However, Fazio (1995) has highlighted a number of limitations with Doll and Ajzen's methodology. For example, Fazio argued that Doll & Ajzen used an inappropriate measure of baseline speed of response, so further simultaneous tests of accessibility and

temporal stability are needed to assess the relative impact of accessibility and temporal stability as moderators.

Research conducted to date suggests that accessibility and temporal stability are important variables in bridging the gap between cognitions and behaviour. However, the absence of a systematic comparison of the impact of both variables leaves many questions unanswered. This thesis will attempt to answer two of the most pressing questions, is temporal stability a better moderator of cognition-behaviour consistency compared to accessibility and are there significant differences in the effect sizes reported for temporal stability and accessibility in previous studies.

1.6 The Plan of this Thesis

There is little research that has evaluated the effects of moderator variables on relationships within the TPB. This thesis seeks to provide a systematic evaluation of these variables in the studies reported in Chapters 2, 3, and 4. Chapter 5 extends the research by examining the impact of temporal stability on information processing. Chapter 6 will review the findings and discuss the implications for research on the TPB and interventions.

In Chapter 2 the relative effectiveness of three properties of cognitions (accessibility, direct experience and temporal stability), as moderators of attitude-behaviour, intention-behaviour and PBC-behaviour relations, is tested in relation to students' charitable donation behaviour. This study serves as a replication of Doll and Ajzen's (1992) comparison between these three variables. Moreover, the study seeks to address some of the criticisms levelled at Doll and Ajzen's paper by Fazio (1995).

Chapter 3 provides the first quantitative review of the moderator variable literature. A meta-analysis is presented that compares the effect sizes associated with seven frequently employed properties of cognitions (accessibility, affective-cognitive

consistency, ambivalence, certainty, direct experience, involvement, and temporal stability). The review achieves a number of goals. First, it provides a precise measure of the impact of moderator variables on five relationships within the TPB—attitude-behaviour, attitude-intention, intention-behaviour, PBC-behaviour and subjective norm-intention—based on the available research literature. Second, it allows for a comparison between the moderator variables for each relationship. Finally, the review quantifies the effects of accessibility and temporal stability on attitude-behaviour and intention-behaviour relations.

Chapter 4 has three aims: First, to examine the factor structure of properties of intentions, second, to compare different ways of measuring properties of intentions (meta-judgmental vs. operative measures), and finally, to provide a further test of moderation of the intention-behaviour relationship by accessibility and temporal stability. To date, no research has examined the factor structure of properties of intention, or examined the differences between meta-judgmental and operative measures of properties of intentions. Accessibility and temporal stability were measured both meta-judgmentally and operatively, to provide a comparison between the two key variables in this thesis. Certainty was also included on the basis of Bassili's (1996) finding that certainty was the only meta-judgmental property to predict attitude pliability. These variables were examined in a factor analysis to describe the factor structure of properties of intention, and on the basis of the factor analysis, properties were employed as moderators of intention-behaviour consistency, to attempt to replicate the findings from Chapter 2.

In Chapter 5 the impact of the temporal stability of participants' intentions on their information processing efficiency is examined. Krosnick and Petty (1995) argue that strong attitudes should have more impact on information processing, compared to

weak attitudes. Applying Krosnick and Petty's analysis to intentions, it is hypothesised that temporal stability acts as an index of the strength of an intention (i.e., more stable intentions are stronger than less stable intentions). Thus, if temporal stability is an index of strength it would be expected that participants with more stable intentions should process information more efficiently than participants with less stable intentions. This prediction is tested in two experiments presented in Chapter 5.

Chapter 6 reviews the evidence presented in Chapters 2-5 and integrates these findings into a discussion of the impact of properties of cognitions as moderators of cognition-behaviour consistency, the relationships between the various properties of cognition (i.e., are they independent) and the impact of temporal stability on information processing. Chapter 6 also considers the implications of the research presented for the TPB and health-promoting interventions.

CHAPTER 2: COMPARING PROPERTIES OF COGNITIONS AS MODERATOR VARIABLES

2.1 Overview

Chapter 1 reviewed the success of the TPB as a predictor of behaviour. Meta-analytic reviews of the literature have demonstrated that the TPB provides an impressive account of how cognitions predict behaviour (see Armitage & Conner, 2001; Godin & Kok, 1996; Trafimow et al., 2002) explaining between 27% and 34% of the variance in future behaviour. Although this level of prediction is impressive, it is nevertheless apparent that a large proportion of variance in behaviour is not explained by the TPB (Sheeran, 2002). The present study examines three variables that might improve the predictive validity of the TPB by moderating the relationships between cognitions and behaviour: Temporal stability, accessibility, and direct experience.

Doll and Ajzen (1992) investigated the impact of the three moderator variables on video game play. Direct experience was manipulated by allowing half of the participants to practice the games whereas control participants simply watched a video of the games. Accessibility was measured by response latencies to TPB items and temporal stability was computed using within-participants correlations between TPB measures taken at two timepoints. Doll and Ajzen (1992) found that: (a) participants who received direct experience showed increased attitude-behaviour, PBC-behaviour, and intention-behaviour consistency, (b) participants with direct experience possessed more stable and accessible cognitions compared to participants with indirect experience, (c) temporal stability mediated the effects of direct experience on cognition-behaviour relations but accessibility did not, (d) temporal stability moderated the attitude-behaviour, PBC-behaviour, and intention-behaviour relations such that participants with stable cognitions demonstrated stronger cognition-behaviour relationships compared to participants with unstable cognitions, and (e) accessibility did not moderate cognition-

behaviour relations. Doll and Ajzen concluded that their findings showed that temporal stability was a more effective moderator of the relationships between the TPB and behaviour compared to accessibility and direct experience.

2.2 Critique of Doll and Ajzen's (1992) Study

There are several issues concerning Doll and Ajzen's (1992) study that mean that replication and extension of this research is warranted. First, Doll and Ajzen examined video game play in a laboratory setting. Hence, it would be desirable to discover whether the findings extend to more meaningful prosocial behaviours in naturalistic settings. To meet these criteria, donation of food to developing countries via the Internet (*www.thehungersite.com*) was chosen as the focal behaviour in the present study. Donations can be given once a day (the food is paid for by the sponsors of the site), which means that the behaviour can form part of people's daily routine.

A second issue about Doll and Ajzen's study relates to problems with the assessment of temporal stability. Temporal stability was assessed over quite a short period of time—just 45 minutes—which means that participants were likely to have been able to remember their initial responses when they were asked to respond the second time. More seriously, temporal stability was computed from within-participants correlations between measures taken *before and after* participants had performed the behaviour. This procedure could have meant that Doll and Ajzen's temporal stability measures were subject to consistency or self-presentational bias. To overcome these difficulties in the present study, temporal stability was computed from cognition measures taken at two timepoints *prior* to performance of the behaviour. The interval between assessments of the cognitions was two weeks. Temporal stability was then used to predict behaviour two weeks after the second assessment of cognitions.

A third concern is that Fazio (1995) has criticised Doll and Ajzen's measurement of response latencies. First, Fazio's studies of accessibility used a yes/no question to provide a measure of attitudes, whereas Doll and Ajzen employed 7-point Likert scales. Fazio suggests that participants may have spent time deciding whether to put a "5" or a "6" which is unrelated to accessing the attitude in memory. Second, Fazio argued that the practice items used by Doll and Ajzen did not provide an adequate measure of participants' baseline speed of response because these items were shorter than the items used to measure cognitions about playing video games in the main experiment. The present study uses 5-point scales and employs practice items that are the same length and format as the experimental items in order to provide a more accurate measure of participants' baseline speed of response. In sum, the current study attempted to provide an second comparison of three important properties of cognitions (accessibility, direct experience and temporal stability) to complement that reported by Doll and Ajzen, taking account of a number of limitations of Doll and Ajzen's study. The main focus is the effects of these variables on intention-behaviour consistency, however the impact of these properties on other relationships within the TPB will also be considered to further clarify the role moderators have in cognition-behaviour consistency.

2.3 Hypotheses

The following hypotheses are tested in this study. First, participants who receive direct experience of performing the behaviour will possess more stable and accessible cognitions. Second, because of greater stability and/or accessibility of cognitions, participants given direct experience will exhibit stronger cognition-behaviour relations and will be more likely to donate food via the website compared to participants given indirect experience. Third, there will be a moderating effect of temporal stability such that participants with more stable cognitions will demonstrate greater cognition-

behaviour consistency compared to participants with less stable cognitions. Finally, there will be a moderating effect of accessibility such that participants with more accessible cognitions will demonstrate greater cognition-behaviour consistency compared to participants with less accessible cognitions.

2.4 Study 1

2.4.1 Participants

Seventy-five students at a United Kingdom university participated in a study investigating "attitudes toward charity" in return for class credit. At Time 1, participants completed measures of TPB variables. At Time 2 (2 weeks later), $N = 71$ participants completed measures of TPB variables. Behaviour was assessed at Time 3 (2 weeks after Time 2, $N = 64$).

2.4.2 Procedure

At Time 1, participants arrived at the testing room and read an instruction sheet that gave them information about *www.thehungersite.com*: "In the following experiment I am investigating attitudes toward charity. In particular, I want to tell you about *www.thehungersite.com*. At this web site you can donate food to people in the third world. To donate food is free as the sponsors of the site pay for the food. All that is required for you to do is to go to the site and press a button. This can be done once a day."

Participants were then seated by a computer and told that they would have to respond to questions on the computer screen, all measured on 5-point scales. The experimenter indicated the keys to use, which were labelled from 1 to 5. Participants were instructed to respond accurately but quickly (cf. Fazio, 1990b). Each item appeared on screen for up to 10 seconds, and when participants responded, the item disappeared from the screen. There was a 1.5 second break between items and the items

were presented in a random order. Prior to presentation of the experimental items, participants completed 16 practice measures. These consisted of 6 attitude, 2 subjective norm, 4 PBC, and 4 intention items regarding exercise. These items were included to familiarize participants with the task. After completing the practice items there was a short break before the experimental session started.

2.4.3 Measures

Attitudes toward donating food via *www.thehungersite.com* were measured by responses to the stem "For me to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks would be..." on twelve bipolar scales (*bad-good, unimportant-important, useless-useful, dull-exciting, harmful-beneficial, unhelpful-helpful, not involving-involving, not enjoyable-enjoyable, foolish-wise, boring-interesting, worthless-valuable, not worthwhile-worthwhile*). *Subjective norm* was measured using four items: "Most people who are important to me would approve of my donating food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*extremely unlikely-extremely likely*), "Most people who are important to me think I should donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*extremely unlikely-extremely likely*), "If I donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks, people who are important to me would disapprove" (*extremely likely-extremely unlikely*), and "People that I like do not want me to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*strongly agree-strongly disagree*). *PBC* was measured by six items: "For me to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks would be..." (*extremely difficult-extremely easy*), "I can easily donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*definitely no-definitely yes*), "I am confident that I can donate food

via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*strongly disagree-strongly agree*), "I will be able to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*extremely unlikely-extremely likely*), "It will be hard for me to donate food via *www.thehungersite.com* every day that I log onto the web in the next 2 weeks" (*extremely likely-extremely unlikely*), and "Remembering to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks, will be difficult" (*strongly agree-strongly disagree*). *Intention* was measured using six items: "I am definitely going to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*strongly disagree-strongly agree*), "I intend to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*strongly disagree-strongly agree*), "I will try to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*extremely unlikely-extremely likely*), "I plan to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*strongly disagree-strongly agree*), "I have decided that I will donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*definitely no-definitely yes*), and "I will make every attempt to donate food via *www.thehungersite.com* every day I log onto the web in the next 2 weeks" (*strongly disagree-strongly agree*). At Time 2 (two weeks later), participants completed the same practice and experimental items in the same testing room.

A behaviour questionnaire was sent via email at Time 3 and comprised the following four items: "On how many days did you log onto the web, in the last 2 weeks?", "On how many days have you donated food via *www.thehungersite.com*, in the last 2 weeks?", "Of the days you logged onto the web, how often did you donate food via *www.thehungersite.com* " (*never, occasionally, sometimes, often, everytime*),

and "What percentage of the days you logged onto the web, did you donate food via *www.thehungersite.com* " (*0-19, 20-39, 40-59, 60-79, 80-100*). After the Time 3 measure, participants were debriefed by an email message that explained the nature and purpose of the experiment.

2.4.4 Direct Experience Manipulation

After completing the Time 1 items, participants were randomly assigned to the direct and indirect experience conditions ($N = 32$ participants in each condition). Participants in the direct experience condition were taken to *www.thehungersite.com* by the experimenter where they read pages entitled "donation totals" (e.g., how many people donated food at the site on the previous day) and "hunger facts" (e.g., how many people are hungry in developing countries). After viewing this information, participants in the direct experience condition donated food via the website. Participants in the indirect experience condition read a booklet that contained printed versions of the "donation totals" and "hunger facts" plus the page that appears after donation of food. Participants in the indirect experience condition did not donate food via the website.

2.5 Results

Data analysis proceeded in three stages. First psychometric properties of the TPB variables, temporal stability and, accessibility were assessed. Second, the impact of direct experience on TPB cognitions, temporal stability, and accessibility was assessed. Finally, the moderating effects of direct experience, temporal stability, and accessibility on cognition-behaviour relations were investigated.

2.5.1 Psychometric Analyses

2.5.1.1 Attitude Components The internal consistency of the twelve attitude items was rather low (alpha = .65) so it was decided to test the possibility that the twelve items were loading on separate components (i.e., cognitive and affective components

following Rosenberg, 1960; 1968). The affective component reflects how a participant *feels* about performing the behaviour whereas the cognitive component reflects a participant's *thoughts* about the behavioural performance. A factor analysis with oblique rotation produced two distinct factors at both Time 1 and Time 2: a cognitive factor consisting of eight items (valuable, good, important, useful, beneficial, helpful, worthwhile, wise) and an affective factor made up of four items (interesting, involving, exciting, enjoyable). Table 2.1 provides a summary of the factor loadings. Thus, the conceptual distinction drawn by Rosenberg (1960; 1968) was supported in the present analysis and in all analyses both affective and cognitive measures were employed.

Table 2.1.
Factor Loadings for the twelve Attitude Measures

	Factor 1	Factor 2
For me to donate food would be... Bad-Good	.85	
For me to donate food would be... Unimportant-Important	.48	
For me to donate food would be... Useless-Useful	.90	
For me to donate food would be... Dull-Exciting		.83
For me to donate food would be... Harmful-Beneficial	.64	
For me to donate food would be... Unhelpful-Helpful	.77	
For me to donate food would be... Not Involving-Involving		.53
For me to donate food would be... Not Enjoyable-Enjoyable		.80
For me to donate food would be... Foolish-Wise	.75	
For me to donate food would be... Boring-Interesting		.85
For me to donate food would be... Worthless-Valuable	.70	
For me to donate food would be... Not Worthwhile-Worthwhile	.83	
Eigenvalue	5.55	1.74
R^2	46.3	14.5

Note Loadings below .30 have been suppressed.

2.5.1.2 Reliability of TPB and Behaviour Measures All TPB variables were entered into a reliability analysis to test their internal consistency. Reliability was high for TPB measures at Time 2 (alphas ranged from .70 to .96). Therefore, items were averaged to compute a scale for each TPB variable. The behavioural measures employed at Time 3

involved first computing a ratio measure by dividing the number of times participants had been to the website by the number of times they had logged onto the web. This ratio measure and the other two measures were then standardized and their mean was used to measure behaviour. Reliability was high (alpha = .86).

2.5.1.3 Computation of Stability Measures Following Conner et al. (2000), four measures of stability were computed for each of the TPB variables: (a) the within-participants correlation between measures taken at Time 1 and Time 2, (b) the sum of absolute differences between items at the two timepoints, (c) the absolute difference between the sum of items, and (d) the number of items exhibiting any change over time. The within-subjects correlations were subjected to *r*-to-*z* transformations, and all items were converted into *Z* scores. The mean of the four items served as a stability measure. Alphas were high (range = .79 to .90).

2.5.1.4 Computation of Accessibility Measures The distributions of the response latencies were positively skewed and, therefore, were subjected to logarithmic transformations as recommended by Fazio (1990b). All analyses were conducted on the transformed data. However, the results reported are retransformed for ease of interpretation. The impact of individual differences in speed of response was controlled by covarying participants' response latencies to the practice trials in all analyses.

A measure of intention accessibility was computed by averaging the (transformed) response latencies to the six items. Reliability for this measure was acceptable (alpha = .78). This process was repeated for all other TPB variables. Alpha values were .69 for affective attitude, .90 for cognitive attitude, .76 for PBC, and .62 for subjective norms. There was no significant impact of direct experience on response times for the filler items, $F(1, 62) = 0.11$, *ns*, and correlations between the filler items

and the response latency scales were highly significant (ranging from .66 to .73, all *p*s < .001).

2.5.2 Effects of Direct Experience on Cognitions, Temporal Stability, and Accessibility

The effects of direct experience on TPB cognitions and the stability and accessibility of these cognitions, were tested in the following ways. The effect of direct experience on the means of the TPB variables was tested using a multivariate analysis of variance (MANOVA). There was no significant main effect, $F(5, 58) = 1.10$, *ns*, and none of the univariate analyses produced a significant difference (see Table 2.2).

Next, the hypothesis that participants who had direct experience with the behaviour under study would possess more stable TPB cognitions was tested using a MANOVA. There was no significant main effect of type of experience, $F(5, 58) = 1.87$, *ns*, on the stability measures. However, participants with direct experience had more stable affective attitudes compared to participants with indirect experience ($M = 0.30$ vs. -0.30, $p < .001$) in univariate analyses (see Table 2.2).

Finally, the hypothesis that participants given direct experience possessed more accessible cognitions at Time 2 was tested using a MANCOVA (the latencies for the filler items were employed as a covariate). There was no significant main effect of direct experience, $F(5, 58) = 1.03$, *ns*. However, Table 2.2 shows that participants in the direct experience condition had significantly more accessible affective attitudes than participants in the indirect experience condition ($M = 3820$ vs. 4094, $p < .05$). To summarise, there was some evidence to support the view that direct experience of donating food via the website leads to greater accessibility and stability of participants' responses. Participants with direct experience had more accessible and stable affective

Table 2.2
TPB Scores and Accessibility and Stability of Cognitions by Condition ($N = 64$)

	Direct Experience		Indirect Experience		F
	Mean	*SD*	*Mean*	*SD*	
TPB Cognitions					
Intention	3.58	1.11	3.67	1.06	0.13
Cognitive Attitude	4.61	0.48	4.45	0.64	1.16
Affective Attitude	3.44	0.68	3.19	0.64	2.26
SN	4.26	0.56	4.19	0.73	0.18
PBC	3.54	0.94	3.65	0.90	0.22
Accessibility (Time 2)					
Intention	4235	1057	4216	900	0.00
Cognitive Attitude	3610	877	3693	986	0.32
Affective Attitude	3820	883	4094	885	4.08*
SN	4740	897	4876	1041	0.80
PBC	4426	969	4385	899	0.02
Stability					
Intention	-0.05	0.92	0.01	0.81	0.08
Cognitive Attitude	0.03	0.84	-0.07	0.97	0.18
Affective Attitude	0.30	0.74	-0.30	0.86	8.98***
SN	0.09	0.67	-0.12	1.01	0.93
PBC	0.02	0.87	-0.02	0.70	0.05

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

attitudes toward donating food via *www.thehungersite.com* compared to participants with indirect experience.

2.5.3 Prediction of Donating Behaviour

2.5.3.1 Effects of Direct Experience on Cognition-Behaviour Relations and Behaviour

The effects of direct experience on cognition-behaviour relations and donation behaviour were tested. First, it was expected that participants with direct experience of donating food via *www.thehungersite.com* would have stronger relationships between

cognitions and behaviour. Second, due to stronger cognition-behaviour relations, it was expected that participants given direct experience would be more likely to donate food compared to participants with indirect experience.

A series of moderated regressions were conducted to investigate whether direct experience moderated the impact of the TPB variables on behaviour (cf. Baron & Kenny, 1986). The TPB variables were entered at the first step, the effect of direct experience was entered at the second step, and finally the interaction between experience type and one of the TPB variables was entered on the final step (the small sample size precluded entering all of the interactions simultaneously). Variables were standardised to reduce potential multicollinearity (Aiken & West, 1991). However, there was no significant effect of direct experience and none of the interactions were associated with a significant increment in variance explained in behaviour (maximum F change = 0.62, *ns*, maximum beta = 0.02, *ns*, see Table 2.3).

To see if participants given direct experience donated food more often than participants with indirect experience a one-way (direct vs. indirect experience) between-groups ANOVA was conducted. Direct experience did not lead to more donating behaviour (direct $M = 0.04$, $SD = 0.95$, vs. indirect $M = 0.13$, $SD = 0.900$), $F(1, 62) = 0.14$, *ns*. In sum, there was no evidence that direct experience affected cognition-behaviour relations or donation behaviour.

2.5.3.2 Effects of Temporal Stability The role of temporal stability in moderating cognition-behaviour relations was assessed using a series of moderated regression analyses. TPB variables were entered on the first step, the measure of TPB stability was entered on the second step, followed by the interaction between the TPB variable and the stability measure on the final step. Table 2.4 shows that the TPB variables explained 53% of the variance in behaviour (F change = 12.86, $p < .001$) with significant beta

Table 2.3
Hierarchical Regression of Behaviour at Time 3 on TPB Variables, Condition, and Interactions ($N = 64$)

Step	Predictors	ß	ß	ß	ß	ß	ß	ß
1.	Intentions	.43*	.43*	.49*	.44*	.44*	.42*	.40*
	Affect	.02	.02	.02	.09	.02	.02	.03
	Cognition	.04	.05	.04	.02	.08	.05	.06
	SN	-.02	-.02	-.01	-.01	-.02	-.03	-.03
	PBC	.32*	.32*	.33*	.32*	.33*	.32*	.27
2.	Condition		.02	.02	.02	.02	.02	.02
3a.	Condition x Intentions			-.08				
3b.	Condition x Affect				-.08			
3c.	Condition x Cognition					-.05		
3d.	Condition x SN						.01	
3e.	Condition x PBC							.10
R^2		.53	.53	.53	.53	.53	.53	.53
R^2 Change		.53***	.00	.00	.00	.00	.00	.00
Model F		12.86***	10.55***	8.99***	8.98***	8.93***	8.88***	9.07***

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 2.4
Hierarchical Regression of Behaviour at Time 3 on TPB Variables, TPB Stability Measures, and Interactions ($N = 64$)

Step	Predictors	ß	ß	ß	ß	ß	ß	ß	ß	ß	ß	ß
1.	Intentions	.43*	.44*	.43*	.44*	.40*	.43*	.40*	.47**	.47**	.46*	.46**
	Affective Attitude	.02	.03	-.02	.02	-.01	.02	-.02	.03	.04	.02	.03
	Cognitive Attitude	.04	.04	.10	.04	.07	.03	.19	.03	.04	.02	.03
	SN	-.02	-.02	-.08	-.02	-.01	-.01	-.06	-.01	.01	-.03	-.08
	PBC	.32*	.33*	.36*	.32*	.39*	.32*	.34*	.34*	.34*	.36*	.42**
2a.	Intention Stability		-.02	.05								
3a.	Intention x Stability			.23*								
2b.	Affective Stability				-.01	-.01						
3b.	Affective Attitude x Stability					-.13						
2c.	Cognitive Stability						.04	-.04				
3c.	Cognitive Attitude x Stability							.22*				
2d.	SN Stability								-.12	-.15		
3d.	SN x Stability									.07		
2e.	PBC Stability										-.10	-.18
3e.	PBC x Stability											.21*
R^2		.53	.53	.57	.53	.54	.53	.56	.54	.54	.53	.57
R^2 Change		.53***	.00	.04*	.00	.01	.00	.03*	.01	.00	.00	.04*
Model F		12.86***	10.55***	10.62***	10.54***	9.34***	10.59***	10.25***	11.09 ***	9.52***	10.83***	10.62***

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

weights for intentions and PBC (betas = .43 and .32, respectively, $p < .05$): Participants with positive intentions and greater perceived control over donation were likely to donate food via the website.

