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The Role of Perceived Control in the Theory of Planned Behaviour in a Physical Activity Context with Children

by

Martin S. Hagger

A Doctoral Thesis
Submitted in Partial Fulfilment of the Requirements for the Award of Doctor of Philosophy of Loughborough University

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Author: Martin S. Hagger

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A study of perceived control in Skinner's (1995) Theory of Planned Behaviour (TPB) in a physical activity context with children. The first two studies examined the construct with respect to the TPB model variables and past behaviour. Study 1 investigated the correlations between intention, behaviour, attitude, subjective norm and perceived control in 181 children. It was hypothesised that attitude, perceived control and self-efficacy would be related to intention and intention to behaviour. However, the correlation between control and attitude otherwise could be better explained by the specification of a direct path between attitude and intention. Path analysis confirmed the theoretical support for the existence of a perceived control-attitude path forming a triadic arrangement with attitude and intention. It was concluded that perceived control governed two routes to the formation of intention: a direct, spontaneous path and an indirect, more deliberate path via attitudes. This relationship was subsequently confirmed in a sample of 382 children in Study 2 using latent measures of attitude and control. The study demonstrated that direct attitude-intention and attitude-behaviour paths regulated the intention-behaviour relationship and augmented the control-intention relationship in extent. Further, past behaviour predicted control but not intentions or prospective behaviour suggesting that perceived control includes judgements regarding previous control experiences. Since Studies 1 and 2 indicated the diverse influence of control on the TPB variables, Study 3 diversified the perceived control variable according to Skinner's (1995) conceptualisation of control. This was achieved through the inclusion of a measure of self-efficacy alongside perceived control in a study of 1152 children. The resulting non-standard model using both latent and observed measures, indicated that self-efficacy regulated the control-intention relationship, while control remained an indirect predictor of intention via attitudes. It was concluded that the spontaneous pathway was largely due to the aspects of control related to past experiences of confidence or self-efficacy. This justified the diversification of the perceived control variable and indicated that when young people consider the control they have over certain behaviours, they refer to a number of different perceptions. To further examine the role of perceived control and explore the origins of the cognitive variables in the TPB, Study 4 examined perceived control from a human needs perspective in 1888 children. The measures included more general, domain-specific...
A series of studies aimed to examine the role of perceived behavioural control in Ajzen's (1985) Theory of Planned Behaviour (TPB) in a physical activity context with children aged 12-14 years. A broader, more differentiated role of perceived control was envisaged in the theory based on the conceptualisation of control and perceived competence put forward by Skinner (1995). The first two studies examined the role of control with respect to the TPB model variables and past behaviour. Study 1 investigated the relations between intention, behaviour, attitude, subjective norms and perceived behavioural control in 181 children. It was hypothesised that attitude, perceived control and subjective norms would be related to intention and intention to behaviour. In addition, it was hypothesised that the covariation between control and attitude observed in previous studies could be better explained by the specification of a direct path between perceived control and attitude. Path analysis confirmed the theoretical relations between the TPB variables and, uniquely, the existence of a perceived control-attitude path forming a triadic arrangement with attitude and intention. It was concluded that perceived control governed two routes to the formation of intentions: a direct, spontaneous path and an indirect, more deliberative path via attitudes. This relationship was subsequently confirmed in a sample of 382 children in Study 2 using latent measures of attitude and control. The study demonstrated that direct attitude-intention and attitude-behaviour paths regulated the intention-behaviour relationship and attenuated the control-intention relationship to zero. Further, past behaviour predicted control but not intentions or prospective behaviour suggesting that perceived control includes judgements regarding previous control experiences. Since Studies 1 and 2 indicated the diverse influence of control on the TPB variables, Study 3 diversified the perceived control variable according to Skinner's (1995) conceptualisation of control. This was achieved through the inclusion of a measure of self-efficacy alongside perceived control in a study of 1152 children. The resulting non-standard model using both latent and observed measures, indicated that self-efficacy regulated the control-intention relationship, while control remained an indirect predictor of intention via attitudes. It was concluded that the spontaneous pathway was largely due to the aspects of control related to past experiences of confidence or self-efficacy. This justified the diversification of the perceived control variable and indicated that when young people consider the control they have over certain behaviours, they refer to a number of different perceptions. To further examine the role of perceived control and examine the origins of the cognitive variables in the TPB, Study 4 examined perceived control from a human needs perspective in 1088 children. The measures included more general, domain-specific
rather than behaviour-specific measures of perceived control and locus of causality (PLOC). The latter variables represented the human needs for competence and autonomy, which are hypothesised to be motivational in nature (Deci & Ryan, 1985). Results indicated that relative autonomy predicted perceived behavioural control and attenuated the control-intention relationship to zero. This suggested that autonomy was the driving force behind the process of internalisation, in which a person assimilates a behaviour by continual competence satisfying experiences. A final study aimed to confirm the triadic relationships between attitude, perceived control and intention in the TPB by a cumulative analysis of these relationships using the data from Studies 1-4. Meta-analytical techniques were used to produce cumulative correlations corrected for measurement and sampling error between the TPB relationships. Results indicated that the variation in the correlations may have been due to more than just sampling error, indicating the existence of moderating variables. A path analysis using these correlations indicated that the attitude-intention relationship in the triadic arrangement tended to be attenuated by the control-intention relationship. This series of studies indicate that perceived behavioural control is an important and diverse predictor of intention in the TPB. In particular, control was shown to be an antecedent of attitudes as well as a direct predictor of intentions and that spontaneous intention formation from control perceptions may have been due to self-efficacy beliefs and past behavioural beliefs being encompassed by perceived control. Finally, the adoption of self-determination theory indicated that more general motives for engaging in physical activity behaviour were antecedent variables of control, attitudes and intention from a social cognitive approach. Such theories helped interpret the relationships in the TPB, in particular the role of control as an important variable in the process of internalisation.
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CHAPTER I

INTRODUCTION

1.1 A RATIONALE FOR PHYSICAL ACTIVITY

The incidence of health disorders attributable to inactivity has increased dramatically in the past few years and has precipitated interest in why people do not participate in enough activity to ameliorate the effects of conditions such as cardiovascular disease (Rowland, 1990). For example, physical inactivity is now acknowledged as a primary risk factor for a number of hypokinetic diseases (Fletcher et al., 1992). Research has shown that those engaged in regular physical activity receive protective effects from such diseases (Tell & Vellar, 1988). Consequently, researchers have attempted to identify and map the reasons why certain populations participate in regular physical activity and why others do not. Exercise psychology is primarily concerned with such issues and has sought to utilise information regarding motives gained from cross-sectional studies as a basis for interventions which can increase physical activity levels (Brawley, 1993).

In addition, epidemiological research has identified that hypokinetic conditions such as heart disease have their origins in childhood (Vaccaro & Mahon, 1989). Although current physical activity status has been the primary predictor of risk from such disorders, researchers have reported that physical activity may promote the health of children in a number of ways (Gutin & Owens, 1996). For example, physical activity may ameliorate in children some of the risk factors associated with hypokinetic disease in adults (Gilliam & MacConnie, 1985; Linder & Durant, 1982) and may also assist in promoting a lifelong continuance of physical activity behaviour (Dishman & Dunn, 1988). As well, research has demonstrated that physical activity may have other benefits for children such as increased psychological (Calfas & Taylor, 1994; Caspersen, Powell & Christensen, 1985) and skeletal (Slemeda, Millder, Hui, Reister & Johnston, 1991) health. This rationale for promoting physical activity in young people has, therefore, prompted research into the antecedents and motives behind children's participation in physical activity. The culmination of recent evidence in favour of increased participation in physical activity has resulted in international consensus recommendations for physical activity specifically for children and young people (Biddle, Cavill & Sallis, 1998; Sallis & Patrick, 1994).
1.2 UNDERSTANDING PHYSICAL ACTIVITY BEHAVIOUR

Exercise psychology, as a sub-discipline, is a fairly new but expanding area of research and practice (Brawley, 1993). Given the benefits of physical activity previously outlined, one of the primary aims for exercise psychologists is understanding why people engage in physical activity and this is relevant to all subgroups in the population, including children. Maddux (1993) indicates that the understanding of physical activity and exercise behaviour has been assisted by the application of theories from social psychology which presents a positivist, hypothesis-testing framework with which to identify the antecedent psychological determinants of behaviour and examine the relationships between such variables. Such research in children is very much in its infancy, but is again recognised as a necessary and legitimate course of action (De Bourdeaudhuij, 1998). While such research is important, two issues must be considered. Firstly, the study of behavioural antecedents may have more far reaching implications than for physical activity alone. The study of the motivational factors underlying behaviour has been central to social psychology since its inception (Weiner, 1992) and any unique findings may have utility for other health behaviours and for human behaviour in general (Blue, 1995). Secondly, the theoretical approach must be able to present findings which are applicable to practitioners (Brawley, 1993). Findings from such research should be relevant and transferable to professionals including physical educators, health promoters and sports developers for the studies to have any practical justification.

The study of motivated behaviour has an extensive and chequered history. Much has developed since the rigorous empirical approaches championed by behaviourists such as Watson (reported in Weiner, 1992) and B.F. Skinner (1953) and later drive theorists such as Hull (1951). Recent cognitive psychology theorists have acknowledged the need for theoretical mergers and meta-theoretical approaches in order to understand not only the motives behind behaviour, but also the origins of such motives (Brawley, 1993; Deci & Flaste, 1995). This is consistent with modern scientific approaches in which “bootstrap” methods serve to link theories together and eliminate the arbitrary assumptions of approximate and partial theories (Chew, 1968). Such an approach may assist in the explanation of behaviour and provide a better basis for interventions aiming to change behaviour (Cialdini, 1980).

A popular approach in social psychology has been the Theory of Planned Behaviour (TPB; Ajzen, 1985; Ajzen and Madden, 1986). This cognitive approach examines a person’s expectancies and cognitions concerning future behaviour and how these are
related to behaviour. A key variable in the model is that of intentionality, which is hypothesised to be the primary antecedent of behaviour and is a key motivational construct in cognitive psychology (Lewin, 1951). This variable reflects a person’s degree of motivation or activation towards the behaviour (Ryan & Connell, 1989). In this model, intentions are the function of three cognitive variables - attitude or a person’s beliefs about the behaviour, subjective norms or the perceived beliefs of significant others, and perceived behavioural control or an assessment of how easy or difficult the behaviour is to perform. These variables are postulated by Ajzen (1985) to be unique predictors of intention. Cumulation of the research evidence using this theory has confirmed its basic properties on numerous occasions in exercise and other behaviours (for meta-analytical reviews see Chatzisarantis & Biddle, 1998b; Hausenblas, Carron & Mack, 1997; Sheeran & Orbell, 1998; Sheppard, Hartwick & Warshaw, 1988).

However, recent research suggests that it is possible that there may be a degree of association between the constituent variables and that these may change the way the model is operationalised (Ajzen & Madden, 1986; Bentler & Speckart, 1979; Godin, Valois, Shephard & Desharnais, 1987). For example, the attitude-subjective norm and attitude-perceived behavioural control correlations are normally significant and of at least moderate strength. It is therefore possible that these variables may be measuring similar constructs and this needs further confirmation if the set of true, salient and most parsimonious behavioural antecedents are to be identified. Further, the notion of intentionality and cognition remain at the level of an individual’s thoughts and are specific to a given situation. If such thought processes are not measured in close proximity with the measure of behaviour, or without sufficient correspondence, the prediction of behaviour is usually attenuated (Chatzisarantis & Biddle, 1998a). Such an approach does not explore the origins of the cognitions, just the antecedent cognitions themselves and their interrelationships.

An alternative viewpoint offering an explanation for cognitions can be found in theories of psychological needs. In particular, self-determination theory, a framework which postulates a number of hypotheses regarding the nature of human functioning, has been most influential in this area (Deci, 1980; Deci & Ryan, 1985). In this theory, the organismic needs for autonomy, competence and relatedness drive human behaviour. Just as the operant theorists postulated that biological needs such as hunger, thirst, sex and pain avoidance act as regulators of behaviour, self-determination theorists see inner regulations being driven by these needs and resulting in the cognitive states which may affect behaviour. It is therefore possible that those who participate in physical activity behaviour may do so because they are motivated by their inner needs, which
consequently result in the formation of intentions and ultimately may predict behaviour according to Ajzen and Fishbein’s (1980) and Ajzen’s (1985) model.

1.3 PURPOSE OF THE STUDY

Recognising that the TPB has met with much success in the study of physical activity and is seen as a useful starting point in the examination of intentional behaviour and its social cognitive antecedents (Godin & Kok, 1996; Hausenblas et al., 1997), the present thesis aims to adopt this theory to identify the underlying psychological predictors of children’s physical activity behaviour. In particular, the thesis aims to examine the substantial unexplained covariance between the constructs of perceived behavioural control and attitude. Despite this reported shared variance control and attitude have been shown to meet discriminant validity and are separate, discrete constructs. Using the TPB as a core model, the role of control and its relationship with possible mediating variables like past behaviour and self-efficacy will be examined. Finally, more general motivational constructs from self-determination theory will be included in the TPB to examine how higher, more general motives to act are related to the specific, contextual perceived behavioural control construct and the TPB variables. The aims and rationale for their inclusion in the study are summarised in the following bulleted list.

- **AIM 1:** It is proposed that the control-attitude relationship in a general social cognitive model of children’s physical activity can be explained by a causal path hypothesised from control to attitudes. This suggests that control is an antecedent of attitude formation, but may also have direct effects on intentions. Such a dual effect may represent a different operationalisation of the variables within the model.

- **AIM 2:** The role of control in relation to the mediating effect of past engagement in physical activity behaviour will also be examined. It is expected that past behaviour will account for some aspects of control which are related to children’s past experiences of control over physical activity behaviour.

- **AIM 3:** The construct of perceived control will be diversified in the TPB by the contribution of other variables falling under the banner of control. Therefore, the related, but conceptually different, variables of self-efficacy beliefs, self-evaluation of outcomes and self-evaluation of behaviour (Bandura, 1977) will be included in the model. This will provide a more differentiated view of perceived control as conceptualised by E. Skinner (1995; 1996).
AIM 4: The relation of perceived control to higher motives such as perceived autonomy from organismic theories of needs (Deci, 1980; Deci & Ryan, 1985) and general measures of control from different sources (Connell, 1985) will be examined. The needs for competence and autonomy will be measured empirically and their relation to perceived behavioural control, attitudes and subjective norms in the Theory of Planned Behaviour examined. Such approaches may be able to provide a greater understanding of the origins of behavioural antecedents and perhaps provide a better explanation as to why children engage or do not engage in physical activity.
CHAPTER II

LITERATURE REVIEW

2.1 CHILDREN’S PHYSICAL ACTIVITY

The weight of research in favour of an active lifestyle points clearly to the need for people of all ages to engage in regular exercise (Shephard, 1985; Shephard, 1987). Physical inactivity is now a recognised principle risk factor for many kinds of hypokinetic disease (Dishman & Dunn, 1988; Rowland, 1990). Epidemiological studies have shown that people with higher levels of physical activity exhibit less cardiovascular disease risk factors and have lower incidence of mortality from hypokinetic disease causes (Morris, Clayton, Everitt, Semmance & Burgess, 1990; Paffenbarger & Hale, 1975). However, recent research has indicated that the occurrence of hypokinetic illness in later life is only a manifestation of a number of conditions, related to physical inactivity, which have paediatric origins (Berenson, 1986; Cresanta et al., 1986). Indeed, research in the past ten years has established the importance of physical activity to children’s cardiovascular health (Rowland, 1990; Sallis & Patrick, 1994; Sallis et al., 1992; Simons-Morton, O’Hara, Simons-Morton & Parcel, 1988). There is evidence to suggest that children who exhibit higher levels of physical activity (Armstrong, Balding, Gentle & Kirby, 1990; Gilliam & MacConnie, 1985) and fitness (Gutin & Owens, 1996; Ross, Dotson & Gilbert, 1985; Vershuur & Kemper, 1985) are less likely to report high levels of cardiovascular risk factors. Aside from the amelioration of hypokinetic disease risk factors, increased physical activity in children is also associated with other positive health benefits. Physical activity has been shown to promote skeletal health (Bailey & Martin, 1994) and aerobic fitness (Morrow & Freedson, 1994), have a positive effect on variables related to psychological health such as depression, anxiety, stress, hostility, anger and intellectual functioning (Calfas & Taylor, 1994; Shephard, 1985; Taylor, Sallis & Needle, 1985) and enhance self-esteem and overall well-being (Hagger, Ashford & Stambulova, 1998). Such findings have compelled researchers to further investigate children’s physical activity behaviour.

2.1.1 THE PROBLEM OF INACTIVITY IN CHILDREN

Unfortunately, and perhaps surprisingly, there is evidence to suggest that children in Britain (Armstrong, 1989a; Cale & Almond, 1992a) and in other countries (Cale & Almond, 1992b; Riddoch et al., 1989; Ross et al., 1985) do not engage in physical
activity of the type, intensity, duration and frequency likely to bring about health benefits. Intuitively, children are expected to be the most active age group in society, but it seems that for many children this observation is misplaced. Research in Britain has shown that children seldom, if ever, engage in sustained physical activity of the intensity thought to yield health benefits and they become less active as they grow older (Armstrong, 1989a; Armstrong & Van Mechelen, 1998; Sleap & Warburton, 1992; Sleap & Warburton, 1996). Further, a number of studies have also reported that boys generally engage in more vigorous physical activity than girls (Armstrong & McManus, 1994; Heath, Pratt, Warren & Kann, 1994; Trost et al., 1996). Such differences may provide information for physical education teachers and health professionals as to which groups are least active and may thus require targeting in interventions. Given that many children have been found to be less active than is deemed beneficial to their health, physical educators, exercise psychologists and health professionals have sought to examine the reasons why children do or do not engage in physical activity. Research has thus focused on examining the determinants and antecedents of physical activity participation in children. If such variables can be identified, and more importantly, if the mechanisms behind the formation of these constructs can be traced, then they may form a basis for intervention to alter children's behaviour in favour of more physical activity.

2.1.2 THE INFLUENCES ON CHILDREN'S PHYSICAL ACTIVITY BEHAVIOUR

Many determinants of young people's physical activity have been identified, some derived from empirical studies on adults' physical activity and others directly from research on children. Physical activity itself must be seen as a voluntary behaviour and is therefore inextricably linked with human decision making processes (Doganis & Theodorakis, 1995). Indeed, psychologists have recognised that the majority of health behaviours are volitional (Ajzen, 1991; Godin, 1994). This has been reflected in the methods which have been adopted to identify and examine these determinants. Such methods range from surveys and qualitative interviews and often involve the application of social psychological theories which provide a framework for examining the interpersonal determinants and their contribution to actual physical activity behaviour. This section will examine the approaches adopted in the study of children's physical activity behaviour and will identify the role of social psychological models among these approaches.

There are many factors that influence physical activity behaviour and, as with any behaviour, these factors, and the interactions of these factors, will determine a
person's contemplation, adoption and adherence to that behaviour (Marcus, 1995). Recent reviews of the determinants of physical activity have defined three major groups of factors which determine physical activity behaviour in adults: Personal characteristics, psychological variables and environmental factors (King et al., 1992; Marcus, 1995). Personal characteristics include demographic variables, such as gender, age, ethnic background, socio-economic status and region of abode. Environmental influences are considered to include the living environment (terrain, facilities, weather, perceived dangers etc.), working environment (facilities, awareness, peers’ exercise habits), education, family support and the nature of available physical activity programmes (availability, type, complexity, convenience, costs). Psychological variables include attitudes and beliefs, knowledge of the behaviour, interest and prior experience of physical activity, perceived benefits/barriers to exercise, social influences on beliefs, self-concept (e.g. physical self-worth), self-efficacy and self-esteem.

There has been much research examining the influence of different demographic and environmental variables and their influence on physical activity in adults and in children. Only the major findings are reviewed here and a more in depth review may be found elsewhere (e.g. King et al., 1992; Stucky-Ropp & DiLorenzo, 1993). Studies have shown gender and age differences in physical activity behaviour in adults and children. Boys tend to be more active than girls and such gender differences tend to become more marked as children grow older, particularly in late adolescence (Armstrong & McManus, 1994; Ross et al., 1985). Activity and fitness levels have been shown to diminish with age in Great Britain (Health Education Authority and Sports Council, 1992) and other countries (Oja, 1995), and this is exhibited from childhood into adolescence (Armstrong, 1989b). Race and ethnicity studies have shown that comparisons are difficult as the findings are adversely affected by variation in socio-economic status (King et al., 1992). Education level has been shown to be positively related to physical activity behaviour (Matthews, Kelsey, Meilahn, Kuller & Wing, 1989) while relationships between activity and occupation have proved to be largely elusive due to methods used in the classification of occupations in terms of socio-economic status. Health habits such as exercise or past behaviour have been positively associated with physical activity behaviour in adults (Valois, Desharnais & Godin, 1988) and in children (Rees, Andres & Howell, 1986; Theodorakaris, Doganis, Bagiatis & Gouthas, 1991). Those who regularly smoke (Emmons, Marcus, Linnan, Rossi & Abrams, 1994) and those who are overweight (Brownell, Stunkard & Albaum, 1980) are less likely to participate in physical activity. Home and working environment have also been found to affect physical activity behaviour and a broader view of the influence of the social, geographic and
economic environment has helped to understand the influences these variables have on physical activity behaviour. Familial aggregation and influence has been examined as a correlate of physical activity behaviour and has been shown to influence physical activity in adults (King et al., 1992) and children (Freedson & Evenson, 1991). Peer influences and their effect on physical activity have been found to be significant in adults (Sallis et al., 1989) and particularly in children (Tappe, Duda & Ehernwald, 1989). Furthermore, physical barriers to physical activity such as weather, facility cost, distance and availability, safety from traffic and terrain have all been shown to influence physical activity participation in both adults (Sallis et al., 1989) and children (Fox & Biddle, 1989).

While these demographic and environmental factors are important, they may be more difficult to modify than psychological variables (King et al., 1992). A number of different psychological factors have been identified and investigated in relation to adult and children’s participation in physical activity. These variables include, but are not limited to, the perceived influence of significant others or peers (Daltroy & Godin, 1989), knowledge of the benefits of physical activity (Holcomb, Carbonari, Ingersoll, Luce & Nelson, 1984; Kincey, Amir, Gillespie, Carleton & Theaker, 1993), prior experience or interest in physical activity (Kendzierski & Lamastro, 1988), perceived barriers to physical activity (Dishman, Sallis & Orenstein, 1985), self-esteem (Biddle et al., 1993; Kincey et al., 1993), attitudes and beliefs (Godin & Shephard, 1986a; Riddle, 1980), goal orientations (Biddle, in press), self-efficacy (Terry & O'Leary, 1995) and perceived control (Chatzisarantis, Biddle & Frederick, 1998). These studies indicate that there are a multitude of different variables which influence physical activity behaviour, and making a clear set of recommendations based on the findings is difficult for three reasons: (1) the sheer number of different variables which have been examined, (2) the variation in methods used to measure these variables and the approaches used and (3) the conceptual overlap exhibited by some of the variables. Such limitations make drawing a specific set of conclusions based on the research findings difficult. Further, the study of relationships between the variables themselves and their effects on physical activity behaviour is necessary in order to draw conclusions across studies. Consequently, social-psychological research in physical activity over the past ten years has utilised these variables within theoretical frameworks in order to test specific hypotheses regarding the influences on physical activity behaviour. Such an approach allows for the application of positivist principles to confirm or disconfirm proposals relating to the influences on behaviour. This is advantageous as it provides an explicit statement of expectations regarding the relationships and mechanisms involved giving the researcher power to derive inferences from the empirical data. However, such an approach is a laborious and long
term process, particularly if the findings of several studies are to be accumulated and used as a basis for recommendations about further research.

2.2 THE THEORETICAL APPROACH TO STUDYING EXERCISE BEHAVIOUR

The aim when examining the determinants of physical activity is to identify the inner motivations which underlie human behaviours. Indeed, the ultimate aim of psychology has been predominately to explain and understand the motives behind human behaviour (Weiner, 1992). Weiner (1992) describes motivation as encompassing all aspects of a person’s motives for behaving or reasons for humans doing what they do. Motivation therefore encompasses choice, latency, intensity, persistence and affective aspects of a behaviour or action. Clearly, examining motivational variables behind peoples’ engagement in physical activity is important for the understanding of why people do too little exercise. However, the reasons behind why some people are motivated to participate in physical activity and glean the obvious health benefits but others do not even though they have an awareness of the possible risks, is a challenge for the relatively new discipline of exercise psychology. As Deci and Flaste (1995) explain, despite health warnings and the known seriousness of health risks from behaviours such as lack of exercise, people still persist in “behaving themselves to death” (p. 160). While people who have this raised awareness do sometimes take concerted action to change in favour of more exercise, such endeavours are seldom maintained and the altered behaviour often falls by the wayside. Further research into the reasons for the initiation of and adherence to regular physical activity programmes is necessary if exercise psychologists are to formulate effective intervention strategies to change peoples’ behaviour.

An additional dimension to the study of physical activity is the notion of lifestyle and lifelong adherence. As outlined previously, current physical activity can have benefits to children’s current health. However, as cardiovascular and other hypokinetic conditions have been shown to have their origins in childhood and physical activity is efficacious in reducing the effects of some cardiovascular disease risk factors in childhood, some researchers ascribe to the logic that promoting physical activity in childhood may reduce the effects of CVD risk factors in later life (Gutin & Owens, 1996). On the other hand, Riddoch (1998) states that caution is necessary when drawing such conclusions: “there is no compelling evidence that unambiguously relates childhood physical activity to child health, a more favourable childhood risk profile or adult health” (p. 19). In addition, research on the risk factors in childhood and adult mortality have not been forthcoming, mainly due to the many confounding
variables and the unfeasibility of such a study (Rowland, 1996). While the evidence is scarce, some research has shown that physical activity appears to decline with age but, among high-active children, activity levels may track into adulthood. Such findings, though, have been confined to the exercise habits of young children rather than adolescents (Armstrong & McManus, 1994). In addition to the growing body of evidence regarding cardiovascular health in children, there is also evidence in favour of participating in physical activity for skeletal and mental health (Bailey & Martin, 1994; Calfas & Taylor, 1994). Such a promotion may have implications for practitioners such as physical educators and health promoters who wish to encourage children to partake in more physical activity with a view to maintaining the increased activity throughout adolescence into adulthood.

Indeed, the promotion of physical activity in children, particularly in an informed, positive manner which will encourage later participation may be at its most opportune in schools. Fox (1994) contends that school physical education is the final opportunity for educators to convey positive beliefs towards physical activity before “the audience is no longer captive and choices about activity are at the mercy of myth, early experiences, peer pressure and the sophistication of understanding and expertise of the young person” (p. 15). Therefore, by the time young people reach late adolescence, it may be very difficult to alter ingrained behavioural patterns based on bad experiences and years of inactivity. In summary, although there is some controversy as to whether active children are likely to become active adults, Rowland (1996) contends that whether there is likely to be health benefits in later life from being active as a child or not, it is preferable to promote physical activity in children than to abstain for such promotion purely on the basis of conflicting evidence. Clearly the consequences of finding an unambiguous positive effect of physical activity on health and activity patterns in later life would have more disastrous and less desirable implications if physical activity had not been promoted in young people. Further the evidence clearly points to the proximal physical and mental benefits of physical activity to children and thus few would argue that the promotion of physical activity in children was a futile endeavour.

2.2.1 THE DEVELOPMENT OF SOCIAL-COGNITIVE THEORIES OF BEHAVIOUR

Modern approaches to motivation in sport and exercise are diverse and no single construct or theory lies at the centre of explaining human motivation. Further, modern approaches are beginning to draw from different perspectives in order to make a more comprehensive and clearer explanation of people’s motivation towards certain
behaviours, including physical activity (Deci & Ryan, 1985). However, the development of current approaches contrasts dramatically with methods and theories developed in early psychological experiments. Early approaches to the study of human motivation were centred about operant or behaviourist theories. Behaviourism relied upon the direct observation of human behaviours in relation to the introduction of overt, external stimuli. Behaviourism considers humans as logical information processing systems who respond to stimuli in a predictable fashion. This lead Weiner (1992) to liken such theories to 'machine-like' metaphors of human behaviour. Two of the major contributors to behaviourist thought were Hull (1951) who proposed drive theory and Skinner (1953) who advocated an operant theory of behaviour. Such theories proposed that behaviour was the result of four innate, biological or 'primary' drives: hunger, sex, thirst and pain avoidance. The behaviourist approach contrasted dramatically with other approaches at the time such as those of Freud (1934) and Wundt (1903). Wundt's (1903) structuralist approach pioneered a method of introspection which aimed to map a person’s consciousness as a physicist would an atom. Freud (1934) recognised that humans had motivations and desires but were unaware of the existence of these motivations which acted at a subconscious level. Behaviourism abhorred the approaches adopted by the structuralists as it was deemed that data collected from the consciousness of humans participants were unreliable and not subject to positivist principles of disconfirmation. While the behaviourist approach dominated psychology for many years, it is no longer central to empirical psychology and has been largely replaced with cognitive theories.