When stability and the stability interaction terms were entered, there were significant moderating effects of temporal stability for intentions, PBC, and cognitive attitudes (see Table 2.4). The intention by intention stability interaction had a significant positive beta weight and was associated with a significant increase in the amount of variance explained in behaviour (beta = .23, $p < .05$, F change = 5.77, $p < .05$, R^2 change = .04). Similarly, the interaction between PBC and PBC stability had a significant positive beta weight and led to a significant improvement in the amount of variance accounted for (beta = .21, $p < .05$, F change = 4.92, $p < .05$, R^2 change = .04). Finally, the cognitive attitude by cognitive attitude stability interaction also had a positive and significant beta weight which lead to a significant increase in the amount of variance explained (beta = .22, $p < .05$, F change = 4.41, $p < .05$, R^2 change = .03).

The interaction terms were decomposed using simple slope analysis (Aiken & West, 1991). The effect of the independent variable on behaviour was examined at three levels of the moderator variable in each case; the mean level, one standard deviation above the mean, and one standard deviation below the mean. For the intention by intention stability interaction there was a positive effect of stability (see Figure 2.1).

When intention stability was low, intentions positively predicted behaviour (B = .44, $p < .001$). However, the predictive validity of participants' intentions improved as stability increased from low to moderate and from moderate to high (Bs = .57, and .71, respectively, $p < .001$). Thus, as intentions became more stable, their predictive power increased.

Figure 2.1 Interaction between Intention and Intention Stability

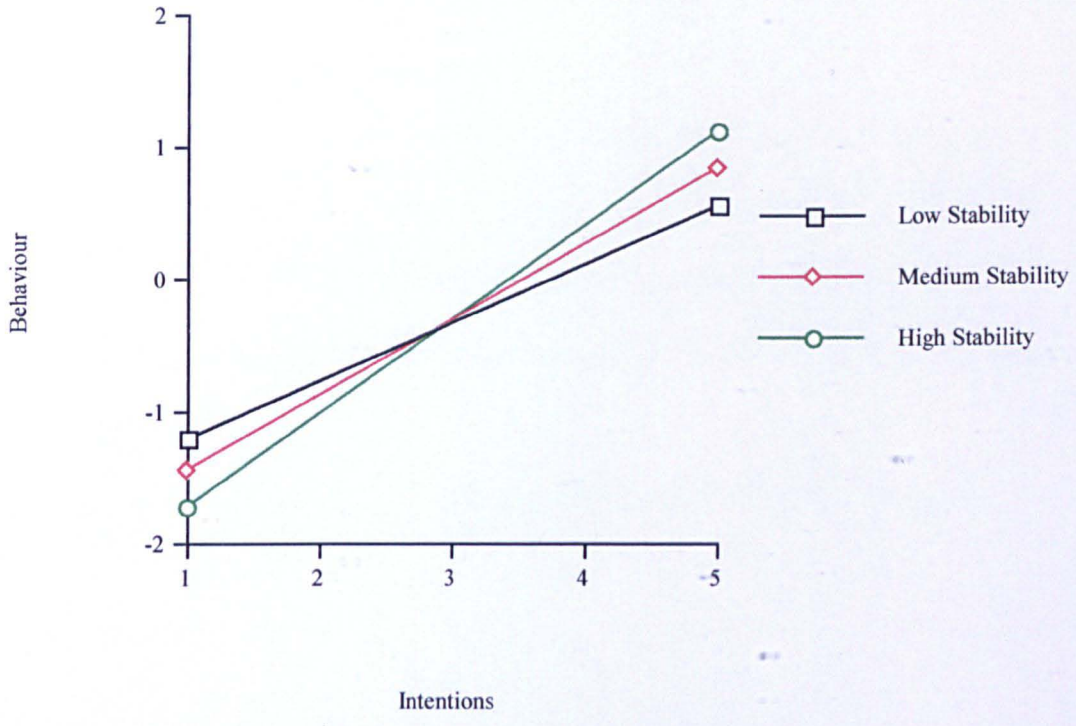
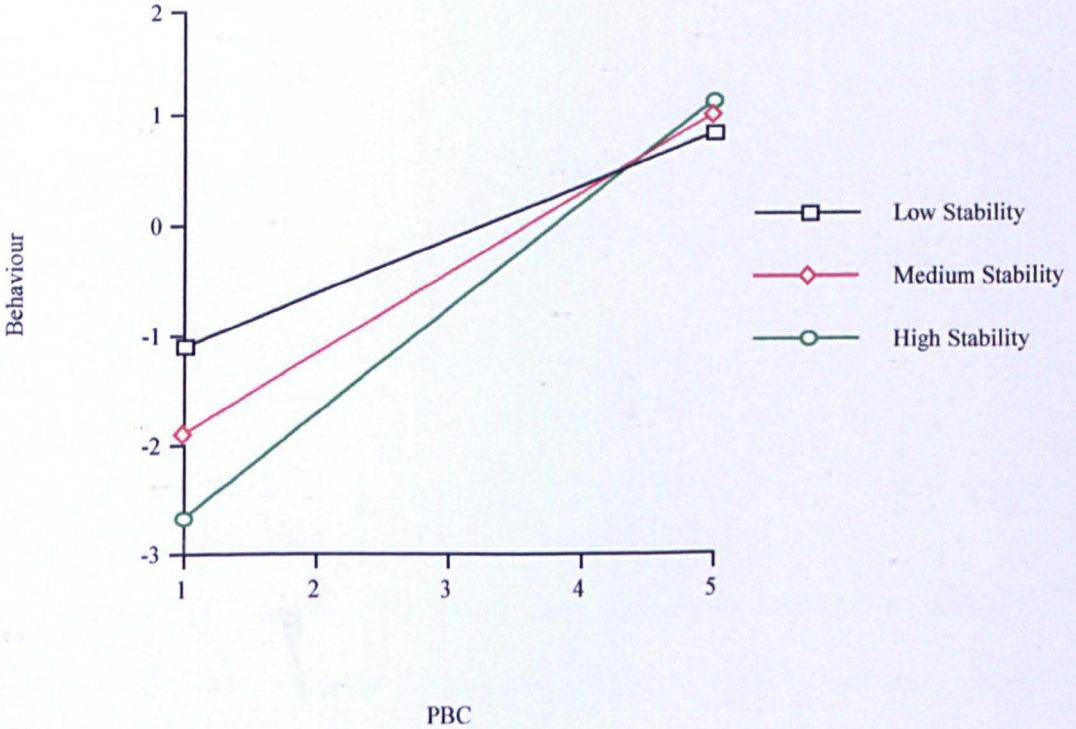


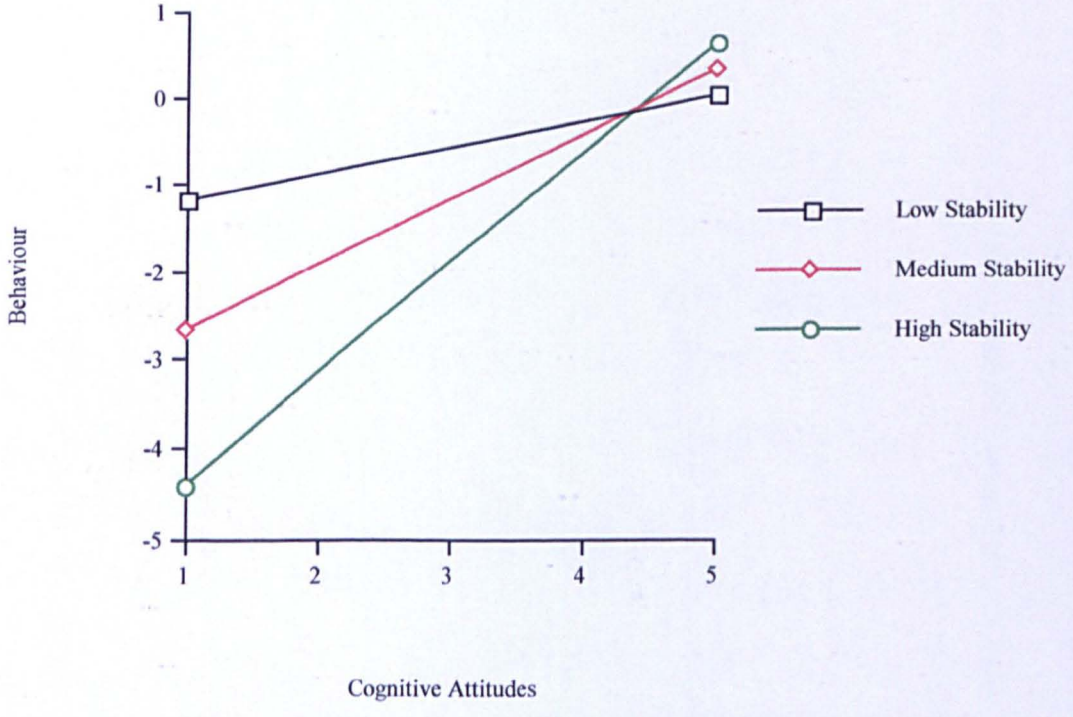
Figure 2.2 Interaction between PBC and PBC Stability



The same pattern of results occurred for PBC (Bs = .49, .73, and .96, for low, medium, and high levels of stability, respectively, all *p*s < .001). Thus, PBC better predicted behaviour when participants' perceptions of control over their behaviour were more stable (see Figure 2.2).

Decomposing the interaction between cognitive attitudes and stability (see Figure 2.3) showed that at low levels of stability, cognitive attitudes did not predict behaviour (B = .31, *ns*). When stability increased to moderate and high levels, participants' cognitive attitudes significantly predicted their behaviour (Bs = .76, and 1.27, respectively, $p < .001$).

Figure 2.3 Interaction between Cognitive Attitude and Cognitive Attitude Stability



In summary, significant moderating effects have been found for intention stability, PBC stability, and cognitive attitude stability. Participants with more stable intentions were more likely to enact these intentions compared to participants with less

Table 2.5
Hierarchical regression of behaviour at Time 3 on TPB variables, TPB Accessibility measures, and all Interactions (N =64)

Step	Predictors	ß	ß	ß	ß	ß	ß	ß	ß	ß	ß	ß
1.	Intentions	.43*	.43*	.35	.38*	.35*	.40*	.35	.42*	.34	.36*	.40*
	Affective Attitude	.02	.02	.02	.08	.05	.04	.19	.02	.00	.03	.03
	Cognitive Attitude	.04	.04	.08	.06	.08	.08	.02	.05	.12	.06	.09
	SN	-.02	-.02	-.06	.01	-.02	.01	-.02	-.01	-.04	-.02	-.05
	PBC	.32*	.33*	.41*	.38**	.42**	.37*	.42**	.33*	.45**	.41*	.40*
2a.	Intention Accessibility		.02	.01								
3a.	Intention x Accessibility			-.13								
2b.	Affective Accessibility				.18	.11						
3b.	Affective Attitude x Accessibility					-.15						
2c.	Cognitive Accessibility						.12	.07				
3c.	Cognitive Attitude x Accessibility							-.16				
2d.	Subjective Norm Accessibility								.03	.03		
3d.	Subjective Norm x Accessibility									-.16		
2e.	PBC Accessibility										.05	.08
3e.	PBC x Accessibility											-.11
R^2		.53	.53	.54	.55	.57	.53	.55	.53	.55	.53	.54
R^2 Change		.53***	.00	.01	.02	.02	.00	.02	.00	.02	.00	.01
Model F		12.86***	10.54***	9.36***	11.68***	10.49***	10.89***	9.75***	10.56 ***	9.67***	10.60***	9.33***

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

stable intentions. For both PBC and cognitive attitude stability, there was an effect of stability at low levels of the cognition such that participants with stable cognitions were less likely to donate food than participants with unstable cognitions. However, when PBC and cognitive attitudes were positive, greater stability did not increase donation behaviour.

2.5.3.3 Effects of Accessibility It was expected that participants with more accessible cognitions would show stronger cognition-behaviour relations than participants withless accessible cognitions. A series of moderated regressions were conducted to test this hypothesis. On the first step all the TPB variables were entered, one measure of TPB accessibility was entered on the second step, and the interaction between the TPB variable and the accessibility measure was entered on the final step. None of the accessibility or interaction items were significant (maximum F change = 2.69, maximum beta = -.16) indicating that accessibility did not moderate the relationship between cognitions and behaviour (see Table 2.5).

2.5.4 Discussion

The present study investigated the impact of three moderating variables—direct experience, temporal stability and accessibility—on cognition-behaviour relations. Findings demonstrated that direct experience led to more stable and accessible affective attitudes, that temporal stability moderated the intention-behaviour, PBC-behaviour, and cognitive attitude-behaviour relations, and that accessibility did not moderate cognition-behaviour relations.

2.6 Temporal Stability as a Moderator of Cognition-Behaviour Relations

In the present study, participants who directly experienced donating food via *www.thehungersite.com* possessed more stable and accessible affective attitudes compared to participants with indirect experience. These results are consistent with findings obtained by Millar and Millar (1996). Millar and Millar argued that direct

experience leads to stronger affect towards a behaviour because participants' feelings about the behaviour are salient when their attitudes are formed. Given that donating food to hungry people is likely to be associated with strong affective responses among participants, it is perhaps unsurprising that participants who received direct experience possessed more stable and accessible affective attitudes toward the behaviour. It is unclear why these effects were limited to affective attitudes, although because of the material included in the study it may be that only affective attitudes were affected over the two week period. Perhaps other effects would have emerged with a shorter time interval between manipulation of direct experience and measurement of cognitions and behaviour. It may also have been the case that the study had insufficient power (due to a small sample) to detect other effects of direct experience. Further studies are needed to address this issue.

The failure to find an effect of direct experience on cognition-behaviour relations is probably due to methodological differences between the present study and previous research. Previous studies (e.g., Doll & Ajzen, 1992) manipulated direct experience immediately prior to measurement of cognitions and then used behaviours such as puzzle completion that can be performed many times after completing measures of cognitions. measurement of cognitions, whereas the present study had a two week gap between the manipulation of direct experience and used a behaviour that could only be performed once a day. This design was employed so that temporal stability could be measured and the behaviour was chosen to widen the types of behaviour tested. In hindsight, direct experience should perhaps have been manipulated immediately before measuring cognitions at Time 2. However, the fact that differences in affective attitudes occurred in spite of the current design suggests that direct experience did have some effect on participants' cognitions. Generally the results suggest that the effects of direct experience on cognitions and behaviour are short-lived.

An alternative explanation is that the manipulation of direct experience was not sufficiently strong—a single visit *www.thehungersite.com*—to increase cognition-behaviour consistency among participants who received direct experience. Future studies will need to examine whether a shorter time interval or stronger manipulation of direct experience would increase the impact of direct experience on cognition-behaviour relations.

The present results support previous research on the effects of temporal stability on intention-behaviour and PBC-behaviour relations (Conner et al., 2000; 2002; Sheeran et al., 1999). Consistent with these studies, the present results show that participants with more stable cognitions possessed stronger intention-behaviour and PBC-behaviour relations, compared to participants with less stable cognitions. These findings further emphasize the utility of employing temporal stability as a moderator of intention-behaviour and PBC-behaviour relations and suggest that temporal stability may be usefully employed in future tests of the TPB to reduce the intention-behaviour gap (cf. Sheeran, 2002).

The present study also tested the moderating role of accessibility on cognition-behaviour relations. Previous studies have found that accessibility moderates both intention-behaviour and attitude-behaviour relations (Bassili, 1995; Kokkinaki & Lunt, 1997). However, the present study found no moderating effects for accessibility. One explanation why accessibility may have failed to moderate cognition-behaviour relations concerns the possibility that donating behaviour was not yet strongly associated with participants' cognitions. Fazio (1990a) noted that the accessibility of participants' cognitions will not aid behavioural prediction unless there are strong associations between participants' cognitions and the behavioural object. For these associations to develop participants must become familiar with performing the behaviour. It may have been the case in the present study that participants were not

sufficiently familiar with the behaviour two weeks after the second measure of cognitions for strong associations between cognitions and behaviour to have developed. This interpretation is supported by the fact that previous studies which obtained moderating effects for accessibility have investigated either (a) behaviours such as voting which are familiar to participants (e.g., Bassili, 1995) or, (b) behaviours that were demonstrated to participants immediately prior to the measurement of cognitions which happened, for example, in studies of puzzle completion (e.g., Fazio et al., 1982). Chapter 4 tests the assumption that familiarity with behavioural performance will increase the impact that accessibility has on cognition-behaviour relations.

Therefore, an important aspect of the present study is that it demonstrates the importance of temporal stability as a moderator of cognition-behaviour relations in comparison to accessibility and direct experience. This is important because research often focuses on a single moderator variable and does not compare the relative impact of different moderator variables on cognition-behaviour consistency. Consequently, the available literature on moderator variables is unclear as to the importance of different moderator variables (cf. Krosnick et al., 1993).

However, research that simultaneously tests multiple moderator variables can increase understanding of the relative importance of different moderator variables. For example, Doll and Ajzen's (1992) research demonstrated that accessibility and temporal stability differed in the impact they had on cognition-behaviour associations, and produced no support for Fazio's (1990a) claim that accessibility mediates the impact of other moderator variables on attitude-behaviour relations. Further research comparing other moderator variables is needed to more completely understand how properties of cognitions differentially affect the relation between cognitions and behaviour (see Chapter 4 for a further test of multiple moderator variables).

In conclusion, the present study shows that temporal stability moderates cognition-behaviour relations in the context of donating food via the Internet but, that neither accessibility or direct experience moderate cognition-donating behaviour relations. Stable intentions, PBC, and cognitive attitudes were associated with stronger cognition-behaviour relations two weeks after the second measure of cognitions.

CHAPTER 3: HOW EFFECTIVE ARE MODERATOR VARIABLES?

3.1 Overview

Chapter 2 demonstrated that moderator variables can differ in the impact they have on cognition-behaviour relations, e.g., temporal stability moderated attitude-behaviour, intention-behaviour and PBC-behaviour relations whereas neither accessibility nor direct experience moderated any of these relationships. Thus, it would be useful to ask "How effective, on average, have properties of cognitions been as moderator variables in previous research?" For example, it may be the case that temporal stability is not usually an effective moderator variable and that the results in Chapter 2 are unique to that behaviour. Similarly, accessibility and direct experience have been shown to moderate attitude-behaviour relations in previous research (Fazio, et al., 1982; Fazio & Williams, 1986) so the results from the previous study may not be indicative of the trend found in other research.

To address this question, a meta-analysis of the literature that has investigated the moderating effects of properties of cognitions was conducted. A meta-analysis is a quantitative literature review that aims to test the generality of research findings in a systematic fashion. The present study focuses on seven properties classified by Krosnick and Petty (1995) as relating to defining features of attitude strength (temporal stability), aspects of attitude structure (accessibility, affective-cognitive consistency, and ambivalence), subjective beliefs about attitudes (certainty and involvement), or processes of attitude formation (direct experience). The power of a meta-analysis does depend on the number of studies that can be included so the seven variables included were chosen on the basis that they have been the most frequently employed moderators of cognition-behaviour consistency, and because they have been mentioned in previous reviews of the moderator literature.

3.2 Properties of Cognitions as Moderator Variables

Krosnick and Petty (1995) suggested that all of these seven properties are likely to improve attitude-behaviour consistency, and Raden (1985) also included all of these variables, except ambivalence, in his review of the literature. Other researchers have employed these properties as moderators of relations within the TPB. Studies have demonstrated that attitude strength indices can moderate attitude-intention relations (Armitage & Conner, 2000; Budd & Spencer, 1984), and can be adapted to moderate subjective norm-intention (Nederhof, 1989; Trafimow, 1994), intention-behaviour (Bassili, 1995; Sheeran et al., 1999), and PBC-behaviour (Conner et al., 2000; Doll & Ajzen, 1992) relations. The aim of the present study is to conduct the first quantitative review of the impact of the seven moderator variables outlined above, on cognition-intention and/or cognition-behaviour relations. The background literature to accessibility, direct experience and temporal stability has been covered in previous chapters. Therefore, the next section will define the four moderator variables that have not yet been described.

3.2.1 Involvement

An issue is involving when it is perceived as important and personally relevant (e.g., Kokkinaki & Lunt, 1997). Thus, the prediction is that participants who are highly involved with an issue should possess greater attitude-intention consistency than less involved participants. Evidence to support this view was obtained by Petty, Cacioppo, and Schumann (1983) who found that participants who were more involved with a product showed greater attitude-intention consistency and were less persuaded by weak arguments for the product, compared to participants who were less involved. Similarly, Verplanken (1989) showed that participants who were highly involved in the issue of nuclear energy possessed stronger attitude-intention relations than participants who were less involved (see also, Nederhof, 1989). Petty, Haugtvedt, and Smith (1995) suggested that involvement moderates attitude-intention consistency because it

produces attitudes that are based on greater elaboration of relevant information, which, in turn, produces attitudes that are more accessible, certain, and based on more knowledge. Supporting evidence for these predictions comes from a series of studies (Bizer & Krosnick, 2001; Kokkinaki & Lunt, 1997; 1999; Lavine, Borgida, & Sullivan, 2000), which showed that a high level of involvement with an object produces more accessible attitudes.

3.2.2 Certainty

Certainty is usually measured using a single item that asks participants how certain they feel about their cognitions (e.g., "My intention to vote for X is certain/uncertain"). Fazio and Zanna (1978a) found that participants who were more certain about their attitudes possessed stronger relations between attitudes and volunteering behaviour than participants who were less certain. Trafimow (1994) found that certainty moderated subjective norm-intention relations: Participants who were highly certain about their subjective norm in relation to using a condom possessed greater subjective norm-intention consistency than participants who were less certain of their subjective norm. Similarly, Bassili (1993) found that certainty moderated the relationship between intention and voting behaviour. Bassili (1996) suggested that certainty has a specificity of meaning (i.e., to be certain is to be unbudgeable on an issue) which may explain why certainty is a successful moderator of cognition-intention and cognition-behaviour associations.

3.2.3 Ambivalence

Attitudes are usually conceived as unidimensional, bipolar, constructs and participants are assumed to possess either a positive, neutral, or negative attitude towards an attitude object. However, Kaplan (1972) pointed out that individuals could hold both positive and negative attitudes toward the same attitude object. For example, a person may hold both positive and negative attitudes towards eating a low fat diet

(e.g., "Eating a low fat diet is healthy" vs. "Eating a low fat diet is unpleasant"). To calculate ambivalence scores most researchers use the formula provided by Thompson, Zanna, and Griffin (1995) that captures both the similarity and intensity of participants' positive and negative attitudes:

$$\text{Ambivalence} = (\text{positive} + \text{negative})/2 - |\text{positive} - \text{negative}|$$

Sparks, Conner, James, Shepherd, and Povey (2001) argued that high levels of ambivalence reduce attitude-intention and attitude-behaviour consistency because participants' attitudes are in conflict; this conflict creates less stable attitudes that offer poor prediction of intentions/behaviour. For example, Armitage and Conner (2000) found that participants with less ambivalent attitudes towards eating a low fat diet possessed greater attitude-intention and attitude-behaviour consistency than participants high in ambivalence. However, not all research has confirmed the moderating impact of ambivalence outlined above. Jonas, Diehl, and Bromer (1997) found that higher levels of ambivalence were associated with *greater* attitude-intention consistency. Jonas et al. claim that higher ambivalence leads to more systematic processing of available information, which produces attitudes that are more predictive of intentions (cf. Petty & Cacioppo's, 1986, elaboration likelihood model of persuasion).