Cognitive science aimed to explain certain observed phenomena which went against the stimulus-response hypotheses of behaviourist theories. Dashiell (1925) noted how hungry laboratory mice would forego food and explore an interesting maze presented for no apparent external reward. Mice were even shown to tolerate crossing an electrified grid in order to further explore a maze on the opposite side (Nissen, 1930). Behaviourism dictated that the animals would not be motivated to behave in such a way because there was no apparent stimulus and in the presence of a negative stimulus they should have been deterred instead of persisting in their exploratory behaviour. Similarly, Piaget’s (1973) observations of children ‘playing’ with different objects and exploring their environment for no apparent external reason could not be accounted for by an operant theory. The cognitive approach instead examined how inner reflections, attributions and expectations were related to contingencies and reinforcements regarding future behaviour and how these formed the basis of subsequent behaviour. Such variables offered a better explanation for the exploratory behaviour observed by Dashiell, Nissen and Piaget as it considers psychological processes rather than observations of behaviour alone. By measuring cognitions from
standard psychometric techniques using written stimuli to illicit participants' responses, quantification of expectations regarding behaviour, and their relationship with observed behaviour, could be examined empirically. Such data could then be used to test specific hypotheses concerning the antecedents of behaviour based on participants' cognitions and expectations.

Researchers examining children's motivation towards physical activity are increasingly adopting a social cognitive perspective (Brustad, 1992; De Bourdeaudhuij, 1998; Godin, 1994). Social-cognitive models examine self-related, normative-related and environmental appraisals and their relationship with behaviour or behavioural expectations. The models seek to reach an understanding of the cognitive antecedents of physical activity behaviour in order to ascertain the influences on intentional action. According to Godin (1994), the adoption of social cognitive models has resulted in a better understanding of the factors which contribute to physical activity behaviour. This must therefore be viewed as a step forward toward a clear mapping of psychological processes underlying behaviour. This advance is important as a number of exercise psychologists have recognised an absence in the past of a theoretical framework in behavioural studies of physical activity. Dishman and Dunn (1988) state that "past behavioural studies of physical activity reflect a pragmatic rather than theoretical approach" (p. 169) and Shephard and Godin (1986) claim that "previous studies of attitudes toward exercise have been hampered by the failure to use an appropriate theoretical model" (p. 103). These authors, therefore, acknowledge the need to apply "accepted models of human behaviour" (Godin & Shephard, 1990, p. 104) to study the theoretical determinants of physical activity.

Godin (1993) claims that past atheoretical research may have been the reason why previous strategies to improve physical activity participation and adherence have failed. Indeed, he goes on to state that "the absence of a theoretical approach to the study of exercise behaviour was seen as a possible explanation of the poor understanding of exercise adherence at the time and, consequently, for the low level of adherence to regular physical activity in the North American population" (p. 141). Dishman and Dunn (1988) contend that a major reason for the application of social psychological theories to physical activity is to produce concepts, measurement techniques and results which can allow studies to be compared using meta-analytical techniques. Thus, a need has been created for studies which use 'accepted' social psychological models (Godin & Shephard, 1990) and researchers in this area have called for more theoretical research (Dishman & Dunn, 1988; Kendzierski & Lamastro, 1988).
2.2.2 THE PRACTICALITY OF USING SOCIAL COGNITIVE THEORIES TO EXPLAIN PHYSICAL ACTIVITY BEHAVIOUR

While the theoretical examination of cognitive variables towards physical activity has been extensive, researchers need to address the relevance and practicality of using such findings in real situations. Brawley (1993) has addressed the practical nature of applying psychological theories to practice in health, exercise and physical activity. He claims that health practitioners "interested in understanding and intervening in health and exercise-related contexts must adopt the scientist-practitioner model. In adopting that model, a central tenet one generally accepts is that understanding human behaviour and practising behaviour change intervention are part of a reciprocal cycle" (p. 99). The implication of this statement is that theory and practice are related such that one modifies the other. Brawley (1993) argues that when attempting to understand a health behaviour, a researcher can begin at any point on the theory-practice cycle (Cialdini, 1980). That is, either by using a practical investigation to devise or test a theory or a theoretical approach to describe a practical situation. However, most researchers enter the research of a particular area using a theoretical approach and then refine or modify the theory according to the results of empirical investigations and intervention strategies.

Brawley (1993) suggests that intervention on the basis of a theoretical approach to exercise behaviour can be directed by producing guidelines on the practicality of the theory or theories used. The suggested guidelines include: the practical characteristics of each theory, correct research practices, theory compatibility and theory capability. Assessment of the practical characteristics of each theory is assessed by the following criteria: (a) whether the theory focuses on processes or concepts that can be changed, (b) whether it describes the relationship between different variables adequately, (c) whether it has an associated set of assessments of the theoretical variables in 'b', (d) whether the concepts it incorporates can be measured, (e) whether it has a substantial research base which indicates concurrent validity, (f) whether it offers variables which can be translated into practical operations which can change the variables described and (g) whether it includes an explanation of why an intervention based on the theory variables fails to produce a change in behaviour (Brawley, 1993). Correct research practices include the rigorous collection of data and control of attenuating factors. Theory compatibility and theory capability are appraisals based on whether the theory best fits a given situation - which is a good reason for using different theories (compatibility) - and the ability of the theory to describe the variance in an exercise-behaviour situation (capability). Careful scrutiny of the theory in applied situations using these criteria will give a reasoned justification or mismatch of the theory to
practice. In addition, wise research practices are cited as the best methods to follow for theoretically-based interventions to be executed successfully. Providing theories meet with the previously cited criteria, the use of the theoretical approach can focus the researcher on the salient contributors to behaviour and highlight the important aspects for intervention and practice.

Recently, researchers in exercise psychology have advocated the adoption of meta-theoretical approaches to the study of physical activity behaviour and have encouraged the unification of conjoining theories to help in the explanation of motivated behaviour. Ducharme, Gyurcsik, Culos and Brawley (in press), for example, state that "we believe it is important for the discipline of sport psychology to avoid continued use of independent theories of motivated behaviour with little regard to understanding the overlap between the theories" (p. 1). Brawley (1993) criticises research comparing theories on the basis of their capability alone and judging which is 'best' at accounting for the greatest amount of variance in behaviour. Instead, he believes theories should be used in a 'theoretical merger' to eliminate similar or overlapping concepts and adopt the unique aspects of each theory to better explain the variance in an exercise-behaviour situation. Such 'meta-theoretical' approaches allow for a greater and more holistic understanding of the constructs and antecedents of behaviour. The meta-theoretical approach is further advocated by the 'bootstrap' hypothesis. 'Bootstrapping' involves the elimination of the assumptions and delimiters which confine a theory. While 'real' bootstrap methods are regarded as 'unscientific' (Chew, 1968) as they do not provide any hypotheses to be subject to scientific disproof, a 'partial' bootstrap approach can be utilised as it minimises the number of assumptions proposed by the theory allowing for more parsimonious explanations. In a partial 'bootstrap', theory 'A' may explain an assumption or constant used in theory 'B'. No attempt is made in the theory 'B' to explain the assumption or constant making its inferences subject to the limitation of the assumption. However, theory 'A' may provide a suitable framework to explain the assumption or constant in theory 'B'. Therefore, theories A and B are effectively 'merged' to allow for a clearer explanatory system. In this respect, the theories may complement each other and be appropriate for the 'merger' advocated by Brawley.

2.2.3 LIMITATIONS OF THEORETICAL RESEARCH

While the use of theoretical approaches can be beneficial in describing and predicting human behaviour, one must also appreciate the shortcomings of such approaches. Research using theoretical models has shown that psychological variables such as attitudes, perceived control, self-efficacy and other cognitive variables are related to
stated intentions to participate in physical activity and to actual physical activity behaviour in children (Craig, Goldberg & Dietz, 1996; Godin & Shephard, 1986b; Theodorakaris et al., 1991). Further, the variables selected can be pinpointed when the design of campaigns and other interventions are made and executed - they can highlight potential areas on which health professionals and physical educators should focus. However, inferences drawn from empirical studies are only as reliable as the quality of the data on which they are based. Dishman (1992) emphasises “theoretical models may offer directions for successful programming decisions, but their propositions require testing by reliable observations” (p. 97). As Martin (1982) suggests, the use of advanced statistical principles is not a substitute for the collection of high quality, unbiased data. Consequently, sound data collection techniques must be adhered to if the theoretical study of the antecedents of exercise are to be valid and reliable.

Dishman (1992) also explains that attitudinal models only offer a partial explanation of physical activity behaviour. Typically, studies using psychological variables and a theoretical approach have predicted between 5 and 30% of the variance in physical activity behaviour. However, while some predictions account for approximately one third of variance in behaviour, a large amount of variance remains unexplained. It would be too grand to expect a psychological theory to explain all or even the majority of the variation in behaviour as there are so many influential variables. Even meta-theoretical approaches or theoretical mergers will have unexplained variance and unavoidable error because they contain limiting assumptions related to their practical nature. Further, Ajzen (1985) points out that personality and other individual variables may be responsible for confounding the relationship between attitudinal variables and behaviour. Moreover, the practical use of such predictions is limited as the theory provides no framework for intervention and behaviour change. It is therefore suggested that while research using attitudinal models is beneficial, it must be put into context and findings should be utilised only as a guide or as recommendations in the design of intervention strategies for behaviour change. Brawley (1993) contends that the use of psychological theories can help drive practice, but theories must also be modified from the results of practice (Cialdini, 1980). Therefore, theories are not to remain unquestioned, they are, instead, part of a process of change which is fed by observation and the accumulation of research findings.

2.3 THE THEORY OF REASONED ACTION

Research into physical activity behaviour in adults and children has adopted a number
of theoretical approaches, but the Theories of Reasoned Action (TRA, Ajzen & Fishbein, 1980) and Planned Behaviour (TPB, Ajzen, 1985) have been widely used and are recognised as having particular utility in this area (Bagozzi, 1992; Brawley, 1993; Maddux, 1993). These theories have been frequently recognised as ‘core’ models in the prediction of ‘reasoned’ and ‘goal directed’ behaviour in humans (Bagozzi & Warshaw, 1990). Bagozzi (1995) identifies the key role the TRA has in behavioural research: “Indeed, with few exceptions, inquiry into the effects of attitudes on behaviour has been guided by one paradigm, the theory of reasoned action” (p. 437). These theories have also been shown to have versatility through the inclusion of many psychological variables not accounted for in their original conceptions (Ajzen, 1991). Bagozzi (1992) summarises the utility and versatility of the TRA:

“One mark of the success of any theory is its longevity. By this measure, the theory of reasoned action has achieved due recognition as a fundamental model for explaining social action. At the same time, the theory has shown remarkable resilience over the years by undergoing change. This, too, is a tribute to its power and versatility” (p. 178).

Researchers have often reported that the basic tenets of the theory in exercise behaviour have been confirmed on many occasions (for review see Godin, 1993) and meta-analytic techniques in an exercise context have shown the value of its predictions to be consistent across studies (Hausenblas et al., 1997). It follows, therefore, that the TRA and TPB are appropriate starting points for the theoretical examination of physical activity behaviour and may prove to be a suitable framework for the study of the determinants of exercise behaviour in children (Craig et al., 1996; Theodorakaris et al., 1991).

2.3.1 FEATURES OF THE THEORY

2.3.1.1 The Role of Attitude

The primary purpose of the TRA was to revise some of the assumptions regarding the role of attitudes and behaviour\(^1\). The role of attitude in social psychology and the examination of behaviour is a central one. Some authors have even gone so far as to state that social psychology is the study of attitudes (Ostrom, 1989). The reason for

\(^1\)For a quick reference guide to the important terms relating to the theories used in this thesis, the reader is guided to the glossary of terms provided in Appendix 1.
this fascination lies in the notion that people have attitudes towards most people, actions, ideas or objects in their environment. It is the way in which attitudes affect behaviour that is of principle concern to the social and behavioural psychologist. Attitudes have always been considered a fundamental determinant of behaviour, but the mechanisms behind this have been shown to be complex. The attitude-behaviour relationship is particularly pertinent in exercise behaviour research as researchers seek the origins of inactivity and the determinants of physical activity behaviour. However, researchers have had difficulty in defining the term 'attitude' and its utility in the prediction of behaviour has only been moderate. Consequently, the conditions of how and when attitude predicts behaviour has been the focus of modern attitudinal models of social psychology. The role of attitudes has also recently been revisited by Bagozzi (1990) who states that the revival of interest in attitudes can be attributed to the fact that the attitude-behaviour relationship still remains unresolved and is a case for further research rather than the dismissal of the construct. Attitude therefore plays a major role in the TRA and this will be reviewed later.

2.3.1.2 Intentionality and Motivation

A major premise of the Theory of Reasoned Action is that the best predictor of a given behaviour is the intent to perform that behaviour (Ajzen & Fishbein, 1977). The construct of intentionality has been a central tenet of research in motivational psychology for some time. Deci and Ryan (1987) recognise intention as "a determination to engage in a particular behaviour" (p. 1024) and a relationship can be hypothesised between intention to act and actual behaviour. Intention is motivational in nature (Ajzen & Madden, 1986) and is a construct which reflects an individual's decision making processes and the formulation of plans of action (Ajzen, 1985). Ajzen and Madden (1986) insist that the higher a person's level of intention to perform a given behaviour, the harder they will try to execute that behaviour. This is supported by empirical evidence which has shown intent to behave to be highly correlated with observed behaviour (Riddle, 1980).

The rationale for an intention-behaviour relationship within the TRA is based on the tripartite model of attitude and the premise that attitudes are predictors of behaviour. Early cognitive theorists such as Allport (1935) and Thurstone (1929) proposed the tripartite model of attitude in which attitude was viewed as a multidimensional concept comprising three components: cognitive, affective and conative (behavioural). The cognitive component of a person's attitude is associated with their beliefs towards an object or action, the affective with their evaluation of those beliefs (positive or negative), and the behavioural component consists of intention to perform
actions according to the beliefs and evaluation of beliefs. The cognitive and affective components of attitude influence the behavioural component as the definition suggests, but together the cognitive and affective do not unequivocally predict behaviour. Two people can hold the same beliefs about an object or action but make different evaluations which may result in different behaviours. For example, two people may believe that exercise on a regular basis will improve aerobic capacity, but only one may perceive improved aerobic capacity as useful.

Fishbein (1967) and Ajzen and Fishbein (1977) viewed attitude as a unidimensional construct comprising only of the cognitive component. Thus, attitude pertains to a person’s expressed beliefs towards objects and actions. Accordingly, the affective and behavioural components are determinants or consequences of a person’s attitude, rather than constituent components of the construct. Fishbein’s argument is straightforward, since attitudes are learned, the response to an object or action in a given situation, that is, the behaviour related to that attitude, must also be learned. However, although two people may hold the same attitude towards a stimulus, they may have each learned a different response to that same stimulus and, as a result, may behave differently. This implies that behaviour is not an integral part of attitude, but rather a consequence of the attitude which may be different for each person. Nevertheless, they are hypothesised to be intrinsically related and researchers have sought to explain the relationships between cognitive component of attitude and behaviour. Fishbein’s (1967) unidimensional definition of attitude comprises only the cognitive. A person’s intention to perform a behaviour is an indicator of a person’s attitude, not a part of the attitude per se. In this way, intention behaves as a mediator between observable behaviour and the perceptual construct of attitude. Therefore, statements about actions or intentions to behave are, according to Fishbein, not part of attitude, but determinants or consequences of a person’s attitude. Thus in the TRA, attitude, intention to behave and behaviour are all independently represented but related constructs.

Consequently, the TRA has been developed using intention as an intermediate variable between attitude and behaviour. Intention is a function of two cognitive antecedents: a person’s stated predisposition towards the action or behaviour labelled attitude and a subjective assessment of whether important others support the person’s engagement in the behaviour, or subjective norm. Attitude and subjective norm are reflections of two sets of beliefs concerning the action of behaviour: behavioural and normative. Traditionally, an expectancy-value formulation is used to assess the salient aspects and negate the irrelevant aspects of these beliefs. Behavioural beliefs represent a person’s expectations that performing the behaviour will result in certain
outcomes and their positive and negative evaluations of those outcomes. Normative beliefs are the sum of the perceived desires of salient referents (significant others) about the person engaging in the behaviour and the person's motivation to comply with those referents. The theory is represented in Figure 2.1.

The system of beliefs should only be viewed as determinants of the attitude and subjective norms and not as having a direct influence on the motivational construct of intention or behaviour. Many studies have examined the operationalisation of attitudes and subjective norms by direct means, that is, scales developed specifically to measure attitudes and subjective norms, and indirectly using the expectancy-value beliefs systems (Ajzen, 1991). However, direct effects of the beliefs systems on intentions and behaviour have not been found in tests of the theory. Rather, it is attitudes and, to a lesser extent, subjective norms which are the most proximal predictors of intention as the theory posits and should serve to mediate the influence of beliefs on intentions. The purpose of the belief systems, as Ajzen and Fishbein (1980) state, are to provide information on the determinants of the attitude and subjective norm variables. However, the beliefs have been shown to explain varying degrees of variance in their respective directly measured constructs. Some studies have shown a great influence of these beliefs on attitudes and subjective norms (e.g. Riddle, 1980) while others have reported only a moderate influence (e.g. Godin, Valois, LePage & Desharnais, 1992; Godin et al., 1987). In their original formulation of the TRA, Ajzen and Fishbein (1980) suggest that a high correspondence between the attitudinal and belief measures will ensure a strong prediction. This suggests that there are other antecedent variables which could determine the attitude and subjective norm variables. Indeed, it could be argued that these other antecedent variables are beliefs and values unaccounted for by the behavioural and normative beliefs variables. However, it may be that other unmeasured antecedents exist which are not directly related to these beliefs systems. For example, Liska (1984) suggested that unmeasured constructs like lack of resources of opportunities may influence intentions or other variables in the model. Therefore, beliefs are but one of the determinants of the attitude and subjective norms constructs.

The purpose of the TRA, according to Ajzen (1988) was to examine the determinants of intention and explain how they are formed. This summarises research conducted on the operationalisation of the immediate determinants of intentions. Bentler (1981), Bagozzi (1979), Liska (1984) and Fredricks and Dossett (1983) all examined the order and recursive nature of the TRA using the attitude and subjective norms constructs without considering beliefs. The advantage in this approach is that the ordering of the model can be operationalised and tested without the confounding
influence of the beliefs systems. Indeed the hypotheses they test are not concerned with the origins of attitudes and subjective norms, but rather their role in determining intentions. Analogously, the hypotheses in the present study have to do with the operationalisation of the variables directly related to the formation of intentions and the order of the variables in the model. Consequently, attitudes and subjective norms will be tapped and used to test the model hypotheses as opposed to the indirect beliefs systems.

Figure 2.1 The Theory of Reasoned Action (Adapted from Ajzen & Fishbein, 1980, p. 100)

2.3.2 EMPIRICAL RESEARCH

Studies examining the TRA in both adults and children have reported its utility in predicting intention and behaviour (Blue, 1995; Craig et al., 1996; Godin, 1993; Hausenblas et al., 1997). In particular, attitude has typically been shown to be the most important predictor of intention. Indeed, the attitude-intention relationship has been consistently stronger than that between subjective norm and intention (Godin, 1993; Godin & Shephard, 1990; Hausenblas et al., 1997). This finding has not been confirmed in studies using the theory with children, however, and results have been inconclusive. Although Hagger, Cale and Ashford (1997) found that subjective norm was significantly and positively related to intention while attitude was not, other researchers examining this relationship in children in an exercise context (Craig et al., 1996; Theodorakaris et al., 1991), and in other contexts (Dennison, 1988; Hill, Boudreau, Amyot, Dery & Godin, 1997), have demonstrated that attitude has a greater predictive influence over intention than subjective norm. The limited use of these theories with children may explain why such trends are not as consistently observed as they are with adults. There may also be developmental factors which affect the relative importance of subjective norm and attitude in relation to intention and
behaviour. The need for further data examining the relative valence of attitude and subjective norm in relation to stated behavioural intentions and actual behaviour in children are necessary.

2.3.3 LIMITATIONS OF THE TRA

While the TRA has shown utility in predicting behaviour, it has recognised limitations as the theory relationships are subject to certain assumptions or boundary conditions. Ajzen (1985) stated that for the TRA to have predictive utility three conditions must be met: (1) there must be correspondence between the measures of attitude, intention and behaviour, (2) intention must be measured as close to the behaviour as possible, and (3) the subjective controllability of the behaviour must be accounted for. The first condition indicates that measures of attitude, intention and behaviour must correspond in terms of action, target, context and time. Practically, when measuring the theory constructs, the target behaviour must be clearly defined for the individual and the items measuring these constructs must state the performance of the behaviour as specifically as possible. In addition, it is recognised that the utility of intention in predicting behaviour can be enhanced if the behaviour is measured in close proximity to the measure of intention. This is due to the relative instability of intention over time as people may change or adjust their intention when subjected to new information. The passage of time increases the likelihood of new information being made available and in the person assimilating this information, adjusting his/her attitude and beliefs, which may result in intention change. Finally, the TRA only displays utility in the prediction of behaviour if it is entirely under the subjective control of the actor. In cases where external factors such as barriers or unforeseen events accompany the execution of the behaviour, intentions may change and therefore not predict behaviour.

2.4 THE THEORY OF PLANNED BEHAVIOUR

Recognising the limitations of the TRA in predicting behaviour in the face of unforeseen events, modifications were made (Ajzen, 1985). A construct was included to represent the relative controllability of the target behaviour with the aim of adapting the theory to account for situations which may not be under the complete volitional control of the individual. Ajzen (1985) acknowledged that measuring actual behavioural control was logistically difficult and that perceived behavioural control was the most appropriate variable to be measured. Ajzen and Madden (1986) therefore hypothesised two modified versions of the TRA as illustrated in Figure 2.2. The first version suggested that perceived control directly influenced intentions
independently of attitude and subjective norms (Figure 2.2, solid lines), while an alternative model recommended that perceived control also had a direct effect on behaviour (Figure 2.2, broken line). Past research has shown perceived control to be significantly related to intention alone, behaviour alone, or both, and this has been shown to depend on the degree to which the perceived control variable represents actual control (Terry & O’Leary, 1995). When perceived control completely accounts for actual control it is more likely to be directly related to behaviour alone. In such cases perceived behavioural control has reduced motivatinal utility because it has less influence on intention. When this is true the TRA is the more applicable version of the two theories and represents a ‘special case’ of the TPB. However, when the behaviour exhibits problems of control, perceived behavioural control will be associated with intentions and the TPB will be necessary to account for the problems with control perceptions.

Figure 2.2 The Theory of Planned Behaviour (Adapted from Ajzen & Madden, 1986, p. 458)

2.4.1 THE PARADOX OF PERCEIVED BEHAVIOURAL CONTROL IN THE TPB

Perceived behavioural control can influence both intention and behaviour which, according to Bagozzi (1992), creates a paradox in the operationalisation of the theory. He claims that the influences of perceived control on intention and behaviour represent volitional and non-volitional paths respectively. The effect of control on intention reflects whether a person perceives themselves to have the means and ability to engage in the behaviour and form plans for action, which is a volitional process.
People make choices regarding their intentions to act based on this appraisal of control. The direct control-behaviour path, on the other hand, is anticipated when the perceived control variable is a proxy measure or reflection of actual control. This, Bagozzi (1992) claims, is a non-volitional path as it reflects the actual control a person has over the factors which might interfere with or facilitate the performance of the behaviour. Consequently, the theory can represent volitional control influences, in which case the control-intention relationship will be significant. Alternatively it can describe non-volitional processes, in which case the control-behaviour path will be significant. However, it cannot explain both volitional and non-volitional at the same time. It may be that models which report the existence of both paths indicate the relative diversity of the control variable and that individuals cannot make a clear distinction between volitional and non-volitional components of control and therefore the variable has a tendency to predict both constructs. Another, more plausible explanation may be that the paths actually reflect other processes or mediating variables not included in the model. Bagozzi and Kimmel (1995), for example, found that both the control-intention and control-behaviour relationships existed in a study of exercising and dieting behaviour. They reported that while this corroborated the findings of Ajzen (1985), the inclusion of past behaviour negated the direct relationship between control and intention. This indicated that past behaviour acted as a mediator of the influence of perceived control on behaviour and that this path may only be in existence when past behaviour was not included in the model. This may be because perceived control acts as a proxy measure of control in the absence of past behaviour, but does not when it is included. Another possibility is that perceived control has some aspects related to past behaviour. Further research is necessary to examine the role of the perceived control variable within the theory of planned behaviour, particularly concerning the dual nature of its influence on intentions and behaviour.

2.4.2 A CONTROL-ATTITUDE RELATIONSHIP IN THE TPB

The relationship between attitude and perceived behavioural control has received little attention in research with the TPB. In their original formulation of the TPB, Ajzen and Madden (1986) hypothesised that attitude and perceived behavioural control were correlated (see Figure 2.2). Despite this overlap, attitudes and perceived control were still considered to be independent constructs and displayed predictive and nomological validity due to their separate affects on intention (Bagozzi, 1981a). However, the exact nature of the relationship between attitudes and perceived control was neither hypothesised nor specified in the original formulation of the model. Further, studies on the TPB in general psychology and in exercise contexts have
typically neglected to elaborate on the relationship between attitude and perceived control. Despite this, studies have frequently reported this relationship in correlation matrices of the TPB constructs. The coefficients are often significant and of a magnitude comparable to those between attitude and intention (see Dzewaltowski, Noble & Shaw, 1990; Godin, Valois, Jobin & Ross, 1991; McCaul, Sandgren, O’Neill & Hinzs, 1993; Prislin & Kovrlija, 1992; Terry & O’Leary, 1995). In a recent meta-analysis of 40 empirical studies using the TPB, Chatzisarantis (1998) reported an average reweighted correlation of .41 between attitude and perceived control in an exercise context. Further, in latent variable models (e.g. Godin, Valois & LePage, 1993), the factors representing attitudes and control have typically been made to covary as recommended by Ajzen and Madden (1986). This research evidence, therefore, suggests that a relationship does exist, but the origins and nature of this covariation remains unexplained.

Recently, Trafimow and Duran (1998) have tested whether individuals are able to make a distinction between attitudes and control and whether a genuine distinction can be made at the conceptual and empirical level. Trafimow and Duran’s (1998) experiment demonstrated, firstly, that attitudes and perceived control exhibited discriminant validity insofar as they defined separate factors. Secondly, attitudes and control predicted their associated sets of beliefs, namely behavioural beliefs and control beliefs respectively. Further, the researchers asked participants to write down six beliefs they had about engaging in the target behaviour. It was found that the responses naturally clustered about two types of beliefs related to attitude and control. The authors concluded that, consistent with the original formulation of the theory, control and attitude were separate factors and justified their separate inclusion in the model.

While the concepts of attitude and control have been demonstrated to be distinct, the substantial covariation exhibited by these constructs within the TPB has yet to be explained. It is proposed that control may serve as an attitudinal antecedent within the TPB and that a causal control-attitude relationship exists. To date, no study has hypothesised that the control-attitude correlation could be explained in terms of a causal path between perceptions of control and attitudes. Since there is no empirical support for this relationship, its inclusion as a hypothesis in the present study must be theoretically and intuitively justified. Such a distinction can be made on three bases: (1) Skinner’s (1995) contention that competence, a psychological need reflecting control, is a precursor of a person’s behavioural orientation; (2) That individuals, when experiencing novel behaviours, rely on control beliefs to form or assess their attitudes which then relate to their intentions; (3) Ajzen’s (1985) theory outlines a
system of behavioural beliefs which underlie and predict attitudes and these may have conceptual overlap with control beliefs, implying a control-attitude relationship.

Conceptual logic may provide a starting point for hypothesising a control-attitude causal path. Skinner (1995) reports that perceived control represents a set of beliefs relating to the perceived contingency between agent and outcomes mediated by access to and ability to engage in the effective means. She also reports a contingency between perceived control and action. She claims that “perceived control does not influence every aspect of the components of action, only those that reflect motivation and volition” (p. 70). Therefore, cognitive expectancies of the successful completion of a behaviour to produce a certain outcome will evoke a tendency to act to produce that outcome. Since action, defined by Connell and Wellborn (1991) as having behavioural, orientational and emotional components, is a consequence of high control, so are its interrelated components. The orientational component, according to Harter (1978) and Kuhl (1981), is an individual’s outlook to the direction of action or behaviour. This is analogous to the definition of attitude in the TPB as a person’s predisposition towards engaging in the action and also reflects the manner by which it is generally measured using affective psychometric scaling procedures (e.g. good-bad, useful-of no use or happy-sad bipolar adjectives on semantic differential scales). Skinner insists that “when perceived control is high, a person tends to orient toward [author’s italics] the activity, attending to it” (p. 71) as well as formulate plans to engage in behaviour. Therefore the antecedent-cognition contingency between control and orientation implies a direct control-attitude causal path. The direct influence of the cognitions of control on attitude is consistent with theory on action sequencing; Skinner cites Kuhl (1984) and Heckhausen (1991) whose research demonstrates that individuals with high control are “more likely to show an ‘action orientation’ which gives them access to their own cognitive resources [e.g. attitudes] during action implementation” (Skinner, 1995, p. 72). Further, the control-planning contingency also implies a direct control-intention relationship. Conversely, those with low control orientate themselves negatively with respect to action or have a tendency to “move away from challenges and opportunities to exercise and expand competencies” (p. 71). It can therefore be expected, based on the conceptual link between control experiences and behavioural orientations (attitudes) that perceived behavioural control in the TPB will have a positive influence on attitudes and intentions.