3.2.4 Affective-Cognitive Consistency

Rosenberg (1960, 1968) proposed that attitudes possess both an affective and a cognitive component; the affective component refers to a participant's *feelings* about performing a behaviour whereas the cognitive component reflects a participant's *thoughts* about behavioural performance. Researchers compute the discrepancy between affective and cognitive attitude measures to calculate affective-cognitive consistency. Rosenberg (1968) stated that affective-cognitive consistency should strengthen the attitude-behaviour relationship because

> "When the affective and cognitive components of an attitude are mutually consistent, the attitude is in a stable state." (p 75).

Thus, individuals with high affective-cognitive consistency were expected to exhibit more stable attitudes that may be better predictors of behaviour compared to the attitudes of individuals with low affective-cognitive consistency. Norman (1975) investigated this hypothesis in a study of students' volunteering behaviour, and found that participants with high affective-cognitive consistency possessed stronger attitude-behaviour relations than participants with low affective-cognitive consistency. However, Fazio & Zanna (1978a), in a replication of Norman's study, found no moderating effect of affective-cognitive consistency on attitude-volunteer behaviour relations.

3.3 Study 2

The present study examines the impact of seven properties of cognitions (accessibility, temporal stability, direct experience, involvement, certainty, ambivalence, and affective-cognitive consistency) as moderators of five relationships in the TPB, namely, attitude-behaviour, intention-behaviour, PBC-behaviour, attitude-intention, and subjective norm-intention relations. There were too few papers on moderation of PBC-intention and subjective norm-behaviour relations by properties of cognitions to include these relationships in the review. The rationale for the current study is that previous tests of moderation by these properties have produced contradictory findings. Thus, it is unclear how well these properties moderate cognition-intention and cognition-behaviour relations across studies. The main aim of the present study is to provide the first quantitative review of the properties of cognitions as moderators of cognition-intention and cognition-behaviour relations. A second aim of this study is to test the comparative strength of the variables in order to identify which moderator(s) best enhance cognition-intention and cognition-behaviour associations.

3.4 Method

3.4.1 Sample of Studies

Several methods were used to generate the sample of studies: (a) computerised searches of social scientific databases (Dissertations Abstracts Online, Index to Theses, PsychLIT, Social Science Citation Index, and Web of Science) from January 1981 to the time of writing (September, 2002), (b) reference lists in each article were evaluated for inclusion, and (c) the authors of published articles were contacted and requests were made for unpublished studies and studies in press.

For inclusion in the review, a bivariate statistical relationship between cognitions and intention (or behaviour) for participants classified as high or low on the moderator variable had to be retrievable from studies. Where studies did not include relevant statistics, the authors of the study were contacted and requests were made for bivariate associations. Using this inclusion criterion, a total of 44 tests of cognition-intention/behaviour associations were found. An asterisk in the reference list precedes the 44 studies that yielded the 92 effect sizes. These 44 studies included 8 unpublished papers (Conner, Povey, & Sparks, 1995; Cooke & Sheeran, 2001a; 2001b; 2002; Godin & Conner, 2002; Huiuk, 1995; Rennier, 1989; Sheeran, 1999). Table 3.1 presents the characteristics and effect sizes obtained from the 44 studies included in the review. Thirty one studies (70%) reported cognition-behaviour correlations, eight studies reported cognition-intention relations (19%) and five studies (11%) reported both cognition-behaviour and cognition-intention relations.

3.4.2 Meta-Analytic Strategy

The effect size estimate employed here was a weighted average of the sample correlations, r_+. r_+ describes the direction and strength of the relationship between two variables with a range of -1.0 to + 1.0. Computing the weighted average effect size

requires a transformation of the correlation from each relevant hypothesis into Fisher's (1921) *Z*. The following formula is then employed:

$$\text{Average } Z = \frac{\sum (N_i \times r_{zi})}{\sum N_i}$$

where r_{zi} = the Fisher's *Z* transformation of the correlation from each study *i*, and N_i = number of participants in study *i*.

In this way correlations based on larger samples receive greater weight than those from smaller samples. The average *Z* value is then backtransformed to give r_+ (see Hedges & Olkin, 1985; Hunter, Schmidt, & Jackson, 1982).

Homogeneity analyses were conducted using the chi-square statistic (Hunter et al., 1982) to determine whether variation among the correlations was greater than chance. The degrees of freedom for the chi-square test are $k - 1$, where k is the number of independent correlations. If chi-square is non-significant, then the correlations are homogeneous and the average weighted effect size, r_+, can be said to represent the population effect size. Transformation of other statistics (e.g., *t*, *F* values) to statistic *r*, computation of the weighted average correlations, and homogeneity analyses were all conducted using Schwarzer's (1988) *Meta* computer program.

To determine the robustness of the average correlations obtained here, the number of unpublished studies containing null results required to invalidate the conclusions was estimated using the 'Fail-Safe *N*' statistic (Rosenthal, 1984). The majority of the high (low for ambivalence) groups exceeded the FSN tolerance level of 5K + 10 and where they did not there was not a significant difference between the high and low groups. Hence, the results presented here can be considered quite robust.

3.4.3 Multiple Samples and Multiple Measures

Table 3.1.
Studies of the Impact of Moderating Variables on Cognition-Intention and Cognition-Behaviour Relations

Authors	Behaviour	Moderator	IV	DV	High		Low	
					N	*r*	*N*	*r*
Armitage & Conner (2000)	Healthy Eating	Ambivalence	Attitude	BI	173	.39	173	.55
	Healthy Eating	Ambivalence	Attitude	B	173	.40	173	.54
Bassili (1995)	Voting	Accessibility	Intention	B	40	1.00	41	.79
Berger & Mitchell (1989)	Product Choice	Direct Experience	Attitude	B	26	.70	25	.47
Budd & Spencer (1984)	Alcohol Consumption	Certainty	Attitude	BI	32	.90	74	.59
	Alcohol Consumption	Certainty	SN	BI	63	.62	43	.33
Conner, Norman, & Bell (2002)	Healthy Eating	Stability	Intention	B	69	.40	69	.20
	Healthy Eating	Stability	PBC	B	69	.17	69	.24
Conner, Povey & Sparks (1995)	Healthy Eating	Ambivalence	Attitude	BI	79	.74	79	.77
	Healthy Eating	Ambivalence	Attitude	B	79	.25	79	.43
Conner, Povey, Sparks, James,	Healthy Eating	Ambivalence	Attitude	BI	113	.55	119	.77
& Shepherd (in press)	Healthy Eating	Ambivalence	Attitude	B	113	.38	119	.62
Conner, Sheeran, Norman,	Health Screening	Stability	Intention	B	100	.32	99	.15
& Armitage (2000) Study 1	Health Screening	Stability	PBC	B	100	.31	99	.13
Conner, Sheeran, Norman,	Healthy Eating	Stability	Intention	B	202	.66	205	.53
& Armitage (2000) Study 2	Healthy Eating	Stability	PBC	B	202	.62	205	.38
Conner, Sparks, Povey, James,	Healthy Eating	Ambivalence	Attitude	BI	75	.37	74	.36
Shepherd & Armitage (2002) Sample 1	Healthy Eating	Ambivalence	Attitude	B	75	-.02	74	.43
Conner, Sparks, Povey, James,	Healthy Eating	Ambivalence	Attitude	BI	72	.67	73	.78
Shepherd & Armitage (2002) Sample 2	Healthy Eating	Ambivalence	Attitude	B	72	.30	73	.48
Cooke & Sheeran (2001a)	Donation Behaviour	Accessibility	Attitude	B	24	.45[a]	24	.40[a]
	Donation Behaviour	Accessibility	Intention	B	24	.61[a]	24	.60[a]

Table 3.1 (continued)

Cooke & Sheeran (2001a)	Donation Behaviour	Accessibility	PBC	B	24	.61[a]	24	.57[a]
	Donation Behaviour	Direct Experience	Attitude	B	23	.43[a]	25	.51[a]
	Donation Behaviour	Direct Experience	Intention	B	23	.70[a]	25	.54[a]
	Donation Behaviour	Direct Experience	PBC	B	23	.71[a]	25	.53[a]
	Donation Behaviour	Stability	Attitude	B	24	.39[a]	24	.48[a]
	Donation Behaviour	Stability	Intention	B	24	.73[a]	24	.40[a]
	Donation Behaviour	Stability	PBC	B	24	.80[a]	24	.49[a]
Cooke & Sheeran (2001b)	Exercise	Accessibility	Attitude	B	28	.58	27	.23
	Exercise	Accessibility	Intention	B	28	.80	27	.54
Cooke & Sheeran (2002)	Exercise	Accessibility	Attitude	B	57	.54	59	.52
	Exercise	Accessibility	Intention	B	58	.74	58	.62
	Exercise	Accessibility	PBC	B	58	.46	58	.28
	Exercise	Ambivalence	Attitude	BI	49	.64	66	.65
	Exercise	Ambivalence	Attitude	B	62	.52	53	.52
	Exercise	Involvement	Attitude	BI	66	.63	50	.50
	Exercise	Involvement	Attitude	B	56	.44	60	.44
	Exercise	Stability	Intention	B	58	.79	58	.54
	Exercise	Stability	PBC	B	57	.39	59	.41
Davidson & Jaccard (1979)	Contraception	Stability	Attitude	B	179	.73	63	-.24
	Contraception	Stability	Intention	B	206	.88	36	-.40
Doll & Ajzen (1992)	Computer Game Play	Accessibility	Attitude	B	38	.43	37	.54
	Computer Game Play	Accessibility	Intention	B	38	.54	37	.43
	Computer Game Play	Accessibility	PBC	B	38	.47	37	.48
	Computer Game Play	Direct Experience	Attitude	B	38	.59	37	.37
	Computer Game Play	Direct Experience	Intention	B	38	.61	37	.39
	Computer Game Play	Direct Experience	PBC	B	38	.51	37	.40
Fazio, Chen, McDonel, & Sherman (1982)	Puzzles	Accessibility	Attitude	B	40	.47	39	.22
Fazio, Powell, & Williams (1989)	Product Choice	Accessibility	Attitude	B	34	.62	34	.50
Fazio & Williams (1986)	Voting	Accessibility	Attitude	B	60	.88	61	.72

Table 3.1 (continued)

Fazio & Zanna (1978a)	Volunteering	Affective-Cognitive	Attitude	B	47	.35	47	.37
	Volunteering	Certainty	Attitude	B	47	.39	47	.08
Fazio & Zanna (1978b) Study 1	Puzzles	Direct Experience	Attitude	B	15	.52	15	.26
Fazio & Zanna (1978b) Study 2	Puzzles	Certainty	Attitude	B	22	.59	21	.42
	Puzzles	Direct Experience	Attitude	B	21	.59	22	.44
Godin & Conner (2002) Study 1	Condom Use	Stability	Intention	B	108	.42	45	.02
Godin & Conner (2002) Study 2	Exercise	Stability	Intention	B	144	.61	170	.04
Huiuk (1995)	Product Choice	Accessibility	Attitude	B	69	.15	72	.20
Jonas, Diehl, & Bromer (1997) Study 1	Product Choice	Ambivalence	Attitude	BI	48	.69	24	.26
Jonas, Diehl, & Bromer (1997) Study 2	Product Choice	Ambivalence	Attitude	BI	20	.70	40	.33
Kokkinaki & Lunt (1997)	Product Choice	Accessibility	Attitude	B	45	.52	45	.41
	Product Choice	Involvement	Attitude	B	45	.51	45	.43
Millar & Millar (1996) Study 2	Puzzles	Direct Experience	Attitude	B	22	.49[b]	22	.16[b]
Millar & Millar (1996) Study 3	Puzzles	Direct Experience	Attitude	B	20	.10[b]	20	.13[b]
Millar & Tesser (1989)	Puzzles	Affective-Cognitive	Attitude	B	40	.62[c]	41	.45[c]
Nederhof (1989)	Research	Certainty	Attitude	BI	52	.67[d]	21	.37[d]
	Research	Certainty	SN	BI	93	.81[d]	34	.49[d]
	Research	Involvement	Attitude	BI	55	.41[d]	17	.50[d]
Norman (1975) Study 1	Volunteering	Affective-Cognitive	Attitude	B	14	.51	12	-.18
Norman (1975) Study 2	Volunteering	Affective-Cognitive	Attitude	B	20	.52[d]	19	.31[d]
Norman (1975) Study 3	Volunteering	Affective-Cognitive	Attitude	B	59	.44	58	.15
Petty, Cacioppo, & Schuman (1983)	Product Choice	Involvement	Attitude	BI	80	.59	80	.36
Pieters, & Verplanken (1995)	Voting	Certainty	Intention	B	74	.95[e]	53	.72[e]
Regan & Fazio (1977) Study 2	Puzzles	Direct Experience	Attitude	B	14	.53[f]	14	.21[f]
Rennier (1989)	Product Choice	Accessibility	Attitude	B	31	.95	30	.85
Schwartz (1978)	Volunteering	Stability	Attitude	B	51	.40[a]	45	.02[a]
Sheeran (1999)	Exams	Certainty	Intention	B	28	.59	22	.15
Sheeran & Abraham (in press)	Exercise	Certainty	Intention	B	102	.65	83	.47
	Exercise	Stability	Intention	B	93	.77	92	.50

Table 3.1 (continued)

Sheeran, Orbell, & Trafimow (1999)	Studying	Stability	Intention	B	82	.73	82	.40
Sparks, Conner, James, Shepherd, & Povey (2001) Sample 1	Healthy Eating	Ambivalence	Attitude	BI	73	.55	72	.62
Sparks, Conner, James, Shepherd, & Povey (2001) Sample 2	Healthy Eating	Ambivalence	Attitude	BI	82	.61	83	.78
Sparks, Hedderly, & Shepherd (1992)	Diet	Ambivalence	Attitude	BI	77	.46[g]	69	.46[g]
Steffen & Gruber (1991)	TSE	Direct Experience	Attitude	B	28	.34	32	.25
	TSE	Direct Experience	Intention	B	28	.59[a]	32	.28[a]
Steffen, Sternberg, Teegarden, & Shepherd (1994)	TSE	Direct Experience	Intention	B	70	.71[a]	207	.61[a]
Trafimow (1994) Study 2	Condom Use	Certainty	Attitude	BI	36	.71	36	.61
	Condom Use	Certainty	SN	BI	36	.94	36	-.09
Trafimow & Sheeran (1998)	Smoking	Affective-Cognitive	Attitude	B	67	.68[c]	38	-.53[c]
Verplanken (1989)	Fuel Use	Involvement	Attitude	BI	832	.58[g]	790	.28[g]
Warland & Sample (1973) Fall	Voting	Certainty	Attitude	B	63	.45	77	-.06
Warland & Sample (1973) Spring	Voting	Certainty	Attitude	B	88	.47	51	.14
Winter & Goldy (1993)	Taking Condoms	Direct Experience	Attitude	B	112	.30	70	.24

Note. PBC = Perceived behavioural control, SN = Subjective norm, IV = Independent Variable, DV = Dependent Variable, BI = Behavioural Intention B = Behaviour, *N* = Number of Participants, *r* = Correlation between cognitions and intentions/cognitions and behaviour, TSE = Testicular self-exam.

[a] Average of measures taken at two timepoints.

[b] Sample weighted average of two groups.

[c] Sample weighted average of four groups.

[d] Sample weighted average of two measures of intention.

[e] Values are proportions.

[f] Average of two measures of behaviour.

[g] Sample weighted average of four measures of intention.

Where studies reported separate statistical tests for more than one sample, then the correlation from each sample was used as the unit of analysis. Where studies included more than one measure of cognition-intention or cognition-behaviour relations (e.g., attitude-intention and subjective norm-intention relations, see Budd & Spencer, 1984; Nederhof, 1989; Trafimow, 1994), each correlation was treated as an independent test of that relation. Where studies contained multiple nonindependent samples (Nederhof, 1989; Norman, 1975; Sparks, Hedderley, & Shepherd, 1992; Verplanken, 1989), the conservative strategy of using the weighted average of the sample correlations and the smallest *N* in the analysis to determine the overall effect size for that study was employed. Where studies had measured multiple moderator variables (Cooke & Sheeran, 2001a; 2002; Doll & Ajzen, 1992; Fazio & Zanna, 1978a; 1978b; Nederhof, 1989; Sheeran & Abraham, in press), they were treated as independent tests of these moderators.

3.5 Results

Two strategies were adopted to examine the moderating effects of the seven variables. First, each moderator was treated as a dichotomous variable, with participants defined as either "high" or "low" on the moderator. This follows the convention in previous studies. The sample weighted average correlation, r_+, was calculated separately for the two groups and Fisher's (1921) *Z* test for the comparison of independent correlations was used to assess the significance of the difference between effect sizes (1-tailed tests were employed because hypotheses were directional in all cases). This provided a measure of the overall effectiveness of each variable as a moderator of cognition-intention/behaviour relations. Second, each moderator was also analysed separately for attitude-behaviour, intention-behaviour, PBC-behaviour, attitude-intention, and subjective norm-intention relations, where appropriate.

3.5.1 Accessibility

It was hypothesised that participants with more accessible cognitions would demonstrate stronger cognition-behaviour associations. Table 3.2 shows that, overall, accessibility moderated cognition-behaviour relations: Participants with more accessible cognitions possessed stronger cognition-behaviour relations ($r_+ = .60$) than participants with less accessible cognitions ($r_+ = .52$). Looking at specific cognition-behaviour relations, accessibility was a successful moderator of attitude-behaviour relations: Participants who possessed highly accessible attitudes showed stronger attitude-behaviour consistency ($r_+ = .61$) compared to participants with less accessible cognitions ($r_+ = .50$). In addition, participants with more accessible intentions showed stronger intention-behaviour consistency ($r_+ = .75$) than participants with less accessible intentions ($r_+ = .62$). In contrast, accessibility did not significantly moderate PBC-behaviour relations (one-tailed $p = .17$).

One factor that differentiated between studies employing accessibility as a moderator of attitude-behaviour consistency was the operationalisation of accessibility. Some studies manipulated accessibility whereas other studies measured accessibility. Further analyses were conducted to discover if this factor influenced whether accessibility moderates attitude-behaviour relations.

3.5.1.1 Operationalisation of Accessibility Three of the ten papers included in the review manipulated accessibility by asking one group to repeatedly express their attitudes and a separate group to express their attitudes just once. The remaining seven papers measured accessibility using response latencies. Therefore, to compare the effects reported for the two different types of accessibility, the weighted average of the sample correlations (for groups high and low on accessibility) were calculated separately for repeated expression and response latency studies.

Table 3.2.
Meta-Analysis of Accessibility, Temporal Stability, Direct Experience, Involvement, Certainty, Ambivalence and Affective-Cognitive Consistency as a Moderators of Cognition-Behaviour and Cognition-Intention Relations

	Low					High					
Relation	*n*	*k*	*CI*	χ^2	r_+	*n*	*k*	*CI*	χ^2	r_+	*Z*
Accessibility											
Overall	468	11	.45 to .59	46.56***	.52	466	11	.14 to 1.00	75.12***	.60	1.78*
Attitude-Behaviour	428	10	.42 to .57	36.44***	.50	426	10	.55 to .67	92.22***	.61	2.32*
Intention-Behaviour	187	5	.52 to .70	14.37***	.62	188	5	.47 to 1.00	24.20***	.75	3.22***
PBC-Behaviour	119	3	.24 to .55	2.62	.40	120	3	.35 to .63	1.27	.50	0.96
Operationalisation of Accessibility											
Attitude-Behaviour (RL)	286	7	.43 to .60	13.39*	.52	287	7	.56 to .70	38.31***	.64	2.16*
Attitude-Behaviour (RE)	141	3	.26 to .54	15.65***	.41	140	3	.43 to .66	41.48***	.56	1.64†
Temporal Stability											
Overall	925	11	.21 to .33	53.78***	.27	1110	11	.58 to .66	139.01***	.62	10.42***
Attitude-Behaviour	132	3	-.19 to .16	9.13*	-.01	254	3	.57 to .72	34.31***	.65	7.24***
Intention-Behaviour	880	10	.24 to .36	67.42***	.30	1086	10	.65 to .72	269.51***	.69	11.85***
PBC-Behaviour	456	5	.23 to .40	7.46	.32	452	5	.41 to .55	31.52***	.49	3.07***
Direct Experience											
Overall	489	11	.38 to .52	25.65***	.45	389	11	.43 to .58	26.69***	.51	1.14
Attitude-Behaviour	282	10	.19 to .42	4.86	.31	319	10	.34 to .52	13.16	.43	1.70*
Intention-Behaviour	301	4	.46 to .63	11.91**	.55	159	4	.57 to .75	11.72**	.67	1.95*

Table 3.2 (continued)

PBC-Behaviour	62	2	.22 to .64	0.55	.45	61	2	.40 to .74	6.17*	.59	1.04
Involvement											
Overall	982	5	.25 to .36	4.37	.31	1068	5	.53 to .61	17.82***	.57	7.38***
Attitude-Behaviour	105	2	.26 to .58	0.16	.44	101	2	.30 to .61	0.48	.47	0.27
Attitude-Intention	958	5	.25 to .37	6.28	.31	1035	5	.54 to .62	20.25***	.58	7.61***
Certainty											
Overall	401	9	.16 to .35	20.04*	.25	470	9	.54 to .66	37.96***	.61	6.65***
Attitude-Behaviour	196	4	-.06 to .22	4.17	.08	220	4	.35 to .56	1.55	.46	4.22***
Intention-Behaviour	105	2	.23 to .56	2.72	.41	130	2	.52 to .73	5.30	.64	2.43**
Attitude-Intention	131	3	.43 to .67	3.77	.56	120	3	.68 to .83	56.38***	.77	3.03**
Subjective Norm-Intention	113	3	.07 to .43	7.37*	.26	192	3	.75 to .85	195.84***	.80	6.94***
Ambivalence											
Overall	790	10	.55 to .64	52.80***	.60	784	10	.43 to .54	27.20***	.49	3.11.***
Attitude-Behaviour	571	6	.46 to .58	9.22	.52	574	6	.25 to .40	16.26**	.32	4.13***
Attitude-Intention	803	10	.60 to .69	116.95***	.65	784	10	.51 to .61	40.99***	.57	2.54***
Affective-Cognitive Consistency											
Overall	284	7	.10 to .33	34.08***	.22	324	7	.44 to .60	10.01	.52	4.32***
Attitude-Behaviour	215	6	-.01 to .27	26.14***	.13	247	6	.44 to .62	10.44	.54	5.04***
Attitude-Intention	69	1	.46 to .46	-	.46	77	1	.46 to .46	-	.46	0.00

Note. RL = studies that used response latencies to measure accessibility. RE = studies that manipulated accessibility by asking participants either to repeatedly express their attitudes or to express their attitudes only once. n = number of participants, k = number of tests of the relationship, CI = 95% confidence interval, χ^2 = chi-square test of homogeneity, r_+ = sample-weighted average correlation.
† $p < .06$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Meta-analysis of the repeated expression studies showed there was a marginally ($p <$ .06) significant difference between the correlations for participants with highly accessible attitudes ($r_+ = .56$) and participants with less accessible attitudes ($r_+ = .41$). There was also a significant difference between the correlations of participants judged to possess high ($r_+ = .64$) versus low ($r_+ = .52$) response latencies. Thus, the type of measure has negligible effect on how well accessibility moderates the attitude-behaviour relation.

3.5.2 Temporal Stability

Table 3.2 summarises the findings for temporal stability. Overall, temporal stability moderated cognition-behaviour relations; participants with more stable cognitions possessed greater cognition-behaviour consistency ($r_+ = .62$) than participants with less stable cognitions ($r_+ = .27$). Temporal stability was also an effective moderator of specific relationships: Participants with more stable attitudes possessed greater attitude-behaviour consistency ($r_+ = .65$) than participants with less stable attitudes ($r_+ = -.01$); participants with highly stable intentions showed stronger intention-behaviour consistency ($r_+ = .67$) than participants with less stable intentions ($r_+ = .30$), and participants with more stable PBC demonstrated greater PBC-behaviour consistency ($r_+ = .49$) than participants with less stable PBC ($r_+ = .32$).

3.5.3 Direct Experience

Direct experience was predicted to increase the strength of cognition-behaviour relations. Inspection of Table 3.2 reveals that, overall, direct experience did not moderate cognition-behaviour relations (high $r_+ = .51$ vs. low $r_+ = .46$). Examining the impact of direct experience as a moderator of attitude-behaviour, intention-behaviour, and PBC-behaviour relations, the following results were found: Participants who received direct experience showed stronger attitude-behaviour relations ($r_+ = .43$) than

participants given indirect experience (r_+ = .31). Also, participants who received direct experience possessed significantly greater intention-behaviour consistency (r_+ = .67) than participant given indirect experience (r_+ = .55). However, there was no moderating effect of direct experience on PBC-behaviour relations (high r_+ = .59 vs. low r_+ = .45).

3.5.4 Involvement

Table 3.2 shows that, overall, participants who were more involved with the attitude object showed greater consistency between attitude and intention/behaviour (r_+ = .57) than participants who were less involved (r_+ = .31). In particular, participants who were more involved with the attitude object had greater attitude-intention consistency (r_+ = .58) than participants who were less involved (r_+ = .31). In contrast, participants who were more involved did not possess stronger attitude-behaviour relations (r_+ = .47) than participants who were less involved (r_+ = .44).

3.5.5 Certainty

Overall, participants with more certain cognitions showed a stronger relation between cognitions and intention/behaviour (r_+ = .61) than participants with less certain cognitions (r_+ = .25, see Table 3.2). Participants who were highly certain of their attitudes demonstrated significantly stronger attitude-behaviour consistency (r_+ = .46) compared to participants with low certainty in their attitudes (r_+ = .08). Similarly, the intention-behaviour consistency of participants high in certainty was significantly greater (r_+ = .64) than participants who were low in certainty (r_+ = .41). Turning to cognition-intention relations; participants high in certainty demonstrated significantly stronger attitude-intention associations (r_+ = .77) than participants low in certainty (r_+ = .56). In addition, participants with high certainty showed a larger subjective norm-intention relationship (r_+ = .80) than participants with low certainty (r_+ = .26).

3.5.6 Ambivalence

Table 3.2 summarises the results for ambivalence. Overall, participants with low ambivalence showed stronger associations between attitude and intention/behaviour (r_+ = .60) than participants with high ambivalence (r_+ = .49). Meta-analysis demonstrated that participants low in ambivalence possessed stronger attitude-behaviour consistency (r_+ = .52) than participants high in ambivalence (r_+ = .32). Similarly, participants with low ambivalence demonstrated stronger attitude-intention relations (r_+ = .65) than participants with high ambivalence (high r_+ = .56).

3.5.7 Affective-Cognitive Consistency

Overall, moderation by affective-cognitive consistency was reliable (high r_+ = .52 vs. low r_+ = .22, $Z = 4.28$, $p < .001$). In addition, participants with high affective-cognitive consistency demonstrated stronger attitude-behaviour consistency (r_+ = .54) than participants with low affective-cognitive consistency (r_+ = .13), but affective-cognitive consistency did not moderate the attitude-intention relationship (both r_+s = .46).

3.6 Factors Affecting Moderation by Properties

Several factors are likely to affect how well properties moderate cognition-intention and cognition-behaviour relations. The first—and most obvious—factor is the type of behaviour under consideration. Unfortunately, studies of different moderator variables have tended to examine different focal behaviours and there is no single behaviour that permits comparison on all seven moderators. Moreover, it was not possible to derive a meaningful system for categorising behaviours that would enable an assessment of the impact of behaviour type on how well properties moderate particular relationships. Thus, a limitation of the present review is that the effects obtained here must be interpreted in the light of the fact that the moderator variables have been tested in relation to different behaviours.

However, there were two factors that might affect moderation by properties of cognitions that could be tested here, namely, publication status and the temporal contiguity of cognition and behaviour measures. Glass, McGaw, and Smith (1981) showed that publication status can influence effect sizes; published studies generally exhibit stronger effects compared to unpublished studies. Sheeran and Orbell (1998) demonstrated that the time interval between measures of intention and behaviour affected the strength of the intention behaviour relation; correlations were significantly stronger over shorter compared to longer time periods.

3.6.1 Published vs. Unpublished Studies. To permit meaningful inferences, the comparison of published versus unpublished studies to properties was restricted to where there were at least two studies in both the published and unpublished categories. Table 3.3 shows that accessibility and temporal stability were both reliable moderators of the intention-behaviour relationship regardless of publication status. Accessibility moderated the attitude-behaviour relation in published studies, and was associated with a marginally significant moderator effect in unpublished studies, $Z = 1.51, p = .066$. Comparison of the moderator effect sizes for published versus published studies showed that there were no reliable differences in any of the three cases (all Zs < 1).Thus, publication status does not seem to constitute a substantial source of bias in the present review.

3.6.2 Temporal Contiguity. To examine the role of temporal contiguity in explaining moderator effects, the time interval between measures of cognition and behaviour was coded in weeks for each study (immediate post-tests were coded as zero weeks). The time intervals employed in studies of different properties were compared separately for attitude-behaviour and intention-behaviour relations. Findings indicated that time intervals were equivalent for moderators of the intention-behaviour relation, $F(3, 17) = 0.96$, *ns*.

Table 3.3
Comparison between Published and Unpublished tests of Moderator Variables

	Low					High					
Moderator	*n*	*k*	*CI*	χ^2	r_+	*n*	*k*	*CI*	χ^2	r_+	*Z*
Accessibility											
Attitude-Behaviour (published)	216	5	.41 to .61	14.57**	.52	217	5	.57 to .73	42.22**	.66	2.24*
Attitude-Behaviour (unpublished)	212	5	.31 to .59	16.69***	.45	133	5	.43 to .67	42.42***	.56	1.51
Intention-Behaviour (published)	78	2	.50 to .77	26.03***	.65	78	2	.34 to 1.00	13.92***	.78	1.65*
Intention-Behaviour (unpublished)	109	3	.46 to .71	2.52	.60	110	3	.63 to .81	24.65***	.73	1.72*
Temporal Stability											
Intention-Behaviour (published)	491	5	.25 to .41	41.00***	.33	659	5	.67 to .74	240.75***	.71	9.11***
Intention-Behaviour (unpublished)	389	5	.16 to .35	24.41***	.26	427	5	.59 to .70	51.33***	.65	7.24***

Note. n = number of participants, k = number of tests of the relationship, *CI* = 95% confidence interval, χ^2 = chi-square test of homogeneity, r_+ = sample-weighted average correlation.
* $p < .05$; ** $p < .01$; *** $p < .001$.

However, there was a reliable difference among time intervals for the seven moderators of the attitude-behaviour relation, $F(6, 34) = 4.35, p < .05$. Newman-Keuls *post hoc* tests indicated that the time interval between measures of attitude and behaviour was significantly longer in studies of temporal stability ($M = 22$ weeks) compared to studies of accessibility, affective-cognitive consistency, certainty, and direct experience (Ms = 1.70, 1.00, 1.00, and 0.40, respectively). None of the other pairwise comparisons were reliable. Thus, temporal stability is probably disadvantaged compared to most other moderators of the attitude-behaviour relation because studies of this property employed longer time intervals.

3.7 Comparisons of Effect Sizes for the Moderator Variables

The findings reported above suggest that moderator variables improve cognition-intention and cognition-behaviour consistency. However, it would be desirable to compare the relative effect sizes of each moderator variable for each cognition-intention and cognition-behaviour association to determine which are the most effective moderators of these relationships. To conduct this comparison, the Z scores obtained for each moderator variable were backtransformed into correlations and Schwarzer's (1988) *Meta* program was used to test if there were significant differences between the effect sizes for the moderators. Initially, the effect sizes for all the moderators of one relation (e.g., attitude-behaviour) were compared to see if they were heterogeneous. If the chi-square statistic was significant, pairwise Z tests were conducted between all pairs of moderators to determine where the differences were between the variables.

The chi-square statistic was highly significant for the seven moderators of the attitude-behaviour relationship, $\chi^2 (6) = 41.87, p < .001$. Similarly, the chi-square statistic was significant for moderators of intention-behaviour consistency, $\chi^2 (3) = 15.16, p < .001$. However, the effect sizes for the three moderators of PBC-behaviour

relations did not differ, χ^2 (2) = 0.31, *ns*. Finally, there was significant heterogeneity among the moderators of attitude-intention associations, χ^2 (3) = 13.48, $p < .01$.Thus, pairwise *Z* tests were used to compare the effect sizes reported for moderators of attitude-behaviour, intention-behaviour, and attitude-intention, relations.

3.7.1 Attitude-Behaviour Relations All seven variables included in this review have been employed as moderators of the attitude-behaviour relationship. Table 3.4 shows the effect sizes for each moderator variable. Temporal stability produced the largest effect size ($r = .37$) and pairwise *Z* tests demonstrated that temporal stability was a significantly better moderator of attitude-behaviour consistency compared to all of the other moderator variables (all $ps < .05$). Certainty was the next strongest moderator variable and was a significantly better moderator of attitude-behaviour relations than accessibility, ambivalence, direct experience, and involvement (all $ps < .05$). Finally, affective-cognitive consistency was a more effective moderator of attitude-behaviour associations than accessibility, ambivalence, direct experience and involvement (all ps < .05). None of the other comparisons yielded significant differences.

3.7.2 Intention-Behaviour Relations Accessibility, certainty, direct experience, and temporal stability have all been employed as moderators of intention-behaviour consistency. Table 3.4 summarises the effect sizes for these variables. Temporal stability produced the largest effect size ($r = .25$) of the four moderators and was a significantly better moderator of intention-behaviour relations compared to certainty ($r = .16$), $Z = 1.81$, $p < .05$, and direct experience ($r = .09$), $Z = 3.18$, $p < .001$, and was a marginally better moderator compared to accessibility ($r = .17$), $Z = 1.48$, $p < .07$. However, none of the other comparisons produced significant differences.

Table 3.4.
Effect Sizes for Moderators of Attitude-Behaviour, Intention-Behaviour, and Attitude-Intention Relationships

	Attitude-Behaviour			Intention-Behaviour			Attitude-Intention		
Moderator	*n*	*k*	*r*	*n*	*k*	*r*	*n*	*k*	*r*
Accessibility	854	10	$.08_{c}$	375	5	$.17_{bc}$			
Affective-Cognitive Consistency	462	6	$.23_{b}$				146	1	$.00_{b}$
Ambivalence	1145	6	$.12_{c}$				1472	9	$.06_{b}$
Certainty†	416	4	$.24_{b}$	363	3	$.16_{c}$	251	3	$.19_{a}$
Direct Experience	601	10	$.06_{c}$	460	4	$.09_{c}$			
Involvement	206	2	$.02_{c}$				1754	3	$.17_{a}$
Temporal Stability	386	3	$.37_{a}$	1966	10	$.25_{ab}$			

Note. Correlations within columns not sharing the same subscript are significantly different from each other ($p < .05$).
n = number of participants, k = number of tests of the relationship, r = effect size.
†The intention-behaviour correlation for certainty is based on combining the bivariate correlations from two studies (Sheeran, 1999; Sheeran & Abraham, in press) with the Z difference score reported by Pieters and Verplanken (1995).

3.7.3 Attitude-Intention Relations Table 3.4 shows that researchers have used affective-cognitive consistency, ambivalence, certainty, and involvement to moderate attitude-intention consistency. Certainty produced the largest effect size ($r = .19$) and was a significantly better moderator of attitude-intention relations compared to both affective-cognitive consistency and ambivalence (both $ps < .05$). Similarly, involvement was a significantly better moderator of attitude-intention relations than both affective-cognitive consistency and ambivalence (both $ps < .05$). None of the other comparisons yielded significant differences.

3.7.4 Discussion

This is the first quantitative review of the impact of moderator variables on cognition-intention and cognition-behaviour relations. Seven properties of cognitions were examined as potential moderators: accessibility, temporal stability, direct experience, involvement, certainty, ambivalence, and affective-cognitive consistency. It was predicted that participants who scored high on these variables (low for ambivalence) would exhibit significantly stronger cognition-intention and cognition-behaviour relations than participants who scored low on these variables (high for ambivalence). These predictions were largely confirmed, and underline the utility of employing moderator variables to enhance the prediction of intentions and behaviour.

3.8 Comparing Moderator Variables

Accessibility was a reliable moderator of both attitude-behaviour, and intention-behaviour, relations in the present review. Moreover, there was little evidence to suggest that publication status affected findings for this property. Fazio (1989; 1995; Fazio & Towles-Schwen, 1999) has claimed that accessibility is a highly important aspect of attitude structure that may mediate the influence of other attitudinal properties on attitude-

behaviour relations. Although the present findings confirm moderation by accessibility, results do not seem to be consistent with this mediation hypothesis: Accessibility produced one of the smallest effect sizes of the seven attitudinal properties examined here and was a significantly weaker moderator of attitude-behaviour relations compared to affective-cognitive consistency, certainty, and temporal stability. Thus, it is unlikely that accessibility mediates moderation of attitude-behaviour consistency by affective-cognitive consistency, certainty, or temporal stability (see Wegener & Fabrigar, 2000, for discussion of "mediated moderation"). Further primary research is required to clarify whether other attitudinal properties that had weaker moderator effects might be mediated by accessibility.

Meta-analysis showed that direct experience moderated both attitude-behaviour relations and intention-behaviour relations, but did not moderate PBC-behaviour relations. These findings support Ajzen and Fishbein's (2001) claims that direct experience produces more informative attitudes and intentions that are better predictors of subsequent behaviour. One reason why direct experience may moderate cognition-behaviour relations is that direct experience produces more stable cognitions (cf. Doll & Ajzen, 1992).

Two factors may explain the failure of direct experience to moderate PBC-behaviour relations in the two studies that have tested this relationship. First, Cooke & Sheeran (2001a) noted that their manipulation of direct experience (a single visit to *www.thehungersite.com*) might not have been sufficiently strong to increase PBC-behaviour consistency among participants. Second, direct experience may not increase the accuracy of PBC, which is necessary for PBC to effectively predict behaviour (Ajzen, 1991; Sheeran et al., in press). Further research is needed to fully understand the influence of direct experience on PBC-behaviour relations.

Involvement moderated attitude-intention but not attitude-behaviour relations. The finding that involvement moderated attitude-intention relations could be seen to support Petty et al.'s (1995) elaboration consistency hypothesis. Petty et al. argued that a high level of involvement leads to greater elaboration of information which, in turn, leads to attitudes that are more certain, more accessible, more internally consistent, and therefore better predictors of intentions/behaviour. However, it is important to note that evidence for Petty et al.'s account of how involvement affects intentions and behaviour is mixed. Lavine et al. (2000) found that the impact of involvement on accessibility was mediated by ambivalence and extremity. Also, Kokkinaki and Lunt (1997, 1999) found that participants with high levels of involvement possessed more accessible attitudes compared to participants with low levels of involvement (see also Bizer & Krosnick, 2001). However, accessibility did not mediate the relationship between involvement and behaviour, as Petty et al.'s hypothesis predicts. Moreover, Nederhof (1989) found no relation between involvement and certainty. Although further primary research on involvement would be desirable (Chapter 4 provides a test of involvement as a moderator of attitude-intention and attitude-behaviour relations) some reformulation of the elaboration consistency hypothesis seems warranted in light of the available evidence.

Meta-analysis showed that certainty moderated attitude-behaviour, intention-behaviour, attitude-intention, and subjective norm-intention associations. One explanation of the moderating effects of certainty is that high levels of certainty could produce cognitions that are more stable and, therefore, better predictors of intentions and behaviour. Consistent with this hypothesis, Bassili (1996) found that certainty was the best predictor of attitude stability in a study of nine attitudinal properties. Bassili also found that accessibility and certainty were independent predictors of stability (i.e., certainty was a

significant predictor of stability even after accessibility had been taken into account) indicating that the moderating effects of certainty were not mediated by accessibility. Sheeran and Abraham (in press), on the other hand, found that the moderating effect of certainty on intention-exercise behaviour relations was mediated by the temporal stability of participants' intentions (see also Abraham & Sheeran, in press). Thus, evidence supports the view that certainty is an effective moderator of cognition-behaviour relations because certainty is associated with greater temporal stability of cognitions (see Chapter 4).

Ambivalence moderated both attitude-intention and attitude-behaviour relations. There have been conflicting findings about the moderating role of ambivalence (Armitage & Conner, 2000; Jonas et al., 1997). Some of this conflict is undoubtedly due to the employment of different ambivalence measures (e.g., meta-judgmental vs. operative measures, cf. Conner & Sparks, 2002). The present review only employed operative measures of ambivalence (using either Thompson et al.'s, 1995, formula or Kaplan's, 1972, formula) so it can be concluded that ambivalence is an effective moderator of attitude-intention and attitude-behaviour relations when this type of measure is employed (cf. Conner & Sparks, 2002). Ambivalence may moderate attitude-intention, and attitude-behaviour, relations because participants with more ambivalent attitudes also possess attitudes that are less stable. Support for this idea comes from both survey research (Conner, Sherlock, & Orbell, 1998) and experimental studies (Bargh, Chaiken, Govender, & Pratto, 1992). For example, Bargh et al. demonstrated that participants who had less ambivalent attitudes gave more stable evaluations of an attitude object at two time points compared to participants who had more ambivalent attitudes.

Greater affective-cognitive consistency was associated with stronger attitude-behaviour correlations though affective-cognitive consistency did not moderate attitude-

intention relations (note, however, that this latter finding was based on just a single study). Affective-cognitive consistency may improve attitude-behaviour relations because participants with high affective-cognitive consistency tend to also possess attitudes that are stable. Indeed, Rosenberg (1968) demonstrated that participants with high affective-cognitive consistency possessed more stable attitudes two weeks after the initial measurement of attitudes compared to participants with low affective-cognitive consistency (see also Erber et al., 1995).

Temporal stability was expected to moderate attitude-behaviour, intention-behaviour, and PBC-behaviour relations. These predictions were all supported by meta-analyses showing that more stable cognitions provided better prediction of behaviour than less stable cognitions. In fact, the results for temporal stability show that this variable was the most effective moderator of the attitude-behaviour relationship, had the largest effect size for the intention-behaviour associations, and was the only variable that moderated PBC-behaviour relations. There are two possible explanations for these findings. First, temporal stability may moderate cognition-behaviour relations because it predicts changes in intention prior to action (cf. Ajzen & Fishbein, 1973). Second, temporal stability may moderate cognition-behaviour consistency because it shields important cognitions from competing cognitions (cf. Conner et al., 2002; Kuhl, 1985). See Chapter 6 for a full discussion of these competing viewpoints in the domain of behavioural intentions.

In conclusion, the present study demonstrated that seven properties of cognitions—temporal stability, direct experience, involvement, certainty, ambivalence, and affective-cognitive consistency—were all reliable moderators of cognition-intention and/or cognition-behaviour relations. Comparisons among the variables indicated that temporal stability was the most effective moderator of cognition-behaviour relations.

CHAPTER 4: THE FACTOR STRUCTURE OF PROPERTIES OF INTENTION

4.1 Overview

Chapter 3 demonstrated that properties of intentions were significant moderator variables. However, the results in Chapter 3 provide no information on how the properties are related to each other, i.e., are the four properties of intentions all manifestations of an underlying construct or are they separate aspects of participants' intentions. The majority of the studies examining moderator variables employed a single variable thus not allowing for the possibility that the effects of this variable are due to an unmeasured variable (although see Abraham & Sheeran, in press; Doll & Ajzen, 1992; Sheeran & Abraham, in press; for exceptions). To date, no research has been conducted on the factor structure of properties of intentions. This work is needed for two reasons (a) to describe the factor structure and (b) to test Bassili's (1996) finding that differences in how properties are measured are reflected in the factor structure. Therefore, the present chapter will focus on the factor structure of properties of intentions. The next section outlines what is known about properties of attitudes as a number of factor analyses have been conducted in this area and this will provide a means to compare the results for properties of intentions.

4.2 Factor Structure and Measurement of Moderator Variables

A number of studies have attempted to define the factor structure of properties of attitudes (Erber et al., 1995; Krosnick et al., 1993; Prislin, 1996). The results from these studies suggest that properties of attitudes are, generally, independent but related concepts. Bassili (1996) proposed that one way to categorise properties of attitudes was to focus on whether they are measured meta-judgmentally or operatively. A meta-judgmental measure is one where participants are asked to report on a property of their attitudes, e.g., "How important is your attitude toward exercise?" In contrast, an operative measure is one that is

calculated during the process of answering an attitudinal query or based on the results of that processing. For example, accessibility is an operative measure because it is measured by the response latency between presentation of a question about an attitude object and a participant's response to the question. Bassili performed an exploratory factor analysis on nine properties of attitudes, and also examined the predictive impact of these properties on attitude pliability (i.e., how likely participants' attitudes are to change when presented with a persuasive communication). Bassili found that the six meta-judgmental properties (certainty, importance, strength, knowledge, attention and frequency of thought) loaded highly on one factor whereas the three operative measures (accessibility, ambivalence and extremity) loaded on a separate factor. In addition, Bassili found that an operative measure of accessibility provided more accurate prediction of attitude pliability compared to a meta-judgmental measure of accessibility and most other meta-judgmental properties of attitudes (certainty was an exception).

No research has been conducted to assess the discriminant validity of properties of intentions or to examine differences between meta-judgmental and operative properties of intentions. The latter research is important because if meta-judgmental properties of intentions moderate intention-behaviour consistency then these measures will be favoured as they are easier to collect. Also, no research has examined where temporal stability fits within the factor structure of properties of attitudes, principally because studies assessing the factor structure tend to use temporal stability as a dependent variable (e.g., Bassili, 1996; Erber et al., 1995) The present chapter will address these issues.

4.3 Rationale for Present Study

The focus of the present study was on two aims. First, to describe the factor structure of properties of intentions and properties of attitudes. The factor structure of

intentions has not been previously described and it was compared to the factor structure of properties of attitudes which has been investigated in earlier research. The second aim was to provide a further comparison of the moderating effects of temporal stability and accessibility on intention-behaviour consistency. Given the results presented in Chapters 2 and 3 which showed that accessibility was a significant moderator across studies but not in Chapter 2 whereas temporal stability was a significant moderator in both Chapters 2 and 3, it seemed worthwhile to provide a further comparison, employing a different behaviour, in an attempt to clarify the impact of the two variables. Exercise behaviour was measured in the current study. Regular exercise is associated with number of health benefits including a reduced risk of coronary heart disease (Powell, Thompson, Caspersen, & Kendrick, 1987), stroke (Paffenbarger & Hyde, 1984) and hypertension (Siscovick, LaPorte, & Newman, 1985). The main reason for choosing exercise was to ensure that the effects reported in Study 1 are not specific to the behaviour studied. Also, exercise was chosen because it is a behaviour that all participants would be familiar with, thus it was possible to assess Fazio's (1990a) claim that accessibility is a significant moderator of cognition-behaviour consistency when participants are familiar with performing the behaviour.