As well, perceptions of control might compel a person to make a consideration of, or adjustments to, their attitudes prior to behaviour. Skinner (1995) comments that perceived control is also very important in situations where a person’s past beliefs are in conflict or not comprehensive enough due to low experience. In such situations,
beliefs about control may not be readily established and may not be enough to initiate plans to act. Instead, the individual may be motivated to consider deep-rooted attitudes regarding the behaviour prior to action. This might occur in novel or unexpected situations or in situations where a person's control beliefs about behaviour may not anticipate a contingency between the means (the behaviour or action) and the outcome. In such situations perceptions of control may assist in the formation of attitudes or may add to a dispositional appraisal of the situation alongside beliefs about previous situations.

Additionally, control may predict attitudes because some aspects of control are related to the system of beliefs which underlie attitudes. Although Trafimow and Duran (1998) recognise that people do make a distinction between behavioural and control beliefs, they and many other authors recognise the high degree of association between attitude and control and that there may be common elements for these constructs. Within the TPB, attitudes have been hypothesised as a function of a person's behavioural beliefs and outcome expectancies (Ajzen & Fishbein, 1980). Ajzen (1986) hypothesises that behavioural beliefs comprise a set of salient outcomes relating to the target behaviour and an individual's evaluation of those outcomes. The theory states explicitly that the evaluation of whether engaging in the behaviour will produce certain outcomes and whether those outcomes are desirable will contribute to the formation of attitudes. This is conceptually analogous to Skinner's (1995) conceptualisation of control as a means-ends relation. She suggests that control beliefs reflect "performance expectations and success estimates" (p. 33). Therefore, an individual's attitude towards a behaviour might be predicted by some beliefs which are conceptually the same as control beliefs. At a global level, it would be logical to suppose that a measure of perceived behavioural control would predict the aspects in a measure of attitudes which are related to control beliefs. It could be argued, that there is no need for the attitude construct if it is so conceptually similar to control. However, attitudes incorporate more that just control beliefs, they represent other beliefs about the behaviour such as the potential of the action to produce salient outcomes and the desirability of those outcomes. It is therefore expected that control will precede those aspects of attitudes most closely related to appraisals about performance expectations.

In summary, the TPB accounts for the boundary condition of subjective controllability over the target behaviour omitted from the TRA. While perceived control has assisted in the prediction of intention and behaviour over and above attitude and subjective norm, its inclusion has created a paradox in its dual prediction of both intention and behaviour. Bagozzi (1992) states that this violates the theories' assumptions that
behaviour is either volitional or non-volitional but not both. Therefore, in studies where both paths existed, there may have been intervening mediating variables, such as past behaviour and attitude itself. Based on this, it is proposed in the current thesis that the direct influence of perceived control on intentions may be mediated by attitude. Conceptual and empirical rationales for the inclusion of this relationship have been provided.

2.5 A MORE DIFFERENTIATED VIEW OF CONTROL

The concept of perceived control has been researched extensively in motivational and intentional psychology and many definitions of the term have been proposed. Skinner (1996) recently reviewed the different aspects of control used in social psychology and formulated a classification system to group similar terms. Skinner recognised that constructs of control invariably made reference to three fundamental aspects: the individual or groups who exert control (the agent), the action or responses which influence control (the means), and the desired or undesired outcomes or resultant manifestations of control or lack of control (the ends). It is important to note, at this stage, that these aspects are all perceptions and therefore may not reflect actual control. These terms are used in a classification system which refers to the relations between these aspects and their associated beliefs about control. Three categories of beliefs are identified: agent-ends relations, agent-means relations and means-ends relations. Agents-ends refers to a definition of control as the potential of an agent (e.g. self, significant others) to intentionally produce a certain outcome. This is often termed control beliefs as it refers to the potential of the agent to exert control over outcomes. Agents-means relations refers to the accessibility of certain means (e.g. actions or responses) to a given agent (usually the self). This is directly related to Skinner’s definition of perceived competence. This is also known as capacity beliefs as it makes reference to the extent to which a person has access to the desired actions or responses. Means-ends relations are beliefs by the individual that actions or behaviour will result in certain outcomes. These relations are referred to as strategy beliefs as it concerns a perceived contingency between the action or behaviour and desired outcomes.

In terms of this classification system, the perceived behavioural control variable in the TPB, defined as the perceived ease or difficulty experienced by an individual in engaging in the target behaviour, can be classified as either an agent-means relation or capacity beliefs construct or as an agents-ends relation or control beliefs construct (Biddle, 1998). The former classification corroborates Ajzen’s (1985) notion that perceived control closely resembles Bandura’s (1986) construct of self-efficacy which
is classified as a capacity belief. However, in accordance with the boundary condition of correspondence proposed by Ajzen (1985), items relating to the perceived behavioural control variable are worded in terms of the action, target, context and time of the target behaviour referred to in the behavioural, intention and attitude measures. Consequently, the performance of the behaviour itself can be viewed as an ‘end’ as intention is defined in such a way that the action is seen as the desirable outcome. In this respect, intention in the TPB can be viewed as being behaviour rather than ‘goal directed’ (Bagozzi & Kimmel, 1995) and therefore the action itself is viewed as an outcome, hence the perceived behavioural control variable is difficult to classify according to Skinner’s classification. However, recent researchers have provided an insight into the diversity of these constructs. Recently, Bandura (1997) has extended the scope of the self-efficacy variable stating that its influences are more far reaching that its effects as a capacity belief on motivation and behaviour. He states that “people’s beliefs in their efficacy have diverse effects. Such beliefs influence the courses of action people choose to pursue, how much effort they put forth, how long they will persevere in the face of obstacles and failures, their resilience to adversity and the level of accomplishments they realise” (p. 3). This statement has compelled Biddle (1998) to claim that self-efficacy has gone beyond its ‘narrow conception’ as an agent-means relation and “suggests that agent-ends connections are present too, and hence control beliefs” (p. 16). This may therefore be a reason why Ajzen (1991) has recently reinforced his endorsement of the alignment between self-efficacy and perceived control. Consequently, perceived behavioural control within the theory of planned behaviour may reflect more than just capacity beliefs, but also as control beliefs or an agent-ends conceptualisation. Perceived control as a capacity beliefs variable relates to the actor's assessment of their ability to engage in a certain action. Perceived control as a control beliefs variable relates to the actor's expectation that they can complete the behaviour (the outcome) a given number of times, in a certain context and temporal framework.

2.51 PAST CONCEPTUALISATIONS OF CONTROL

As control appears to be an important aspect of the TPB and may have a variety of effects in the model in the prediction of intention, behaviour and, as proposed, attitude, it is necessary to examine the origins of such a variable and why it has such comprehensive utility. For example, as perceived behavioural control is viewed as either an agent-means or agent-ends relation under Skinner's (1995) classification system, it is possible that the role of control in the TPB may also be more differentiated. Skinner talks of different levels of specificity in control constructs and these different constructs may allow for a diverse interpretation of how control is
related to the TPB variables. Therefore, in order to make such an examination, one must return to the original conceptualisations of the construct.

Rotter's (1954) social learning theory and Weiner, Heckhausen, Meyer and Cook's (1972) theory on causal attributional processes and motivation are the most prominent theories which postulate the notion of control. Rotter (1954) was the first to conceptualise that reinforcement of behaviour was either perceived under one's control (internal locus of control) or not (external locus of control). The resulting psychometric measure, the Internal-External (I-E scale) was a measure of generalised 'expectancy of control'. Extending this premise, Weiner and coworkers (1972) classified perceived causes of past events (attributions) in terms of an internal or external locus of control. This concept was then further developed in a number of contexts (Lefcourt, 1991). Lefcourt's (1991) definition of control as (1) the extent to which a behaviour will result in a certain outcome and (2) the value of that outcome, represents a more differentiated view of control utilising an expectancy-value model (Weiner, 1992). Such a measure is classified on Skinner's (1995) continuum as a means-ends relation or strategy beliefs, that is, whether an individual has access to a means or the ability to produce the desired behaviour. Similarly, Harter and Connell (1984) and Connell (1985) allude to a definition of control as the degree of control a person has over outcomes like success or failure. This also focuses on control as means-ends relations or strategy beliefs. These constructs of control, therefore, differ from perceived behavioural control as they examine an individual's perceived control over outcomes, rather than both agent-means and agent-ends relations.

Skinner (1996) states that the concept of perceived control has been examined from two levels of specificity. The first is a general or global level of control and the second is situation-specific measures of control and these can be viewed on a continuum. Some control constructs use a very situation specific correspondence between the control measurement and the measure of intention and behaviour. These control constructs such as perceived behavioural control (Ajzen, 1985) and variables related to control, such as Bandura's (1977) self-efficacy beliefs, a term which has been likened to perceived behavioural control by some authors (Ajzen, 1991; Terry & O'Leary, 1995), require such close correspondence. However, other aspects of control, particularly modern conceptualisations of the 'locus of control' construct (Lefcourt, 1991), tend to be time neutral and specific to a given domain and source (Connell, 1985). While the formulation of control within the TPB has used a situation specific measure, it is hypothesised in the current thesis that a general measure may reflect a person's predisposition to experience perception of control in a variety of situations and is likely to reflect control in a number of different contexts.
Another issue regarding perceived control is whether it represents a control expectancy or an evaluation of control based on recency of performance of the target behaviour or action. Control expectancies are a set of regulative beliefs which precede action and outcome. Most concepts relating to control fall into this category and represent an expectation of control over future events. However, such control expectancies will naturally be a function of past experiences of control toward the target behaviour unless the situation or behaviour is novel, in which case other cues such as attitudes or beliefs about the behaviour and experience with similar types of behaviour will guide action. In this respect such control beliefs are proximal to the behaviour at hand and therefore are more likely to be predictive of intentions and behaviour. Variables which are related to control expectancies, of varying specificity, are the locus of control construct (Rotter, 1954), self-efficacy (Bandura, 1977), goal orientations (Duda, 1993) and the perceived behavioural control variable utilised in the TPB (Ajzen, 1985; Ajzen, 1991; Ajzen & Madden, 1986). As an alternative to the regulatory, proximal control variables, attributions based on Weiner and associates' (1972) conceptualisation, tend to be assessments which are distal in relation to future actions and outcomes when compared to other regulative beliefs such as locus of control and perceived behavioural control (Biddle, 1998). As a consequence, attributions tend not to have motivational valence when examined in cross-sectional studies, rather they are of greater utility in prospective studies. Therefore, while attributions can be classified as a means-ends relation of control, they are not as applicable to the study of the antecedents of intentions and behaviour unless some prospective design can be utilised. However, if such a design were used, they may have important ramifications for the formation of control beliefs and highlight that past experiences of control can be measured against expectancies for a fuller, more differentiated view of control.

Recent adaptations of Rotter's (1954) model of a means-ends control construct have identified that locus of control is a multidimensional construct and that people demonstrate perceptions of control in different domains (aspects) and from different sources (Harter, 1981). This is logical, the domains reflect the different areas in which individuals are likely to assess their competency and degree of internality or externality of their control perceptions. These sources extend the notion that locus of control is distinguished between internal and external. Recent formulations of the construct have separated out the sources (agents) of control responsible for external attributions of success or failure. Levensen (1981) describes locus of control as originating from three perceived sources: internal, powerful others and chance. Therefore any one individual may exhibit different perceptions of control for each
area and might identify control originating from these different sources for each domain. This has resulted in a ‘profile’ approach to measurement of locus of control (Harter, 1982).

However, many of these approaches have been developed with adults and Skinner (1996) expresses concern that children may not be able to reliably use adult rating scales to express the dimensions of control sources and that questions should be tailored specifically for them. Connell (1985) sought to develop a measure specific to children and their perceptions of control in different domains and for different sources. He identified three different sources of control similar to those proposed by Levenson (1981), Leftcourt (1981; 1991) and Wallston (1992) - internal, powerful others and unknown within four behavioural domains: cognitive or ‘academic’, social, physical and general based on Harter’s (1982) domains of competency. It was thought that ‘unknown’ and ‘powerful others’ sources of control were more suitable measures of an external locus of control for children than ‘chance’, ‘fate’ or ‘social systems’ (Leftcourt, 1981). The devised inventory demonstrated satisfactory factorial validity and internal consistency. Predictive validity was also assessed for each domain. For the cognitive domain, a relative index of internality for success (defined as the mean of internal success items minus the mean of powerful others success items) was significantly correlated with measures of cognitive achievement scores. The social domain items were significantly correlated with the ‘peer acceptance’ scale from Harter’s (1982) perceived competence scale. As well, items from the physical domain were significantly correlated with items from the physical domain from Harter’s scale.

Despite the reservation that criterion based validity testing of a given scale is only as good as the scale against which it is assessed, the significant correlations with established psychometric tests provide evidence for the validity of Connell’s (1985) multidimensional measure of perceptions of control. Further support for the different domains and their relationship to autonomy and perceived competence was examined by Ryan and Connell (1989). Their results indicated that internal motives for engaging in a behaviour in an academic context were related to internal perceptions of control from the cognitive (school) source as measured by Connell’s (1985) multidimensional control inventory. In summary, Connell produced a scale for the measurement of perceived control in children from the three different sources: internal, powerful others and unknown. Tests of this measure demonstrated construct, concurrent and predictive validity and internal consistency. The scale provides a means of assessing perceived control in different domains at a general, rather than situation specific, level.
2.5.2 WHY IS CONTROL SUCH A GOOD PREDICTOR?

Figure 2.3 Relations between Capacity, Strategy and Control Beliefs (Adapted from Skinner, 1995, p. 31)

The notion of control is inextricably linked to the notion of perceived competence. Indeed, Skinner (1996) classified perceived competence as a part of the domain of control and rates Harter’s (1985) conceptualisation of the construct as an agent-means relation or capacity belief. Consequently, it is similar in some respects to the notion of self-efficacy proposed by Bandura (1986). Competence does, however, differ conceptually from perceived behavioural control, which is an agent-ends relation or control beliefs measure. Skinner (1996) views all the relations between agents, means and ends as being interrelated, and therefore one would expect some overlap between competence and the perceived behavioural control variable which reflects a number of control concepts. In fact, according to Skinner’s (1995) conceptualisation, control beliefs tend to be a function of capacity beliefs and strategy beliefs as viewed in Figure 2.3. This diagram demonstrates the relations between the agents, means and ends relations in the conceptualisation of perceived control.

2.5.3 THE ROLE OF PERCEIVED COMPETENCE

In order to explain the motivational influence of perceived control, Skinner adopts a meta-theoretical assumption that perceived control reflects the fundamental human need for competence. Skinner (1995) refers to White (1959; 1960) who proposed that competence is an innate human psychological need. Competence was defined as “fitness of ability to carry on those transactions with the environment which result in its maintaining itself, growing and flourishing” (White, 1960, p. 100). Therefore
competence relates to the perceived ability of a person in a given situation and is related to both a person's functioning in their environment and their development. This is similar to Piaget's (1971) observations of children's desire to 'play'. Piaget (1973) observed that children would, without stimulation, attend to tasks and manipulations which seemingly had no definite purpose other than the gratification provided by the performance of the task. This was corroborated by White (1959) who stated that "effectance motivation shows itself most unambiguously in the playful investigatory behaviour of animals and young children" (p. 329). Further, White (1960) reports findings from behaviourist research which could not be explained as being the result of overt stimulus-response pairings as evidence in support of the intrinsic tendency to satisfy competence. He reported that:

"A whole series of workers...have pointed out that animals show persistent tendencies toward activity, exploration and manipulation even when all primary drives have been satiated. Clearly the original drive model, based on hunger and other internal deficits, stands in need of extensive revision" (p. 101).

He acknowledged that the observed behaviours of exploration and manipulation for no apparent reward or externally regulating stimulus, have nothing to do with deficits such as hunger or thirst, rather they produce "instrumental learning without any signs of consummatory response or drive reduction" (p. 102). The reason White (1959) proposed for this exploratory, seemingly self-activated behaviour was the innate need for competence. Skinner (1995) acknowledges the increasing body of research which corroborates the work of White (1959; 1960) and other researchers such as DeCharms (1968). Indeed, recent researchers have supported the view that competence is an innate need of every human (Connell & Wellborn, 1991; Deci & Flaste, 1995; Deci & Ryan, 1985; Harter, 1990).

Skinner (1995) extended the assumption that competence is an innate need by postulating that perceived control is a vital aspect of competence. She states that "all people need to experience control. The need for competence, or effectance, is considered innate and universal, a part of human nature" (p. 8). This relationship, therefore, implies that positive experiences of control will result in concomitant increases in competence. Perceived control is representative of what Skinner calls a competence system, which determines the areas in which a person will be able to experience competence and evaluate their goal-directed interactions with the environment. An effective competence system in relation to a given behaviour or behavioural category is one in which a person feels control or possesses past
experiences of control and can therefore formulate control beliefs about that behaviour. This is summarised by Skinner’s useful metaphor that “control experiences are to the need for competence as water is to thirst” (p. 12). In this manner experiences of control ‘quench’ the need for competence which results in a person constructing a notion of high perceived ability and effectance in that area. Clearly, this has motivation implications. Perceived control itself is motivational in nature and this has been demonstrated in a number of studies (Deci & Ryan, 1990; Kincey et al., 1993; Ryan & Connell, 1989; Ryan, Vallerand & Deci, 1984). The reason that control is such an effective predictor of motivational variables is via its satisfaction of the need for competence (Skinner, 1995). As a person builds up their competence system relating to a given action, behaviour or behavioural category, they will need to experience control in that area. The experience of control for a given behaviour feeds competence and this in turn compels the actor to be motivated to continue engaging in that behaviour so as to perpetuate the associated feelings of competence. If the behaviour is continually successful in producing experiences of control, the individual will attach value to that behaviour as one in which competence can be satisfied. In this manner, perceptions of control and, in particular, experiences of control have value-giving properties to the behaviour which leads to such perceptions.

However, perceived control must be viewed as both a socially constructed variable as well as part of an intrinsic needs system. Skinner claims that people can experience control or lack of control due to socially constructed situations or in relation to acquired needs theories. Such theories assume that perceptions of control are either a result of the socialisation process, where needs vary from individual to individual depending on the degree to which their needs were socialised. For example, a person can be ‘oversocialised’ and have too great a need for control or competence, in which case the environment and their own ability to satisfy their needs cannot cope and they are left feeling inadequate. Alternatively, they can be discounted as not having enough needs for a particular area because they were not socialised into valuing the behaviours which provide those needs (Skinner, 1995). Such theories relate needs to external sources which is in contrast to Skinner’s position where needs for competence are intrinsic and innate. Consequently, Skinner returns to the previously cited analogy that control is to competence what water is to thirst. She states that thirst is not a socialised need, it is an intrinsic innate need, and to examine the behaviours motivated by thirst researchers would not investigate individual differences on the need for thirst, but the factors which contribute to the access to water, that is, the *causes* of the thirst. Therefore, individual differences are not the focus of the control-competence relation and their effects on motivation, rather the focus should be on the contextual factors which contribute to differences in needs within people.
Measures of control can be differentiated by domain and source to create a 'competence' system of control beliefs. A 'profile' of perceived control measures reflecting the diversity in control beliefs will result in a better reflection of competence and a greater prediction of other cognitive antecedents of behaviour such as attitudes and intentions. In addition, the role of control in relation to other motivational constructs like autonomy can be identified. As Biddle (1998) states, "a true sense of perceived control must involve both perceived competence and contingency, thus control involves both agent-means and means-ends, or simply the direct agent-ends connection" (p. 31). Connell (1985) differentiated between the sources of control to provide a greater emphasis on the internality and externality of control. Connell’s control constructs are aligned with the those conceptualised by researchers of the locus of control construct (Lefcourt, 1981; Rotter, 1954; Weiner et al., 1972). In such measures, the focus is on the expectancy that the reinforcement of behaviour is under one’s own (internal) or others (external) control. Such expectancies, Connell (1985) suggests, are likely to originate from past experiences with the behavioural reinforcement. The reinforcing expectancies will be others if the locus of control is deemed external, or the person if the locus is deemed to be internal. In this respect locus of control is segmented to be domain specific, but more importantly, to be specific to a source. Therefore, a differentiation between the source of control is made; internal aspects will be related to the actor’s personal statements about control while external control will be related to powerful others and these others’ controlling influences over the actor’s engagement in the behaviour. Control is thus segmented into separate internal and external (powerful others) variables. In addition, a third dimension to control is added and aims to measure what the actors do not know about the sources of their control i.e. who or what determines their success or failure to achieve given outcomes. This unknown measure of control aims to measure control in situations unaccounted for by the internal and powerful other scales.

Conceptually, Connell’s (1985) perceptions of control model is related to the means-ends relations or strategy beliefs aspects of Skinner’s (1995) control conceptualisation; whether the actor has control over the behaviour or action (means) to produce a given outcome (ends). What it does not include is the notion of agency or capacity beliefs or agent-means relations. This should be accounted for by other variables relating to control such as self-efficacy or perceived behavioural control which can account for control and capacity beliefs. The different perceptions of
control from different sources would therefore be expected to account for the aspects of the control beliefs variable relating to strategy beliefs. By differentiating between the different aspects of control - internal, powerful others and unknown - greater light may be shed on the influences of perceived control on behaviour providing a clearer insight into the nature of the perceived behavioural control variable in the TPB.

In summary, perceived behavioural control is one of a family of variables which can be classified by Skinner’s (1995) system. Perceived behavioural control is defined as an agent-ends or control beliefs variable as it refers to a person’s belief that they can produce a desired outcome, but it also includes capacity beliefs or agent-means relations. According to many theorists, control variables are motivationally adaptive because they represent the psychological need for competence. Skinner introduced her competence system in which different aspects of control account for an individual’s innate desire to demonstrate ability at valued tasks. It is likely that including control measures which represent both general and specific contexts, are domain and situation specific and include different aspects of the control system, may help to better map how control affects intention and behaviour. This may be done in a social cognitive framework such as the TPB.

2.6 THE INTENTION-BEHAVIOUR RELATIONSHIP

While studies using the TPB have reported the relative utility of this approach with children’s physical activity (Chatzisarantis, Biddle & Meek, 1997; Craig et al., 1996; Godin & Shephard, 1986b; Theodorakaris, 1994), the intention-behaviour relationship is typically of moderate magnitude. Possible reasons for these findings may relate to the measurement limitations of physical activity in these studies. In large sample studies, the measurement of behaviour is often difficult as (1) physical activity is complex as it incorporates a large number of different behaviours, and (2) there is no recognised means of accurately and objectively measuring physical activity behaviour. Studies using the TRA and TPB with children in exercise research have typically used self-reports for the measurement of behaviour as recommended by Ajzen (1985). The problems with such methods is that, while brief and easy to use, they can lack validity and reliability. Specifically, research using the TRA/TPB tended to measure behaviour as if it were a psychological variable measured on a psychometric-type scale in a similar manner to cognitive variables such as attitude, intention and perceived control. The advantage of such a measure is that it conforms to the need for correspondence between the measures as advocated by others (Ajzen, 1985; Courneya & McAuley, 1993). However, it must be noted that behaviour is not a cognitive variable and should therefore not be measured as a judgement or
expectation. Rather, it should be measured in a manner which provides the most valid and reliable quantification of behaviour possible. This will assist in the examination of relationships between behaviour and the TPB variables. For example, DuCharme, Gyurcsik, Culos and Brawley (in press) indicate that "a more objective measure of physical activity, although more challenging to obtain, will increase the validity of an observed relationship between intentions and actual behaviour" (p. 11).

As the major limitation to an accurate self-assessment of physical activity behaviour is memory, any measure of physical activity behaviour should aim to enhance the participant's recall which is not likely to be attained by a single item measure. However, studies examining the TPB to date have largely neglected the literature referring to the validity and reliability of self-reports of physical activity behaviour, which has consistently highlighted the need for comprehensive self-report methods which enhance recall. The present thesis aims to address this issue by utilising a measure of behaviour which meet the criteria of correspondence as well as validity and reliability.

2.6.1 SELF-REPORT MEASURES OF PHYSICAL ACTIVITY

Many studies examining physical activity behaviour, especially those investigating physical activity concurrently with other psychological variables or with large sample sizes, find it impractical to use so-called 'gold standard' measures of physical activity such as motion sensors or heart rate monitors mainly due to cost and time constraints (Freedson, 1991). Some researchers, therefore, recommend the use of self-report measures which are more time efficient and less costly (Saris, 1985; Washburn & Montoye, 1986; Wilson, Paffenbarger, Morris & Havlik, 1986). Self-reports come in many forms and have been reviewed extensively elsewhere (Cale, 1994; Sallis, 1991). Four main types have been identified, namely self-administered recall, interview-administered, recall diaries and proxy reports (Sallis, 1991). All these methods rely to some extent on the reports provided by the participants themselves. According to Sallis (1991), it is reasonable to rely on self-reports as physical activities tend to be fairly salient events and therefore more memorable than other everyday tasks. The researcher is reliant on the ability of the participants to recall their activities and their accuracy in recalling the time, duration and intensity of the activity events as well as the events themselves. As humans cannot be relied upon to necessarily provide accurate information of their daily activities, the onus is on the researcher to provide a self-report instrument which serves to enhance and maximise a person's recall of activity events. In addition, it is the researcher's responsibility to establish the validity of the measure, usually via the concurrent administration of a recognised objective
measure. Furthermore, the assessment of physical activity in children constitutes a special case as children may not recall events as effectively as adults as they differ in terms of their ability to remember and recall different events from the past (Cale, 1994). They are also exhibit sporadic, short-bursts of activity rather than sustained periods (Sleap & Warburton, 1996) which makes an accurate assessment of physical activity behaviour difficult to quantify.

2.6.2 THE INFORMATION PROCESSING PERSPECTIVE

Recent research into the development of physical activity measurement instruments has investigated the information processing and cognitive processes which influence the respondents and their recall of behaviour (Baranowski, 1988). The cognitive skills which enable people to accurately chronicle their behaviour is recognised as one of the major limitations of self-report methods, particularly in children (Baranowski, 1988). Therefore, the most optimal means of eliciting accurate information in children has been sought. A further limitation of the previous recall measures of physical activity has been the definition of the activity intensities. The methods have defined the types and intensities of physical activity for the respondents and then prompted them to specify the periods in which they participated in physical activities of those types (Baranowski, 1988). However, this does not necessary elicit the most accurate information or assist in the recall of all activity information as the respondent must attempt to match the activities in which they have engaged to the researcher's criteria. Recent research has shown that the reporting of activities in the order that they happen, without specification of intensity, known as reporting a 'stream of physical activity', may allow for better and more accurate recall (Baranowski, 1988). This method has further advantages insofar as it reduces the possibility of respondents omitting or misclassifying physical activities.

2.6.3 SEGMENTATION

Other methods have also been employed to enhance physical activity recall. Researchers have segmented their questionnaires into different times of the day and varied the type of time response format of the questionnaires to enhance the recall of the duration of physical activities. They have also prompted respondents to recall other salient activities during the day to assist in the recall of the sequence of daily activities including physical activities (Baranowski et al., 1984). Baranowski et al. (1984) showed that rather than asking children to specify the exact minutes engaged in their activity, better recall was obtained from di- and tri-chotomous response formats. Their research led them to administer physical activity recall questionnaires
to children with three different time response formats: (1) the exact number of minutes engaged in physical activity (exact minutes format), (2) reporting no activity or activity less than 20 minutes in duration and activities greater than 20 minutes in duration (dichotomous), and (3) reporting no activity, activities less that 20 minutes in duration and activities greater than 20 minutes in duration (tri-chotomous). Estimation of duration was best when the tri-chotomous format was used. Baranowski (1988) also showed that asking children to report habitual activities and other activities in which they were engaged throughout the day such as ‘doing homework’ and ‘watching TV’ assisted in their recall of physical activity. Finally, monitoring several days activity information in this manner, rather than a single day provided a more representative profile of a child’s physical activity. This is because daily physical activity patterns may exhibit substantial variation due to routine changes such as physical education lessons, seasonal variations and weekday versus school day variations (Cale, 1994).