4.3.1 Rationale: Factor Analyses

The present study aimed to investigate the factor structure of properties of attitudes and properties of intentions. Four properties of attitudes—accessibility, ambivalence, involvement and temporal stability—were measured. The first three properties have been employed in previous factor analyses (e.g., Bassili, 1996; Erber et al., 1995) however, no previous factor analysis has included attitude stability. This property was included on the basis of findings that have shown attitude stability to be a significant moderator variable in both experimental studies (Chapter 2 and Doll & Ajzen, 1992) and meta-analysis (Chapter

3). In addition, the three properties of intentions with the largest effect sizes reported in Chapter 3—accessibility, certainty and temporal stability—were tested. Research has demonstrated that all three variables significantly improve intention-behaviour consistency (Bassili, 1995; Conner et al., 2002; Sheeran & Abraham, in press) although no single study has included all three properties.

4.3.2 Rationale: Moderator Analyses

Ambivalence and involvement were employed as moderators of both attitude-intention and attitude-behaviour relations because research has shown that these properties can moderate these relationships (Armitage & Conner, 2000; Kokkinaki & Lunt, 1997; Petty et al., 1983; Sparks et al., 2001). Accessibility and temporal stability were included to test the findings of Chapter 2, that temporal stability moderated attitude-behaviour relations but that accessibility did not. Also, the present study measured intention accessibility and intention stability both meta-judgmentally and operatively to see if the measures differ in their impact as moderators of intention-behaviour consistency. Finally, when predicting exercise behaviour it is important to consider the impact of past exercise behaviour on future behaviour. For example, Norman, Conner, & Bell (2000) demonstrated that past exercise behaviour was both a significant predictor of future exercise behaviour and a significant moderator of the PBC-behaviour relationship. Moreover, Sheeran & Abraham (in press) found that past behaviour moderated intention-behaviour consistency in a study examining exercise behaviour, though this effect was mediated by temporal stability.

4.4 Hypotheses

Six hypotheses will be tested. The first hypothesis (H1) is that properties of attitudes and properties of intentions will demonstrate discriminant validity. Second (H2), meta-judgmental measures will load on separate factors to operative measures, for both

properties of attitudes and properties of intentions. Third (H3), ambivalence and involvement will moderate attitude-intention consistency, such that participants low on ambivalence will show greater attitude-intention consistency than participants high on ambivalence and, participants high on involvement will possess greater attitude-intention consistency than participants low on involvement. Fourth (H4), accessibility, ambivalence, involvement and temporal stability will all moderate attitude-behaviour consistency such that participants with high scores on these variables (low for ambivalence) will demonstrate stronger attitude-behaviour consistency than participants who score low (high for ambivalence) on these variables. Fifth (H5), accessibility, certainty and temporal stability will all moderate intention-behaviour consistency such that participants with high scores on these variables will possess greater intention-behaviour consistency than participants with low scores on these variables. Finally (H6), operative measures will provide better moderation of cognition-behaviour consistency than meta-judgmental measures.

4.5 Study 3

4.5.1 Participants

One hundred and thirty nine undergraduates at a UK university voluntarily participated in an experiment assessing "attitudes to exercise". At Time 1 participants answered questions that measured TPB variables, past behaviour, ambivalence and involvement. Two weeks later (Time 2) participants completed a second questionnaire that measured the TPB, past behaviour, and properties of intentions ($N = 139$). Exercise behaviour was measured at Time 3, two weeks later. Behaviour data was collected from 83% of the participants who completed Time 1 and Time 2 measures ($N = 116$). MANOVA revealed no significant differences between the samples on any of the measures, $F(15, 122) = 0.92$, *ns*, (univariate Fs were also non-significant).

4.5.2 Procedure

Consistent with previous research (e.g., Norman & Smith, 1995), a brief definition of exercise was printed on the front of all the questionnaires ("Exercise involves at least 20 minutes of moderate/physical activity. Exercise includes activities such as aerobics, badminton, jogging, rugby, etc., but not activities which form part of your daily life such as walking to the bus stop, dancing at discos, etc.") in order to reduce ambiguity about the meaning of "exercise".

The first questionnaire was completed at the end of a laboratory class. Two weeks later participants were tested in large groups of about $N = 30$ in a computer laboratory. Participants were seated by a computer and told that they would have to respond to questions on the computer screen, all measured on 5-point scales. The experimenter indicated the keys to use, which were labelled from 1 to 5. Participants were instructed to respond accurately but quickly (cf. Fazio, 1990b). Each item appeared on screen for up to 10 seconds, and when participants responded, the item disappeared from the screen. There was a 1.5 second break between items and the items were presented in a random order. Prior to presentation of the experimental items, participants completed 10 practice measures. These consisted of 4 attitude, 1 subjective norm, 2 PBC, and 3 intention items regarding studying in the next two weeks. These items were included to familiarize participants with the task. After completing the practice items there was a short break before the experimental session started. Participants were sent the Time 3 questionnaire by email. They received class credit for replying to the email.

4.5.3 Time 1 Measures

Attitudes toward exercise were measured by responses to the stem "Exercising at least 6 times in the next 2 weeks would be..." on eight bipolar scales (*unpleasant-pleasant*,

bad-good, foolish-wise, worthless-worthwhile, harmful-beneficial, unsatisfying-satisfying, unenjoyable-enjoyable, difficult-easy) (alpha = .82). *Subjective norm* was measured using two items: "Most people who are important to me think I should exercise at least 6 times in the next 2 weeks" (*strongly disagree-strongly agree*), and "Most people who are important to me would like me to exercise 6 times in the next 2 weeks" (*definitely no-definitely yes*) (alpha = .86). *PBC* was measured by four items: "How much control do you have over exercising at least 6 times in the next 2 weeks?" (*no control-complete control*), "I am certain that I can exercise at least 6 times in the next 2 weeks" (*strongly disagree-strongly agree*), "I am confident that I will be able to exercise at least 6 times in the next 2 weeks" (*strongly disagree-strongly agree*), and "Exercising at least 6 times in the next 2 weeks is..." (*completely outside my control-completely under my control*) (alpha = .74). *Intention* was measured using six items: "I am definitely going to exercise at least 6 times in the next 2 weeks" (*strongly disagree-strongly agree*), "I intend to exercise at least 6 times in the next 2 weeks" (*strongly disagree-strongly agree*), "I will try to exercise at least 6 times in the next 2 weeks" (*extremely unlikely-extremely likely*), "I plan to exercise at least 6 times in the next 2 weeks" (*strongly disagree-strongly agree*), "I have decided that I will exercise at least 6 times in the next 2 weeks" (*definitely no-definitely yes*), and "I will make every attempt to exercise at least 6 times in the next 2 weeks " (*strongly disagree-strongly agree*) (alpha = .95). *Past behaviour* was measured using two items: "How many times have you exercised in the last month?" and "How often have you exercised in the last month?" (*never, rarely, sometimes, often, every day*) (alpha = .86). *Ambivalence* was measured using two items: "For a minute consider only the positive things about exercise, and ignore any negative things about it. Please rate how positive those positive things are..." (*not at all positive-extremely positive*) and : "For a minute consider only the negative things about

exercise, and ignore any positive things about it. Please rate how negative those negative things are..." (*not at all negative-extremely negative*). *Involvement* was measured using three items: "Exercising is important to me, personally." (*very certainly not-very certainly*), "How much interest do you have in exercising?" (*none at all-a great deal),* and "How involving an issue is exercise for you personally?" (*not at all involving -very involving*) (alpha = .86).

4.5.4 Time 2 Measures

At Time 2 (two weeks later), participants completed the same TPB items. Reliabilities were all satisfactory (alphas ranged from .73 to .95). Moderator variables were measured as follows. *Meta-accessibility* was measured using three items: "When you are asked about your intention to exercise in the next 2 weeks, how quickly does your intention come to mind?" (*not quickly at all-extremely quickly*), "Does your intention to exercise in the next 2 weeks come to mind easily?" (*definitely no-definitely yes*), and "How easily does your intention to exercise in the next 2 weeks come to mind?" (*not at all easily-very easily*) (alpha = .81). *Certainty* was measured using five items: "How definite is your intention to exercise in the next 2 weeks?" (*not at all definite-extremely definite*), "How sure are you of your intention to exercise in the next 2 weeks?" (*very unsure-very sure*), "Do you consider your intention to exercise in the next 2 weeks to be..." (*very uncertain-very certain*), "How confident are you about your intention to exercise in the next 2 weeks?" (*not at all confident-extremely confident*), and "How certain are you about your intention to exercise in the next 2 weeks?" (*very uncertain-very certain*) (alpha = .87). *Meta-stability* was measured using three items: "How stable is your intention to exercise in the next 2 weeks?" (*very unstable-very stable*), "Do you think that your intention to exercise will change, in the next 2 weeks?" (*definitely no-definitely yes*), and "How likely is it that your stated intention

to exercise will change?"(*very unlikely-very likely*) (alpha = .74). *Past behaviour* was measured using two items: "How often have you exercised in the last month?" (*not at all-every day*), and "How often have you exercised in the last month?" (*never, rarely, sometimes, often, every day*) (alpha = .93).

4.5.5 Time 3 Measures

At Time 3 participants completed measures of exercise behaviour. *Behaviour* was measured using three items: "On how many days, in the last 2 weeks, did you exercise?", "How often have you exercised in the last 2 weeks?" (*never, rarely, sometimes, often, every day*), and "I exercised at least 6 times in the last 2 weeks." (*strongly disagree–strongly agree*). Reliability was high (alpha = .93).

4.5.6 Measurement of Temporal Stability

Consistent with previous operationalisations (e.g., Conner et al., 2000) there were four measures of temporal stability: (a) the within-participants correlation between measures taken at Time 1 and Time 2, (b) the sum of absolute differences between items at the two timepoints, (c) the absolute difference between the sum of items, and (d) the number of items exhibiting any change over time. Reliability was satisfactory for attitude stability and intention stability (alphas = .74 and .84, respectively).

4.5.7 Measurement of Accessibility

The distributions of the response latencies were positively skewed and, therefore, were subjected to logarithmic transformations as recommended by Fazio (1990b). All analyses were conducted on the transformed data. However, the results reported are retransformed for ease of interpretation. The impact of individual differences in speed of response was considered by co-varying participants' response latencies to the practice trials in all analyses. A measure of accessibility was computed by averaging the (transformed)

response latencies to the six intention items. Reliability for this measure was acceptable (alpha = .70). This process was repeated for attitudes (alpha = .81).

4.6 Results

Analyses proceeded in five stages. First, the factor structure of properties of attitudes was examined. Second, tests of the moderation of attitude-intention and attitude-behaviour relations by properties of attitudes were conducted. Third, the factor structure of properties of intentions was examined. Fourth, tests of moderation of the intention-behaviour relation by properties of intentions and past behaviour were conducted. Finally, the mediating effects of intention stability in relation to the other moderator variables were investigated.

4.6.1 Factor Structure of Properties of Attitudes

Factor analysis is applied to a set of variables in order to determine which variables form coherent subsets that are relatively independent of one another (Tabachnick & Fidell, 1996). There are a number of extraction techniques, but principal factor extraction is the most appropriate statistical technique for deriving a theoretical solution uncontaminated by unique and error variability, and was therefore used here. Similarly, a number of rotation techniques are available. Oblique rotation was used because it was reasonable to expect that the factors would be correlated (direct oblimin rotation). The factor analysis was performed through SPSS on 17 items for the sample of $N = 139$ participants. Four factors were extracted (based on Kaiser's criterion) that explained 61% of the variance in participants' responses. Table 4.1 shows the loadings of variables on factors and the eigenvalues and proportion of variance explained by each factor. Variables are ordered by size of loading to facilitate interpretation.

Factor 1 had high loadings from all eight accessibility items and was interpreted as *accessibility*. All three involvement items loaded on Factor 2, which was labelled *involvement*. Factor 3 had high loadings from the four temporal stability items and was labelled *temporal stability*. Factor 4 had high loadings from both ambivalence measures and was interpreted as *ambivalence*. Six variables were complex with loadings greater than .30 on more than one variable. However, there was no clear pattern to these loadings. Correlations between the factors were low, with none of the correlations larger than .20. Reliabilities were satisfactory for accessibility, involvement and temporal stability (alphas = .81, .86 and .74, respectively). However, the reliability of the ambivalence factor was rather low (alpha = .52). It must be noted that ambivalence is usually computed by performing a calculation known as the 'Griffin formula' (Thompson et al., 1995) and not by averaging the two items. Thus, although reliability is low, the fact that the two items load on the same factor is enough to suggest that they are measuring a similar, and distinct, aspect of people's attitudes. Scales for accessibility, involvement and temporal stability were computed by taking the mean of each set of items. Ambivalence was calculated using the 'Griffin formula' (Thompson et al., 1995) that captures both the similarity and intensity of participants' positive and negative attitudes:

$$\text{Ambivalence} = (\text{positive} + \text{negative})/2 - |\text{positive} - \text{negative}|.$$

These scales were used as predictor variables in subsequent analyses.

4.6.2 Moderation of the Attitude-Intention Relationship

Table 4.2 presents the means, standard deviations, and intercorrelations for study variables. Attitudes were significantly associated with intentions as were ambivalence and involvement. The moderating impact of attitude ambivalence and involvement on attitude-intention relations was tested using the procedure recommended by Aiken and West (1991).

Table 4.1.
Factor Loadings for Properties of Attitudes

	Factor 1	Factor 2	Factor 3	Factor 4
Exercising at least 6 times in the next 2 weeks would be... Unsatisfying-Satisfying (ACS)	.72			
Exercising at least 6 times in the next 2 weeks would be... Unpleasant-Pleasant (ACS)	.68			
Exercising at least 6 times in the next 2 weeks would be... Worthless-Worthwhile (ACS)	.68	-.36		
Exercising at least 6 times in the next 2 weeks would be... Harmful-Beneficial (ACS)	.66			
Exercising at least 6 times in the next 2 weeks would be... Difficult-Easy (ACS)	.65			
Exercising at least 6 times in the next 2 weeks would be... Bad-Good (ACS)	.64			
Exercising at least 6 times in the next 2 weeks would be... Unenjoyable-Enjoyable (ACS)	.63			
Exercising at least 6 times in the next 2 weeks would be... Foolish-Wise (ACS)	.60			
Exercising is important to me, personally. (INV)		.87		
How involving an issue is exercise for you, personally? (INV)		.87		
How much interest do you have in exercising? (INV)		.86		-.40
Sum of differences between scores at T1 and T2 (STAB)		.30	-.91	
Number of items that changed (STAB)		.46	-.79	
Within-participants correlation (STAB)			-.69	
Absolute difference between scores at T1 and T2 (STAB)			-.58	-.41
Consider only the negative things about exercise. How negative are those things? (AMB)				.79
Consider only the positive things about exercise. How positive are those things? (AMB)		.39		-.63
Eigenvalue	4.07	3.32	1.91	1.07
R^2	23.9	19.5	11.3	6.3

Note. Loadings below .30 have been suppressed. ACS = reaction times to attitude items, AMB = attitude ambivalence, INV = attitude involvement, STAB = temporal stability items.

Table 4.2
Means, Standard Deviations and Intercorrelations for TPB Variables, Properties of Attitudes and Properties of Intentions

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	*M*	*SD*
1. Behaviour	1.00	.69***	.54***	.25**	.37***	-.08	-.11	.49***	.12	-.08	.34***	.54***	.06	.75***	2.61	1.63
2. Intention		1.00	.67***	.43***	.43***	-.19*	-.22*	.61***	.05	-.03	.15	.59***	-.05	.69***	2.93	1.11
3. Attitude			1.00	.41***	.45***	-.14	-.31**	.57***	.36***	.01	.15	.48***	.09	.62***	4.00	0.63
4. SN				1.00	.00	-.12	-.07	.34***	.16	.05	.03	.26**	-.03	.30**	3.27	0.97
5. PBC					1.00	-.16	-.20*	.22*	.00	-.18	.35***	.38***	.19*	.33***	3.52	0.85
6. Attitude Accessibility						1.00	-.06	-.20*	.08	.69***	.04	-.06	-.02	-.11	3513	843
7. Ambivalence							1.00	-.10	-.03	-.01	-.02	-.09	.06	-.12	0.05	1.01
8. Involvement								1.00	.24**	-.10	.17	.59***	.08	.55***	-0.06	1.02
9. Attitude Stability									1.00	.11	.16	.35***	.23*	.17	0.00	0.75
10. Intention Accessibility										1.00	-.13	-.07	-.15	-.02	4106	1133
11. Certainty											1.00	.57***	.35***	.26**	0.01	0.66
12. Meta-Accessibility												1.00	.21*	.59***	-0.03	0.80
13. Intention Stability													1.00	.03	0.03	0.80
14. Past Behaviour														1.00	2.89	0.90

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4.3
Moderated Regression Analyses of Intention on Attitude, Ambivalence, Involvement, and Interaction Terms

		Beta						
Step	Variable Entered	Step 1	Step 2	Step 3	R^2	Model F	ΔR^2	ΔF
1.	Attitude	.67***	.65***	.66***	.45	91.91***		
2.	Ambivalence		-.02	-.01	.45	44.82***	.00	0.04
3.	Ambivalence X Attitude			-.04	.45	29.80***	.00	0.30
1.	Attitude	.67***	.48***	.56***	.45	91.91***		
2.	Involvement		.33***	.35***	.52	61.28***	.07	17.41***
3.	Involvement X Attitude			.24***	.57	49.53***	.05	13.01***

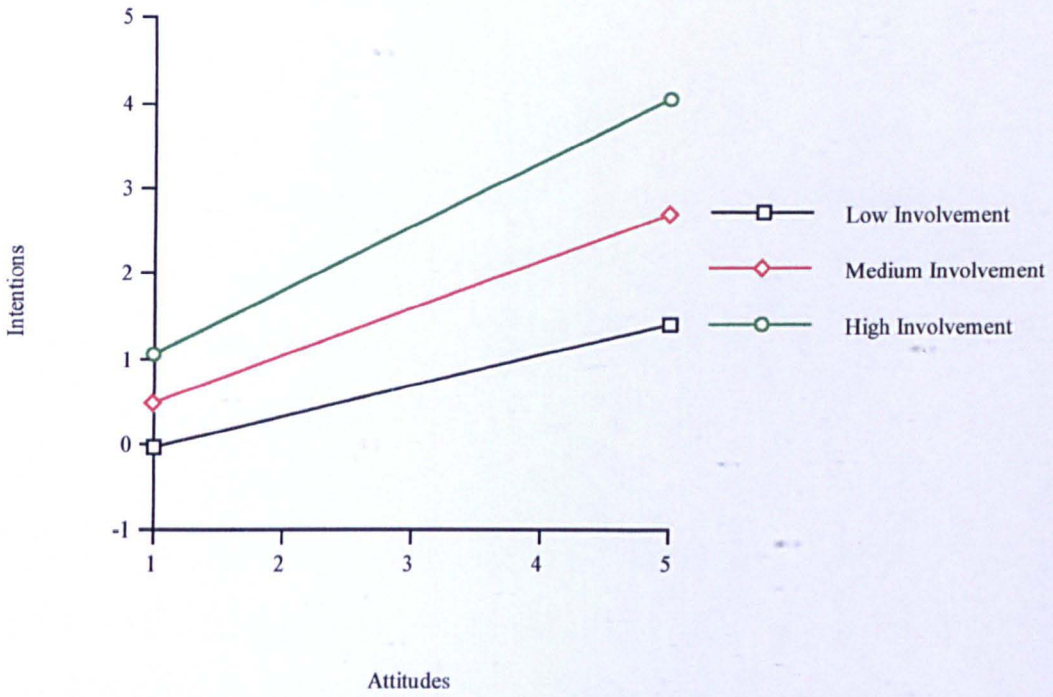
Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

This involved a three-step hierarchical regression analysis for each moderator; intention was regressed on attitude at the first step, on attitude and the focal moderator variable at the second step, and on attitude, the moderator variable, and the multiplicative attitude by moderator variable (interaction term) at the final step.

Moderation can be said to obtain when the interaction term has a significant regression coefficient and is associated with significant increment in explained variance. Prior to all analyses, variables were standardised to reduce potential multicollinearity (Aiken & West, 1991).

Table 4.3 presents the results of the regressions, which show that attitude involvement moderated the relationship between attitudes and intentions ($\Delta R^2 = .04$, $\Delta F = 12.65$, $p < .001$), however ambivalence did not moderate the attitude-intention relationship. Simple slope analyses were used to decompose the interaction (Aiken & West, 1991). The regression of intention on attitude was computed for three levels of the moderator variable; one standard deviation below the mean (low), the mean level (moderate), and one standard deviation above the mean (high). Findings for attitude involvement confirmed expectations.When attitude involvement was low, attitudes positively predicted behaviour (B = .36, $p < .001$). However, the predictive validity of participants' attitudes improved as involvement increased from low to moderate and from moderate to high (Bs = .55, and .75, respectively, $p < .001$). Thus, participants who considered their attitudes toward exercise to be highly involving possessed attitudes that were more informative of their intention than participants who had considered exercise less involving (see Figure 4.1).

Figure 4.1. Interaction between Attitude and Involvement



4.6.3 Moderation of the Attitude-Behaviour Relationship

The effect of properties of attitudes as moderators of the attitude-behaviour relationship was also investigated. Moderated regression analyses were conducted using attitude accessibility, ambivalence, involvement and stability as moderator variables. However, none of the interactions between attitudes and the moderator variables significantly increased the variance accounted for by the regression equation and none of the betas were significant. Therefore, no evidence was provided for the hypothesis that properties of attitudes moderate the attitude-behaviour relationship (see Table 4.4).

4.6.4 Factor Structure of Properties of Intentions

The same procedures outlined for the properties of attitudes were used for properties of intentions (see above). Factor analysis was performed through SPSS on 21 items for the sample of $N = 139$ participants. Four factors were extracted (based on Kaiser's criterion) that explained 57.7% of the variance in participants' responses. Table 4.5 shows the loadings of variables on factors and the eigenvalues and proportion of variance explained by each factor. Variables are ordered by size of loading to facilitate interpretation. Factor 1 had high loadings from all three meta-accessibility items and two certainty variables and was interpreted as *meta-accessibility*. All four temporal stability items loaded on Factor 2, which was labelled *temporal stability*. Five of the six response latency items loaded on Factor 3, which was labelled *accessibility*. Factor 4 had high loadings from all three meta-stability variables, three certainty items, and the remaining response latency measure and was interpreted as *certainty*. Eleven variables had loadings greater than .30 on two factors though most of these loadings did not follow a pattern. However, the certainty items tended to load on both Factor 1 and Factor 4. Correlations between the factors were low. Factor 1, meta-accessibility, has a moderate ($r = .30$) positive correlation with Factor 4, certainty, which probably reflects the fact that measures of certainty load on both factors. In sum, the discriminant validity of the factors is further supported by the correlational findings.

Reliabilities for accessibility, meta-accessibility and temporal stability were satisfactory (alphas = .69, .84 and .85, respectively). However, the reliability of the certainty factor was considerably improved by removing the accessibility item (alpha increased from .65 to .88) so only the meta-stability and certainty items were included in this measure.