2.6.4 ADMINISTRATION ISSUES

The administration processes behind the questionnaires is also important to recall. Sallis (1991) indicates that research examining physical activity behaviour in children with other psychological variables has either used self-administered questionnaires (Godin & Shephard, 1986b) or proxy reports (Theodorakaris et al., 1991). However, as memory decay is high and the perceptual skill for the recall of past events is particularly problematic in children, the use of an interviewer-administered questionnaire may be more appropriate. This form of questionnaire enables the researcher not only to prompt the child concerning different aspects of their day, but also to ask more ‘probing questions’ specific to the interview situation which may enhance the child’s recall of activity events. In summary, the research indicates that a self-report measure of physical activity should be segmented, tri-chotomous and interview-administered. In addition, it should include activities relating to lifestyle and different intensities of physical activity. Provided the questionnaire is administered in the time frame specified by the psychometric measures and corresponds to the intensities and type of activities referred to in the cognitive items, the behavioural measure will meet the criteria of correspondence and report accuracy. Using these methodological advances may provide a better examination of the intention-behaviour relationship.
2.7 OTHER THEORIES USING THE TPB AS A FRAMEWORK

While the Theory of Planned Behaviour is popular and has shown to have utility in predicting behaviour in exercise, health and other fields, it is by no means the definitive theory of intention, behaviour or action. Indeed, other theories such as the Theory of Interpersonal Behaviour (Triandis, 1977), the Theory of Self-Regulation (Bagozzi, 1992) and the Theory of Trying (Bagozzi & Warshaw, 1990) are all theoretical approaches which have demonstrated value in the prediction of goal directed behaviour. In particular, the theories proposed by Bagozzi and coworkers (1992; 1995), have sought to overcome the shortcomings of the TPB and extend the role of perceived behavioural control. In addition, the TRA/TPB have been found to be versions of more general models of intention and behaviour (Bagozzi, 1981b; Bentler & Bonnett, 1980; Bentler & Speckart, 1981; Fredricks & Dossett, 1983; Liska, 1984). While a detailed insight into these theories is beyond the scope of this review, there are several key issues which arise from these models which may assist in the understanding of the role of perceived control in the TPB and these will be discussed in this section. The relevant issues are: (1) the TPB focuses on intention and behaviour as the key dependant variables while other theories focus on goals or outcomes, but the behaviour oriented approach may be more efficacious in examining physical activity, (2) facilitating conditions, as proposed in Triandis' (1977) Theory of Interpersonal Behaviour, are recognised as an important moderator of intentions and past behaviour and may imply a more elaborated role for perceived control in a social cognitive model - it therefore serves as a natural precursor for the inclusion of perceived control in the TPB, (3) expectations of success and failure as antecedents of attitudes towards trying in the Theories of Goal Pursuit and Theory of Trying (Bagozzi & Warshaw, 1990) when performing a certain behaviour are likely to be similar to considerations of control, and (4) the TRA may be a more limited version of a more general social cognitive model of behaviour. Each of these issues will be dealt with in turn and their relevance to the current thesis discussed, but a detailed overview of each model is avoided for reasons of clarity, relevance and length. The reader is directed to Appendix 2 for a full discussion of the models and their theoretical underpinnings.

2.7.1 INTENTIONAL OR GOAL DIRECTED BEHAVIOURS?

In their meta-analysis, Sheppard, Hartwick and Warshaw (1988) demonstrated that the TRA was not very effective in explaining behaviours which were defined in terms of an outcome or goals instead of the actual performance of a behaviour or action. For
example, a behavioural intention defined in terms of “doing physical activity, three times per week in the next week” would represent an item statement for a performance-based intention, while “doing physical activity to lose weight in the next few weeks” illustrates intention toward a goal directed behaviour. This raises a number of issues relating to how the target behaviour and associated item statements for intention, attitude, subjective norm and perceived behavioural control should be worded, particularly if the ‘law of correspondence’ or law of compatibility (Eagly & Chaiken, 1993) is to be followed. Sheppard and colleagues (1988) demonstrated that variance in the intention-behaviour relationship across studies of the TRA could be attributed to the moderating effect of whether the behaviour was an action or a goal. Their findings demonstrated that prediction was better for actions rather than goals. Bagozzi and Edwards (in press) corroborated this opinion by demonstrating that attitudes and subjective norms in TRA and TPB provided better predictions of intention and behaviour when the behaviour was a specific action toward an overall goal (such as increasing physical activity levels) rather than actions towards achieving the goal itself. For example, dieting and exercise are examples of specific actions relating to an overall behavioural goal of losing weight, while losing weight or improving fitness are considered outcomes or goal directed behaviours. As the studies in the present thesis focus on examining the role of perceived control in the TPB, the behaviour variable and the cognitive variables of intention, attitudes, subjective norms and perceived control will be defined in terms of performing the behaviour, instead of specific outcomes. Therefore the cognitions behind the engagement or participation in the behaviour will be studied rather than the goals themselves.

2.7.2 THE MODERATING EFFECT OF FACILITATING CONDITIONS AND PAST BEHAVIOUR

The influence of past behaviour and facilitating conditions has been included as a predictor of intention and behaviour in other social cognitive models based on the Ajzen and Fishbein’s (1980) TRA. Triandis’ (1977) Theory of Interpersonal Behaviour (TIB) is one such approach. The cognitive variables adopted by Triandis are very similar to those of Fishbein and Ajzen, but they are ordered in a different fashion. Triandis adopts the tripartite conceptualisation of attitude and includes the cognitive, affective and social components of attitude in his model. These different aspects of attitude are hypothesised to predict intentions along with personal normative beliefs (similar to subjective norm). Intentions are also the best predictor of behaviour but a second influence on behaviour is that of habit. Further, both habit and intention are weighted or moderated by the existence or absence of ‘facilitating conditions’ toward performing the behaviour. The model demonstrates that the
variance in intention can be further explained by the extent of past involvement in the behaviour. It also illustrates that an evaluation of certain facilitating conditions, such as lack of barriers and a high likelihood of success with the behaviour may contribute to the intentional and past behavioural prediction of behaviour. This model raises issues in terms of the role of facilitating conditions, which are particularly relevant for the role of perceived behavioural control in the TPB, but also the salience of past behaviour within the theory. The relationships within the Theory of Interpersonal Behaviour are shown schematically in Figure 2.4.

Figure 2.4 The Theory of Interpersonal Behaviour (Adapted from Godin and Shephard, 1990, p. 113)

Clearly, there are conceptual similarities between facilitation conditions and perceived behavioural control and its inclusion as a moderator in the prediction of behaviour from intention is interesting and relevant to the current thesis. Perceived behavioural control is often measured as barriers towards engaging in a behaviour or the perceived ease or difficulty in engaging in the behaviour, and similarly positive facilitating conditions can be seen as high perceived ease of engaging in the behaviour or low barriers toward the behaviour. The moderating effect of facilitating conditions on intentions may explain why perceived control, in the TPB, might predict both intention and behaviour. In Triandis' theory facilitating conditions may contribute to intentional formation and to the valence of past behaviour or habit in predicting behaviour. It was noted in Section 2.4.1 that control presented a contradiction in the TPB in the prediction of both intention and behaviour. The influence of facilitating conditions on intention and behaviour via habit, may indicate that both mechanisms may be operating. It is possible that the direct effect of control on behaviour is due to past consideration of control relating to past engagement with the behaviour. For
example, a person who has performed the behaviour in the past may have experienced no barriers to engaging in the behaviour and that it is easy to do. These positive perceptions would contribute to subsequent engagement in behaviour as facilitating conditions does with habit. In addition, the control-intention relationship may be due to the aspects of control relating to the formation of plans to act, such as whether a person can anticipate possible barriers and whether the means and capacities are available to them to engage in the behaviour. This is paralleled in the TIB by the moderating effect of facilitating conditions on intentions. In summary, Triandis' theory provides important conceptual and empirical evidence that past behaviour and facilitating conditions contribute to the formation of intentions and engagement in behaviour. It serves as a precursor for the TPB and for more general models of the TRA proposed by Bagozzi (1981a), Bentler (1979), Liska (1984) and others.

2.7.3 EXPECTATIONS OF SUCCESS AND FAILURE MAY INCLUDE CONSIDERATIONS OF CONTROL

Bagozzi and Warshaw (1990) proposed two theories to explain goal directed behaviour; the Theory of Goal Pursuit (TGP) and the Theory of Trying (TT). Both approaches included the TRA as an underlying starting point with modifications to include aspects unaccounted for in previous approaches. These theories have a different behavioural focus than the TPB as they aim to explain intentions towards a behavioural attempt and goal or outcome directed behaviours. However, some of the variables included and relationships proposed have relevance to the study of perceived behavioural control in the TPB and the existence of a causal relationship between control-attitude. This section will give a brief discussion of the basic tenets of each theory and highlight how these can contribute to the present thesis.

Briefly, the TGP adopted an augmented version of the TPB proposed by Ajzen (1985). The model proposes that the most proximal predictor of a behavioural attempt or 'trying' is a person's intention to try which is, in turn, predicted by attitudes towards trying. Furthermore, attitudes towards trying are preceded by attitudes and expectations of success and failure. The hypothesised model is illustrated schematically in Figure 2.5.
The augmented TRA was modified to produce the TGP by including attitudes towards the process of engaging in the behaviour as an antecedent of attitude towards trying. The TT included measures akin to past behaviour as predictors of intention after Triandis (1977) and others (Bentler & Speckart, 1981; Fredricks & Dossett, 1983), and these were recency and frequency of past trying. These modified theories are shown schematically in Figures 2.6 and 2.7.
The inclusion of expectations towards success and failure in these modified social cognitive models is relevant to the proposed control-attitude path in the TPB hypothesised in Section 2.42. The expectations of success and failure represent some aspects of perceived behavioural control. In order to understand how these expectations relate to control, one must return to the definition of perceived control. Perceived control represents an individual's estimates of a successful engagement in the behaviour based on their own capacities and strategies to produce outcomes. Similarly, an expectation towards success is likely to include some aspects of control as it reflects a subjective evaluation of performing the behaviour successfully and therefore may include considerations of barriers, means and capacities towards engaging in the behaviour. Indeed, Bagozzi and Warshaw (1990) explicitly align their expectations measure with perceived behavioural control: "the resultant expectations of success and failure represented the individual's perceived control (i.e. self-efficacy) over losing weight" (p. 134). Clearly, then, the expectations are meant to assess expectations towards success in terms of an agent-means relation or capacity beliefs according to Skinner's (1995) conceptualisation. Such expectations are offset by the attitudinal or affective importance of the behaviour. If a person has a positive attitude towards success, but the expectation of success is low, it represents a valued behaviour which has many associated barriers either through capacities such as ability or through availability of means such as access to facilities. This is matched against beliefs about failure and expectation of failure, which reflect low perceptions of control. While not extensively researched, these theories have demonstrated utility in the prediction of behavioural attempts and trying for some health behaviours like...
losing weight (Bagozzi & Warshaw, 1990) and exercise and dieting (Bagozzi & Kimmel, 1995). They provide further conceptual and empirical evidence for the existence of a control-attitude path in the TPB.

### 2.7.4 MORE GENERAL MODELS OF TRA/TPB

After the advent of the first versions of the TRA (Ajzen & Fishbein, 1977; Fishbein, 1967; Fishbein & Ajzen, 1975), Bagozzi (1981b) and Bentler and Speckart (1979; 1981) demonstrated that the model, while adequate in describing some behaviours, may have been a specific version of a more generalised attitudinal model. The modifications and variants examined in their revised models centred about the attitude-behaviour relationship (Bagozzi & Burnkrant, 1979) and inclusion of past behaviour (Bentler & Speckart, 1979; Bentler & Speckart, 1981). Initially, Bagozzi and Burnkrant (1979) corroborated notions from other researchers on the attitude behaviour relationship (e.g. Fazio & Zanna, 1978a; Fazio & Zanna, 1978b; Fishbein, 1967; Fishbein & Ajzen, 1975) by demonstrating that attitudes predicted behaviour provided they were appropriately measured and adhered to the stipulation of scalar correspondence. Bentler and Speckart (1979; 1981) further demonstrated that while the suppositions of Ajzen and Fishbein's (1977) model were confirmed, attitude had further utility in the model by directly predicting behaviour. This was a confirmation of the estimates by previous researchers that attitudes did have a motivational component and people can act spontaneously on the basis of their attitudes. Similarly, Liska (1984) showed that attitudes did exert an influence on behaviour independent of intention. The authors concluded that the TRA was inadequate in describing the volitional processes behind action. They also postulated that this may be due to the relative instability of intentions, an issue later recognised by Ajzen (1986) in the boundary conditions of the TPB and studied by Chatzisarantis, Biddle and Meek (1997). Bentler and Speckart (1979) also recognised that the inclusion of both the direct and indirect effects of attitudes on behaviour provides "a model that reflects greater theoretical specification and is more informative than a less explicated model" (p. 236). The authors conclude that while including only one of the paths may allow for a more parsimonious explanation of the processes behind behaviour, the enlarged model incorporating both paths provides a more adequate reflection of the complex processes involved. The researchers did, however, recognise that mediation of the attitude-behaviour relationship by intention was partly because intention and attitudes were highly correlated. There is therefore a high degree of shared variance between the constructs which may, in part, be accounted for by the prediction of behaviour, but may also reflect other processes not included in the model.
When a measure of past behaviour was included in Bentler and Speckart’s (1979; 1981) models it demonstrated a capacity to predict future behaviour and intentions. Previous experience with the behaviour, logically, predicted future behaviour but also was useful in the formation of intentions. This was corroborated by Bagozzi (1981b; 1982) who demonstrated that past behaviour was influential in predicting both intentions and behaviour, but the extent of the experience with the past behaviour was also influential as proposed by Triandis (1977). These authors, therefore, suggested that past behaviour and attitudes, or other processes related to these antecedents, mediated the effect of intentions on behaviour. This confirmed the theoretical suppositions by Bem (1972) and Kelman (1974) who hypothesised that future behaviour was a function of past action as well as other regulatory processes. It is possible that such processes may have been due to perceived behavioural control. Therefore, Fishbein and Ajzen’s (1975) postulation that the predominant influence on behaviour is the formation of a behavioural intention was brought into question. The evidence did not refute this claim, it merely supported the influence of attitudes and past behaviour and pointed to the inclusion of other mediating variables.

Some additional findings by Liska (1984) included the interaction between attitudes and subjective norms and the influence of ‘resources’ on the cognitive antecedent variables. Liska (1984) drew attention to the high covariance between subjective norms and attitudes, a relationship previously neglected by other researchers. The authors demonstrated a significant interactive rather than additive effect of these two antecedents on intentions. The authors concluded that the belief systems which underlie these variables, while conceptually independent, were not causally independent. This was later examined by Trafimow and Fishbein (1995) who questioned the inclusion of both normative and attitudinal beliefs in models of volitional behaviour. These researchers did demonstrate some degree of independence, but the significant relationship between these variables has yet to be adequately resolved.

Liska (1984) also postulated that volitional and nonvolitional models of attitude and behaviour were dependent upon the influence of the variation in resources among people. Examples of such resources were skills, abilities, opportunities and co-operation. It was postulated that attitudes and intentions would be the immediate determinants of behaviour if the variations in intentions was high relative to the variations in resources. This was hypothesised to be the case for behaviours which some people found rewarding. On the other hand, resources would influence behaviour if intentions exhibited low variability, i.e. they were behaviours for which people tended to have stable intentions. This can therefore be viewed as a measure
akin to perceived control over behaviour. Resources such as capacities (skill/abilities) or barriers (opportunities/social co-operations) are seen as key elements to many aspects of behavioural control such as self-efficacy and are thought to be considerations taken into account in Ajzen’s (1985) conceptualisation of perceived behavioural control as the ease or difficulty in executing the behaviour. Davis (1985) also drew comparisons between the resources variable presented by Liska and Ajzen’s perceived behavioural control. Ajzen (1985) commented that behaviours that are under the volitional control of people will not be subject to their perceptions about limitations and therefore the TRA will be most influential. However, when control is partially relinquished by the individual, barriers and resources may account for intention formation and behavioural engagement. This has particular relevance to the present thesis. Clearly, the TRA and TPB alone represent quite specific processes behind the formation of intentions and the antecedents of behaviour. They therefore require revision for conditions the original models were unable to account for, a fact acknowledged by Ajzen (1991) who said that the TPB is open to the inclusion of other variables provided they have predictive utility in the model. The work of Bentler and Speckart (1979; 1981), Bagozzi (1981b) and Liska (1984) were precedents of the recent revisions of the TPB and its derivatives to help explain the influences of intentions, attitudes, subjective norms and, more recently, perceived behavioural control, on behaviour.

2.8 INFLUENTIAL VARIABLES IN THE TPB

2.8.1 PAST BEHAVIOUR

"Motivation is what gets you started. Habit is what keeps you going"

Jim Ryun, former world mile record holder

The exercise and health literature often claims the need to promote a ‘lifelong habit’ of physical activity (Gutin & Owens, 1996; Rowland, 1990). Indeed, it is believed that once a person has been motivated to begin a programme of physical activity and it is adhered to, they will be more likely to continue in future because it has become ‘habitual’. Therefore one of the aims of exercise psychologists has been to examine how physical activity behaviour can become ‘habitual’ based on the premise that habitual physical activity has numerous benefits to health (Ronis, Yates & Kirscht, 1989). Indeed, many models of health behaviour contain variables labelled as ‘habit’ such as Triandis’ (1977) Theory of Interpersonal Behaviour and Ronis et al.’s (1989) model on attitudes, decisions and habit. Habit has also been incorporated as a
predictor of intention in the TPB (Godin et al., 1987; Valois, Shephard & Godin, 1986). Habit has been defined as a behaviour which is performed automatically in the face of situational cues without conscious thought or cognitive decision making processes (Triandis, 1980). Therefore, a habitual behaviour is one that has been performed so often in a ‘routinised’ manner that its performance bypasses other cognitive processes such as intention, attitudes and beliefs (Triandis, 1980). Many studies have examined the effect of habit on physical activity behaviour and it has been shown to be successful in the prediction of exercise behaviour (Godin & Shephard, 1990).

Recently, Maddux (1997) has criticised two aspects of the notion of habit: (1) that physical activity is not a behaviour which is truly habitual as participation in physical activity usually involves some decision making processes, and (2) that previous studies and theories have defined habit as a ‘kind’ of behaviour (i.e. one that is automatic) but measured it as a determinant or cause of behaviour. Firstly, Maddux argues that few habits can be completely unconscious and automatic as the definition of habitual behaviour implies. He argues that most complex actions (e.g. exercise) and even simple behaviours (e.g. brushing teeth) require planning and preparation which implies cognitive evaluations of the demands, requirements, problems and barriers associated with that behaviour. Rather than viewing habit as a mindless, automatic execution of a behaviour, Maddux believes that habitual behaviour should be considered part of a ‘routine’ where certain conditions or cues to action facilitate the conscious processes involved with engaging in that behaviour. The second premise is one of definition and measurement. Habit defined as a type of behaviour cannot also be a ‘cause’ of behaviour. Previous studies have measured ‘habit’ as ‘past behaviour’ or ‘past experience’ with the behaviour in question (e.g. Valois et al., 1986). This is, however, not a measure of ‘habit’ as past behaviour merely acknowledges previous involvement but not automaticity of the behaviour. Maddux suggests that past behaviour only measures a person’s routinised, rather than habitual, behaviour. A behaviour performed regularly, he argues, may be either truly ‘habitual’ or one regularly stimulated by decision making processes when presented with the appropriate cues. It is for these reasons that making physical activity habitual should not be viewed as a realistic goal of psychologists and promoters.

Researchers have, therefore, typically used past behaviour as a measure of previous regular behavioural engagement. Past behaviour (referred to as ‘habit’ in some studies) has been a successful predictor of behaviour and has even been termed the most important determinant of behaviour (Triandis, 1977). Some studies on exercise and physical activity have incorporated a measure of past behaviour and results have
supported the notion that past behaviour is predictive of present behaviour (Godin, Desharnais, Valois & Bradet, 1995; Godin et al., 1987; Valois et al., 1986) and in some cases both intention and behaviour (Terry & O’Leary, 1995). More general models of behaviour have examined the effects of past behaviour on present time behaviour in conjunction with salient constructs such as intention, attitudes and subjective norms (Bagozzi, 1981b; Bentler & Speckart, 1979; Liska, 1984). These authors used structural equation models to illustrate that past behaviour was a significant and substantial predictor of subsequent intention and behaviour and served to mediate the intention-behaviour relationship. The present thesis will also aim to address the influence of past behaviour or ‘habit’ in the TPB.

The inclusion of the past behaviour variable in the model may assist in the explanation of the influence of perceived behavioural control in the TPB, and in particular the control-attitude and control-intention relationships hypothesised and identified previously. A conclusion from Bagozzi et al.’s (1992) work on the TPB is that control’s dual influence on intention and behaviour may be due to other processes. He noticed that the inclusion of past behaviour ‘swamped’ the influence of perceived control on intentions. This suggests that past behaviour may reduce the influence of control on intentions which suggests that the control-intention relationship is mediated by the inclusion of past behaviour. The present investigation will further examine the utility of past behaviour when examining the role of control in the TPB. In particular, its utility as a mediator of the perceived control-attitude and perceived control-intention relationships will be tested.

It should be noted that the inclusion of past behaviour as a predictor of intentions and future behaviour in the TPB and other social cognitive models has some critics (Fredricks & Dossett, 1983). Firstly, past behaviour is a recollection of past experience with the behaviour in question, and yet the TPB is concerned with the cognitive antecedents of the behaviour. Past behaviour is therefore unhelpful if it is made to predict future behaviour because it attenuates the influences of the cognitions. Instead, past behaviour would have better utility if it served to mediate the cognitions on future behaviour (Bentler & Speckart, 1981). Further, researchers have demonstrated that including past behaviour as a predictor of future behaviour is effectively letting a variable predict itself, and the same cognitive variables which are affecting current behaviour are affecting past behaviour thereby confounding the results (Fredricks & Dossett, 1983). Therefore, while past behaviour may be an important influence on prospective behaviour in the TRA and TPB, such autoregressions for behaviour are deemed unhelpful as they do not account for other behavioural antecedents. It is more important to examine the role of past behaviour in
relation to cognitive antecedents rather than prospective behaviour. In summary, it can be seen that the TRA and TPB are appropriate frameworks to adopt when examining physical activity behaviour which has previously been experienced, but its integrity may be altered by the inclusion of past behaviour as a predictor of intentions and behaviour or as a mediating variables between the model constructs.

2.8.2 SELF-EFFICACY

In his original formulation of the TPB, Ajzen (1985) recognised the congruence between perceived behavioural control and the construct of self-efficacy advocated in social cognitive theory (Bandura, 1977; Bandura, 1986). Ajzen (1985; 1991) and Ajzen and Madden (1986) claim that perceived control is conceptually similar to self-efficacy in terms of a person’s belief in their capabilities to perform the target behaviour. However, despite these similarities, studies have shown that self-efficacy may be conceptually and empirically distinct from perceived behavioural control (Terry, 1993; Terry, Galligan & Conway, 1993; Terry & O’Leary, 1995). Some researchers have extended the study of self-efficacy and exercise behaviour by successfully incorporating the construct into or alongside the variables from the TPB. Such studies have demonstrated that self-efficacy predicts intentions and/or behaviour in addition to the effects of perceived control (DuCharme & Brawley, 1995; Dzewaltowski et al., 1990; Terry & O’Leary, 1995; Vanryn, Lytle & Kirscht, 1996). For example, Dzewaltowski and coworkers (1990) illustrated that self-efficacy beliefs were as effective as perceived control in predicting exercise intention while Vanryn, Lytle and Kirscht (1996) and Godin, Valois and LePage (1993) presented evidence that self-efficacy makes a significant and independent contribution to intention. There is therefore evidence to suggest that self-efficacy may be a useful variable to further the understanding of exercise behaviour in the TPB. However, as with any construct, justification of its theoretical and conceptual utility must be made prior to its inclusion in an investigation.

The conceptual distinction between perceived behavioural control and self-efficacy can be made on three bases. Firstly, according to Terry and O’Leary (1995), perceived control in the TPB reflects both a person’s abilities (internal constraints) and barriers (external constraints) to perform a behaviour, but does not distinguish between these, therefore the inclusion of self-efficacy might assist in this distinction. Secondly, Ajzen’s (1985) conceptualisation of perceived control does not distinguish, as Bandura (1986) does, between ability to perform a given behaviour (self-efficacy beliefs) and the expectancy that engaging in the behaviour will result in certain salient outcomes (expectancy beliefs), but doing so may reveal clearer predictions of
intentions and behaviour. Thirdly, perceived behavioural control may reflect control beliefs as conceptualised by Skinner (1995), but does not make explicit a separate distinction between capacity beliefs and strategy beliefs, while the inclusion of self-efficacy may model capacity beliefs within the theory more clearly. The following discussion will assess the utility of each basis for the inclusion of self-efficacy within the TPB.

In the original formulation of the TRA, Ajzen (1985) suggested that intentions were the best predictor of a person’s engagement in behaviour, only as long as the behaviour was under the volitional control of the actor. In order to address this boundary condition of controllability, a measure of control was introduced in the TPB which was hypothesised as a regulator between intention and behaviour. It was expected that when the behaviour was not completely under the control of the individual, the intention-behaviour relationship may be compromised to an extent reflected by the strength of the relationship between control and behaviour. While the perceived control variable was conceptualised as a reflection of actual constraints on the behaviour, it could not be a completely accurate reflection of actual control as it was also subject to the person’s subjective judgements of their control. Therefore, perceived control also accounted for perceived barriers and internal control perceptions, such as perceived ability. It was hypothesised that the closer perceived control reflected actual control, the more likely it was to directly predict behaviour independently of its effect on intentions (Ajzen, 1985). However, if control was not a good reflection of actual control, the control-behaviour relationship may be low, but the variable may still reflect aspects of perceived control such as abilities and be related to intention. In summary, perceived behavioural control represents both internal and external judgements of control and measures of this variable have indicated these aspects.

Some studies have asked participants how much control they have over their behaviour while others have asked how easy or difficult it is to participate in the behaviour. Terry and O’Leary (1995) suggest that measures of control asking how much a person has control over a given behaviour should be distinct from how easy or difficult it would be for them to do so. The former, they argue, measures mainly external constructs of control (proxy measure of actual control), while the latter reflects internal aspects of control such as abilities (self-efficacy). The authors provided empirical evidence in favour of this distinction by indicating that these measures were adequately represented by two factors. However, if the distinction is made in this manner then it would imply that when asked about how much control they have, people give their assessment predominantly in terms of external aspects of
their control, with little subjective judgement of internal or perceived problems with control. Further, it was also assumed that when asked about their ease or difficulty in engaging in the behaviour, they provide responses about their ability unconfounded with difficulties encountered in the face of external barriers. Of course, this would be unlikely as both statements are likely to tap similar constraints and would, to some degree, be subject to both internal and external perceived barriers to behaviour. As Ducharme and coworkers (in press) state: “while it is true individuals will be motivated by their personal beliefs, they do not ignore their external surroundings” (p. 4). One would therefore expect some cross-loadings or covariation between perceived control and self-efficacy which was not reported in Terry and O’Leary’s (1995) study. As a means of distinguishing between the internal and external aspects of control or between efficacy and perceived control, this explanation is unsatisfactory.

Authors have also attempted to make a conceptual differentiation between perceived behavioural control and self-efficacy on the basis of the dual nature of self-efficacy presented by Bandura (1977). Bandura’s (1977) social cognitive theory acknowledged that an individual’s likelihood of adopting a certain behaviour is influenced by two sets of beliefs; firstly, the belief that the individual has the capacity or ability to perform the given behaviour (self-efficacy beliefs) and secondly, the belief that performing the target behaviour will result in certain desirable outcomes (outcome expectancies). Self-efficacy beliefs, therefore, reflect a person’s evaluation of their confidence in performing that behaviour independent of an evaluation of outcomes. Terry and O’Leary (1995) suggested that outcome expectancies can be regarded as conceptually similar to perceived control as they, in part, reflect how external environmental conditions may affect the adoption of a behaviour. They state that efficacy beliefs, on the other hand, represents a person’s reflection of their own internal capacity to engage in the behaviour and produce that outcome and this is their definition of self-efficacy. However, if perceived control represents both internal and external aspects of control, as Terry and O’Leary (1995) previously argued, it would be expected that both self-efficacy beliefs, as an internal aspect of control, and outcome evaluations, as an external aspect of control, would both be correlated with perceived control. Yet, this has not been demonstrated empirically. Dzewaltowski et al. (1990) showed that self-efficacy was related to perceived control, but, interestingly, outcome expectations were not. Terry and O’Leary’s (1995) argument is therefore tautological: if perceived control represents both internal and external aspects of control, then both internal (self-efficacy beliefs) and external (outcome expectations) aspects of cognitive evaluation should be related to perceived control. Also, if this is the case, perceived control could not be defined solely as an outcome expectancy as suggested by Terry and O’Leary (1995), but rather a variable including
both self-efficacy beliefs and outcome expectations. In summary, the suggestion that control is a reflection of outcome expectations alone is not supported and a clearer theoretical explanation for the distinction is required.

Conceptually and theoretically, the construct of perceived behavioural control can be differentiated from self-efficacy in terms of the aspects of control they include and the aspects they do not include. The best representation of this is provided by Skinner's (1995) classification system of control constructs. According to Skinner's (1995) system, perceived behavioural control is an agent-ends or control beliefs representation of control, as it encapsulates both capacity (how well the individual can engage in the behaviour) and strategy (whether that behaviour will produce certain outcomes) beliefs. This can be seen in the item statements which have been used to measure perceived control. For example, the statement: “How much control do you have over doing physical activity three times or more during the next week?” makes reference to their capacity for control over their behaviour (“do you have control?”) and the outcome (“doing physical activity”). Self-efficacy beliefs, however, reflect a person’s ability to act and therefore their capacity for that action. For example the statement: “I am confident I can participate in physical activities” refers explicitly to the ability to perform the behaviour. Outcome expectations, however, are different as they represent a person’s evaluation of the worth of the behaviour for producing certain outcomes and therefore represent strategy beliefs. Outcome expectations are often measured in terms of specific outcomes from the behaviour, rather than just the behaviour itself: “Do you believe doing physical activity will result in you getting fitter?”.

Represented schematically, control beliefs as an agent-ends relation are illustrated as comprising capacity and strategy beliefs (see Figure 2.3). Skinner (1995) suggests that “primary regulatory beliefs are beliefs about control, but strategy and capacity beliefs can also be used to regulate action more specifically, for example in forming an action plan [intentions]” (p. 31). It is expected that perceived control will be related to intentions, but also subcomponents of control such as self-efficacy beliefs (capacity beliefs). According to this conceptualisation, outcome expectancies and self-efficacy beliefs are subcomponents of control beliefs. In making this distinction, one would expect some shared variance between self-efficacy beliefs and perceived control, but they are distinct and may have independent effects on intention and attitudes. The present investigation will examine perceived behavioural control as a differentiated construct and therefore resolves to examine how it is empirically and conceptually related to self-efficacy. Therefore, self-efficacy will be included alongside the measure of perceived control. The measure will be different to that proposed by Terry
and O'Leary (Terry & O'Leary, 1995) and in line with Ajzen's (1985) and Skinner's (1995) conceptualisations of control and efficacy.

2.8.3 MORAL OBLIGATION

The inclusion of a measure of a ‘moral obligation of choice’ variable by Raats, Shepherd and Sparks (1995) and ‘personal norm’ by Parker, Manstead and Stradling (1995) present useful modifications to the TPB. Raats and coworkers (1995) recognised that Ajzen and Fishbein (1980) acknowledged the possibility that moral obligation might influence intentions and behaviours for certain actions. However, to maintain parsimony in the model and ensure its generalisability such variables, which are likely to have an influence for very few behaviours, were not included as standard. Ajzen and Fishbein (1980) and others (Blue, 1995; Godin & Kok, 1996) postulated that the model was subject to the inclusion of other variables provided they explain a substantial amount of variance in the criterion variables: intention and behaviour.

Raats et al. (1995) demonstrated that a moral obligation to act in a certain way would be influential in the formation of both intentions and attitudes. This supported work provided by Eagly (1992) and Eagly and Chaiken (1993) who suggested that attitudes could be a function of moral obligations or dimensions of choice. Raats and coworkers (1995) showed empirically that the inclusion of a moral dimension of choice added to the prediction of both attitudes and intentions in the purchase of healthy food alternatives for family members. They concluded that moral obligations played a significant role in the formation of plans to act where moral considerations are important. This, they claimed, was not just for behaviours that involved blatant moral judgements such as lying, cheating, blood donation, giving to charity etc., but also for those involving interpersonal responsibilities, for example family health and worker welfare. Further, they also saw the inclusion of moral obligation as an antecedent of attitudes as an important contributor to the explanation of the origins of attitude and behavioural beliefs.

Raats et al.'s findings were corroborated by research from Parker and associates (1995) who included a measure of ‘personal norm’ in an examination of driving behaviour. Personal norm is very similar to ‘moral obligation’ and describes an "individual’s personal beliefs about what is right and wrong" (p. 129). The variable is akin to Triandis’ (1977) notion of personal subjective norm, a predictor of attitudes in the Theory of Interpersonal Behaviour, and has been measured in the same manner as ‘moral obligation’ (Valois et al., 1988). Parker et al. demonstrated that personal norm predicted intentions over and above the prediction provided by attitudes, subjective
norm and perceived behavioural control. The authors concluded that people take into account deep rooted moral beliefs or obligations and consider the consequences of their transgression before the formation of intentions to act.

While the inclusion of cognitive variables relating to moral obligation or personal norm did result in improved prediction of intentions, the issue of obligations may represent a broader issue. Moral obligation may have a relationship with perceived behavioural control and obligations may be related to a more differentiated set of motivational constructs related to self-determination theory, particularly introjection, identification and the process of integration. The study by Raats et al. (1995) provided no evidence for the discriminant validity of the perceived behavioural control variable and moral obligation construct. Logically, if a person felt obliged to perform a behaviour for moral reasons, they may consider such reasons if they were asked about their perceived behavioural control over performing that behaviour. The additional variance explained by the moral obligation variable may be attributable to a high covariation with perceived behavioural control resulting in a misspecification in the analysis. Consequently, if these variables are thought to be highly correlated and did not exhibit discriminant validity, they would not have utility in the model. Parker and coworkers (1995) also suggested that personal norm may just be another facet of attitude. Indeed, they recognise that in Fishbein’s (1967) formulation of the TRA one could distinguish between personal and social normative beliefs, the former reflecting personal pressures put on oneself to perform given behaviours. Similarly, Triandis hypothesised personal subjective norm as a predictor of attitudes, highlighting its possible influence over the construct. It may be that moral obligations and norms reflect ‘deep rooted’ or ‘well formed’ attitudes postulated by Fazio and Zanna (1978a) and Doll and Fishbein (1992) which are stable and unlikely to be influenced. The authors also present no evidence for the discriminant validity of the measures used and therefore an assessment of the true nature of personal norm’s relationship with attitudes could only be supposed.

An obligation to perform a behaviour has parallels with more organismic reasons for engaging in a behaviour. Deci and Flaste (1995) demonstrate that people may perform a behaviour due to perceived external pressures such as feelings that one has to or should engage in the behaviour. Such people are believed to demonstrate introjected behaviour. Introjection can be seen as performing a behaviour due to perceived external pressures and is “driven by the dynamics of self- and other approval” (Ryan, 1995, p. 406). Examples of introjected behaviour are acting out of guilt, obligation, shame or anxiety avoidance. This can be a powerful predictor of attitudes and behaviour as demonstrated by Raats et al. (1995) and Parker et al. (1995). However,
moral obligations and personal norm may be more akin to identified behaviours where the actor engages in the behaviour to fulfil a personal value. Identified reasons for action, therefore, are perceived to be less coercive than introjects. They reflect a more autonomous form of regulation and are more likely to be internalised as a personal value. Indeed, Parker and coworkers (1995) talk of personal norms as being "internalised notions of right and wrong" (p. 135) suggesting that these are beliefs which have been assimilated by the individual and provide a reference guide for action. Thus moral obligations may reflect deeper intrinsic motives to engage in a behaviour as derived from organismic approaches such as self-determination theory (Deci & Ryan, 1985).

The prediction of attitudes and intentions by moral obligations, a reflection of an identified behaviour, was corroborated by Chatzisarantis (1998) who demonstrated that identified reasons such as engaging in physical activity behaviour to improve fitness or to feel good were related to both attitudes and intentions. Moral obligation and identification vary in the level of specificity of measurement. There are also measurement issues involved with the distinction between moral obligation and identification. Identified (and introjected) reasons for performing an action tend to be measured at a domain-specific level and represent an orientation or tendency to act for the reasons given. Moral obligation on the other hand is measured as behaving in accordance with a specific moral code towards a specific action and therefore may have a differing influence on intention and behaviour. Clearly, further research is necessary to clarify these relationships, particularly in relation to the utility of the identification or moral obligation measures within the context of the TPB.

The inclusion of higher motives such as personal norm and moral obligation, particularly those relating to locus of causality, has relevance to the present thesis. Such variables may be important to the understanding of control in the TPB. This is because perceived control has been shown to be related to the degree of relative autonomy or perceived locus of causality (Connell, 1985; Ryan & Connell, 1989) and consequently has implications for perceived competence and the motivation of behaviour. Motivation toward a behaviour is shown to be greatest when a person has experiences of control or competency in the context of high locus of causality or self-determination (Biddle, 1998; Skinner, 1995). It may therefore be important to consider moral obligations or other identified or introjected motives as they may further motivate or threaten adherence. If the obligation is introjected, it may threaten adherence as the person feels they are being pressured by guilt or shame to perform the behaviour instead of doing it out of their own volition. Hence when the introjection is absent, the behaviour may cease due to the absence of positive, more
autonomous regulations and a lack of perceived control. However, if the obligation is identified or due to a personally held value it may be closer to a more internal locus of causality and more motivationally adaptive. This may assist in the person wanting to demonstrate control in the behaviour to satisfy the need for self-determination set-up by the identified motive. By considering such motives, a clearer understanding of the controlling mechanisms underlying behaviour can be ascertained.

2.8.4 ACCESSIBILITY OF ATTITUDES, NORMS AND PERCEIVED CONTROL

Regan and Fazio (1977) and Fazio and Zanna (1978a) suggested that the attitude-behaviour relationship was moderated by whether attitudes were formed on the basis of direct experience with the attitude object or behaviour in question, as opposed to indirect experiences. Direct experience was shown to be an actual engagement with the behaviour or attitude object such that some degree of past experience or past behaviour was present. Indirect experience was categorised by vicarious experiences characterised by the observation of someone else engaging in the behaviour. Fazio and Zanna’s (1978a; 1978b) experimental manipulations demonstrated that participants who engaged in a problem solving task reported a greater endorsement of their attitude ratings than those who were merely shown the task without engagement. In addition, participants were more likely to engage in the behaviour on the basis of their attitudes when they had had direct experience with the behaviour than those who had not. This led the researchers to suggest that attitudes were mediated by the accessibility of those attitudes in memory. Attitudes formed on the basis of direct experience were more confidently held and more rooted in memory than those based on indirect experience or no experience at all. Fazio and Zanna (1978a) suggested that this mediating factor may be responsible for the inconsistencies in the regression of intention and behaviour on attitude in Ajzen and Fishbein’s (1977) model. The magnitude of the attitude-intention relationship, intention-behaviour relationship and the valence of the attitudinal and normative components on intention, it was said, may be dictated by the accessibility of those attitudes, suggesting that Ajzen and Fishbein’s (1977) model was incomplete. This was later shown to be the case in the dual relationship of attitudes on intention and behaviour (e.g. Bagozzi, 1981b; Bentler & Speckart, 1979).

The accessibility issue is related to the inclusion of past behaviour in the TPB. As cited earlier, past behaviour was shown to influence the formation of attitudes, intentions and future behaviour in the model. This implies that the accessibility of attitudes may be a function of the proximity and degree (if any) of past involvement.
with the behaviour. Doll and Ajzen (1992) examined this supposition in an experimental paradigm using the TPB. The authors examined the accessibility of attitudes, subjective norms and perceived behavioural control under the conditions of direct experience and indirect experience. It was shown that accessibility of these variables to the participants, as indicated by response latency to items measuring these constructs, was greater when the participants had direct experience than when they did not. Further, the stability of intentions, attitudes, subjective norms and perceived behavioural control was better for the participants in the direct experience condition than those in the indirect experience condition. The correlations of intentions and behaviour with attitudes, control and subjective norms was significantly greater under the direct experience condition than under the indirect experience condition. Controlling for response latency (the speed of response to attitudinal stimuli), however, did not alter these differences, but when the correlations were controlled for temporal stability (time elapsed between experience and attitudinal measure), the differences were nullified. These findings lend greater support to the accessibility of not only attitudes, but perceived behavioural control and subjective norms when subjected to past direct experience with the behaviour. This not only alludes to the influence of past behaviour in the model relationships, but also indicates that past experiences may affect the beliefs systems (behavioural, control and normative) which underlie the formation of these antecedent variables and result in better prediction of intentions and behaviour. It was thought that the positive effect of past direct experience with the behaviour on the cognitive antecedents of intentions may be due to the presentation of additional information which actors can utilise to make better judgements and evaluations regarding their intentions. Therefore, prior experience with behaviour, as postulated by researchers such as Triandis (1977) and Bagozzi (1981b), bolsters the robustness of the cognitive antecedents in the TPB.

Fazio (1990) extended the ideas of experiential influence on attitudinal formation, to present a model which described not necessarily how attitudes are formed and how they will predict behaviour, but when they will predict behaviour. Fazio (1990) introduced the MODE model by which two processing modes or systems are used to determine decision making. The MODE model suggests that Motivation and Opportunity serve to Determine decisions to act. Central to this is the deliberative and spontaneous cognitive processes by which a person makes decisions to act. Fazio (1990) suggested that these two processes dictated which strategy for decision making was adopted: motivation to deliberate and opportunity to make use of attributes in decision making. Motivation to avoid the potential costliness of making an incorrect decision facilitates a careful deliberation over the attributes of the behaviour in question before the decision to act is taken. Such a motivation can be viewed as a
'motivation to deliberate'. Opportunity or ability to make use of information from the known attributes of a behaviour will also determine which decision making process will guide action. Examples of such attributes may be a weighing up of the potential costs and benefits and therefore a consideration of the advantages and disadvantages of engaging in the behaviour. Such deliberations are a reflection of perceptions regarding behavioural control. Sanbonmatsu and Fazio (1990) suggested that attribute-based decision making was the foundation of the TRA and TPB, as a person considered "an overall assessment of their behavioural option by considering their salient beliefs of the attributes of the option, the evaluations of those beliefs and the normative constraints on those beliefs" (p. 615). Knowledge about the behaviour and its alternatives and an opportunity to utilise such knowledge may guide a deliberative process which will result in action. The other process reflects a more spontaneous one, which Sanbonmatsu and Fazio (1990) refer to as an attitude-based decision making process; "In an attitude-based decision strategy, decisions are guided by global attitudes associated with the decision alternatives" (p. 615). Consequently, attitudes which are well formed, possibly those due to direct previous experience, are those which directly guide behaviour and are far less deliberative than the attribute-based process. In summary, Sanbonmatsu and Fazio (1990) state that

"Individuals who are highly motivated to make a correct decision and are able to use the relevant available knowledge may rely more on an attribute-based strategy in making a decision. As the motivation to make a correct decision or the opportunity to use the relevant available knowledge decreases, the likelihood that attitudes will guide memory based decisions may increase" (p. 615).

It is possible that the motivation to make the correct decision may depend on the perceived expectation of success and the potential costliness of the behaviour. Consequently, considerations regarding control are essential as to which process is accessed.

Fazio (1990), however, does not take into account the role of control in this process as a possible mediator of the attitude-behaviour relationship. It may be that the spontaneous process in decisions based on attitudes may only be true for attitudes which are deeply rooted and accessible. Attitudes which are subject to change or are in conflict with the behaviour may also be subject to deliberation prior to action. Such attitudes may result in behavioural engagement only after they have been mediated by the formation of intentions based on the person's deliberations over these intentions and also the consideration of other mitigating factors like perceived behavioural
control. This possible route was highlighted by Bagozzi and Warshaw (1990), who showed that perceptions of success and failure and expectations of success and failure, which reflect control estimates, predicted attitudes prior to intentions. Such a route would necessarily entail a deliberative process or, as Bagozzi (1992) describes it, a predecisional phase. Therefore, while some aspects of attitudes may predict behaviour, it is only those which may be deep rooted or have foundations due to past experiences with the behaviour. Attitudes which are either in conflict with the behaviour or are less completely formed or perhaps are formed due to indirect experience may be involved in the deliberative process and may interact with the known attributes of the behaviour to help guide action via a deliberative process. In addition, perceived behavioural control concerning barriers or costs of the behaviour may result in attitudes being formed or changed on the basis of such control beliefs. Consequently, control may also be part of the deliberative process by which attitudes guide behaviour. The present investigation will examine the deliberative and spontaneous processes postulated by Fazio (1990) within the TPB. In particular, the prediction of intention will be examined to determine whether there is a spontaneous process due only to attitudes or whether such a process is influenced by control and past behaviour.

2.9 LIMITATIONS OF THE COGNITIVE APPROACH

The cognitive approach to the theoretical examination of behaviour is often viewed as a reaction to the empirical operant or mechanistic (Bandura, 1989) theories of psychology offered by Hull (1951) and B.F. Skinner (1953). Deci and Ryan (1985) state that "the main impetus for change [from the behaviourist approach] came from these theories' inability to explain various phenomena related to animals' avid exploration and manipulation" (p. 5). This resulted in a shift in focus from the examination of behaviour on the basis of past reinforcements, to an assessment based on expectations about future reinforcements. Therefore, while people were previously thought to react due to the stimulus provided by external reinforcements, the cognitive approach examined this perspective from the viewpoint of responses to stimuli because they expect to be reinforced in the future. As Deci and Flaste (1995) state, cognitive theorists "explained [behaviour] in terms of people's thoughts about reinforcements - their expectations and interpretations - rather than just the objective description of reinforcements themselves" (p. 78). This consequently, led to empirical psychology examining people's expectations and affect using psychometric inventories as stimuli to provide the appropriate responses. This has resulted in a number of current theories on motivation which Deci, Vallerand, Pelletier and Ryan (1991) have described as containing the concept of intention and are "concerned with
factors that promote (vs. fail to promote) people’s understanding of behaviour-outcome instrumentalities and engaging in efficacious behaviours to attain those outcomes” (p. 326). As reviewed previously, these theories have had success in mapping the antecedent aspects of intention and behaviour and much of what is now known about motivation is based on the findings of these approaches. However, as Deci et al. (1991) point out “they do not deal with the question why certain outcomes are desired. Therefore, they fail to address the issue of the energisation of behaviour” (p. 327). While cognitive psychologists differ from the operant theorists by moving “inside the person to search for the causes of behaviour” (Deci & Flaste, 1995, p. 78), they fail to account for the more deeply rooted motives which underlie these causes. Cognitive psychologists have therefore “stayed largely at the level of people’s thoughts rather than going deeper to their motivations” (Deci & Flaste, 1995, p. 78). This has led to increased interest in theories based on human psychological needs in order to answer the ‘why’ questions relating to the origins of the antecedent behavioural variables. Deci and Ryan (1985) state that the cognitive approaches “set the stage for the examination of self-determination by introducing concepts of behavioural decision making (i.e. intentionality) and control over outcomes, they allowed self-determination theorists such as DeCharms (1968) and Deci (1980) to point out that only some intended behaviours (namely those with an internal perceived locus of causality) are self-determined and that having control over outcomes does not ensure self-determination” (p. 38).

Therefore, while cognitive approaches such as the TRA/TPB have utility in predicting physical activity and other behaviours, they may not be able to explain some of the pathways as they do not account for deeper rooted, innate motivations or needs. The next section will elaborate on approaches based on human or ‘organismic’ needs which may assist in the interpretation and provide a richer, more elaborate explanation of cognitive intentional theories of motivation.

2.10 INTERPRETING THE TPB FROM A THEORY OF NEEDS PERSPECTIVE

Skinner’s (1995) conceptualisation of control and its inherent association with human psychological needs for competence has already been discussed with respect to the cognitive variables in the TPB and, in particular, its relationship to perceived behavioural control. Such an approach transcends the purely cognitive nature of the models put forward by Ajzen (1985) and Fazio (1990), for example, in explaining
human behaviour. Theories of motivation which are based on inner human motives, therefore, can be used as a means of interpreting the motivational effects of cognitive variables such as intention, attitude and perceived control. The explanation can be further assisted by the inclusion of constructs which reflect these needs in order to assist the interpretation. Foremost in the theoretical understanding of behaviour and motivation from a needs perspective is the framework known as self-determination theory. Chatzisarantis and coworkers (1998), in their examination of self-determination theory and the Theory of Reasoned Action, highlighted that the inclusion of variables relating to needs within social cognitive theories like the TRA can contribute to the understanding of the motivation of behaviour. The authors suggested that constructs relating to needs can help interpret the findings of models of cognition by providing insight into the origins of existing psychological constructs and can help evaluate the utility of social cognitive variables in their prediction of behaviour. Indeed, a number of authors have cited the utility of using such theories in a 'meta-theoretical approach' to interpret cognitive relations. Bagozzi, Baumgartner and Yi (1992), in their examination of the utility of their model of goal directed behaviour, cite self-determination theory as an example and claim that cognitive models “have similarities with, and can be interpreted from the perspective of, research done ... on the initiation and termination of action” (p. 335). Chatzisarantis, Biddle and Meek (1997) illustrated that classifying intention within the Theory of Planned Behaviour according to the need for self-determination from Deci and Ryan’s (1985) theories can assist in the prediction of physical activity behaviour in children. However, before hypotheses relating needs to cognition can be formulated, it is necessary to identify and differentiate between types of needs in order to provide further explanation behind the motivational utility of the cognitive variables within the TPB. The present review will examine this distinction between needs hypothesised by leading theories of self-determination and how they can be related to the TPB.

2.10.1 SELF DETERMINATION THEORY

Self-determination theory refers to a general framework which encompasses a set of related motivational mini-theories which address the effects of internal and external events on human motives for behaving (Deci & Ryan, 1985). A central tenet of these approaches is the notion of humans as proactive organisms who strive to attend to behaviours which will satisfy certain innate psychological needs. In this respect, self-determination theory has been termed an organismic theory of motivation. Another common element in the theories is the construct of intrinsic motivation. Intrinsic motivation is the activation or drive to engage in an activity or behaviour out of one's
own volition, for the mastery of the task and for its inherent interest and enjoyment. "When people feel intrinsically motivated, they experience interest and enjoyment, they feel competent and self-determining, they perceive the locus of causality for their behaviour to be internal" (Deci & Ryan, 1985, p. 34). Intrinsic motivation, then, is the type of activation towards a behaviour which characterises humans as active learners and interactors with the environment. In this respect, self-determination theory is primarily concerned with intrinsic motivation.

Two of the mini-theories which have received attention in the field of exercise research are cognitive evaluation theory and organismic integration theory (Deci & Ryan, 1985). Cognitive evaluation theory posits that the controlling nature of rewards can undermine a person's intrinsic motivation. Deci and Ryan (1987) demonstrate that the presentation of extrinsic rewards tends to undermine intrinsic motivation and shifts the reasons why people engage in the activity or behaviour towards obtaining the controlling reward. This has dramatic implications for persistence in behaviour. If a person performs the behaviour for the reward, rather than the self-gratification and satisfaction provided by the task or behaviour itself, the behaviour persists only as long as the controlling stimulus is present. However, while rewards have a tendency towards controlling and undermining motivation, the way in which they are presented is critical. Rewards which are provided as the purpose or goal of the performance, and are contingent on a normative reference, are those which tend to undermine intrinsic motivation and apply a controlling context to the behaviour. Such rewards may foster an 'ego orientation' in the individual in which perceptions of success are gauged only in relation to others (Deci & Flaste, 1995). However, if rewards are presented as tokens representing an acknowledgement of effort or success and not as the sole purpose for doing the behaviour, they may have a less adverse effect on intrinsic motivation. Such rewards are termed 'informational'. When a reward is presented in such a manner it is said to be under an 'autonomy supportive' context rather than a controlling one (Deci & Ryan, 1985). Cognitive evaluation theory has had much success in describing how a controlling environment can negatively affect intrinsic motivation and thereby stem the pleasurable engagement in activities which is done on a purely volitional basis by the organism. It was the starting point for the development of other mini-theories within the self-determination framework to explain further implications of autonomy, control and human agency and behaviour.
2.10.2 ORGANISMIC NEEDS

2.10.2.1 Autonomy and Competence

Deci and Ryan (1985), in their extension of cognitive evaluation theory, recognised three organismic or psychological needs which are innate within each individual from an early age; the need to demonstrate competence, the need to be self-determining or autonomous and the need for relatedness. The need for competence, identified by White (1959) has been defined and reviewed previously (see Section 2.5.3), and represents the organismic need for people to exert control over their environment or outcomes. Deci and Ryan (1985) state that competence has utility in enhancing intrinsic motivation. Whether a person is performing a behaviour to gain an extrinsic reward or for personal satisfaction or interest, a sense of competence at the task is important if the desired outcomes are to be attained. Therefore, a person can feel in control and have a sense of competence when they are extrinsically motivated or controlled. However, they may not get the concomitant positive emotional responses associated with such competence as the behaviour is not intrinsically motivated. In intrinsically motivated behaviours, competence is intertwined with the positive feelings of satisfaction gleaned from engagement in the behaviour. Therefore "feeling competent at the task is an important aspect of one's intrinsic satisfaction" (Deci & Flaste, 1995, p. 64).

Concurrent with the need for competence is the inherent need to be self-determining or autonomous. Autonomy has been defined as being the origin or cause of one's own behaviour. This construct was derived from work by DeCharms (1968) who suggested that "man strives to be a causal agent, to be the primary locus of causation for, or the origin of, his behaviour" (p. 269). Deci and Flaste (1995) state that a person who experiences his or her behaviour as being autonomous will perceive that they have a sense of freedom and authenticity in performing the behaviour. In contrast, a person who is not autonomous will not feel that sense of freedom or choice and will feel as if they are controlled in a similar manner that rewards have a controlling effect on behaviour. A person who does not feel they are autonomous will feel as if they are not the source of their actions, that they are being controlled by external agents and may therefore feel alienated. Extending these ideas, Heider's (1958) concept of perceived locus of causality was used to demonstrate the difference in personal causation of events. DeCharms (1968) argued that intentional behaviour can be viewed as having an internal locus of causality where an actor sees him/herself as the origin of their own behaviour while an external locus of causality has the actor perceiving him/herself as a pawn to external or controlling agents. A person's locus of causality,
therefore, will be a reflection of their autonomy. This was acknowledged by Ryan and Connell (1989) in their description of the perceived locus of causality as a 'gradient of autonomy'. As with control, autonomy can be viewed at different levels of specificity. According to cognitive evaluation theory, a person will have a need to be the origin of their behaviour at a global level and to be autonomous or authentic towards their overall environment and social structure. This assessment, however, will be based on perceptions of autonomy in different domains and therefore loci of causality in different sub-areas will contribute to overall perceptions of autonomy. In relation to intrinsic motivation, the need for autonomy in different domains means that intrinsically motivated behaviours will contribute to the person’s perception that they are the origin of their behaviour. In summary, people strive to become self-determined or autonomous and intrinsically motivated behaviour, as it is done purely for intrinsic reasons, may assist in this process.

2.10.2.2 Relatedness

Deci and Ryan (1985) introduced a third organismic need known as the need for relatedness. This was based on observations by psychotherapists such as Rogers (1951) and Perls (1973) and psychologists like Maslow (1943) who championed the notion that for people to be psychologically free and fully functioning they must recognise their nature as social beings. Individuals therefore have innate needs for relatedness and engage in social relationships with other people. Early psychoanalytic theorists (Freud, 1934) described the human ‘sex drive’ as an innate, sub-conscious biological need. While sexual gratification may clearly be a motivation to engage in relationships with others, theorists may have been neglecting the other aspects of these ‘drives’ such as the need to feel loved, included and related to others. People strive to forge relationships with others due to an innate desire to be dependent on others and for others to be dependent upon them. However, this results in a potential problem in the coexistence of the need for relatedness with the other organismic needs for competence and autonomy. It can be seen that a person may be relinquishing their independence in favour of being with others. This is not the case however, as Deci and Flaste (1995) point out that independence is not autonomy. Independence means to do things without any reliance on others. Autonomy, however, refers to choice and the feeling that one is the author or origin of one’s own actions. One can choose and feel freedom in that choice to foster personal relations with others and to be dependent on others. Part of being autonomous, therefore, is being able to freely choose the interpersonal relationships in which one is engaged. Consequently, relatedness is an associated part of the system of needs which drive behaviour. This implies that there must be some degree of complementarity in the three different needs for self-
determination, competence and relatedness in order for a person to be positively and effectively functioning in their environment.

2.10.3 REGULATORY PROCESSES

Autonomy is typically measured using a modified perceived locus of causality (PLOC) scale which represents the relative internality of the individual’s personal causation. However, the internal-external duality of the perceived locus of causality does not reflect the true differentiation in a person’s origins of causality. Rather, it is possible, for example, that some extrinsically motivated behaviours have an internal locus of causality. An example would be a person acting due to obligation or guilt. While there is no tangible regulating force to compromise the person’s self-determination, the person will still perceive their actions as being pressured and therefore they would not feel as if they were the author of their behaviour. Deci and Ryan (1985) suggested that extrinsically motivated behaviour can vary in its degree of self-determination. This has resulted in a new approach to the examination of locus of causality which is based on another sub-theory of self-determination known as organismic integration theory. Ryan and Connell (1989) view locus of causality as a continuum representing a ‘degree’ of autonomy. Intrinsic and external regulation remain as the endpoints of the continuum and all behaviours can be seen as being to some extent self-determined. However, intrinsically motivated behaviour can only be viewed as self-regulated while extrinsically motivated behaviours can be viewed as either self-regulated or externally regulated (Ryan, 1995). The continuum is measured using constructs on a perceived locus of causality (PLOC) scale. This scale was originally developed in an academic and prosocial domain (Ryan & Connell, 1989) but has been shown to have effectiveness in the physical domain (Chatzisarantis et al., 1998; Mullan & Markland, 1997; Vlachopolous, 1996).