Table 4.4
Moderated Regression Analyses of Behaviour on Attitude, Accessibility, Ambivalence, Involvement and Stability

		Beta						
Step	Variable Entered	Step 1	Step 2	Step 3	R^2	Model F	ΔR^2	ΔF
1.	Attitude	.54***	.54***	.53***	.29	45.80***		
2.	Accessibility		.00	.01	.29	22.70***	.00	0.00
3.	Accessibility X Attitude			-.06	.29	15.30***	.00	0.63
1.	Attitude	.54***	.55***	.55***	.29	45.80***		
2.	Ambivalence		.06	.07	.29	22.49***	.00	0.58
3.	Ambivalence X Attitude			-.03	.29	14.95***	.00	0.19
1.	Attitude	.54***	.38***	.43***	.29	45.80***		
2.	Involvement		.27**	.28**	.34	28.68***	.05	8.53**
3.	Involvement X Attitude			.14	.35	20.36***	.01	2.80
1.	Attitude	.54***	.57***	.56***	.29	45.80***		
2.	Stability		-.09	-.10	.29	23.42***	.00	1.02
3.	Stability X Attitude			-.04	.29	15.53***	.00	0.11

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4.5
Factor Loadings for Properties of Intention

	Factor 1	Factor 2	Factor 3	Factor 4
Does your intention to exercise come to mind easily? (MA)	.85			
How confident are you about your intention to exercise? (Cert)	.84	-.30		.40
When you are asked about your intention to exercise, how quickly does it come to mind? (MA)	.76			.33
How definite is your intention to exercise? (Cert)	.73			
How easily does your intention to exercise come to mind? (MA)	.66	-.37		
Sum of differences between scores at T1 and T2 (STAB)		-.93		
Number of items that changed (STAB)		-.90		
Absolute difference between scores at T1 and T2 (STAB)		-.80		
Within-participants correlation (STAB)		-.76		
I intend to exercise at least 6 times in the next 2 weeks. (ACS)			.71	
I have decided that I will exercise at least 6 times in the next 2 weeks. (ACS)		.30	.70	-.38
I will make every attempt to exercise at least 6 times in the next 2 weeks. (ACS)			.65	
I plan to exercise at least 6 times in the next 2 weeks. (ACS)		.41	.59	
I am definitely going to exercise at least 6 times in the next 2 weeks. (ACS)			.49	
How likely is it that your stated intention to exercise will change? (MS)				.85
Do you think that your intention to exercise will change in the next 2 weeks? (MS)		-.35		.82
How stable is your intention to exercise? (MS)	.48			.71
How certain are you of your intention to exercise? (Cert)	.60			.67
How sure are you of your intention to exercise? (Cert)	.56			.64
Do you consider your intention to exercise to be...? (Cert)	.54			.57
I will try to exercise at least 6 times in the next 2 weeks. (ACS)			.33	-.39
Eigenvalue	6.38	3.24	1.97	1.62
R^2	27.7	14.1	8.6	7.0

Note. Loadings below .30 have been suppressed. ACS = reaction times to intention items, Cert = certainty of intention, MA = meta-accessibility of intention, MS = meta-stability of intention, STAB = temporal stability measures.

Scales for each variable were computed by taking the mean of all the variables that loaded on each factor. These scales were used as predictor variables in subsequent analyses.

4.6.5 Moderation of the Intention-Behaviour Relation

Intentions, PBC, certainty, meta-accessibility and past behaviour were all significantly correlated with exercise behaviour (see Table 4.2). Moderated regression analysis (Aiken & West, 1991) was used to test whether intention accessibility, certainty, stability and meta-accessibility of intentions moderated the relationship between intention and behaviour. In addition, past behaviour was included as a moderator variable, as research has shown that this variable can moderate intention-behaviour relations (cf. Sheeran & Abraham, in press). Table 4.6 shows that intention stability and past behaviour were both significant moderators of the intention-behaviour relationship. In each case, the inclusion of the interaction between the moderator variable and intention was associated with a significant increment in the variance explained in behaviour (ΔR^2 = .02 and .03, ΔF = 4.69 and 9.22, respectively, $p < .05$). Accessibility, meta-accessibility and certainty did not moderate intention-behaviour consistency.[1] Simple slope analyses were used to decompose the interactions (Aiken & West, 1991).

Findings for intention stability confirmed expectations (see Figure 4.2). When intention stability was low, intentions positively predicted behaviour (B = .50, $p < .001$). However, the predictive validity of participants' intentions improved as stability increased from low to moderate and from moderate to high (Bs = .62, and .73, respectively, $p < .001$). Thus, as intentions became more stable, their predictive power increased.

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[1] The effects of PBC stability and PBC accessibility (measured in a similar way to intention stability and accessibility) and the interactions between these variables and PBC on the PBC-behaviour relationship was also investigated using moderated regression analyses. Measures of PBC stability and accessibility were reliable (alphas = .79 and .65). However, the interaction term for both stability and accessibility did not have significant betas and did not significantly improve the amount of variance explained.

Table 4.6
Moderated Regression Analyses for Intention Stability, Intention Accessibility, Past Behaviour, Intention Certainty, and Meta-Accessibility

Step	Variable Entered	Beta			R^2	Model F	ΔR^2	ΔF
		Step 1	Step 2	Step 3				
1.	Intention	.69***	.70***	.66***	.48	105.34***		
2.	Intention Stability		.10	.12	.49	54.44***	.01	2.32
3.	Stability X Intention			.15*	.51	39.04***	.02	4.69*
1.	Intention	.69***	.69***	.69***	.48	105.34***		
2.	Intention Accessibility		-.06	-.06	.48	52.95***	.00	0.78
3.	Accessibility X Intention			.04	.49	35.21***	.01	0.35
1.	Intention	.69***	.34***	.31***	.48	105.34***		
2.	Past Behaviour		.51***	.55***	.62	90.54***	.14	39.84***
3.	Past Behaviour X Intention			.17**	.65	67.82***	.03	9.22**
1.	Intention	.69***	.67***	.60***	.48	105.34***		
2.	Intention Certainty		.23***	.24***	.53	63.83***	.05	12.08***
3.	Certainty X Intention			.11	.54	43.60***	.01	2.01
1.	Intention	.69***	.57***	.52***	.48	105.34***		
2.	Meta-Accessibility		.20*	.22**	.51	58.04***	.02	6.07*
3.	Meta-Accessibility X Intention			.13	.52	40.55***	.01	3.25

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Figure 4.2 Interaction between Intention and Intention Stability.

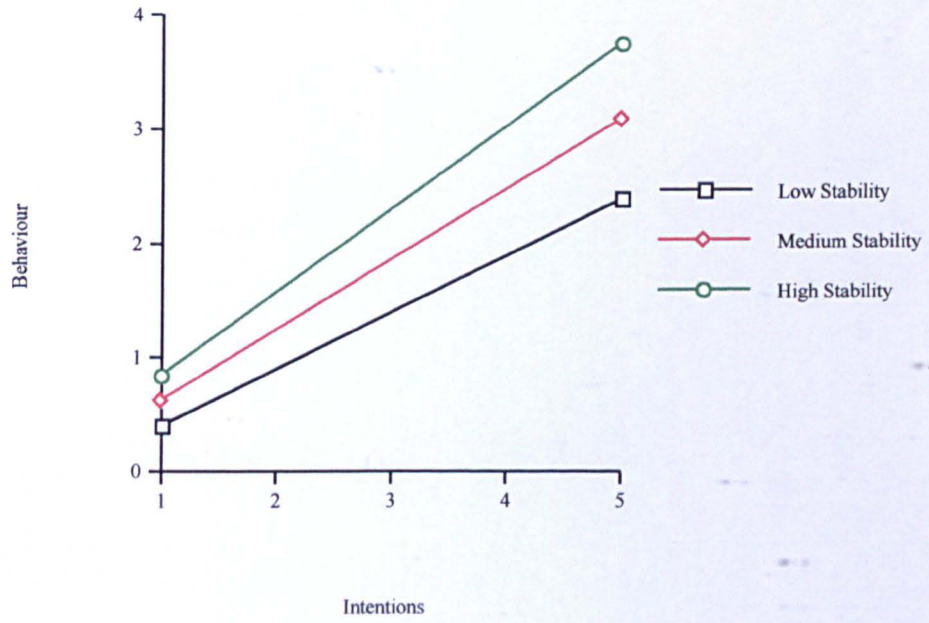
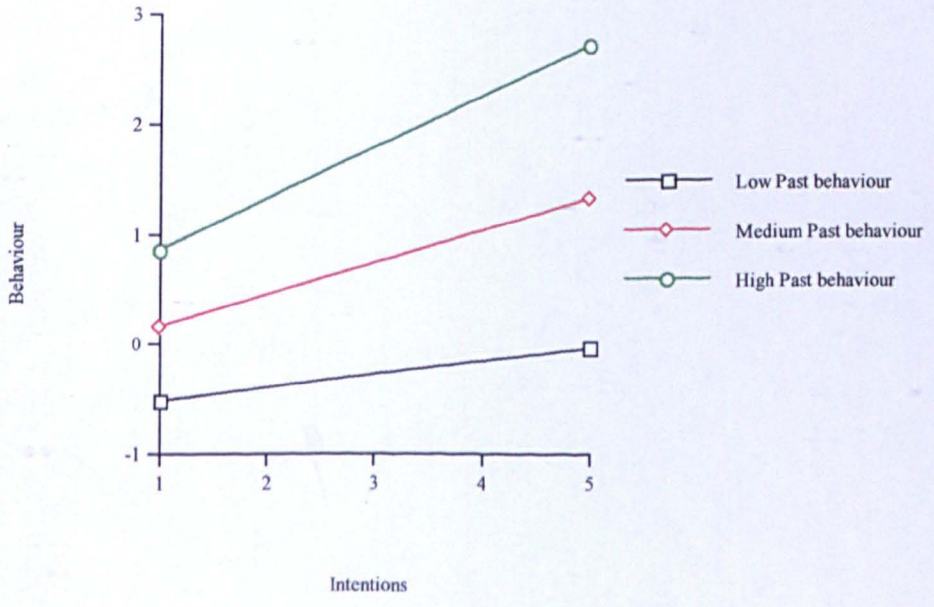


Figure 4.3 Interaction between Intention and Past Behaviour



A similar pattern was observed for past behaviour. When participants had little experience of performing the behaviour, intention did not predict behaviour (B = .12, *ns*) but as experience increased to moderate and high levels, intention became a significant predictor of behaviour (Bs = .29 and .46, respectively, $p < .001$). Figure 4.3 illustrates these findings.

4.6.6 Mediation of the Intention by Past Behaviour Interaction by Intention Stability

Finally, the hypothesis that intention stability mediates the relationship between behaviour and the intention by past behaviour interaction was tested (cf. Sheeran & Abraham, in press). One reason why a person who has exercised a lot in the past has intentions that better predict behaviour (see above) could be because their intentions are more stable. According to Baron and Kenny (1986) mediation can be said to occur when three conditions are satisfied: First the independent variable should be associated with the dependent variable. Second, the independent variable should be associated with the mediating variable. Third, in a regression of the dependent variable on both the independent variable and the mediator, the independent variable should be reduced to non-significance whereas the mediator should be significant. The findings in Table 4.6 satisfy the first criterion since the interactions between intention and intention stability, and between intention and past behaviour, were significantly associated with behaviour.

The second criterion was tested by regressing intention stability (the proposed mediating variable) on past behaviour and the interaction between intention and past behaviour. Results showed that the past behaviour by intention interaction accounted for a significant proportion of the variance in intention stability ($R^2 = .12$, $\Delta F = 15.15$, $p < .001$).

To test the third criterion, a hierarchical regression was performed. Variables from the TPB were entered on the first step, followed by past behaviour and the intention by past behaviour interaction term on step 2 and, intention stability and the

intention by intention stability interaction on the final step. Table 4.7 shows that the TPB explained 50% of the variance in behaviour with intention the only significant predictor. The inclusion of past behaviour and the intention by past behaviour interaction increased the variance explained to 65%. However, entering intention stability and the intention by intention stability interaction term did not reduce the interaction between intention and past behaviour to non-significance.

Table 4.7
Hierarchical Regression of Behaviour on Theory of Planned Behaviour Variables, Past Behaviour, Intention Stability, and Interactions with Intention

Step	Variables	Beta	Beta	Beta
1.	Intention	.61***	.32***	.29**
	Attitude	.13	-.01	-.00
	Subjective Norm	-.07	-.03	-.04
	PBC	.05	.02	.04
2.	Past Behaviour		.55***	.53***
	Past Behaviour X Intention		.17**	.17**
3.	Intention Stability			.01
	Stability X Intention			.13*
R^2		.50	.65	.66
ΔR^2		.50***	.15***	.01
Model F		27.37***	33.22***	26.09***

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

This means that intention stability does not mediate the relationship between behaviour and the intention by past behaviour interaction.

4.6.7 Discussion

This is the first study to examine the factor structure of properties of intentions. Results show that properties of intention possess discriminant validity. Similarly, factor analysis of properties of attitudes shows that these variables are relatively independent constructs also. These results provide support for H1. In addition, the study demonstrated that meta-judgmental properties load on separate factors to operative properties for both properties of attitudes and properties of intentions, supporting H2.

There was some evidence for H3 because attitude involvement moderated attitude-intention relations. However, properties of attitudes did not moderate attitude-behaviour consistency so there was no support for H4. Support for Hypotheses 5 and 6 was provided because intention stability moderated intention-behaviour consistency. Finally, findings showed that past behaviour was also a significant moderator of intention-behaviour relations though its moderator effects were not mediated by intention stability.

4.7 Properties of Cognitions possess Discriminant Validity

The findings for the PCA of properties of attitudes support previous factor analyses (Bassili, 1996; Erber et al., 1995; Krosnick et al., 1993; Prislin, 1996) as the properties tested loaded on separate factors. Thus, the present study provides further evidence of the independence of multiple properties of attitudes. The results are also consistent with Bassili's distinction between meta-judgmental and operative properties since involvement (a meta-judgmental property) loaded on a different factor to the three operative properties (accessibility, ambivalence, and temporal stability). Similarly, PCA of properties of intentions produced a four factor solution, with relatively independent constructs, and meta-judgmental properties loading on different factors to operative properties.

The only surprising finding was that the certainty measures loaded on two different factors (meta-accessibility and meta-stability). Perhaps most interesting is the link between meta-stability and certainty because previous research (Bassili, 1996; Sheeran & Abraham, in press) suggests that stability and certainty are related, and there was a significant correlation between certainty and meta-stability in the present study. This suggests that there may be similarities between participants' conceptions of the certainty and stability of their intentions: To be certain about something is to be

unbudgeable and confident about this issue (cf. Bassili, 1996) so perhaps participants interpreted questions about the stability of their intentions in a similar manner because to be stable is to be unlikely to change. This may be why these items loaded on the same factor.

4.7.1 Results of Moderation Analyses

Involvement was a significant moderator of attitude-intention consistency (Petty et al., 1983; Verplanken, 1989): Participants who considered exercise highly involving possessed greater attitude-intention consistency than participants who rated exercise as less involving. Previous research has defined high levels of involvement about an issue/behaviour as reflecting an issue/behaviour that is a key aspect of a person's self-concept (cf. Sherif & Cantril, 1947). For example, Johnson and Eagly (1989) stated

> 'We thus propose that involvement is the motivational state induced by an association viewed between an activated attitude and some aspect of the self-concept.' (p. 293).

Research has demonstrated that issues/behaviours that are important aspects of a person's self-concept can improve prediction of intentions. For example, Sparks & Shepherd (1992) found that self-identity predicted participants' intentions to consume organically grown vegetables. Thus, involvement appears to improve prediction of intentions from attitudes by identifying those individuals who consider issues/behaviour to be self-relevant and therefore, an important part of their identity. Indeed, Petty et al. (1995) argue that a high level of involvement leads to greater elaboration of information, which leads to attitudes that are more certain, accessible (Bizer & Krosnick, 2001; Kokkinaki & Lunt 1997; 1999), less ambivalent (Lavine et al., 2000), and therefore better predictors of intentions.

Ambivalence failed to moderate attitude-intention or attitude-behaviour consistency. These findings are inconsistent with previous research that has

demonstrated that ambivalence can moderate both relationships (Armitage & Conner, 2000; Sparks et al., 2001). However, it is possible that exercise is a behaviour that participants are not ambivalent about. For example Conner, Povey, Sparks, James and Shepherd (1998) measured the amount of ambivalence generated by twelve health behaviours (five health-risk and seven health-protective) and found that exercise was in the middle of distribution of behaviours, i.e., it generated moderate levels of ambivalence. When measured from 0-1, exercise produced a mean ambivalence score of 0.27 in Conner et al.'s study, which is similar to the mean value of 0.24 found in the current study. In explaining the fact that sometimes ambivalence does not moderate attitude-intention relations Conner and Sparks (2002) suggest that one factor is the amount of ambivalence the behaviour causes:

> 'Where the behaviour which is the focus of intention does not produce a considerable degree of ambivalence in at least some respondents, the moderation effect is unlikely to be observed (i.e., the lower and higher ambivalence groups are too similar).' (pp 59-60)

Accessibility failed to moderate attitude-behaviour and intention-behaviour relations, thus replicating the findings from Chapter 2 and Doll and Ajzen (1992). Fazio (1990a) claimed that participants must be familiar with performing the behaviour under study, if accessibility is to moderate cognition-behaviour consistency. The present study found that accessibility did not moderate cognition-behaviour consistency for exercise, a behaviour that was familiar to all participants. Therefore, the current study provides no support for the moderating impact of accessibility on cognition-behaviour relations. Chapter 6 will provide an analysis of the reasons for the failure of accessibility in this thesis.

Temporal stability significantly moderated intention-behaviour consistency replicating the results from Chapter 2 and other studies (Conner et al, 2000; 2002; Doll

& Ajzen, 1992; Sheeran & Abraham, in press; Sheeran et al., 1999). Thus, there appears little difference between temporal stability as a moderator of novel (donating food via the Internet) and familiar (exercise) behaviours. Moreover, temporal stability remained a significant moderator even after controlling for the impact of past behaviour. Given that past behaviour is typically the best predictor of future behaviour when researching exercise behaviour (see Norman et al., 2000; Sheeran & Abraham, in press), it is especially impressive to find a moderating effect of intention stability.

The current study replicated Sheeran and Abraham's (in press) finding that past behaviour can moderate intention-behaviour consistency for exercise behaviour. When participants had little recent experience of exercise their intentions did not predict behaviour. However, at moderate and high levels of past behaviour intentions were a highly significant predictor of behaviour. This finding contrasts with Ouellette and Wood (1998) who suggest that as past behaviour increases then intentions should be less strongly associated with future behaviour.

A further issue regarding the past behaviour by intention interaction is the why intention stability did not mediate the effect of this interaction. A recent study by Sheeran and Abraham (in press) found that intention stability mediated the impact of the past behaviour by intention interaction on future behaviour, suggesting that past behaviour moderates intention-behaviour consistency because it is related to the stability of participants' intentions. At present it is unclear why the two studies differ, although one explanation is that past behaviour is moderating the intention-behaviour relationship through its effects on another dimension of intention strength (i.e., not temporal stability) that was not measured in the present study. Further research is required to clarify the mechanisms by which past behaviour moderates the intention-behaviour relationship.

The present results suggest that meta-judgmental and operative measures were indexing different concepts. Consistent with this suggestion are the correlations between the meta-judgmental and operative measures for accessibility (r = -.02, *ns*) and temporal stability (r = .32, p < .001). The correlation between accessibility measures was virtually zero, suggesting little overlap between the two measures and although the correlation between the stability measures is significant, it is only of 'medium' size according to Cohen's (1992) classification system. Thus, it appears that people are actually quite poor at assessing the objective accessibility and stability of their intentions.

In terms of the impact of meta-judgmental and operative properties as moderator variables, involvement moderated attitude-intention consistency and temporal stability moderated intention-behaviour consistency. Thus, although both types of measures can be significant moderator variables, these results corroborate Bassili's (1996) claim that operative measures provide more accurate prediction of important cognitive processes, as temporal stability was the only moderator of intention-behaviour consistency. A final point to note is that even though no variables moderated attitude-behaviour consistency, this is not a critical finding in the present analysis because attitude was not a significant predictor of behaviour when entered into the equation with intention (see Table 4.6). Therefore it appears that participants' attitudes toward exercise are a less important predictor of their exercise behaviour than their intentions to exercise (see also, Sheeran & Abraham, in press).

In summary, the results from this study support previous findings that properties of attitudes possess discriminant validity and can be distinguished on the dimension of meta-judgmental properties vs. operative properties. In addition, temporal stability is a significant moderator of intention-behaviour consistency, whereas accessibility is not. Furthermore, this study demonstrates that properties of intentions appear to be relatively

independent constructs, with meta-judgmental measures loading on separate factors to operative measures, and apparently tapping different sources of information.

CHAPTER 5: TEMPORAL STABILITY AS A MEDIATOR OF INFORMATION PROCESSING

5.1 Overview

The previous chapters have demonstrated that temporal stability is a highly effective moderator of cognition-behaviour relations. However, little research has examined the influence of temporal stability on information processing, which is another of the four aspects of a 'strong' attitude outlined by Krosnick and Petty (1995). Krosnick and Petty's definition of a strong attitude can be divided into two factors *durability* (temporal stability and resistance to persuasion) and *impact* (impact on information processing and impact on behaviour). Applying Krosnick and Petty's definition to intentions, Sheeran et al. (1999) argued that temporal stability could be antecedent to behavioural impact, because intentions must be stable before they affect the prediction of behaviour. Following this approach it could be argued that temporal stability may also be antecedent to informational impact, because intentions must be stable before they affect information processing. This is important because research has demonstrated that information processing biases can affect subsequent behaviour (see below). This chapter tests the relationship between intention stability and information processing to examine the possibility that participants' with more stable intentions process information related to these intentions differently compared to participants with less stable intentions.

5.2 Effects of Properties of Attitude on Information Processing

Research has shown that properties of attitudes can affect participants' information processing, especially with regard to persuasion. For example, Bassili (1996) demonstrated that participants with more accessible attitudes were less likely to change their attitudes when presented with a counter-attitudinal message. Also, Armitage and Conner (2000) found that participants with less ambivalent attitudes were

less persuaded by an attitude-relevant message, compared to participants with more ambivalent attitudes. Finally, research has shown that participants who consider an issue highly involving are likely to process an issue-relevant message more carefully, which in turn reduces attempts at persuasion (Bizer & Krosnick, 2001). Thus, there is evidence that properties of attitudes affect information processing.

No research has examined how properties of intention (such as temporal stability) impact on participants' information processing. One would expect that more stable intentions should be more robust in the face of persuasive communications. However, the mechanisms by which stability influences information processing have not been clearly articulated. Therefore, this chapter tests the impact of temporal stability on information processing in two studies. The first study examines the impact of temporal stability of exercise intentions on processing of information related to exercise. It is hypothesised that more stable intentions are higher in priority than less stable intentions (cf. Kuhl, 1985) thus participants with more stable exercise intentions will be more sensitive to information related to these intentions compared to participants with less stable intentions. The consequence of this is that participants with more stable exercise intentions should possess better recognition memory for information presented about exercise than participants with less stable exercise intentions.

5.3 Study 4

5.3.1 Method

Study 4 used participants who completed Time 1 and Time 2 measures in Study 3. To recap, $N = 139$ participants completed six measures of their intentions to exercise on two occasions, two weeks apart (the items are fully described in the method section of Chapter 4). These participants were used because the temporal stability of their intentions was already calculated. Approximately 3 months later, Study 4 was

conducted. Participants were matched to their earlier responses using a coding frame that preserved their anonymity. The same measures of intentions and temporal stability outlined in Chapter 4 were used, although it must be noted that the coefficient alphas were recalculated for this sample, to ensure that the intention and intention stability items were reliable. Reliability was satisfactory (both alphas > .78).