_Intrinsic regulation_ lies at one extreme on the PLOC scale and is akin to intrinsic motivation. Therefore, a person aligned with this endpoint views his or her engagement in the behaviour as emanating completely from the self. Practically, it can be seen that intrinsically motivated individuals would provide reasons for participation as purely for the inherent pleasure or enjoyment of the task or action. The _external regulation_ construct, on the other hand, refers to actions which are more or less completely determined by others. Reasons for engaging in behaviour under an external PLOC may be due to external authority such as rule compliance or punishment avoidance. As PLOC is viewed as a continuum, it is unlikely that behaviours will fall completely into the endpoint categories of intrinsic motivation and external regulation. Ryan and Connell (1989) suggest that other reasons for
engaging in the behaviour in question may give rise to loci of causality which lie on intermediate points on the continuum. While people engage in some behaviours for completely autonomous reasons such as for enjoyment or inherent pleasure, some behaviours are undertaken for reasons of personal obligation such as one's own moral values, needs or goals. Such behaviours are not completely intrinsically motivated as there is a self-regulatory effect from personal pressures. These are termed identified behaviours and they reflect internally-based or self-regulated reasons for engaging in the behaviour because the reasons are related to personal beliefs. Since such personal pressures are likely to reflect needs, behaviours under the control of an actor in the context of an identified PLOC may be competence satisfying. The concomitant control experiences would therefore be viewed as personally relevant and originating from the self. Identified behaviours, therefore, while not intrinsically motivated, are still self-regulated and lie adjacent to intrinsic motivation on the PLOC continuum.

Conversely, behaviours which are perceived to be engaged in due to obligation or guilt lie proximal to external regulation on the PLOC continuum and are termed introjected. Introjected reasons for acting are in fact a form of self-regulation where there is no tangible external force. Deci and Flaste (1995) likened introjects to “voices in one’s head that come from outside and issue orders” (p. 94). They are therefore classified alongside extrinsically determined PLOC because, although there is no real external regulating force, the behaviour is enacted due to perceptions of external regulation. Introjected behaviours are usually characterised by performing the behaviour due to feelings of ‘guilt’ and ‘shame’. Doing something as the result of complying with others’ wishes is performing as a result of guilt avoidance and represents lowered self-determination because freedom of choice is threatened and the need for relatedness is compromised. Analogously, avoiding a behaviour may be due to lowered competence and the actor may be motivated by an introjected regulation to avoid the associated feelings of shame.

The four constructs relating to behavioural regulation on the PLOC scale, external, introjected, identified and intrinsic can be viewed as a continuum ranging from highly internal to highly external in the following order: intrinsic, identified, introjected and extrinsic. Intrinsic and identified reasons may result in control perceptions to be competence satisfying and thereby motivationally adaptive, while extrinsic and introjected reasons are largely related to pawn or controlling situations (DeCharms, 1968) where the actor does not feel autonomy of action regardless of perceptions of control. Ryan and Connell (1989) view their PLOC model as a ‘gradient of autonomy’ (p. 759) and the continuum therefore represents the degree of autonomy a person experiences toward a given behaviour or situation.
The proponents of needs theories, Skinner (1995) and Deci and Ryan (1985), have acknowledged that competence and autonomy are separate and distinct constructs, but are also inherently complimentary due to their interaction to enable the person to become an authentic, self-determined agent in their environment. Skinner (1995) also recognised and reported that control is not autonomy. Control, she said, was a precursor of competence and refers to the contingency between the action and the outcomes and whether the actor has both the ability and the strategy to execute the necessary behaviour to produce the outcomes. Autonomy on the other hand, often quantified by means of the perceived locus of causality (PLOC) construct, refers to the individual’s need for the behaviour to be self-determining. At a global level, the need to become self-determining is a vital aspect of personal development, while at a situational level the need to be self-determining is vital to the role control has to play in developing competence in a certain area. Autonomy refers to whether the origin of an action or a behaviour is internal and that a person has complete freedom to initiate the action and experience the self as the originator of action. It is therefore possible to experience control without an associated internal locus of causality or autonomy.

An example put forward by Deci and Ryan (1985) to illustrate how control can occur without feelings of autonomy was the perceptions of slaves when rowing in a ship. It can be seen that the slaves have complete control over their ability to row the ship. They possess positive perceptions toward all aspects of Skinner’s (1995) conceptualisation of control; they have the means available (participating in rowing) to produce outcomes (moving the boat), the ability (capacity) to produce those outcomes and the positive beliefs that the means (participating in rowing) will result in the outcomes (moving the boat). Despite this control, they do not have an internalised locus of causality for the behaviour of rowing because they do not have a freedom of choice in the behaviour and it is not regulated by the self. Deci and Ryan (1985) suggest that for control to increase competence, the behaviour must be experienced as self-determined. Control will not be competence satisfying if it is experienced under an external perceived locus of causality or low autonomy. Therefore, if the environment is seen as externally regulating, as it was in the slaves’ case, then while control is high, competence will not be satisfied as the slave does not feel they are acting for themselves. As a consequence, the needs for autonomy and competence are complimentary. In order for control to increase competence, the behaviour must be experienced as self-determined, similarly, control perceptions towards a given behaviour does not necessarily mean that a person will see that behaviour as self-determined. Deci and Ryan (1985) point out that only some intended behaviours are completely self-determined, and that having control over
outcomes does not ensure self-determination. Conversely, Biddle (1998) states that autonomous incompetence will not lead to intrinsically motivated engagement with the activity. This illustrates that only when both needs are satisfied will the behaviour be truly intrinsically motivated and free from introjects.

2.10.4 INTERNALISATION AND INTEGRATION

The complimentary nature of the needs for autonomy and competence, has important implications for the process of internalisation. Internalisation refers to the process by which a behaviour or a behavioural regulation is acquired or ‘taken in’ by the individual and turned into a personal goal or value. It is a constructive process which assists the person to become more competently self-determining in their social world. Internalisation, therefore, helps in a person achieving a sense of global self-determination. Deci, Eghrari, Patrick and Leone (1994) view internalisation as “the process of transforming external regulations into internal regulations and, when the process functions optimally, integrating those regulations into one’s sense of self” (p. 121). In this respect, internalisation is an ongoing active process by which a person exerts effort to ‘take in’ actions in order to help them to ultimately become more autonomous and have greater functioning.

However, in order for a person to become a more effective causal agent in managing themselves, some compromises may have to occur. For example, a person may be motivated to internalise or accommodate a behaviour or action which would not normally be performed volitionally. In this case, internalising non-volitional behaviours would be viewed as a necessary compromise which would ultimately contribute to self-determination. This demonstrates that it is possible for an extrinsically motivated action to be internalised by a person if it is perceived to assist in satisfying their needs for autonomy. Therefore, while the internalisation process may accommodate some behaviours which are extrinsically motivated or not normally under the person’s volition, complete internalisation must ultimately result in the behaviour being self-determined and devoid of the negative affect associated with non-volitional behaviours. When this occurs, the behaviour or regulation has reached the point where it is part of one’s sense of self, even if it can never be viewed as emanating from the self.

Deci and coworkers (1994) differentiated between the quality or completeness of internalisation and identified two types, integrated and introjected. Integrated internalisation is the accommodation, by a person, of a behaviour which is competence satisfying and is perceived to be self-determined. When a behaviour is
internalised under integration, a person engages in the action “wholly volitionally because of its utility or importance to one’s goals” (Deci et al., 1994, p. 121). Behaviours which are suitable candidates to become integrated via the process of internalisation are those with an intrinsic or identified locus of causality because they reflect actions which have value to the actor. Intrinsically motivated behaviours are those actions which are deemed to be self-regulated, autonomous and competence satisfying. In this respect intrinsically motivated behaviours can be viewed as those which are ‘ready integrated’ i.e. they are integrated because they contribute to the person’s sense of self due to their very nature (Deci & Ryan, 1990). Identified behaviours are also valued as having benefit to the way the person views the world, they are therefore competence satisfying and self-regulated. They differ from intrinsically motivated behaviour because they are performed due to self-held values rather than for the inherent pleasure or gratification of the action itself. Identified behaviours are likely to be integrated as they are important to the individual’s functioning in their environment.

In contrast, holding introjected regulations towards certain behaviours refers to internalisation in which a person “takes in a value or regulatory process but does not identify with and accept it as his or her own” (Deci et al., 1994, p. 121). Rather, the behaviour is enforced by perceptions of guilt, threats or other forces perceived to be operating externally from the self. Clearly, such behaviours are not autonomous though they may be competence satisfying if the person experiences some degree of control and autonomy in relation to the behaviour. Consequently, internalisation under introjected regulation is deemed only partial or suboptimal, the person has not completely ‘taken in’ the behaviour as a regulation emanating from their self. Instead, it lies on the periphery, and functions as a control over behaviour in opposition to more self-determined courses. Introjected behaviours are deemed to have maladaptive consequences due to their pressure giving properties. Introjected or internally controlling regulations which have been internalised are associated with negative affect, often associated with extrinsic control such as pressure, tension and anxiety (Ryan & Connell, 1989). Behaviours which are internalised and integrated into one’s functioning self, on the other hand, are not associated with these negative experiences and result in greater consistency and coherence in internal states. Integrated internalisation is therefore desirable. The need for autonomy drives internalisation and will ultimately determine whether the regulation or behaviour becomes integrated rather than just introjected. Deci and Flaste (1995) state:

“People’s need for autonomy, their need to be a causal agent in managing themselves, provides energy for integrating (rather than just...
introjecting) a regulation. Thus, although needs for relatedness and competence can motivate introjection, it is the need for autonomy that champions the integration of a value or regulatory process into one’s self." (p. 94).

Deci and Ryan (1985) talk of the need for ‘competent self-determination’ for behaviours undergoing the processes of internalisation to be fully integrated. Therefore, while limited internalisation may occur of behaviours which are not autonomous, complete internalisation of a behaviour cannot occur without the behaviour being both autonomous and competence satisfying.

2.10.5 A SCHEMA OF REGULATIONS

Recently, Ryan (1995) has incorporated the notion of integration into the locus of causality continuum to provide a schematic conceptualisation of how integration is accommodated alongside other ‘styles of regulation’ (Figure 2.8). Rather than perceiving intrinsic motivation as the most intrinsic endpoint of the continuum, it is perceived as a separate category and not as a product of internalisation. Intrinsically motivated behaviours, therefore, stand not as internalised and integrated regulations which are essential to the person’s development, functioning and integral to the satisfaction of their organismic needs, but as “conflict-free expressions of the self” (p. 407). Intrinsically motivated behaviours can be internalised if they serve to help accommodate the being in their environment, but do not have to be if they are merely products of self-expression. Further, external regulation, introjection, identification and finally integration represent different styles of regulation and reflect the process of complete internalisation. This is plotted alongside the processes, degree of relative autonomy and perceived locus of causality to give a clear schema. A useful addition is the concept of amotivation, which reflects the performance of a behaviour without any personal causation, intentional or control component. Amotivated behaviour is characterised by a lack of control (no contingency seen between action and outcome) and lack of competence. Consequently, this too occupies a separate category at the external end of the schema. This schematic represents a useful conceptualisation of how integration can be accommodated alongside the locus of causality and needs theory framework. Integration, however, should not be considered a point on the perceived locus of causality as it represents the completeness of internalisation rather than a reason for engaging in a behaviour.
Clearly then, the needs for competence and autonomy are closely related and both may assist in the explanation of control on the TPB variables and the motivation of behaviour. It may therefore be necessary to incorporate this distinction between competence and autonomy in the TPB, so that the full complement of organismic needs are accounted for and their influence on cognitive variables mapped. However, for the inclusion of such constructs in the model, appropriate measures must be adopted and validated. Empirically, the notion of self-regulation or autonomy, as quantified by the PLOC construct, has been supported by confirmations of construct, predictive and convergent validity. Ryan and Connell (1989) demonstrated that the PLOC scale produced two factors, an internal and external locus of causality. This provided partial evidence for the continuum as intrinsic and identified items loaded on a first factor and items pertaining to the extrinsic and introjected scales determined the second. To further differentiate the constructs they found that a correlation matrix between the different variables in continuum order, namely, intrinsic at the apex followed by identification, introjection and extrinsic at the base formed an ordered 'simplexlike' pattern of relationships. The highest correlations were found at the top of the principal axis and then were reduced as one moved towards the origin. In particular, it was found that intrinsic and extrinsic reasons were typically uncorrelated or negatively correlated with each other. As expected the intrinsic scale was highly correlated with the identified scale and introjection correlated with the extrinsic. In terms of predictive and convergent validity, the PLOC demonstrated an expected linear pattern of correlations with the psychological variables relating to motivation.
The external scale was negatively correlated or unrelated to scales measuring mastery motivation (Harter, 1981) and internal control (Connell, 1985) and correlations increased in positivity and magnitude as one moved along the PLOC continuum so that intrinsic motivation exhibited highly positive and significant relationships with the measures of mastery motivation and internal control. Consequently, relative autonomy over certain behaviours or a behavioural category can be measured by the PLOC.

However, the distinction also needs to be made between autonomy and perceived competence. Indeed, competence is typically measured via constructs of perceived control which can be done from a number of different perspectives as outlined by Skinner's (1995) conceptualisation. Further, it can be domain specific (e.g. Connell, 1985) or behaviour and context specific (e.g. Ajzen, 1991). Biddle (1998) claims that competence and autonomy, while conceptually different, remain correlated at the empirical level. By including measures of both constructs within a cognitive framework, the present investigation will examine the motivational relevance of these antecedents in a children's physical activity context. In particular, as self-determination is theorised to stimulate internalisation and perceived control will only be competence satisfying under the conditions of self-determination, it is hypothesised that autonomy will predict control. Further, based on the findings of Chatzisarantis and Biddle (1998a), it is also anticipated that autonomy will directly predict both attitudes and intentions and thereby regulate the attitude-intention relationship. These findings may assist in the further explanation of the origins of attitude, perceived control and intention as preceding variables in the prediction of physical activity behaviour in children. Furthermore, the inclusion of perceived control may provide a meta-theoretical overview linking Skinner's (1995), Deci and Ryan's (1985) and Ajzen's (1985) theories on the motives behind children's physical activity behaviour.

2.11 PURPOSE OF THE THESIS

2.11.1 SUMMARY OF LITERATURE REVIEW

This literature review has examined the influence of many operationalisations of the perceived behavioural control variable on physical activity behaviour from a theoretical social cognitive approach, the Theory of Planned Behaviour (TPB). Perceived control was first examined in the context of the TPB as postulated by Ajzen (1986) and possible influences on control identified: past behaviour, attitude, moral obligation and self-efficacy. More differentiated views of control were gleaned from
early research on the TRA (Bagozzi, 1981b; Bentler & Speckart, 1979) and examined accessibility to resources as an indirect measure of perceived control (Liska, 1984). Other starting points when examining the motivational utility of perceived control were gleaned from early research with the locus of control construct (Lefcourt, 1991; Weiner et al., 1972). This led to modern conceptualisations of control and how they can be classified and related to control within the TPB. In particular, Skinner’s (1995; 1996) conceptualisation of control and its close relationship with an organismic need for competence was reviewed. This led to the approach to control in the TPB from a human needs perspective. To further such an approach, self-determination theory (Deci & Ryan, 1985) was put forward as a meta-theoretical framework for studying control and the cognitive variables in the TPB. This was viewed as an important and useful perspective to use in the theoretical examination of physical activity behaviour as it assists in interpreting some of the assumptions of the TRA (Chatzisarantis & Biddle, 1998a) and helps explain the origins of the antecedent cognitions.

With reference to the approaches reviewed, the major purpose of this thesis is to examine the role of perceived behavioural control in a physical activity context with children using the TPB as a starting point. Four specific hypotheses regarding this global aim will be tested in four empirical studies respectively. The hypotheses and rationale based on the literature review are provided in the next section.

2.11.2 RESEARCH HYPOTHESES

The following hypotheses represent the four major research questions to be addressed by this thesis. Each hypothesis will be examined in a single empirical study. Specific and more elaborated hypotheses are provided with each individual study. The studies follow a logical progression in examining the role of perceived behavioural control in the TPB. In the first study, a more elaborated role of control in the TPB will be hypothesised. Then the role of control in relation to other potential mediating variables such as past behaviour and in relation to other aspects of control such as...
self-efficacy, perceptions of control and the need for self-determination or autonomy will be examined.

Hypothesis 1. Perceived behavioural control will influence intentions and behaviour to engage in physical activity as postulated by the TPB, but will also influence attitude.

RATIONALE: The observed covariation between attitude and perceived behavioural control in previous studies has yet to be explained in both children and adults (Godin et al., 1987). Past experiences of control may influence the consideration of, formation of and change in attitudes prior to formation of intentions. Skinner (1995) suggests that perceived control and competency is likely to be related to beliefs about a behaviour. It is therefore logical to hypothesise that as attitudes reflect behavioural beliefs, control will be one of its predictors.

Hypothesis 2. Past behaviour will predict intention to engage in physical activity and prospective physical activity behaviour and will also predict perceived behavioural control. Past behaviour will mediate the direct influence of perceived control on intention and behaviour.

RATIONALE: Past research on the TRA indicates that the relationship between attitude and behaviour may have been due to other processes such as the influence of past behaviour (Bagozzi, 1981b; Bentler & Speckart, 1979). Indeed the dual prediction of intention and behaviour by control may be due to past behaviour (Bagozzi et al., 1992). If past behaviour is found to attenuate the direct influence of perceived behavioural control on behaviour, it provides evidence that the influence of perceived control directly on behaviour is due to past beliefs about control (Skinner, 1995).

Hypothesis 3. Self-efficacy will influence perceived behavioural control as well as model the aspects of control due to confidence on intention.

RATIONALE: Perceived behavioural control has been aligned with the self-efficacy variable from its introduction to the TPB (Ajzen & Timko, 1986) and this has been restated recently by Ajzen (1991). However, research suggests that these variables may be separate, although the exact nature of their relationship is still unclear (Terry & O’Leary, 1995). Using Skinner’s (1995) conceptualisation of control, perceived behavioural control is seen as a broad control construct incorporating capacity beliefs as well as control beliefs, while self-efficacy represents capacity beliefs alone.
Including both variables within the TPB will examine the influences of these variables on intentions.

**Hypothesis 4.** Autonomy will be positively related to perceived control, perceptions of control and attitudes in the TPB. It will also contribute to intentions via attitudes and control.

**RATIONALE:** Meta-theoretical approaches are advocated by a number of researchers to clarify the notions unexplained in a partial approach of a single theory (Brawley, 1993; Chatzisarantis et al., 1998; Chew, 1968). Recent research has adopted variables from self-determination theory to test empirically and interpret cognitive approaches to motivation (Chatzisarantis & Biddle, 1998a; Chatzisarantis et al., 1997). Variables relating to organismic needs theory have been shown to be applicable to the study of TPB offering further variables which, serving as exogenous predictors, govern the relationships in the theory. Conceptually, perceived behavioural control has been shown to reflect a person’s need for competence and may be related to their construction of a sense of autonomy (Deci & Ryan, 1985; Skinner, 1995). Perceived control is likely to be governed by these needs which may affect how control influences intentions and attitudes. The origins of perceived behavioural control as a reflection of competence and part of the need for autonomy will be represented by two variables, the perceptions of control scales (Connell, 1985) and perceived locus of causality (Ryan & Connell, 1989) respectively. The inclusion of these variables initiates an integrated, meta-theoretical approach to studying physical activity behaviour. Three theories will be referred to and utilised in the final model: the Theory of Planned Behaviour, self-determination theory and Skinner’s conceptualisation of control. It is expected that intrinsic and identified behavioural regulations will predict control but also mediate the control-intention relationship.

In addition to these hypotheses, the present thesis aims to replicate and extend the basic assumptions of the Theory of Planned Behaviour and relate this to the study of physical activity in children. Specifically, the present study aims to provide a greater insight into the role of perceived control as an antecedent of physical activity behaviour in children. Such an understanding may be useful in guiding interventions aimed at promoting physical activity and may be useful for those who are involved in promoting physical activity among children such as physical educators, community sports leaders and health promoters.
CHAPTER III

STUDY 1

The Theory of Planned Behaviour with Children: Does Perceived Behavioural Control Predict Attitudes?

3.1 INTRODUCTION

The role of perceived behavioural control in the TPB is potentially complex. Ajzen (1985) initially proposed that control was an antecedent of intention and behaviour, depending on the degree to which perceived control reflected actual control over the behaviour. However, studies examining physical activity and other behaviours have indicated that both paths may exist simultaneously (Godin & Kok, 1996; Terry & O’Leary, 1995), which represents a conceptual conflict (Bagozzi et al., 1992). If perceived control represents actual behavioural control, it would predict actual behaviour, but not intentions as it would have no cognitive or expectation component. On the other hand, if it did not reflect actual control, then it would predict intentions and act as an estimate of how much control can be exercised over the behaviour. However, the empirical evidence demonstrates that perceived control is a more far reaching variable than originally expected. When participants are asked about how easy or difficult a behaviour is to perform or how much control they have over the behaviour, they will provide a response which encompasses both estimates about control and reports based on actual control. This may explain the dual nature of the perceived control influence on intention and behaviour.

However, the relationship of control with intention and behaviour may be the result of other processes not encompassed by the TPB. One possible process may be that control may predict attitudes and there is conceptual and empirical evidence to support such a causal relationship. Conceptually, control may be seen to be part of attitudes. If attitudes are a function of beliefs about a behaviour then perceptions of control over that behaviour may represent one aspect of a person’s behavioural expectations, an argument put forward by Trafimow and Duran (1998). Bagozzi and Warshaw (1990), Bagozzi and Kimmel (1995) and Warshaw, Sheppard and Hartwick (in press) also showed that attitudes towards success and failure and expectations of success and failure, which, in part reflect perceived control, predicted attitudes towards making a behavioural attempt. Bagozzi (1990) also demonstrated that attitudes towards success predicted attitudes towards trying. These estimations of
success and failure are likely to include some aspects of perceived control, implying a control-attitude relationship. In addition, Skinner (1995) proposed that perceived control may be part of a system of beliefs about a behaviour. In particular, perceived control may reflect beliefs about past experiences of control and an assessment of competence toward the behaviour.

Despite evidence for their conceptual discrimination (Trafimow & Duran, 1998), empirical research has demonstrated the close relationship between control and attitude. Empirical studies in a physical activity context have consistently reported a high correlation or covariance between perceived control and attitude (e.g. Ajzen, 1985; Godin et al., 1993; Godin et al., 1992). Clearly, further research into the operationalisation of the attitude and perceived behavioural control constructs is required to resolve whether attitude and control are really distinct and how the relationship can be logically explained. One possible solution is to utilise the conceptual evidence presented in Chapter 2, Section 2.4.2 as a basis for the existence of a control-attitude path and test these hypotheses empirically. Such a relation may assist in further explaining how perceived control is related to intentions and behaviour within the TPB.

An important issue when examining variable relationships in the TPB, is measurement of behaviour. Clearly if new pathways in the model are to be hypothesised and tested, such as a control-attitude relationship, it is important that an appropriate behavioural measure is utilised to ensure the boundary condition of correspondence is maintained. Measures of behaviour used in previous studies with the TPB can be viewed as being unsatisfactory from a methodological point of view. While studies using the TPB have reported the relative utility of this approach with children's physical activity (Chatzisarantis et al., 1997; Craig et al., 1996; Godin & Shephard, 1986b; Theodorakaris, 1994), the intention-behaviour relationship is typically of moderate magnitude. Possible reasons for these findings may relate to the measurement limitations of physical activity in these studies. In large sample studies, the measurement of behaviour is typically difficult as (1) physical activity is complex and incorporates a large number of different behaviours and (2) there is no recognised means of accurately and objectively measuring physical activity behaviour. Studies using the TRA and TPB with children in exercise research have used single item, self-reports using psychometric scales for the measurement of behaviour as recommended by Ajzen (1985). However, such measures neglect the large body of literature referring to the validity and reliability of self reports of physical activity. Researchers in physical activity measurement have consistently highlighted the need to use segmented, interview-administered methods to enhance behaviour recall and increase
the accuracy of behavioural reports (Baranowski, 1988; Sallis, Buono, Roby, Micale & Nelson, 1993).

3.2 RESEARCH HYPOTHESES

The aims of the present study are to examine the psychological determinants of physical activity behaviour in children using the TPB as a framework. Specifically, this research aims to examine the TPB in children with an expanded role for the perceived behavioural control variable. In particular, the relationship between perceived behavioural control and attitudes will be tested. The study will also incorporate a comprehensive self-report measure of physical activity behaviour (Cale, 1994) which addresses recommendations regarding validity and reliability when assessing physical activity behaviour in children. A path analysis model will be used to examine the relationships between the TPB variables, particularly the control-attitude, attitude-intention and intention-behaviour relationships.

Several key research hypotheses relating to the relationships between intentions, attitudes, subjective norms and control in the TPB are proposed. Hypotheses 3.1 to 3.4 refer to the theoretical relationships specified by Ajzen (1985).

As intention is deemed to reflect motivational aspects behind physical activity participation the following hypothesis will be tested:

H3.1 Intention to participate in prospective physical activity will directly and positively predict self-reported physical activity measured at a later time.

The theory relationships for the TPB illustrated in Chapter 2, Figure 2.2 will be tested in the following hypothesis. In particular, perceived behavioural control will be hypothesised to influence behaviour directly and indirectly via intention. The contribution and significance of these paths will be estimated in the path analysis models:

H3.2 Intention is directly predicted by attitudes, subjective norms and perceived behavioural control.

H3.3 Perceived behavioural control will directly predict behaviour.

In addition, the previous research evidence indicating the superior valence of attitudes in the TPB will be tested:
H3.4 The relationship between attitude and intention will be stronger than that between directly measured subjective norm and intention.

The possibility of some aspects of control being accounted for by attitude, leads to a potential two-path influence of perceived behavioural control on intention - directly and indirectly through the mediation of attitudes. Hence the following hypothesis will be tested:

H3.5 Perceived behavioural control will positively influence attitude and thereby influence intention

3.3 METHOD

Participants. Ten state high schools were contacted by telephone and asked if they would participate in a ‘survey’ of children’s attitudes towards their activities. Three schools confirmed their participation and gave written consent. Written details were disclosed to the headteachers and teachers involved, but full details were withheld from the pupils to minimise any influence on responses. Participants involved in the study were 181 secondary school children (86 boys, 95 girls) aged 12 to 14 years from three high schools in the West Midlands, England. Previous work on the TPB and physical activity levels has been conducted on children of this age and it was thought that this age group possessed sufficiently mature reading abilities to cope with the language in the questionnaires (Godin & Shephard, 1986b; Theodorakaris et al., 1991).

The assessment of socio-economic status (SES) of the children in the sample was obtained from national independent Office for Standards in Education (OFSTED) reports which provided details on the catchment area of the schools and the percentage of the pupils receiving subsidised school meals. The catchment area information provided an overview of the overall socio-economic status (SES) of the children while free school meals are considered indicative of whether the distribution of children in the sample from areas of economic deprivation was similar to the national average.

The reports described the catchment areas for the schools as predominately of mid-range SES, but all included at least two areas having levels of unemployment above the national average as well as some socially deprived ‘inner city areas’. The average percentage of pupils eligible for free school meals of 8.5% (range: 3.0 - 11.6%) was
behind the national average (17.2%) in all three schools. Therefore the schools were generally above the national average for SES based on these indicators.

Written approval from the schools regarding the administration of the questionnaires to the children was obtained prior to the commencement of data collection. The anonymity of the participants was maintained throughout the study and questionnaires and interviews were identified by code numbers allocated to them by their class teachers. A master list of names and code numbers was kept by the teacher but at all times the participants’ identities were kept strictly confidential.

Pilot study. A pilot study was conducted on a separate group of 48 primary school children (aged 10-11). The aim was to examine the feasibility of using psychometric measures of intention, attitudes, subjective norms and perceived control with children. The children were presented with a brief TPB questionnaire. The questionnaire contained four items, one to measure each salient TPB construct: intention, attitude, subjective norm and perceived behavioural control. These items were constructed from standard stems provided by Ajzen and Fishbein’s (1980) published guidelines and from other studies using the TPB with children (Craig et al., 1996; Godin & Shephard, 1986b).

Prior to the completion of the questionnaire, the researcher explained that the questionnaire was part of a survey to find out what children of their age thought about certain things to do with the activities they did. It was explained that there were no ‘right’ or ‘wrong’ answers, that nobody else would see the questionnaires and that they did not have to put their names on the questionnaires. The children were then told how to use the semantic differential scales to respond to the items. The target behaviour, physical activity, was defined for the children as “activities which make you out of breath or huff and puff”. This was repeated from time to time throughout the administration of the questionnaire to remind the children of the behaviours under examination. The questionnaire was administered in the presence of the school teachers under classroom conditions. All the items were read aloud and then time given for the children to ask any questions and make their responses.

Feedback from the teachers and children concerning all questionnaires was positive and neither group raised any major concerns. Some children did report difficulty in understanding some of the words in the items. For example, some children did not understand the word pair ‘pleasant’/‘unpleasant’. These were therefore defined for the children in the classroom session as ‘nice feelings’ and ‘awful feelings’ and changes to the wording of the questionnaire was undertaken on the basis of this finding.
Overall the children could cope with the concept of 'scales' and this has been shown in other studies using similar scaling principles (e.g. Theodorakaris et al., 1991). However, with this age group there was a tendency in some participants toward consistent responses on the extremes of the scales with no intermediate responses. Therefore, for some children the scale formed only a method of indicating extreme positive or negative responses towards the statements rather than graduated responses. While there is some literature to suggest that the number of choices represented on a scale makes little change in the direction of responses the subjects provide (Matell & Jacoby, 1971), the lack of intermediate responses may result in adverse skewness in the distribution of the data, which will have implications for the subsequent data analyses. It is therefore recommended that administrations be carried out on older children who are more able to cope with a scale requiring graduated responses.

Theory of Planned Behaviour Questionnaire. Based on the findings of the pilot study, the procedures for the development of the TPB questionnaire (Ajzen & Fishbein, 1980) were considered appropriate for use with children. Some limited modifications were made to the questionnaire to clarify the wording of the items. The TPB questionnaire is presented in Appendix 3.

Intentions. Intention to participate in physical activity was assessed from responses to the statement: “I plan to do physical activities at least three or more times during my free time in the next week”. Responses were given using the likely-unlikely word pair on a seven-point semantic differential scale.

Attitudes and Subjective Norms. Attitude was measured using one item: “My doing physical activities at least three or more times in the next week is...” Participants responded to the statement on three scales using the good-bad, exciting-boring and fun-unpleasant endpoints. The scale responses were averaged to produce a composite score for attitude. Subjective norm was measured from a single statement: “Most people important to me think I should do physical activities at least three or more times in the next week” which was evaluated on a scale using the likely-unlikely word pair. All scales were of the seven-point semantic differential type.

Perceived Behavioural Control. Perceived behavioural control was defined as a person’s perceived ease or difficulty in engaging in physical activity behaviour. Participants responded to one item to measure this variable: “Do you think it will be easy or difficult for you to participate physical activities which make you out of breath at least three or more times in the next week?” Responses were measured on a seven-point semantic differential scale with easy-difficult as endpoints.
Physical Activity Behaviour. The interview-based four by one-day recall physical activity questionnaire was administered to the sample in the two weeks following the completion of the psychometric measures. The interviews were conducted at school during term time. The questionnaire asked the respondents to provide all activity information from the previous day. If the previous day was a weekend day an amended form was used. The interview conforms to the recommendations regarding physical activity measurement given in Chapter 2, Section 2.6.4. This interview has been shown to have concurrent validity and test-retest reliability in studies with children (Cale, 1994). A sample of the four by one day recall interview form for a school day is provided in the Appendix 4.

Due to the large number of interviews required for the study, six interviewers were used to administer the questionnaires. The interviewers were trained in the administration of the physical activity questionnaire using the guidelines of Cale (1994). Each interviewer was instructed on the specific administration protocol and was involved in a practice session of administering the questionnaire prior to data collection. Previous research has shown that a training programme for interviewers results in high reliability both in the interviewer’s own repeated administration of the questionnaire and in relation to other interviewers (Gross, Sallis, Buono, Roby & Nelson, 1990). An assessment of the inter- and intra-interviewer reliability is reported in Appendix 5. The analyses showed that the interviewers exhibited a high degree of agreement with each other in their scoring of the interview forms and also excellent repeatability over time.

The Leisure Time Exercise Questionnaire. In order to check the concurrent validity of the four by one day recall physical activity questionnaire, the Godin & Shephard (1985) leisure time exercise questionnaire was administered to the sample after the interview. The questionnaire is a single-page, self-report of physical activity which uses language applicable to children aged 10 to 16 and has been validated against other self-reports of physical activity (Sallis et al., 1993). The questionnaire asked the children to estimate how many times they participated in ‘hard’, ‘moderate’ and ‘light’ activities in a ‘normal’ or ‘typical’ week. The children were guided through the questionnaire by the researcher. The definition of the different activities in the questionnaire were provided on the questionnaire with specific examples. Boxes were provided for each activity intensity for the children to fill in their frequency of participation in each. However, to assist in the children’s understanding of the questionnaire, the children were asked to provide other examples prior to completing the questionnaire. This enabled the children to better estimate which activities fit in to
which category. The second question asked the children to state how often they participate in physical activities ‘which make your heart beat faster or get out of breath’. The children were required to circle one of three emboldened words, ‘often’, ‘sometimes’ and ‘never/not very often’, which best described their frequency of participation. A sample questionnaire is provided in Appendix 6.

Administration. The TPB questionnaire was administered to the children in quiet classroom conditions. As in the pilot study, physical activity was defined for the children and then repeated at frequent intervals as a constant reminder of the target behaviour in the study. The principle behind using the scales to respond to the questionnaire items was also explained using a visual aid with an enlarged scale and sample item unrelated to the study. The children were reminded that the questionnaire required individual responses with no consultation with others. The items were then read out aloud by the researcher, one at a time and time was allowed for the children to ask any questions and make their responses. The four by one day recall physical activity questionnaire and leisure time exercise questionnaire were administered within two weeks of the questionnaire administration.

3.4 RESULTS

Physical activity behaviour. The data from the four by one day recall physical activity questionnaire were analysed to provide estimates of children’s physical activity behaviour in terms of energy expenditure (Blair, 1984) and minutes spent in ‘moderate’ and ‘vigorous’ physical activity. Descriptive statistics for these estimates are shown in Table 3.1.

<table>
<thead>
<tr>
<th>Physical activity</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate activity (hrs)</td>
<td>.74</td>
<td>.92</td>
</tr>
<tr>
<td>Hard activity (hrs)</td>
<td>.12</td>
<td>.38</td>
</tr>
<tr>
<td>Energy expenditure (kcal.kg⁻¹.day⁻¹)</td>
<td>38.08</td>
<td>6.70</td>
</tr>
</tbody>
</table>

Concurrent validity of the physical activity interview was estimated by a non-parametric correlation (Spearman’s Rho) with scores from the leisure time exercise questionnaire (Godin & Shephard, 1985). A significant correlation was obtained
between time spent in moderate physical activity from the four by one day recall questionnaire and minutes spent in moderate activity from the leisure time exercise questionnaire (\(p=.47, p<.01\)). There was also a significant correlation between vigorous activity from the four by one day recall and hard activity from the leisure time exercise questionnaire (\(p=.44, p<.01\)). While these correlations are of a modest magnitude they provide some evidence for the concurrent validity of the physical activity data from the interview and are of the order reported in other studies (Cale, 1993; Sallis et al., 1993).

Theory of Planned Behaviour. Descriptive statistics and correlations for the TPB variables are provided in Table 3.2.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intention</td>
<td>2.16</td>
<td>1.30</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Attitude</td>
<td>5.68</td>
<td>3.09</td>
<td>.73*</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Subjective Norm</td>
<td>1.68</td>
<td>1.39</td>
<td>.22</td>
<td>.29*</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Perceived behavioural control</td>
<td>1.25</td>
<td>1.63</td>
<td>.38*</td>
<td>.25*</td>
<td>.01</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. Behaviour</td>
<td>38.08</td>
<td>6.70</td>
<td>.13</td>
<td>.14</td>
<td>.01</td>
<td>.05</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. * \(p <.01\)

The hypotheses pertaining to the theoretical relationships between the TPB variables were examined by path analysis\(^1\) for observed variables using the EQS computer program (Bentler, 1989). Prior to the analysis the data were examined for excessive departures from normality. Multivariate structural equation estimation methods require the data to be multivariate normally distributed except those based on elliptical distribution theory. However, methods of estimation such as maximum likelihood allow some departures from normality and provide robust estimates of the model. In the present study, the examination of the data’s normality was made for individual variables (kurtosis and normality estimates) and from Mardia’s coefficient for multivariate kurtosis which tests the hypothesis that the distributions of the variables used in estimating the model conform to a multivariate normal distribution. Excessively high values for this coefficient would be grounds for the rejection of this hypothesis. Some individual variables demonstrated high kurtosis but this was not

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\(^1\)For a quick reference guide to the important terms relating to the statistical methods used in this thesis, the reader is guided to the glossary of terms provided in Appendix 1.
grounds for the rejection of the assumption of multivariate normality. However, robust estimates, which are resilient to departures from normality, were used to prevent contamination by the individual variables which demonstrated excessive kurtosis.

The relationships between the variables were represented by a series of structural equations and the fit of the data in relation to a perfectly fitting model estimated using a robust maximum likelihood (MLROBUST) method. In the present study overall model goodness-of-fit was assessed from several recommended indicators: (1) the comparative fit index (CFI) which ranges from 0 to 1.0 and should be .90 or above for an adequate fit (Bentler, 1990), (2) the Tucker-Lewis index (TLI), which is a more parsimonious estimate of goodness-of-fit and is interpreted in the same way as the CFI (Tucker & Lewis, 1973), (3) the ratio of the goodness-of-fit Chi-square value divided by the degrees of freedom (χ²/df) and authors have suggested that values as low as 2 or as high as 5 can reflect good fit (Marsh & Hocevar, 1985), although values of about 2 tend to be most accepted and (4) the standardised root mean square of the residuals from the population matrix which should be below .05 (Byrne, 1989).

In the event of a less than adequate fit of the data to the hypothesised model, incremental tests for freeing parameters (LaGrange Multiplier or LM-test) and fixing parameters (Wald or W-test) to improve model fit were available (Bentler, 1989). However, Joreskog and Sorbom (1988) suggest that these should only be estimated if theoretically justified. Further, adding paths not previously hypothesised may substantively alter the path coefficients or factor loadings in the hypothesised model, and some authors suggest testing the revised model on new data (Marsh, Hey, Johnson & Perry, 1997).

The model tested is represented schematically in Figure 3.1. Nomenclature and diagram conventions for variables are taken from Joreskog and Sorbom (1988) and Bentler (1989). The ith independent (exogenous or predictor) variable is represented by the symbol Xᵢ in a square box. The ith dependent (endogenous or predicted) variable is shown as Yᵢ in a square box. The ith measurement error or residual in the equation variable is represented with the symbol Eᵢ. Relationships between variables in the model which represent structural equations are shown in the diagram as unidirectional arrowed lines. By convention the endogenous or dependent variables are located at the proximal (arrowed) end of the line. This is because dependent variables in the structural equations are always formulated in terms of the independent variables. The model provided standardised structural estimates for all the hypothesised relationships between the variables. The covariance matrix for this and all the models presented in this thesis are listed in Appendix 7.
An important issue when using such models is the issue of causality. Martin (1982) claims: "causal models are not proved by structural equation modelling; rather, they are subject to the positivistic principle of disconfirmation" (p. 598). Therefore, if the equations in the model adequately describe the data, the hypotheses cannot be rejected which implies that the causal model too cannot be rejected. While Martin (1982) contends that the full latent variable model is deemed superior to a measured variable model as latent variables do not carry error variance and therefore paths between these variables are effectively 'error free' (Huba & Bentler, 1982), it was thought that the sample size was not large enough to use such a model (Bentler & Bonnett, 1980). The present study used path analysis to examine causal relations between the theory variables. This provided path estimates with explicitly modelled error terms for the measured constructs, but did not use latent, unobserved constructs.

The initial analysis resulted in a model with acceptable goodness-of-fit ($\chi^2=19.88; \text{df}=4$) according to the non-incremental fit index (CFI=.90) but it lacked parsimony (TLI=.83, $\chi^2/\text{df}=4.97$). The LM-tests revealed that no paths should be freed while the W-tests recommended that the perceived control-behaviour, subjective norms-intention and intention-behaviour paths be fixed to zero to improve the parsimony of the model. The model was amended fixing the control-behaviour and subjective norms-intention paths to zero. The intention-behaviour path was left freed as it is integral to the model. The resulting model (Figure 3.2) exhibited satisfactory
goodness-of-fit statistics and increased parsimony ($\chi^2=20.06; \text{df}=6; \text{CFI}=.92; \text{TLI}=.87; \chi^2/\text{df}=3.43; \text{SRMSR}=.02$). Relationships between attitudes and intention ($\lambda=.68, p<.01$), control and intention ($\lambda=.21, p<.01$) and control and attitudes ($\lambda=.25, p<.01$) were significant. However, there was no influence of subjective norms on intentions. As before, the intention-behaviour relationship was low and of marginal significance and was therefore also recommended as a candidate for being fixed to zero by the modification tests. However, this path was allowed to remain free as the marginal significance may have been due to the small sample size.

Figure 3.2 Path Diagram Showing Standardised Coefficients between Attitudes, Subjective Norm, Perceptions of Control, Intentions and Behaviour within the Theory of Planned Behaviour

As the sample size was relatively small, cross-validation of the model and its revisions by dividing the sample and re-testing the model was not feasible and, instead, a resampling technique was employed. Some authors (Bentler, 1989; Boomsma, 1986) recommend the use of resampling techniques to further test for the robustness of the parameter estimates and fit indices of the model. The model in the present study was, therefore, subjected to a 'bootstrap' resampling procedure using the EQS computer program (Bentler, 1989). The bootstrap procedure conducts repeated tests of the model by randomly selecting cases from the existing data set with replacement to form new data sets on which to test the model. The more successful replications of the model on these subsamples, the more researcher can be content that the model adequately represents the relationships specified in that sample (Efron, 1982). In the present study, the revised model was subjected to a bootstrap procedure.
with 1000 replications, the maximum permitted in the EQS program. The bootstrap procedure in EQS provides test statistics for goodness-of-fit and parameter estimates for each replication as well as an overall summary of the replications. Boomsma (1986) suggests that the examination of the elicited confidence intervals for the overall model fit statistics, the parameter estimates and the distribution of these statistics, provides a good overview of the model and its utility in the sample. The resampling results are shown in Table 3.3.

### Table 3.3 Table Showing Bootstrap Estimates for the Resampling of the Final Model

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Mean</th>
<th>SD</th>
<th>Skew.</th>
<th>Kurt.</th>
<th>Lower 5%</th>
<th>Upper 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFI</td>
<td>.84</td>
<td>.13</td>
<td>-1.71</td>
<td>3.02</td>
<td>.52</td>
<td>.95</td>
</tr>
<tr>
<td>TLI</td>
<td>.81</td>
<td>.13</td>
<td>-1.59</td>
<td>2.47</td>
<td>.51</td>
<td>.95</td>
</tr>
<tr>
<td>SRMSR</td>
<td>.11</td>
<td>.03</td>
<td>.19</td>
<td>-.22</td>
<td>.07</td>
<td>.16</td>
</tr>
<tr>
<td>λ, Intention-Behaviour</td>
<td>.17</td>
<td>.94</td>
<td>2.33</td>
<td>4.72</td>
<td>-.80</td>
<td>.21</td>
</tr>
<tr>
<td>λ, Control-Intention</td>
<td>.15</td>
<td>.14</td>
<td>.75</td>
<td>.23</td>
<td>-.01</td>
<td>.40</td>
</tr>
<tr>
<td>λ, Attitude-Intention</td>
<td>.47</td>
<td>.16</td>
<td>-.39</td>
<td>-.53</td>
<td>.17</td>
<td>.71</td>
</tr>
<tr>
<td>λ, Control-Attitude</td>
<td>.24</td>
<td>.20</td>
<td>.28</td>
<td>-.95</td>
<td>-.03</td>
<td>.56</td>
</tr>
</tbody>
</table>

*Note.* Statistics based on 1000 replications with 999 successes, 1 failure

During the bootstrap procedure, only one replication of the model failed to converge, indicating that the model fit the data in 99.9% of the subsamples. Results indicated that the fit indices for the overall sample were included in the confidence interval, but the means for the resampling procedure were substantially lower. This was also true for the parameter estimates (λ's) for the overall sample, although the means across the bootstrap procedure were substantially lower. In addition, the confidence intervals included zero for the intention-behaviour relationship, which corroborates that finding that the coefficient between these variables was non-significant. For the control-attitude and control-intention relationship the confidence interval also included zero, but examining the distribution of the scores from the replications demonstrates that the distributions were positively skewed, which may suggest that the more likely estimate is closer to the upper, rather than lower, end of the distribution. In summary, the bootstrap results indicate that the model does have a 99.9% successful replication rate, corroborates the existence of the hypothesised paths with the exception of the intention-behaviour path and suggests that perhaps the estimates provided by the overall model are higher than indicated. These statistics do provide some
substantiating evidence of the robustness of the parameter estimates in the sample, and tests on other samples and using latent variables may provide further evidence.

3.5 DISCUSSION

3.5.1 SUMMARY OF FINDINGS

Results from the present study support a number of the hypotheses regarding the relationships between children's physical activity behaviour, intention, attitudes, subjective norms and perceived behavioural control within the TPB. Results suggest that attitude was the main predictor of intention but subjective norms did not predict intention. These findings have been supported by meta-analytic reviews (Hausenblas et al., 1997). Perceived behavioural control was also an important predictor of intention but not behaviour. Critically, perceived behavioural control predicted attitudes as hypothesised (H3.5) - a relationship previously unreported. Surprisingly, intention was poorly related to behaviour and attained only marginal significance. When replicated using the 'bootstrap' technique, the model fit the data for 99.9% of the randomly selected subsamples indicating that the model represented the data adequately. However, the confidence intervals for the intention-behaviour, control-intention and control attitude coefficients may have been lower than specified in the model or zero.

3.5.2 THE INTENTION-BEHAVIOUR RELATIONSHIP

Intention was not the significant predictor of behaviour as hypothesised (H3.1). This is contrary to the majority of findings from previous exercise and physical activity research in adults (Riddle, 1980) and children (Chatzisarantis et al., 1997; Craig et al., 1996; Theodorakaris et al., 1991) which highlight this fundamental aspect of Ajzen's theory. In a review of the TRA/TPB research, Courneya & McAuley (1993) state that "considerable data exist to support intention as an immediate determinant of behaviour" (p. 51). Theoretically, stated intention is supposed to reflect motivational aspects of a person's cognition about a given behaviour and stated intention provides an indication of how hard a person will try to engage in the behaviour and that they will formulate a plan (Warshaw & Davis, 1985) or behavioural commitment (Hausenblas et al., 1997) to execute that behaviour. The concept is clearly an important tenet of the theory, as it is through intentions that the other social-cognitive predictors exert their influence on behaviour.
However, not all studies have reported high degrees of association between intention and behaviour and concern has been raised by some authors over the poor magnitude of the intention-behaviour relationship in physical activity research (Coumeya & McAuley, 1993). A lack of correspondence between the measures of intention and physical activity and a small sample size may have been reasons why the attitude-intention relationship is low and non-significant in the present study. Some authors report that studies which fail to find high intention-attitude relations did not adhere to Fishbein's (1975) and Ajzen's (1977) boundary condition that there must be a high correspondence between measures of attitude and behaviour in terms of action, target, context and time (Blue, 1995; Courneya & McAuley, 1993). The measure of behaviour in the present study satisfies most of these criteria, particularly in terms of action, target and context, and other studies using such self-reports have exhibited success in their intention-behaviour predictions (Blue, 1995). However, the temporal element in the present study may have been compromised. The measure of behaviour was administered two weeks after the completion of the intention measure, while the intention measure specifies engaging in the behaviour in the next week which may violate the correspondence rule. While it may seem a small detail, the one week difference may be critical in the accuracy of prediction when the relative instability of attitudes is considered (Doll & Ajzen, 1992). Conversely, though, Randall and Wolff (1994) found no significant difference in the correlation between intention and behaviour when the time delay between the measures was short (attaining correspondence) and long (no correspondence). This suggests that intentions may still have motivational importance even if correspondence is not attained as in the present study. The 'law of correspondence' may therefore have been less influential than first thought.

The problem of prediction may also have been due to the error resulting from a small sample size. The relationship was of marginal significance in this study, but the same relationship may have demonstrated significance in a larger sample. Researchers examining multivariate statistical techniques have consistently reported the likelihood of obtaining significance with increased sample sizes due to increased overlap in the confidence intervals of the data sets (Howell, 1992). While this has been a problem in structural equation modelling with large data sets where finding non-significance in goodness-of-fit statistics is very unlikely (Marsh, Balla & McDonald, 1988), it also highlights the opposite problem encountered with smaller sample sizes. It is anticipated that a larger sample size will result in a significant prediction of behaviour from intention.
3.5.3 PREDICTION OF INTENTION

Behavioural intentions were a function of attitudes and perceived behavioural control but not, as hypothesised (H3.2), subjective norms. A non-significant finding for the subjective norms-intention path is neither unique nor completely unexpected. Studies have consistently reported the tendency of attitudes to be of greater influence on intention than subjective norms (Blue, 1995; Godin & Kok, 1996; Godin & Shephard, 1990; Godin et al., 1993; Hausenblas et al., 1997) while others have indicated, as the present study has, that the relationship is non-significant (Dzewaltowski, 1989; Dzewaltowski et al., 1990; Godin et al., 1991; Terry & O'Leary, 1995; Valois et al., 1988). Hausenblas et al. (1997) indicate in their meta-analysis that attitude is clearly more influential than subjective norm in the prediction of intention in exercise behaviour with an effect size across 32 studies more than double that of subjective norm.

There are a variety of different views as to why attitudes are more influential than subjective norm in the TPB. Clearly, peer influences are an important determinant of many behaviours including exercise and physical activity (Tappe et al., 1989). Researchers have claimed that although individuals are subject to influence from their peers, they are still essentially self-serving and therefore more subject to their own thoughts and opinions over others, particularly in volitional behaviour (Ajzen & Madden, 1986). Others believe that the superiority of attitude over subjective norms may be a function of the way these constructs are operationalised in the theory (Grube, Morgan & McGree, 1986; Miniard & Cohen, 1981). Terry and O'Leary (1995) state that subjective norms measured in the prescribed manner recommended by the TPB is unlikely to tap the subtle social pressures that people perceive when formulating intentions to act. The researchers hypothesise that behavioural examples i.e. salient referents engaging in the behaviour itself are more likely to influence behaviour than the perceived desires of others.

It has also been hypothesised that individuals who perceived themselves as being controlled by external events and therefore having a high external locus of control were more likely to be influenced by subjective norms (Godin & Shephard, 1990; Kristiansen & Eiser, 1986). This has been corroborated by empirical studies. Saltzer (1978) found that individuals who perceived themselves as having low perceived locus of control over their behaviour are more likely to formulate intentions as a function of normative beliefs than attitudes. Similarly, Chatzisarantis and Biddle (1998a) have shown that subjective norms were a positive influence on intention in a controlling context as opposed to a more autonomous context where its influence was
negative. It may be that the present sample rated control very highly and this therefore negated any influence the subjective norm variable was likely to afford. In addition, the subjective norms variable may include significant others other than peer influences such as parents and teachers. It may be that the lack of prediction in intention from subjective norms reflects the contribution of referents with whom they do not wish to comply.

The lack of prediction of intention from subjective norm may also be a measurement issue. The measure of subjective norms in the present study is derived from responses to a single item and therefore may not tap all aspects of social pressures for engaging in the target behaviour. A further measurement issue is that of reliability; a single item measure is likely to be less reliable which may adversely affect association with other variables. In addition, as with the intention-behaviour relationship, significance may be obtained in a larger sample size where sampling error is likely to be reduced.

3.5.4 THE PERCEIVED CONTROL-ATTITUDE RELATIONSHIP

As expected, the attitude-intention relationship was positive and significant and superior to the subjective norm-intention relationship (H3.4). Studies using the TPB have consistently reported the importance of attitudes in the prediction of intention. As attitudes reflect the sum of a person's beliefs about engaging in a given target behaviour, or, in the case of physical activities, a behavioural category, it would be expected that this will be a critical determining factor on the formulation of plans for involvement (Ajzen, 1991; Hausenblas et al., 1997). However, it seems that attitudes may not only reflect behavioural and outcome beliefs as hypothesised by Ajzen (1985), but also control beliefs. A significant path was hypothesised (H3.5) and supported in the present study between control and attitudes. In addition, control also afforded an influence over intentions directly. This confirms the postulation by Trafimow and Duran (1998) that control must not be viewed as a mere determinant of attitude, but as a variable with independent effects on intention. The notion that control exerts a motivational influence above and beyond attitudes is therefore supported.

Trafimow and Duran provide further support for the existence of a control-attitude path in their arguments against the conceptual distinction of attitudes and control. They hypothesise that, when making decisions to act, people assess whether the behaviour is easy or difficult (control beliefs) and whether it is advantageous or not to engage in the behaviour (behavioural beliefs). However, there may be some overlap between these beliefs. A person may perceive a behaviour as being easy to do (a
control belief) and such a perception may also be construed as an advantage (a behavioural belief). Simply, the person can see that it is advantageous for the behaviour to be easy. Such an overlap at the beliefs level may cause control beliefs to predict attitude. This implies the existence of a control-attitude path.

The authors claim that the overlap of control and behavioural beliefs is an argument against the conceptual distinction of attitudes and perceived behavioural control i.e. they are the same thing. They later refute this argument by demonstrating that control and attitudes are distinguishable constructs and have independent effects on the other variables in the model. However, they do not report that the variables are always correlated at the empirical level. Therefore, while the constructs are distinguishable, some aspects of control are conceptually similar to attitudes and it is these aspects which are shared in the correlation. The unshared variance may reflect different aspects such as past beliefs about control, as hypothesised in the present study, which may directly predict intentions. Further support for discriminant validity of perceived control and attitude in subsequent studies using latent constructs will allow researchers to have a clearer idea of the utility of the perceived control variable and its influences on intentions and attitudes.

The direct influence of control on attitudes also regulates the relationship between control and intention. This is observed by the reduction in the unconfounded zero-order correlation between control and intention from \( r = .38 \) to \( \lambda = .21 \) in the structural equation model. This suggests that some aspects of control beliefs which would normally be directly regressed on intention, predict intention through the mediation of attitudes. A possible interpretation for this dual influence is that some aspects of control may result in the deliberation by the individual over their beliefs before forming intentions. These aspects of control probably reflect a person's consideration or 'weighing up' of potential problems with control such as barriers or possible constraints on the control of the target behaviour. Such perceived problems with control may necessitate increased thinking or cognition on the part of the actor prior to the formation of a plan to act. This implies a more deliberate process in the formation of intentions through control and attitudes. On the other hand, the direct path between control and intentions may reflect aspects of control related to past experiences of control. These past experiences, positive or negative, may result directly in the formation of a plan to act or not to act. As this is an effect on intention independent of attitudinal consultation, it reflects a more spontaneous formation of behavioural plans.
3.5.5 INTERPRETATION OF THE CONTROL-ATTITUDE PATH

Conceptually, the deliberative process in the current model is similar to Fazio’s (1990) idea of deliberative vs. spontaneous processes of attitudes on behaviour. Fazio (1981) hypothesised that under certain conditions, such as little experience with the behaviour, a novel behaviour or a behaviour which has a high degree of potential cost in terms of effort and planning, an actor will consult their deep-rooted attitudes prior to a decision to engage in the behaviour. Conversely, under conditions where the behaviour is more familiar, attitude accessibility is high or when time is a factor in decision making, a more spontaneous path leads directly to engagement with the behaviour. It can be seen that under conditions of novelty or little experience, a person may engage in a weighing up or consideration of barriers prior to engaging in that behaviour. Or, as Fazio (1990) suggests, “the perceived costliness of the potential behaviour motivates the individual to exert cognitive effort” (p. 93).

Perceived control variable is a reflection, in part, of problems with control and a consideration of barriers to engaging in the behaviour. Based on these problems, the actor may be compelled to form or access attitudes toward the behaviour prior to the formation of a behavioural plan to act. This may therefore entail a deliberative process, similar to the notion suggested by Fazio (1990), by which control predicts intention. In the present model, control follows this deliberative path to behaviour through the mediation of attitudes. On the other hand, authors have suggested that if the behaviour is habitual (Verplanken, Aarts, van Knippenberg & Moonen, 1998) or if it has few barriers (Ajzen, 1991), control is likely to better reflect actual control, or at least past experiences with control, and result in a direct formulation of a behavioural plan or intention and therefore a more spontaneous path to behaviour engagement without the need for attitude consideration.

Verplanken et al. also suggest that the deliberative and spontaneous processes may be a function of two types of attitudes - those that are accessible and those that are not. Accessible attitudes may directly predict intentions. This is because ‘accessible’ attitudes may be those related to past involvement with the behaviour and therefore past experiences of control. Such attitudes may be encompassed by the perceived behavioural control variable resulting in the more spontaneous path. Less accessible attitudes may be considerations made on the basis of the attributes of the behaviour itself, forcing the individual to consider the barriers, consequences and beliefs towards engaging in that behaviour. They may also consider attitudes towards similar behaviours with which they have had experiences in the past. Such less-accessible attitudes may be encompassed by the attitude variable in the present study and...
predicted by the aspects of control which relate to possible barriers to the behaviour. This is represented in the present model by the more deliberative pathway by which control predicts intentions through attitudes.

Theoretically, these the current findings can be interpreted from the perspective of other theories concerning perceived control, competence and the motivation of behaviour. Skinner (1995) suggests that control experiences are integral to the development of perceived competence at a task which will, in turn, motivate individuals to persist in the tasks that provide these experiences of control. She suggests that individuals who have past experiences of control with a certain behaviour will act in such a way to perpetuate those experiences of control and the associated sensations of competence in a *self-perpetuating cycle*. Therefore, experiences of control are likely to result in a person formulating an intention to act so as to confirm their estimates of perceived control and continue developing competence. Similarly, Deci and Ryan (1985) state that, "to a large extent, perceived competence comes from success experiences and from positive feedback" (p. 124) from such experiences. Children in particular are therefore more likely to express motivation towards engaging in a given behaviour if their past experiences are positive and result in feelings of control and competence. Relating Skinner's (1995) theory to the present findings, the aspects of perceived behavioural control accounting for past control experiences would be expected to lead to the formation of intentions to act. Such intentions are formed so that the actor can perpetuate these experiences of control and the associated feelings of competence. This is represented by the direct or more spontaneous path from control to intention. Other aspects which may represent problems with control such as the weighing up of barriers are not related to these control experiences but more to cognitive deliberation. This may therefore require attitudinal consultation and result in a more deliberative process in the formation of intentions.