5.3.2 Participants and Procedure

Of the students who completed the experiment, eighty-eight (out of 139) could be matched to their earlier responses. These eighty-eight participants are the sample for Study 4. They did not differ on the measures of intentions and intention stability from the 51 participants who did not complete Study 4. Participants were informed that they would be taking part in a study that examines how people understand medical findings. Consistent with this cover story, participants were presented with a large passage that detailed the benefits of exercise in reducing the likelihood of developing hypertension (the text was taken from Goldberg & Elliot, 1994). The first slide was as follows:

> Hypertension is a common health problem and represents a significant risk for development of coronary heart disease, stroke, and congestive heart failure. Exercise can alter baseline blood pressure and retard its progression to hypertension. Cross-sectional research (Fraser et al., 1983) has observed that children with higher fitness levels have lower blood pressures. When the blood pressure status and physical activity index of young adults were followed, pressures remained lower among the fittest and those who performed the greatest amount of regular exercise. These differences remained after accounting for differences in height and weight.

The second slide was as follows:

> Paffenberger et al. (1983) observed that adults performing greater amounts of weekly dynamic exercise had lower blood pressure than less active adults. Also high aerobic fitness may lower the risk of developing hypertension. Blair et al. (1984) followed 4,276 men for an average of 8.5 years after performing exercise tolerance tests. Blood pressure at rest and during exercise remained lower for the most aerobically fit. The physically inactive subjects had up to 52% greater chance of developing hypertension, independent of other factors known to influence blood pressure.

The final slide looked like this:

However, regular exercise is necessary to maintain low blood pressure; Cade et al. (1984) found that elevated blood pressure levels return within weeks of resuming a sedentary lifestyle. In addition, a meta-analysis of 25 studies (Hagberg, 1990) found that exercise reduced blood pressure in patients with hypertension. Hagberg also found that blood pressure reductions produced by physical activity did not correlate with the intensity of training and that weight lifting is as effective at reducing blood pressure as aerobic activity.

Each slide was presented for thirty seconds and was then replaced by the next slide. After the third slide, participants were told to turn over the questionnaire placed in front of them and answer the questions. Once participants had completed the questions they were thanked and received their credit.

5.3.3 Measures

Participants answered ten multiple-choice questions based on the material presented on the slides: 'Hypertension represents a significant risk for the development of ...' (a) coronary heart disease, stroke and myocardial infarction, (b) coronary heart disease, myocardial infarction and congestive heart disease, (c) stroke, congestive heart failure, and myocardial infarction, (d) coronary heart disease, stroke and congestive heart disease; 'Blair et al. (1984) followed:' (a) 4,276 men for 8.5 years, (b) 4,276 men for 9.5 years, (c) 4,376 men for 8.5 years, (d) 4,376 men for 9.5 years; 'Hagberg's (1990) meta-analysis was based on...' (a) 10 studies, (b) 15 studies, (c) 25 studies, (d) 30 studies; 'Fraser et al. (1983) showed that...' (a) exercise has more impact on blood pressure in obese subjects, (b) exercise has less impact on blood pressure in obese subjects, (c) exercise has the same impact on blood pressure for fit and obese subjects, (d) exercise has more impact on blood pressure for sedentary subjects; 'Paffenberger et al. (1983) found that...' (a) greater amounts of weekly aerobic exercise lead to lower blood pressure, (b) greater amounts of weekly dynamic exercise lead to lower blood pressure, (c) greater amounts of daily aerobic exercise lead to lower blood pressure, (d) greater amounts of daily dynamic exercise lead to lower blood pressure; 'Blair et al. (1984) found that physically inactive subjects had up to' (a) 42% greater chance of

developing hypertension, (b) 52% greater chance of developing hypertension, (c) 62% greater chance of developing hypertension, (d) 72% greater chance of developing hypertension; 'Hagberg's (1990) meta-analysis found that exercise reduced blood pressure in...' (a) young children, (b) patients with hypertension, (c) patients with stroke, (d) patients with myocardial infarction; 'Cade et al. (1984) found that elevated blood pressure levels return within...' (a) days of resuming a sedentary lifestyle, (b) a week of resuming a sedentary lifestyle, (c) weeks of resuming a sedentary lifestyle, (d) months of resuming a sedentary lifestyle; 'Blood pressure...' (a) has no correlation with the intensity of training, (b) has a strong positive correlation with the intensity of training, (c) has a strong negative correlation with the intensity of training, (d) has a weak positive correlation with the intensity of training; 'High fitness levels are associated with low blood pressure' (a) only among young children, (b) only among adults, (c) among both adults and children regardless of height, (d) among both adults and children regardless of height and weight.

A pilot study ($N = 15$) was conducted to assess the difficulty of the questionnaire. The results showed that participants answered about 50% of the questions correctly, indicating that the questions were quite difficult considering that a score of 25% would be expected by chance.

5.3.4 Results

Analysis focussed on the impact of temporal stability of intentions on participants' recognition memory for the information presented. The dependent variable in this study was participants' recognition memory as indexed by their score on the questionnaire. Participants had a mean score of 5.44 (54% correct), which was similar to the findings reported in the pilot study. The correlations between recognition memory score on the questionnaire, intentions 3 months earlier, and intention stability were computed. Exercise intentions 3 months earlier were not significantly correlated

with recognition memory (r = -.02, *ns*), however there was a significant positive relationship between intention stability and recognition memory (r = .20, p = .03, one-tailed). A median split on stability was performed to classify participants as either 'low' or 'high' in temporal stability (Median =.02) and then an independent groups t-test was performed using group as the independent variable and score as the dependent variable. Participants with more stable intentions had a significantly higher scores on the questionnaire (M = 5.84) compared to participants with less stable intentions (M = 5.02), t(86) = 2.17, p < .04. Therefore, further analyses were conducted to examine the effect of intention stability on score.

To test the impact of temporal stability on information processing, a three-step moderated regression was performed (Aiken & West, 1991). Score was regressed on intention at the first step, intention and intention stability on the second step, and intention, intention stability and the intention by intention stability interaction on the third step.

The results from the analysis are presented in Table 5.1. Intentions did not predict score on the questionnaire, and there was no significant interaction term, however, there was a *direct* effect of intention stability on score: Participants with more stable intentions demonstrated higher scores on the questionnaire than participants with less stable intentions (Beta = .22, p < .05). The addition of intention stability to the model on the second step lead to a significant increase in the variance accounted for (ΔF = 3.67, p = .03). The impact of past behaviour, attitudes, subjective norms, and PBC 3 months earlier, and the gap between completion of Study 4 and the measurement of variables 3 months earlier all failed to qualify the above effect.

Table 5.1
Moderated Regression Analysis of Recognition Memory Score on Intention, Intention Stability and the Interaction Term

Step	Variables	Beta	Beta	Beta
1.	Intention	-.02	-.00	.00
2.	Intention Stability		.20*	.22*
3.	Stability X Intention			-.10
R^2		.00	.04	.05
ΔR^2		.00	.04*	.01
Model F		0.03	1.85	1.51

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

5.3.5 Discussion

The results from Study 4 show that intention stability can *directly* affect participants' information processing. Even after a three month gap between completing measures of intentions and performance on the multiple-choice task, participants with more stable intentions performed significantly better at the task than participants with less stable intentions. Although the effect described was small in quantitative terms, it is worth noting that no other variable predicted score on this task; attitudes, subjective norms, PBC, intentions and past behaviour all failed to predict score, which suggests that there is something critical about the stability of *intentions* that generalises to information related to these intentions, e.g., the importance of exercise for a healthy lifestyle. Nevertheless, Study 4 is the first study that has shown that temporal stability affects information processing. Thus, a second study was conducted to provide a further test of the impact of temporal stability on information processing.

5.4 Context Effects on Cognition Ratings

A subtle influence on participants' judgements has been detailed in the literature on context effects (see Schuman & Presser, 1981, for a review). Research has shown that a number of aspects of questionnaire design can affect the ratings that participants

give. For example, Schwarz, Knäuper, Hippler, Noelle-Neumann, and Clark (1991) demonstrated that participants gave significantly higher ratings on a –5 to + 5 scale compared to a 0-10 scale despite the fact that both scales are formally equivalent. Schwartz et al. hypothesised that the –5 to +5 scale leads participants to believe that the dimension being investigated is bipolar whereas the 0-10 scale leads participants to believe that the dimension is unipolar (known as the "shift of meaning" hypothesis). When the verbal label "not at all successful" is associated with the numeric value of "0" then participants believe it to reflect the absence of satisfaction. In contrast, when "not at all successful" is associated with the numeric value "-5" and the scale has a mid-point of "0", then participants interpret the verbal label to mean the presence of explicit dissatisfaction. Sheeran and Armitage (2001) tested Schwarz et al.'s hypothesis. They presented participants with students' average ratings for attitudes, subjective norm and PBC related to an unidentified health behaviour on either a 0-10 scale or a –5 to +5 scale. In the 0-10 condition, all variables had a rating of 3, while in the –5 to +5 condition all variables had a score of –2. Despite the formal equivalence of these values participants possessed significantly greater intentions to perform the behaviour when given information on a unipolar scale as opposed to a bipolar scale. Sheeran and Armitage's findings suggest that "shift of meaning" was responsible for the differences in participants' intention to perform the behaviour.

Krosnick and Petty's (1995) definition of attitude strength would suggest that strong attitudes should be less susceptible to these effects than weak attitudes, because strong attitudes should be more stable, resistant to persuasion, etc. However, research into context effects has produced equivocal results.

For example, Krosnick and Schuman (1988) found that context effects occurred for both weak and strong attitudes; properties of attitudes (certainty, importance, and intensity) did not moderate the impact of context effects. In the research that has

followed, operative measures of properties of attitude (e.g., accessibility) have been investigated as moderators of context effects (Bassili, 1996; Lavine, Huff, Wagner & Sweeney, 1998) with some success. However, Bassili and Krosnick (2000) examined all the variables tested in the previous studies (accessibility, extremity, certainty, importance, intensity, knowledge, likelihood of change) and found that no single property of attitudes moderated all types of context effects. Nevertheless, no research has employed temporal stability as a moderator of context effects.

Study 5 examines the impact of temporal stability on the numeric values participants assign to rating scales. Participants were asked to rate their attitudes, subjective norms, PBC, and intentions on either –5 to +5 scale or on a 0-10 scale. There were two aims of Study 5: (a) to examine whether condition affected participants' ratings and (b) to assess the impact of temporal stability on condition. It was hypothesised that participants would assign higher ratings on the bipolar scales compared to unipolar scales, but that this effect would be qualified by the temporal stability of participants' intentions. Participants with less stable intentions are more likely to be affected by momentarily salient aspects of the situation, e.g., whether the scale is unipolar or bipolar, and this should lead them to assign higher ratings to bipolar scales than unipolar scales. For participants with more stable intentions no difference between scores due to condition was expected.

5.5 Study 5

5.5.1 Method

Study 5 also used participants' who completed Time 1 and Time 2 measures for Study 3. However, Study 5 was conducted after data collection for Study 4 had been completed. The same coding frame used in Study 4 was again used to match participants while maintaining their anonymity. The same measures of intentions and temporal stability outlined in Chapter 4 were used, although it must be noted that the

coefficient alphas were recalculated for this sample, to ensure that the intention and intention stability items were reliable. Reliability was satisfactory (both alphas > .70).

5.5.2 Participants and Procedure

Of the students who completed the experiment, ninety-four (out of 139) could be matched to their Study 3 responses. These ninety-four participants are the sample for Study 5. They did not differ on any of the measures from the 45 participants who did not participate in Study 5. Participants were randomly assigned to either the unipolar or bipolar condition and asked to complete the questionnaire in silence. Once participants had completed the questionnaire they were thanked and received their credit.

5.5.3 Measures

Consistent with previous research (e.g., Norman & Smith, 1995), a brief definition of exercise was printed on the front of all the questionnaires ("Exercise involves at least 20 minutes of moderate/physical activity. Exercise includes activities such as aerobics, badminton, jogging, rugby, etc., but not activities which form part of your daily life such as walking to the bus stop, dancing at discos, etc.") in order to reduce ambiguity about the meaning of "exercise".

Participants then indicated their general attitude towards exercise by marking a 65mm visual thermometer with endpoints 'not at all positive' and 'extremely positive'. This was done to ensure that participants had been randomly assigned to each condition. Participants then completed the measures of TPB variables. Affect was measured using the items "I think exercising at least 6 times in the next 2 weeks would be... *pleasant*" and "I think exercising at least 6 times in the next 2 weeks would be... *enjoyable*". Cognition was measured using the items "I think exercising at least 6 times in the next 2 weeks would be...*worthwhile*" and "I think exercising at least 6 times in the next 2 weeks would be... *important*". *Subjective norm* was measured by the item "What would people who are important to you think about your exercising 6 times in the next 2

weeks? Would they... *approve*?" *PBC* was measured using the two items "I think exercising at least 6 times in the next 2 weeks would be...*easy*" and "I think exercising at least 6 times in the next 2 weeks would be... *achievable*". *Intention* was measured by two items "How strongly do you intend to exercise at least 6 times in the next 2 weeks?" and "How hard will you try to exercise at least 6 times in the next 2 weeks?" All variables were anchored by the terms "not at all" and "extremely". The reliability of each construct was assessed using Cronbach's alpha, on each pair of items. Alphas ranged from .72 to .90, so each pair of items was averaged into a scale measure of each construct.

5.5.4 Results

Two sets of analyses were conducted. First, the impact of condition on participants' ratings on the questionnaire was examined. Second, the impact of temporal stability on condition was investigated. To assess the random assignment of participants to each condition a one-way ANOVA was conducted on the general attitude item with condition as the between-participants variable. Unfortunately, participants in the unipolar condition demonstrated significantly more positive attitudes than participants in the bipolar condition (Unipolar $M = 43.73$, Bipolar $M = 37.09$), $F(1, 96) = 4.03$, $p < .05$. Therefore, in all subsequent analyses, the general attitude item was included as a covariate to account for any differences that may be caused by this failure of randomisation.

The first analysis focussed on condition as a predictor of participants' score on the questionnaire. A MANCOVA, with the general attitude item as a covariate, was conducted on the TPB items, to assess the impact of condition on ratings. There was no significant multivariate effect of condition, $F(5, 88) = 1.31$, *ns*. Examining the univariate analyses, there was a marginal effect of condition on intention scores, participants gave higher values in the bipolar compared to the unipolar condition (*Ms* =

6.24 vs. 5.41, respectively), $F(92) = 3.53$, $p = .06$, but none of the other variables were affected by condition.

A hierarchical regression analysis was conducted to test the impact of temporal stability on condition. Intention score was regressed on the general attitude item, condition, intention stability, and the interaction between intention stability and condition. The results of this analysis are presented in Table 5.2. Condition had a marginal effect on intention (beta = .16, p =.06), indicating that higher scores were given in the bipolar condition compared to the unipolar condition. However, this effect was qualified by an interaction between condition and intention stability (beta = -.28, p < .05).

Table 5.2
Moderated Regression Analysis of Intention Score on Condition, Intention Stability and the Interaction Term

Step	Variables	Beta	Beta	Beta
1.	Check	.63***	.64***	.65***
1.	Condition	.16†	.15†	.16†
2.	Intention Stability		.02	.22†
3.	Stability X Condition			-.28*
R^2		.39	.39	.42
ΔR^2		.39***	.00	.03*
Model F		28.88***	19.08***	16.62***

Note. † $p < .07$; * $p < .05$; ** $p < .01$; *** $p < .001$.

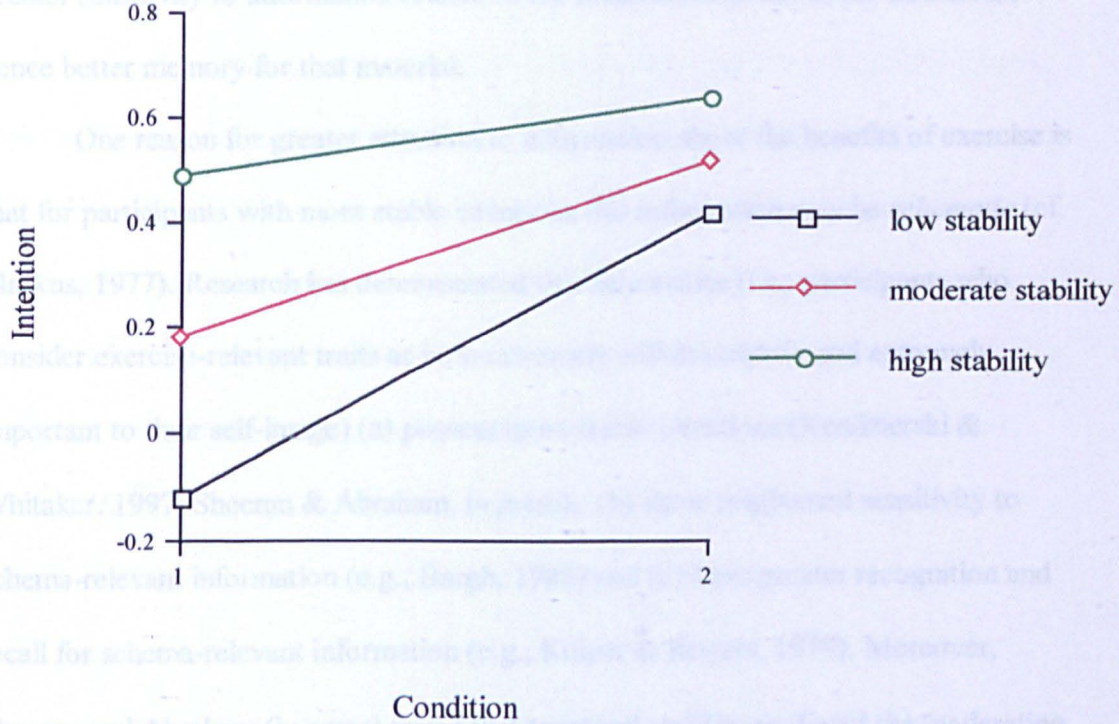
Simple slopes analysis (Aiken & West, 1991) was used to decompose the interaction term, examining the relationship between condition and intention score at three levels of temporal stability, the mean level and one standard deviation above and below the mean. When participants' intentions were low in stability, condition was a significant predictor of intention score (B = .54, $p < .05$) such that participants gave higher scores on the bipolar scale compared to the unipolar scale. At moderate levels of

intention stability, condition was a marginal predictor of intentions (B = .31, p = .06). However, at high levels of intention stability, condition was not a significant predictor of intentions (B = .15, p = .47). These results are illustrated in Figure 5.1.

5.5.5 Discussion

Consistent with predictions, participants with more stable intentions were unaffected by changes in response format, whereas participants with less stable intentions were affected by the manipulation. This result adds to the literature that has attempted to overcome the effects of response format (Bassili & Krosnick, 2000; Krosnick & Schuman, 1988) although the present findings are the first attempt to employ temporal stability as a moderator of these effects.

Figure 5.1 Interaction between Condition and Intention Stability



Note. Condition 1 = 0-10 (unipolar) scale; Condition 2 = -5 to +5 (bipolar) scale.

5.6 Temporal Stability affects Information Processing

Across two studies, temporal stability of intention had an impact on participants' information processing. Study 4 demonstrated that more stable intentions improved processing of intention-related material, as shown by recognition memory score. Study 5 found that temporal stability could moderate the impact of a rating scale manipulation on participants' ratings of their intentions.

It is likely that information about exercise stored in memory includes reference to the health-related benefits of exercise; indeed, research by Rivis and Sheeran (in press) found that 72% of participants associated the concept 'healthy' with the 'type of person who engages in exercise'. Thus, people are aware of the link between exercising and health. In Study 4, participants were presented with information demonstrating that exercise reduces the chance of developing undesirable conditions such as hypertension. The results from Study 4 suggest that more stable intentions are associated with a greater sensitivity to information related to the behavioural focus of the intentions; hence better memory for that material.

One reason for greater attention to information about the benefits of exercise is that for participants with more stable intentions this information may be *schematic* (cf. Markus, 1977). Research has demonstrated that schematics (i.e., participants who consider exercise-relevant traits as both extremely self-descriptive and extremely important to their self-image) (a) possess more stable intentions (Kendzierski & Whitaker, 1997; Sheeran & Abraham, in press), (b) show heightened sensitivity to schema-relevant information (e.g., Bargh, 1982) and (c) have greater recognition and recall for schema-relevant information (e.g., Kuiper & Rogers, 1979). Moreover, Sheeran and Abraham (in press) found that temporal stability mediated the moderating effect of self-schemas on the intention-behaviour relationship. In other words, the effect of self-schemas on intention-behaviour relations was entirely due to the temporal stability of participants' intentions. Thus it may have been that participants with more

stable intentions in Study 4 possessed self-schemas related to exercise, and this increased their sensitivity to schema-relevant information and lead to greater recognition of this information as indexed by the recognition memory test.

There are two alternative explanations of the effects reported in Study 4 that need to be considered. First, it may be that participants with more stable intentions also possess more knowledge about that behaviour/issue, which would improve performance on a recognition memory task. On the basis of the results for Study 4 it is difficult to rule out this possibility. Therefore, further tests controlling for the effect of previous knowledge are needed to comprehensively demonstrate that intention stability leads to more efficient information processing. Second, the finding that there was no interaction between intention and intention stability in Study 4 was surprising, as one might predict that stability would only improve memory for information that reinforces intentions. In other words, participants who read information about the benefits of exercise in reducing the risk of hypertension and who held positive intentions should have been more likely to notice and remember information that supports their position compared to participants' who possess negative intentions. It may be that for participants with highly stable intentions information related to these intentions is schematic (see above). This may hold for both positive and negative intentions, thus explaining why performance in Study 4 was not affected by the valence of intentions. Nonetheless, given the novelty of the procedure used in Study 4 further studies are required before the effects described can be considered general.

Study 5 adds to the literature on questionnaire context effects (Bassili & Krosnick, 2000; Bishop, 1990; Lavine et al, 1998; Schwartz et al., 1991) by providing the first test of temporal stability as a moderator of these effects. Schwartz et al. showed that participants usually give higher ratings on 11-point bipolar scales compared to 11-point unipolar scales. The present study provided a replication of this finding for

exercise intentions however, the effect of condition on ratings was qualified by an interaction between condition and the stability of participants' intentions: Participants with less stable intentions were affected by the manipulation, whereas participants with more stable intentions were not affected by the manipulation.

One reason for the influence of temporal stability in Study 5 is that it is an operative measure of intention strength (see Chapter 1 for a full discussion of operative vs. meta-judgmental measures). Bassili (1996) argued that operative measures are less derivative and less susceptible to extraneous influences than meta-judgmental measures. Bassili and Krosnick (2000) speculated that operative measures may be associated with more universal moderation of context effects, and although they found that accessibility did not moderate all types of context effects, they did not test temporal stability as a moderator. Given the superiority of temporal stability as a moderator of intention-behaviour consistency compared to accessibility, and evidence that temporal stability may be the mechanism through which other properties of intention exert their influence (Abraham & Sheeran, in press; Sheeran & Abraham, in press), it may be that temporal stability can moderate all types of context effects. However, the impact of temporal stability has only been demonstrated for one of the many context effects described in the literature (see Bassili & Krosnick, 2000, for a list of other context effects) so further research examining the impact of temporal stability on context effects is warranted.

In summary, the two studies outlined in the present chapter demonstrated that temporal stability affected participants' information processing. Chapter 6 will provide a discussion of the main findings that have been presented in this thesis.

CHAPTER 6: CONCLUSIONS

6.1 Properties of Cognitions as Moderators of Cognition-Behaviour Consistency

Chapters 2-5 have examined various aspects of properties of cognitions. These have included: A review of previous research on the impact of properties of cognitions as moderators of cognition-behavioural intention and cognition-behaviour relations within the TPB (Chapter 3), two tests of properties of cognitions as moderators of cognition-behaviour relations (Chapters 2 and 4), factor analyses of properties of attitudes and properties of intention (Chapter 4), and two tests of the impact of temporal stability on information processing (Chapter 5). This section will attempt to integrate the results of the previous chapters into a discussion of temporal stability and other properties of cognitions. The focus will be on three themes: The relationship between temporal stability and (a) cognition-behaviour consistency, (b) other properties of cognitions, and (c) information processing. Finally, the consequences of temporal stability for theory and interventions will be discussed.

6.1.1 Temporal Stability as a Moderator of Cognition-Behaviour Relations

Studies 1 and 3 demonstrated that temporal stability was a significant moderator of intention-behaviour consistency, confirming previous research findings (Conner et al., 2000; 2002; Doll & Ajzen, 1992; Sheeran & Abraham, in press; Sheeran et al., 1999). Thus, the impact of temporal stability on the intention-behaviour relationship appears to be robust across a variety of behavioural settings. This suggestion is further supported by a meta-analysis of temporal stability as a moderator of intention-behaviour consistency (Chapter 3).

The evidence presented for temporal stability as a moderator of attitude-behaviour and PBC-behaviour relations was less supportive: Temporal stability moderated attitude-behaviour and PBC-behaviour relations in Study 1 but had no effects

in Study 3. However, meta-analyses presented in Chapter 2 found that across studies temporal stability significantly improved the prediction of behaviour by attitudes and PBC. It may be that there is something specific about exercise behaviour that explains why temporal stability did not moderate attitude-behaviour and PBC-behaviour relations. One explanation is that participants possessed inaccurate attitudes and PBC—the mean scores for attitudes and PBC were 4 and 3.52 (out of 5), while participants' modal frequency of exercise was zero times, on average, in two weeks—suggesting that participants perceptions of how much they enjoy exercise and how much control they have over exercise are not reflected in their behaviour. In addition, participants are likely to revise inaccurate cognitions thus reducing the stability of these cognitions (cf. Ajzen & Fishbein, 2001) and this may have decreased the likelihood that temporal stability moderated attitude-behaviour and PBC-behaviour relations in Study 3.

A critical question is why does temporal stability improve cognition-behaviour consistency? Based on the literature, two explanations are advanced. Ajzen and Fishbein (1973) argued that measuring intentions immediately prior to behavioural performance is critical because the longer the time interval between measurement of intentions and behaviour, the greater the likelihood that participants will receive new information that may change their intentions. Evidence supports the view that shorter time intervals are associated with improved intention-behaviour consistency (e.g., Sheeran & Orbell, 1998). The implication is that intentions that are more stable provide a better indicator of the intention immediately prior to action compared to intentions that are less stable. However, if temporal stability is only important because it is a marker for the intention immediately prior to action this implies that temporal stability should moderate intention-behaviour consistency over relatively short time periods only. Over longer time periods, temporal stability should not moderate intention-

behaviour relations because participants are likely to receive new information that will alter the intention that is active immediately prior to the behavioural performance.

The results of a study by Conner et al. (2002) do not support Ajzen and Fishbein's suggestion. In the context of healthy eating behaviour, Conner et al. found that participants with more stable intentions possessed stronger intention-behaviour associations compared to participants with less stable intentions even though behaviour was measured *six years* after the measure of temporal stability had been taken. This finding is incompatible with Ajzen and Fishbein's position since they would have expected that participants' intentions would change in six years because of exposure to new information. Thus, the moderating effect of temporal stability is not explained by its being a marker for intentions immediately prior to action since temporal stability can moderate intention-behaviour relations even over extended periods of time.

An alternative explanation of moderation by temporal stability focuses on a mechanism by which temporal stability may moderate cognition-behaviour relations. It is possible that temporal stability may represent the *priority* of intentions over time, i.e., it provides an index of the extent to which an intention is shielded from competing intentions (cf. Kuhl, 1985). Kuhl suggested that successful completion of a goal requires the protection of the intention to achieve the goal (e.g., "I intend to give blood") from other, competing, intentions that are unrelated to completion of the goal (e.g., "I intend to go swimming"). Thus, the temporal stability of a particular intention may reflect the position of that intention in a hierarchical structure of actions that the person has told him/herself to undertake in a particular time period (see also Carver & Schier, 1998; Karoly, 1998).

Results from Chapter 5 support Kuhl's predictions. Study 4 found that participants with more stable intentions performed better at a task based on information related to these intentions compared to participants with less stable intentions.

Similarly, Study 5 showed that participants with more stable intentions were unaffected by a contextual manipulation contained in a questionnaire. Both of these results are consistent with the idea that more stable intentions are high in priority, and that information related to these intentions is also high in priority. In contrast, participants with less stable intentions do not appear as sensitive to information related to their intentions.

There are two domains in which further research into temporal stability is needed: Research into health-risk behaviours and an examination of the causes of intention stability. First, no study has examined moderation of intention-behaviour relations by temporal stability for health-risk behaviours such as drug taking and binge drinking. Research has shown that these behaviours are predicted by intentions (e.g., Conner, Sherlock et al., 1998; Rivis & Sheeran, 2002). Thus, it would be expected that temporal stability should moderate the strength of the intention-behaviour relationship such that participants with more stable intentions should possess greater intention-behaviour consistency compared to participants with less stable intentions. However, an empirical test of this proposition has yet to be conducted.

Second, relatively little research has been directed toward understanding the determinants of intention stability. Previous research has shown that indirect experience, ambivalence, attempts to analyse the reasons underlying attitudes and low affective-cognitive consistency have all been associated with unstable attitudes (Bargh et al., 1992; Cooke & Sheeran, 2001a; Doll & Ajzen, 1992; Rosenberg, 1968; Wilson, Dunn, Kraft, & Lisle, 1989). Study 3 found that there were significant correlations between both intention stability and PBC and intention stability and attitude stability. This suggests that other factors within the TPB are related to the stability of participants' intentions. Studies examining these relationships are critical. Given that intention stability moderates the relationship between intentions and behaviour it is

important to identify variables that are antecedent to intention stability. These antecedent variables may be easier to modify than intention stability. Moreover, if changing the stability of participants' attitudes can affect the stability of their intentions this would be useful knowledge when designing interventions since considerable research has been conducted on changing attitudes (e.g., Petty & Cacioppo, 1986; Petty et al., 1995).

6.1.2 Accessibility as a Moderator of Cognition-Behaviour Consistency

This thesis provides mixed evidence to support the idea that accessibility is a moderator of cognition-behaviour relations. Although accessibility emerged as a significant moderator of attitude-behaviour and intention-behaviour relations in the meta-analysis reported in Chapter 3, accessibility failed to moderate attitude-behaviour, intention-behaviour, or PBC-behaviour relations in Studies 1 and 3.

There are three possible explanations for the failure of accessibility as a moderator variable in the empirical studies presented here. First, it might be argued that accessibility may have been measured inadequately in the present research. However, the present measures of accessibility matched previously employed measures (e.g., Doll & Ajzen, 1992) and accounted for a number of limitations highlighted by Fazio (1995). For example, Fazio argued that the null results for accessibility reported by Doll and Ajzen could have been due to a poor match in length between practice items and experimental items such that practice items did not provide an accurate measure of baseline speed of response. In both Studies 1 and 3 the practice items were similar in length to the experimental items. Also, they were covaried in the analyses and had no impact on the results. Fazio also argued that responding on a 7-point scale might have reduced the accuracy of the accessibility measure in Doll and Ajzen's study because participants were presented with too many options. Studies 1 and 3 both employed 5-point scales which have been associated with successful moderation of attitude-

behaviour relations by accessibility in previous research (see Fazio & Williams, 1986). Thus, one can be confident that the findings for accessibility reported in Study 1 and Study 3 are based on an accurate measure of accessibility.

A second reason why accessibility did not moderate cognition-behaviour relations in Studies 1 and 3 is that moderation of cognition-behaviour relations by accessibility may be affected by participants' familiarity with performing the focal behaviour. Fazio (1990a) argued that the accessibility of participants' cognitions should not affect behavioural prediction unless there are strong associations between participants' cognitions and the behavioural object. Previous studies have ensured participants' familiarity with behavioural performance by investigating either behaviours such as voting which are familiar to all participants (e.g., Bassili, 1995; Fazio & Williams, 1986) or behaviours that were demonstrated to participants immediately prior to measurement of cognitions which happened, for example, in studies of puzzle completion (e.g., Fazio et al., 1982). Although this explanation may account for the findings in Study 1 (because Study 1 examined a behaviour participants were not familiar with, donating food via *www.thehungersite.com*), it does not explain why accessibility failed to moderate cognition-behaviour relations for exercise in Study 3. Thus, participants' familiarity with behavioural performance does not explain why accessibility failed to moderate cognition-behaviour relations.

An third explanation of the results reported for accessibility in the present thesis, is that the effects of accessibility dissipate over time. All previous accessibility studies (except Bassili, 1995 and Fazio & Williams, 1986) measured behaviour in close temporal proximity to the measurement of accessibility. For example, Fazio et al. (1989) measured attitude accessibility toward ten products and then allowed participants to choose five products as a measure of their behaviour in the same session. In contrast, Studies 1 and 3 both assessed accessibility two weeks prior to measures of behaviour. It

may be that the accessibility of cognitions changed such that cognitions which were accessible when participants completed measures in the laboratory were not accessible when behaviour was performed. In turn, this may have reduced the moderating effects of accessibility on cognition-behaviour consistency. However, this explanation does not account for the findings of Bassili (1995) and Fazio and Williams (1986). They assessed behaviour after a longer gap than was employed in the present research, and still reported moderation of cognition-behaviour consistency by accessibility. Nonetheless, because both Bassili and Fazio and Williams investigated voting behaviour it is possible that their findings may be specific to the type of behaviour studied.

Voting is an interesting behaviour in that it is infrequently performed and yet can be quite habitual (Green & Shachar, 2000; Kabashima & Reed, 2001). It is also a special behaviour because around the time of an election there is substantial media coverage of the election. This coverage is likely to keep the election and associated attitudes/intentions salient over time and when combined with the knowledge that people tend to be habitual in their voting behaviour—which is likely to increase the accessibility of attitudes/intentions (see Verplanken & Aarts, 2000)—suggests that voting is an example of a behaviour where accessibility can be a significant moderator even when behaviour is measured some time after measures of accessibility.

Further research is needed to assess the conditions under which accessibility is a significant moderator of cognition-behaviour consistency. For example, the impact of accessibility on cognition-behaviour consistency over different time periods could be investigated to examine whether the moderating effects reported by Fazio and colleagues obtain when behaviour is performed one day/one week/one month/6 months after the measurement of cognitions. Alternatively, examining the impact of context stability on the role of accessibility as a moderator of cognition-behaviour consistency could be useful: In all of the studies where accessibility moderated cognition-behaviour

relations behaviour was performed either in the same context that the cognition measures were collected, or in the voting studies, a context that is likely to be similar every time a person goes to vote. In contrast, the behaviours examined in this thesis may be performed in different contexts (i.e., a person may exercise in a gym, go for a swim, or exercise at home). Perhaps accessibility only moderates cognition-behaviour relations when behaviour is performed in a stable context.

Finally, more research that compares the moderating effects of accessibility on implicit and explicit behaviours is needed. Explicit behaviours involve conscious and deliberative self-control of behaviour such as exercise and donations to charity. In contrast, implicit behaviours are behaviours that participants are unaware of performing, e.g., nonverbal behaviours such as eye gaze and blinking that have been classified as generally lying out of conscious awareness (cf. Crosby, Bromley, & Saxe, 1980). Research by Dovidio, Kawakami, Johnson, Johnson, and Howard (1997) demonstrated that the accessibility of participants' attitudes towards black people affected their eye gaze and blinking behaviour. Participants with highly accessible prejudiced attitudes engaged in significantly less eye gaze (and significantly more blinking) than participants with less accessible prejudiced attitudes. In contrast, Dovidio et al. found that the accessibility of participants' attitudes did not predict their behaviour on more explicit measures (e.g., jury decisions) in two studies. The distinction drawn by Dovidio et al. between participants' implicit attitudes (as measured by response latencies to positive and negative adjectives) and their explicit attitudes (measured using McConahay's, 1986, Modern Racism Scale) is similar to the suggestion made by Wilson, Lindsey and Schooler (2000) that participants sometimes possess "dual" attitudes toward the same attitude object; an automatic, implicit, attitude and an explicit attitude. Wilson and colleagues argued that the attitude participants use depends upon whether they have the cognitive capacity to retrieve the explicit attitude and whether

this overrides the implicit attitude. Dovidio et al.'s findings show that for behaviours such as making a decision as part of a jury participants are capable of overcoming their implicit attitudes and responding in a non-prejudiced manner whereas for behaviours such as eye gaze and blinking they are not. The findings from the present thesis suggest that participants do not rely on their implicit cognitions (as measured by response latencies) as guides to their donation or exercise behaviour. Nevertheless, more research examining the impact of accessibility on implicit measures of behaviour is required to understand the mechanisms by which cognitions affect these types of behaviour.

6.1.3 Temporal Stability in Relation to other Properties of Cognitions

The factor analyses presented in Chapter 4 were the first to include temporal stability as a property of attitude and constituted the first factor analysis of properties of intentions. The PCA of the properties of attitudes provided further support for the independence of properties of attitudes (Bassili, 1996; Erber et al., 1995; Krosnick et al., 1993; Prislin, 1996) and reinforced Raden's (1985) argument that properties of attitudes are related but independent constructs. The PCA of properties of intentions demonstrated that two operative properties, temporal stability and accessibility, were independent constructs. However, there were significant cross-loadings for the certainty items on two factors, suggesting that meta-judgmental indices of intention are less internally consistent. In sum, temporal stability emerged as an independent construct and had only weak correlations with other properties of cognitions. Thus, measures of the temporal stability of attitudes and intentions appear to possess discriminant validity.

Study 2 compared the impact of seven properties of attitudes as moderators of attitude-behaviour consistency and showed that temporal stability emerged as the property with the largest effect size. This effect was significantly larger than the effect size associated with any other property of attitudes. Similarly, temporal stability had the largest effect size of four properties of intentions, with a significantly larger moderating

effect than accessibility, certainty and direct experience. These findings lead to the conclusion that temporal stability improves cognition-behaviour consistency better than other properties of cognitions.

One property of cognitions not included in the present thesis was extremity (the degree of favourability associated with a cognition, Krosnick & Petty, 1995). Research has shown that participants with extremely positive or negative attitudes possess different reactions to situations compared to participants with more moderate attitudes (Abelson, 1995). However, these results have been inconsistent. Bassili and Krosnick's (2000) review of the impact of properties on response effects that extremity moderated some response effects but not others. Extremity is an important variable to consider because it could be argued that the results reported for temporal stability are due to participants with extreme intentions, rather than highly stable intentions.

This explanation receives support because the differences between participants with highly stable intentions and moderate and less stable intentions are greatest when intentions are very negative or very positive in Study 1. However, simple slopes analysis of the intention by intention stability interaction in Study 3 shows that there is a greater difference between the three temporal stability groups when intentions are moderate as opposed to extremely negative (see Figure 4.1). Nevertheless, the greatest difference between the three temporal stability groups is at extremely positive intentions.

The results presented in this thesis are consistent with the possibility that intention extremity drives the reported interactions. Nevertheless, Study 3 shows that extremity per se does not appear to explain everything and that the valence of participants' intentions is also important. Further research is required that disentangles the effects of valence and extremity on intention stability.

6.1.4 Temporal Stability in Relation to Information Processing

The information processing findings highlight the processes that occur when participants encounter a message that may have implications for valued goals. Participants with less stable intentions appear to engage in less efficient processing of information (Study 4) and are more likely to be influenced by momentarily salient aspects of the situation (Study 5). In contrast, participants with more stable intentions attend to information relevant to these intentions and this leads to more accurate and less biased performance on tasks associated with the information presented.

It would be useful to conduct research that examines the impact of intention stability on information processing in different contexts. The message presented in Study 4 is one that is endorsed by most people, i.e., that exercise reduces the chance of developing illnesses. However, would temporal stability of intentions affect information processing when participants were presented with a message that is more open to debate? For example, would presenting a message that conflicts with participants' intentions (e.g., the benefits of tuition fees to university students) be processed more efficiently by students with more stable intentions to protest against student poverty compared to students with less stable intentions. This message may not be as effectively processed because it conflicts with participants' cognitions (Block & Williams, 2002).

Alternatively, it would be interesting to vary the conditions under which participants receive the message. In Study 4, participants were given enough time to read all the information. However, would the results be the same if the time per slide were reduced to 15 or 10 seconds? Also, would participants perform as well if they were distracted by another task? Research on memory has shown that participants' performance on tasks such as recognition memory (i.e., measures of 'explicit' memory) is affected by increased time pressure and dual tasks (Graf & Mandler, 1984; Schacter & Graf, 1986). However, possessing stable intentions may protect participants' performance on such tasks. For example, the effects reported in Study 4 occurred even

though exercise intentions were measured 3 months prior to the task and there was no mention of exercise intentions in the experiment. Hence, it is unlikely that participants were aware of the impact of intention stability on their performance. This suggests that greater attention to intention-relevant information may occur in a relatively automatic fashion for participants with more stable intentions. Research has shown that processes that occur in a relatively automatic fashion are less likely to be affected by increasing the demands on participants; Roskos-Ewoldsen and Fazio (1992) found that attitude-relevant stimuli automatically attracted attention even when attending to these items was not required for a task.

6.2. Further Issues

Three final issues will be considered: Intention formation and the consequences for moderator variables, how the results for temporal stability affect the TPB and how the findings of this thesis could be used in the design of health-promoting interventions.

6.2.1 Intention Formation and Moderator Variables

The TPB assumes that intentions are calculated on the basis of a consideration of attitudes, subjective norms and PBC (Ajzen, 1991). However, as research has demonstrated that intentions are not full explained by attitudes, subjective norms and PBC (see Armitage & Conner, 2001, for a review) it is perhaps important to reconsider the variables that affect intention formation. This is may increase the number of variables employed as moderators of intention-behaviour consistency (e.g., Sheeran & Abraham, in press, employed past behaviour as a moderator of intention-behaviour relations).

6.2.2 Consequences of Temporal Stability for the TPB

This thesis began by outlining the strong evidence that exists for the efficacy of the TPB based on several meta-analyses of the research literature (Armitage & Conner, 2001; Godin & Kok, 1996; Sheeran, 2002) but argued that prediction of behaviour

could be improved by including measures of properties of attitudes and properties of intentions. In terms of the prediction of behaviour, the TPB can be said to have succeeded in Study 1 and Study 3: In both studies, intention predicted behaviour while PBC emerged as a significant predictor in Study 1. In both studies, these variables explained at least 50% of the variance in future behaviour. Moreover, Study 3 demonstrated that intentions were a significant predictor of exercise, even after past behaviour was controlled for. This finding is impressive given research that suggests that intention is a less influential predictor of future behaviour for frequently performed behaviours (Ouellette & Wood, 1998).

However, even accounting for 50% of the variance in future behaviour demonstrates that the TPB does not contain all of the factors that influence participants' behaviour. Indeed, Study 3 found that the inclusion of past behaviour and the past behaviour by intention interaction term increased the variance accounted for, over and above the TPB, to 65%. This finding matches previous research which suggests that previous experience of exercising is an effective predictor of future exercise performance (see Norman et al., 2000; Sheeran & Abraham, in press).

Temporal stability of intention also significantly improved prediction of behaviour by intentions in Studies 1 and 3, providing support for the idea that properties of intention can be employed to increase intention-behaviour consistency by identifying participants who are likely to enact their intentions. However, temporal stability may be a more important variable to investigate than past behaviour. As Ajzen (1987) stated, the fact that someone performed a behaviour in the past does not tell us *why* he or she will perform the behaviour in the future. In contrast, temporal stability is a theoretically derived and empirically testable variable that has been shown to improve the prediction of behaviour by intentions. Researchers have begun to describe the mechanisms through which temporal stability has its effects. For example, Sheeran and Abraham (in press)

argue that stable intentions may be more strongly related to higher level goals ("principles" in Carver & Schier's, 1998, terms) than are less stable intentions. Clearly, further research which examines the causes and consequences of temporal stability is needed to help refine the predictive and explanatory value of the TPB.

6.2.2 Consequences of Temporal Stability for Interventions

To encourage health-promoting behaviours, and discourage health-risk behaviours, an increased understanding of the factors that predict behaviour is required. This thesis has demonstrated that participants' intentions predict their behaviour, but that this relationship is moderated by the stability of these intentions. More specifically, participants with positive and stable intentions engaged in greater amounts of behaviour compared to other participants. Therefore, interventions need to focus on both participants' intentions and the stability of these intentions. Participants with negative and unstable intentions need interventions that will first make their intentions more positive. Interventions could focus on making participants' attitudes subjective norms and PBC more positive, perhaps via persuasive communications, which should in turn lead to more positive intentions (cf. Hardeman, Johnston, Johnston, Bonetti, Wareham, & Kinmonth, 2002; Quine, Rutter, & Arnold, 2001).

To increase the stability of positive intentions interventions could aim to increase participants' sense of control over performing the behaviour. Ajzen (1991) stated that participants who perceived little control over their behaviour were unlikely to attempt to perform the behaviour, regardless of how positive their intentions were. Support for the relationship between perceptions of control and intention stability is provided in Study 3. There was a significant positive correlation between PBC and intention stability (see Table 4.2). Therefore, interventions that increase participants' PBC could lead to more stable intentions.

Participants with negative intentions that are high in stability represent the most problematic target group when designing interventions. These participants possess potentially damaging intentions which are likely to be resistant to persuasion. For example, Study 5 showed that participants with more stable intentions were unaffected by a context effect that should have altered the favourability of their intentions. Research by Block and Williams (2002) provides an explanation for this effect. They found that participants with attitudes that conflicted with a health-related message were less likely to attend to the threatening aspects of the message. Thus, participants with stable negative intentions may not be persuaded by interventions that focus on the negative consequences of their behaviour because they do not attend to this information. Block and Williams found that focussing participants' attention on the threatening aspects of the message increased change appraisal (i.e., greater belief that they could change their behaviour) and persuasion. Perhaps, asking participants to focus on the negative consequences of their behaviour may undermine the temporal stability of their intentions and lead to a reduction in health-risk behaviour.

All these suggestions could be compared to the impressive findings reported for implementation intentions (Gollwitzer, 1996; Milne, Orbell, Sheeran, 2002). Essentially an implementation intention is an intention (e.g., 'I intend to exercise.') with a time and place for enacting the intention specified (e.g., 'I intend to exercise in the gym at 5pm on Monday.'). Results for implementation intentions have shown that by specifying a time and a place to perform the behaviour the likelihood of enacting the intention dramatically increases (see Sheeran, 2002, for a review). At present it is unclear how intention stability is related to implementation intentions. Nevertheless, it would be interesting to compare the effects of the two variables to assess the merits of each.

In conclusion, the primary message of this thesis is clear: Considerable improvements in the prediction of behaviour by intentions in both theoretical and

applied settings can be achieved by measuring the temporal stability of participants' intentions. Hopefully, the present research will serve to refine social cognition models of behaviour and lead to profitable avenues for health-promotion interventions.

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