As an extension to the Theory of Planned Behaviour, Ajzen and Madden (1986) suggested that perceived behavioural control may exert a direct influence on behaviour in addition to indirect effects through intentions, but this was not supported in the present study. The path between perceived control and behaviour was dropped in the present study because it was not significant. Results from some studies on exercise behaviour have demonstrated that the control-behaviour relationship is significant and of high magnitude and may even exceed that between intention and attitude (Godin & Gionet, 1991; Maslow, 1943; Theodorakaris, 1994; Wankel, Mummery, Stephens & Craig, 1994). However, there have also been research findings which corroborate the present results, reporting that control is not directly related to
behaviour and affects behaviour only through the mediation of intentions (Dzewaltowski et al., 1990; Prislin & Kovrlja, 1992). Two reasons can be given for these conflicting findings: the constructs used to measure the control variable and the degree of controllability over the target behaviour. Hausenblas et al. (1997) indicate that control may influence exercise behaviour beyond that afforded by the TRA variables and that this is due to the fact that the TPB control measure accommodates a consideration of the barriers to engaging in physical activity. While the measure of control in the present study will, in part, reflect a consideration of barriers on the part of the individual, it does not account for barriers alone and these aspects may not have been directly influential on behaviour. Other studies have distinguished between control beliefs and barriers in an attempt to achieve a more differentiated view of the relationships between control, intentions and behaviour. However, these measures have been shown to be highly and positively correlated with each other and not differentially predictive of behaviour (Godin et al., 1991). Therefore, if the differentiation of control into barriers and other control considerations is the problem, then the amount of variance in perceived behavioural control which accounts for barriers should still be regressed on behaviour in the present study. As control is not predictive, the suggestion that the measures need to be differentiated is not the reason for the non-significant control-behaviour path.

Another explanation might be the degree of controllability of the target behaviour. Ajzen (1985) suggests that most behaviours lie at some point of a continuum from complete control to total lack of control. Recent research suggests that exercise behaviour may not be completely under the control of the participants as demonstrated by Madden, Ellen and Ajzen (1992). They reported that exercise had some of the lowest perceived control scores among a study of ten commonly executed behaviours. They concluded that “the effects of perceived behavioural control on behaviour are most vivid when the behaviour exhibits some problem with respect to control” (p. 3). This implies that when controllability is low, then control is likely to predict behaviour. The sample may rate their control over the target behaviour as high and therefore the control variable may not reflect problems with control and will therefore only influence behaviour through attitudes and intentions.

3.6 CONCLUSIONS AND RECOMMENDATIONS

The aims of this study were to examine the TPB in children and in particular the control-attitude relationship in a physical activity context. The analysis revealed a model in which intention predicted behaviour with marginal significance despite the inclusion of a comprehensive self-report behavioural measure. The poor prediction
may have been due to a small sample size and a low degree of temporal correspondence between the measures of intention and behaviour. Intentions were significantly predicted by attitudes and control while perceived social pressures to engage in the target behaviour had no significant influence on intentions. In addition, the hypothesised path between attitudes and control was supported. It has been suggested that intentions formed as a result of the indirect effect of control through attitudes reflected deliberations over barriers and other questions about control, while the direct effect of control on intentions, which attenuated the attitude-control relationship, involved reflections on past experiences of control. This study provides a basis for further studies of similar design to examine these relationships with larger, more representative samples. Specifically, the following recommendations for future study are made:

(1) The correspondence between measures of intention, attitude and control should be made with closer temporal correspondence with the measure of behaviour which may contribute to a better behavioural predictions

(2) Problems in the prediction of intentions and behaviour from control, attitudes and subjective norms may be clarified using a larger sample and latent variables in the model. A larger sample would allow the use of latent variables which would minimise the contribution of random error in the measurement of the variables and predictions in the model. A latent variable model would provide ‘error-free’ measures of model constructs is desirable (Martin, 1982). The use of multivariate analyses with unobserved constructs is advantageous as latent variables are not subject to ‘arbitrary’ measurement error or problems of reliability and the only error term associated with the latent variable is error in prediction from other constructs.
CHAPTER IV

STUDY 2

Replication of the Perceived Control-Attitude Path and the Inclusion of Past Behaviour in the Theory of Planned Behaviour

4.1 INTRODUCTION

While the results of Study 1 support a number of hypotheses relating to the Theory of Planned Behaviour (TPB) with children, including the influence of perceived behavioural control on attitudes, a number of limitations were highlighted. Specifically, these were (1) the violation of the boundary condition of measurement correspondence between items measuring intentions, attitudes, behaviour and control and the measure of behaviour, (2) the small sample which may have compromised the significance of the perceived behavioural control-behaviour, subjective norm-intention and intention-behaviour relationships and (3) the requirement for a latent variable model to allow for more accurate coefficients of prediction due to the reduction in the measurement error of the theory constructs. By addressing these problems the present study aimed to make a more comprehensive test of the relationships and provide a further test of hypotheses from Study 1. In particular, it is expected that this study will provide additional evidence for the existence of a relationship between control and attitudes as an indirect influence of control on intentions.

In addition to testing these hypotheses, this study will also aim to address the influence of habit or ‘past behaviour’ in the TPB. The inclusion of past behaviour in the model may assist in the explanation of the control-attitude and control-intention relationships hypothesised and identified in Study 1. Evidence in favour of the inclusion of past behaviour in the model is provided by a number of researchers. Bagozzi (1981b), Bentler and Speckart (1979; 1981), Fredricks and Dossett (1983) and Liska (1984) all illustrated that past behaviour was an influence on intention and behaviour. The influence of past behaviour has been shown to mediate the influence of perceived behavioural control on intention and behaviour. Valois, Shephard and Godin (1986) demonstrated that past behaviour is effective in predicting intentions above and beyond the effects of control. Bagozzi and Kimmel (1995) also observed that the effects of perceived behavioural control on intentions and prospective behaviours were negated by the inclusion of variables representing past recency and frequency of behaviour.
Based on this evidence, it is possible that the direct paths of perceived behavioural control on intention and behaviour may be a by-product of the effects of past behaviour. Therefore its effects may only be observed when past behaviour is not measured. In particular, this may explain why perceived control, on occasion, predicts both intentions and behaviour. There may be aspects of perceived control which are the result of or a reflection of past behaviour. DuCharme et al. (in press) maintain that “perceived behavioural control should mediate past behaviour’s impact on either intentions or behaviour because those who have performed the behaviour in the past should have developed a feeling of control over performing it” (p.9). An alternative hypothesis is that past behaviour may share some common variance with perceived control and control may instead act as a mediator of past behaviour on intention and behaviour. Perceived behavioural control may therefore be a predictor of perceived control and could have indirect effects on intention and behaviour through control. The mediating effect of past behaviour on the control-intention and control-behaviour relationships will be tested in the present study, but the mediation of the past behaviour-intention and past behaviour-behaviour relationships by perceived control is considered an alternative hypothesis.

One interpretation of the ‘tripartite’ relationship between intention, attitudes and perceived behavioural control was that the direct intention-control path was a reflection of past experiences and future expectancies of control. This is in line with Skinner’s (1995) theory that past experiences of control and the accompanying feelings of competency will result in greater motivation to confirm and heighten these perceptions through further similar experiences. This provides an explanation for the direct, more spontaneous path between perceptions of control and intentions. It was hypothesised that if perceived control reflected past experiences of control with the behaviour the actor would form a plan to engage in the behaviour further in order to extend the experiences of competence. On the other hand, it was hypothesised that the aspects of control which predicted intention through attitudes represented a deliberation of barriers, constraints and beliefs about control prior to the formation of intentions. This indirect influence of control on intention was represented by a more deliberate path from control on intention through the mediation of attitudes. However, the inclusion of past behaviour may account for aspects of control which are related to past experiences of control and thereby reducing the direct, more spontaneous influence of control on intentions. It is therefore expected that past behaviour will be directly related to behavioural control accounting for the individual’s beliefs about control from previous experience with the behaviour. It is further expected that the inclusion of paths from past behaviour to control and from past behaviour to intention may regulate the relationship between control and intentions.
4.2 RESEARCH HYPOTHESES

The aims of this study are threefold. Firstly, using a non-standard model with both latent and observed variables (Bentler, 1989), the relationships between the TPB variables will be examined. Specifically, the following hypotheses will be tested:

H4.1 Prospective behaviour will be predicted by intention.

H4.2 Intention will be predicted by attitude, subjective norm and perceived behavioural control.

H4.3 Perceived behavioural control will exert an indirect influence on intentions through attitudes.

A perceived behavioural control-behaviour relationship was not specified on the basis of this relationship being non-significant in Study 1. Additionally, although the subjective norms-intention relationship was non-significant in the previous study, it was hypothesised in the present study in order to test whether this relationship was attenuated in Study 1 due to sample size or measurement error. However, the use of a non-standard structural equation model and incremental goodness of fit modification tests will allow for the model to be modified should the path demonstrate non-significance.

Secondly, to examine the influence of past behaviour on the intention and behavioural elements of the TPB the following hypothesis will be tested:

H4.4 Past behaviour will predict prospective behaviour directly and indirectly through intention.

In addition, to test for the possibility that past behaviour accounts for the aspects of control related to intentions, the following hypothesis will be tested:

H4.5 Past behaviour will directly predict perceived behavioural control and intention and this will result in an attenuation of the control-intention relationship.

Finally, the factorial and discriminant validity of the latent factors of attitude and control in the model will be tested through confirmatory factor analysis. This will lend further weight to the predictions made in the path analysis.
4.3 METHOD

Participants. 382 children (181 boys and 201 girls) aged 12-14 years from five schools in the East Midlands and South East areas of England volunteered to take part in this study. As in the previous study consent from teachers and pupils involved in the study was sought and obtained prior to commencement of data collection. SES was estimated from catchment area and free school meals. The catchment areas were predominately middle SES but did include some lower SES suburbs. The mean proportion of students eligible for free school meals was 13.3% (range: 5.0-15.5%) which is below the national average of 17.2%.

Physical activity behaviour. The four by one day recall interview-administered physical activity questionnaire was used to assess physical activity behaviour. As a large number of interviews were conducted, three interviewers were used. Inter- and intra-interviewer reliability was assessed using the same procedure reported in Study 1. Results demonstrated that there was a high degree of correspondence between the interviewers (inter-interviewer reliability) and for each interviewer over time (intra-interviewer reliability). The findings are reported in Appendix 5.

Theory of Planned Behaviour Questionnaire. The Theory of Planned Behaviour questionnaire used in Study 1 was modified to include additional items for attitudes and control so that these could define latent constructs in subsequent analyses. The seven point semantic differential scale was used for these measures. The modified questionnaire is presented in Appendix 8.

Attitudes. Attitudes were measured from the statement: “My doing physical activities at least three or more times in the next week is...” Participants responded to the statement on three scales using the good-bad, exciting-boring and fun-unpleasant end points. The scales were not summed to give a composite score, instead they were allowed to define a single attitude factor.

Perceived Behavioural Control. Four items measured this variable: “Do you think it will be easy or difficult for you to participate in physical activities which make you out of breath three or more times in the next week?” measured with easy-difficult scale end points; “It is mostly up to me whether I do physical activities three or more times in the next week” measured with true-false scale end points; “If I wanted to I could do physical activities three or more times in the next week” measured with true-false scale end points; “There is very little I can do to make sure I do three or more physical
activities in the next week” measured with agree-disagree scale end points - the scores were reversed for this item. The first item was derived from other studies using the TPB as a framework (Craig et al., 1996; Godin et al., 1993). The other three items were derived from Skinner’s (1995) control beliefs scales as these reflect a person’s consideration of a child’s control beliefs or an agent-ends relation. The only difference in these measures and the measures of control from Skinner’s (1995) recommendations is that the current measures adhere to the boundary condition of correspondence with the behavioural category and are expressed in terms of action, target, context and time. Previous studies have used similar measures of control with the TPB to produce a broad view of perceived behavioural control which includes both Ajzen’s (1988) conceptualisation of control (perceived ease of difficulty) and Skinner’s (1995) control beliefs (see Bunce & Birdi, 1998; Dzewaltowski et al., 1990), although it is expected that these will be highly correlated with the easy-difficult measure of control and define a single factor.

Past behaviour. The children’s past involvement with physical activity was measured by an additional item on the TPB questionnaire. Children were asked “How many times per week have you normally participated in physical activities in the last six months?” Children’s responses were measured on a six point scale with the following possible responses: 1 - none, 2 - about once a week, 3 - about twice a week, 4 - about three times a week, 5 - about four times a week and 6 - more than four times per week.

Subjective norm and intention. Single items were used as measures of these variables and the item statements remained unchanged from Study 1.

Administration. In line with procedures from Study 1, the psychometric measures were completed in classroom conditions under the guidance of the researcher. Physical activity was defined for the children and the researcher read each question aloud to ensure the understanding of each item by the children. The children were permitted to ask questions whenever they wished and were given ample time to make their responses. The four by one day recall was administered within one week of the administration of the TPB. This was facilitated by using smaller group numbers and increasing the number of trained interviewers. Fewer children were included per group tested so that the interviews could be completed within one week of psychological measures. Interviewers were trained according to the procedure outlined in Study 1 and inter-and intra-interviewer reliability was also tested to ensure consistency in the behavioural measure. These precautions were taken to ensure temporal correspondence between the measures of intention, attitudes, subjective norms and control and the measure of behaviour.
4.4 RESULTS

Means, standard deviations and correlation coefficients for the physical activity questionnaire and TPB are shown in Table 4.1.

Table 4.1 Means, Standard Deviations and Correlations between the TPB Variables, Past Behaviour and Behaviour

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Behaviour</td>
<td>37.21</td>
<td>5.52</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Past behaviour</td>
<td>5.73</td>
<td>.57</td>
<td>.13</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Intention</td>
<td>2.16</td>
<td>1.30</td>
<td>.30*</td>
<td>.23*</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Attitude</td>
<td>5.68</td>
<td>3.09</td>
<td>.40*</td>
<td>.17</td>
<td>.74*</td>
<td>.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Subjective Norm</td>
<td>1.68</td>
<td>1.39</td>
<td>.17</td>
<td>.21</td>
<td>.32*</td>
<td>.43*</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6. Perceived behavioural</td>
<td>1.25</td>
<td>1.63</td>
<td>.32*</td>
<td>.39*</td>
<td>.60*</td>
<td>.80*</td>
<td>.53*</td>
<td>.40</td>
</tr>
</tbody>
</table>

Note. * p < .01

Alpha reliability coefficients for latent variables along principal diagonal

To ensure the latent variables in the model demonstrated satisfactory factorial and discriminant validity, a confirmatory factor analysis using the ML\textsubscript{ROBUST} method was used. Confirmatory factor analysis is superior to the frequently used exploratory model as it allows the researcher to specify the location of loadings of inventory items on hypothesised latent variables or factors, and sets all other loadings to zero. The sample data matrices of factor loadings, factor variances/covariances and error/uniquenesses are then compared to the hypothesised model and the degree of congruency between the models estimated. Each item for the attitude and control scales was specified to load on its respective factor (latent variable) while all other factor loadings were set to zero. The one exception was one item loading for each factor which was arbitrarily set to unity to ensure the model was properly defined. Model goodness-of-fit was assessed from the CFI, TLI, $\chi^2$/df ratio and SRMSR. The confirmatory factor analysis for the attitudes and control variables in the present study exhibited satisfactory goodness of fit statistics ($\chi^2=32.19$; df=12; CFI=.94 ; TLI=.91; $\chi^2$/df=2.68; SRMSR=.03).
Table 4.2 Factor Loadings, Standard Errors and Multiple Correlations for the Attitude and Control Items

<table>
<thead>
<tr>
<th>Scale and items</th>
<th>Factor loadings</th>
<th>Standard error</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attitude</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>good-bad</td>
<td>.86</td>
<td>.039</td>
<td>.74</td>
</tr>
<tr>
<td>exciting-boring</td>
<td>.79</td>
<td>.051</td>
<td>.62</td>
</tr>
<tr>
<td>fun-unpleasant</td>
<td>.82</td>
<td>.048</td>
<td>.67</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It would be easy or difficult...</td>
<td>.64</td>
<td>.106</td>
<td>.41</td>
</tr>
<tr>
<td>It is up to me...</td>
<td>.51</td>
<td>.061</td>
<td>.26</td>
</tr>
<tr>
<td>If I wanted to...</td>
<td>.60</td>
<td>.052</td>
<td>.36</td>
</tr>
<tr>
<td>There is very little I could do...</td>
<td>.59</td>
<td>.075</td>
<td>.34</td>
</tr>
</tbody>
</table>

In addition to an overall assessment of good fit, the examination of the solution estimates for each variable was also considered to ensure adequate model fit (Byrne, 1989; Joreskog & Sorbom, 1988). Solution estimates include the examination of the standardised parameter estimates (factor loadings), standard errors, standardised residuals and multiple correlation coefficients. The consideration of these estimates provides a useful overview of the suitability of the data with the hypothesised model and helps pinpoint variables which may be inadequately represented in the model. These estimates are shown in Table 4.2.

Standardised parameter estimates are equivalent to factor loadings from exploratory factor analyses and are the covariance parameter estimates which have undergone z-transformations. The higher the factor loading of an item the better the correspondence between the item and the latent variable. The standard errors represent the degree of uncertainty that the model factor loading represents the same loading in the population. The ratio between the standard error and the unstandardised parameter estimates should result in a significant t-value (the ratio should be greater than 1.96 for significance at the 5% level) and tests the hypothesis that the factor loading is zero in the population. Items from both attitude and control factors exhibited factor loadings which were moderate-to-high and all significant. Standardised residuals for each item are equivalent to standard deviation estimates and should approach zero. Standardised residuals greater than 2 indicate a poor fitting model or problems with the model specifications (Byrne,
1989). In the present study no residuals exceeded 2 indicating good parameter specification. Finally, the standardised regression coefficient squared ($R^2$) provided an indication of the percent variance in the latent variable or factor accounted for by the item. Some authors suggest that $R^2$ values should exceed .50 for a well specified model (Crocker, Gessaroli & Bouffard, 1995). In the present study, items for the control factor did not meet this criterion, suggesting that there is some misspecification of this factor in the analysis.

Further, this factor exhibited low reliability. This may have been a function of the broad nature of the control items. The aim was to introduce a measure which incorporated different aspects of Skinner's conceptualisation of control. These were Ajzen's (1988) concept of perceived behavioural control, which includes both control beliefs or an agent-ends relation and capacity beliefs or an agent-means relation, and Skinner's (1995) conceptualisation, which is predominantly an agent-ends relation. Other studies using this method of quantifying control have exhibited similar problems. Bunce and Birdi (1998), for example, measured control using items of perceived ease or difficulty and "if I wanted to, I could...". They reported a modest alpha coefficient ($\alpha=.60$), but demonstrated that the control factor still had predictive utility in the TPB. However, the problems due to poor reliability and factor loadings were reduced in the current study when the scale was used in the analyses to estimate a latent variable. This meant that the measurement error from the items was statistically controlled and not included in the factor.

Finally, discriminant validity of the factors is partially supported if the correlation between the two factors is less than unity by an amount greater than twice the standard error (Bagozzi & Kimmel, 1995). The factor correlation between attitude and control while significant at .80, fell short of unity by a degree which was substantially more than twice its standard error (.091), indicating that these variables were distinct constructs.

The hypotheses relating to the TPB behaviour variables were tested using a non-standard structural equation model (Bentler, 1989). Items for attitudes and perceived behavioural control were specified as latent factors. Intention, behaviour, past behaviour and subjective norms were treated as observed constructs. The model was estimated using the MLROBUST method and the CFI, TLI, $\chi^2$/df and SRMSR used to estimate the overall goodness of fit of the model. The model tested is represented schematically in Figure 4.1. Diagram conventions remain as before, but the $i$th latent exogenous factor in the model is represented by the letter ksi, $\xi_i$ in a circular rather than square box. The $i$th endogenous latent factor is represented by the letter eta, $\eta_i$ and the
error term or disturbance in the ith latent factor is represented by the letter delta, $\delta_i$. The LM- and W- incremental tests for improvements in model fit were used to alleviate model misspecification.

**Figure 4.1 Hypothesised Model for Relationships between the TPB Variables, Past Behaviour and Behaviour**

![Diagram of the hypothesised model](image)

Estimation of the model resulted in unsatisfactory model fit ($\chi^2=129.71; \text{df}=38; \text{CFI}=.86; \text{TLI}=.80; \chi^2/\text{df}=3.41; \text{SRMSR}=.12$). The model was therefore revised according to the modification tests. The W-test recommended fixing the paths between past behaviour and behaviour, past behaviour and intention, subjective norm and intention, control and intention and intention and behaviour. The LM-tests recommended freeing paths between control and subjective norms and attitudes and behaviour. The fit statistics on the modified model were indicative of a well-fitting model ($\chi^2=55.82; \text{df}=41; \text{CFI}=.98; \text{TLI}=.97; \chi^2/\text{df}=1.36; \text{SRMSR}=.05$). The modified model relationships are shown in Figure 4.2.
The model indicated that perceived behavioural control predicted attitudes ($\lambda=.80$, $p<.01$) which in turn influenced intentions ($\lambda=.74$, $p<.01$). Control was also predicted by past behaviour ($\lambda=.38$, $p<.01$), but past behaviour did not predict any other construct. Unexpectedly, the control-intention correlation ($r=.32$, $p<.01$) was reduced to zero and attitudes were directly related to behaviour ($\lambda=.40$, $p<.01$). In addition, the significant correlation between past behaviour and intention ($r=.23$, $p<.01$) was reduced to zero. A number of paths could have been responsible for the attenuation of the control-intention and the past behaviour-intention relationships, namely the paths between attitude and behaviour, attitude and intention or the contribution of past
behaviour. In order to test the mechanism behind these attenuations, the model was respecified fixing these paths to zero to examine their effects on these variables. Firstly, dropping the attitude-intention path resulted in the LM-test recommending the control-intention and past behaviour-intention paths be freed. This suggests that the influences of control and past behaviour on intention are directed through attitudes. When the attitude-behaviour path was fixed at zero, the LM-test recommended the control-behaviour path be freed, suggesting that the attitudes were responsible for the direct influence of control on behaviour. Attitude therefore acted as a mediator of the control-behaviour and control-intention paths and served to regulate the intention-behaviour relationship.

These results also indicate that perceived control mediates the influence of past behaviour on behaviour. Dropping the past behaviour-control path had no effect on the other relationships in the model. Finally, subjective norms was predicted by control ($\lambda = .53, p < .01$) and the significant unconfounded correlation coefficient between subjective norms and intention ($r = .32, p < .01$) was reduced to zero. Fixing the attitude-intention path to zero did not result in the LM-test recommending the subjective norm-intention path be freed. This suggests that control, not attitude, accounts for the significant correlation ($r = .32, p < .01$) between subjective norms and intention.

As the sample size was small, the bootstrap resampling procedure was used with the EQS programme to examine the robustness of the fit indices and parameter estimates. The procedure was performed with 390 replications, the maximum permitted due to computer memory limitations. The results are presented in Table 4.3.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Mean</th>
<th>SD</th>
<th>Skew.</th>
<th>Kurt.</th>
<th>Lower 5%</th>
<th>Upper 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFI</td>
<td>.91</td>
<td>.03</td>
<td>-.52</td>
<td>.44</td>
<td>.87</td>
<td>.95</td>
</tr>
<tr>
<td>TLI</td>
<td>.88</td>
<td>.04</td>
<td>-.52</td>
<td>.44</td>
<td>.82</td>
<td>.93</td>
</tr>
<tr>
<td>SRMSR</td>
<td>.05</td>
<td>.01</td>
<td>.27</td>
<td>.03</td>
<td>.04</td>
<td>.06</td>
</tr>
<tr>
<td>$\lambda$, Attitude-Intention</td>
<td>4.78</td>
<td>.70</td>
<td>.47</td>
<td>.44</td>
<td>3.71</td>
<td>5.94</td>
</tr>
<tr>
<td>$\lambda$, Attitude-Behaviour</td>
<td>1.23</td>
<td>.15</td>
<td>.43</td>
<td>.32</td>
<td>.99</td>
<td>1.50</td>
</tr>
<tr>
<td>$\lambda$, Control-Attitude</td>
<td>.75</td>
<td>.15</td>
<td>.47</td>
<td>.34</td>
<td>.52</td>
<td>.99</td>
</tr>
<tr>
<td>$\lambda$, Past Behaviour-Control</td>
<td>.35</td>
<td>.09</td>
<td>.56</td>
<td>.44</td>
<td>.22</td>
<td>.50</td>
</tr>
<tr>
<td>$\lambda$, Control-Subjective Norms</td>
<td>1.05</td>
<td>.18</td>
<td>.28</td>
<td>.11</td>
<td>.77</td>
<td>1.36</td>
</tr>
</tbody>
</table>

*Note. Statistics based on 390 replications with 388 success and 2 failures*
The bootstrap estimates represent a reliable and stable model. The analysis only elicited two replications which did not converge, representing a model which could not be fitted to the data. This produced an overall success rate of 99.5%. As with Study 1, the bootstrap parameter estimates provided further evidence that the hypothesised paths are not zero and the fit indices and parameter estimates from the whole sample analyses were an adequate reflection of the data. The mean fit indices for the procedure were high (CFI=.91, TLI=.88) indicating good fit of the model to the data. Further, none of the confidence intervals for the parameter estimates included zero suggesting that the hypothesised paths were non-zero and positive. As well, deviations from the normal distribution of the bootstrap results for model fit indices and parameter estimates was slight as indicated by low kurtosis and skewness coefficients.

4.5 DISCUSSION

4.5.1 SUMMARY OF FINDINGS

The hypotheses concerning the TPB relationships were only partially supported by the present study. While the basic tenets of the theory outlined in hypotheses H4.1 and H4.2 were corroborated by the correlation matrix between latent factors and observed constructs, the path analyses suggested that some of the relationships were extinguished by the inclusion of paths with other variables. Of these relationships, only the attitude-intention relationship was significant and attitudes were shown to be a strong predictor of intention. This lends further weight to findings from Study 1 and other research on children's attitudes towards physical activity (Craig et al., 1996; Godin & Shephard, 1986b; Theodorakaris et al., 1991) indicating the significance of attitudes in the formation of a child's plans to act.

Intention did not predict behaviour (H4.1) while subjective norms and perceived behavioural control did not predict intentions (H4.2). In addition, the control-attitude relationship was positive and significant and exerted an indirect effect on intention as hypothesised (H4.3). While the influence of perceived behavioural control on intentions was reduced to zero, this was not due to the influence of past behaviour as hypothesised (H4.5). Rather, it was due to the indirect path from control to intention via the mediation of attitudes. Further, attitudes predicted behaviour directly and served to regulate the intention-behaviour relationship which corroborates the findings of Bentler and Speckart (1979), Bagozzi (1981b) and Liska (1984). Finally, subjective norms were predicted by control, but did not predict intention. Further, the attitude and control variables demonstrated adequate factorial and discriminant validity from the
confirmatory factor analyses. Once revised, these paths represented a model which fit the data very well as indicated by the high fit indices in the final model and the stable fit index and parameter estimates from the bootstrap results.

4.5.2 DISCRIMINANT VALIDITY OF THE ATTITUDES AND PERCEIVED CONTROL FACTORS

The attitude and control factors exhibited satisfactory factorial and discriminant validity. This corroborates the findings of Trafimow and Duran (1998) who demonstrated that attitude and control were conceptually and empirically distinct factors and control beliefs were not mere reflections of behavioural beliefs. Discriminant validity between latent factors is important in a non-standard path analysis model as the possibility of multicollinearity between factors must be avoided if a clear overview of the influences on intentions and behaviour are to be seen. The correlation coefficients, factor loadings, confirmatory factor analysis goodness-of-fit and examination of parameter estimates indicated that the items for the attitude factor were satisfactory. Potentially problematic statistics were obtained with the factor structure of the control variable. The items for this scale fell below the recommended $R^2$ threshold of .50. This was attributed to the broad nature of the items included in the measure of control. However, the inclusion of these problematic items in a latent factor is not a great cause for concern as the error associated with such a variable is statistically controlled in the estimation of the factor, and subsequently less relevant in analyses.

4.5.3 THE ATTITUDE-BEHAVIOUR RELATIONSHIP

The present study not only indicated the existence of a significant relationship between attitude and behaviour, but showed this path regulated the intention-behaviour relationship. Although it was not hypothesised, a significant attitude-behaviour relationship is not an unusual finding. Bender and Speckart (1979) found that attitudes directly predicted behaviour in addition to its effects via intentions. The authors concluded that the Ajzen and Fishbein's (1977) claim that intention was the immediate determinant of behaviour was "limited or incomplete" (p. 462) and that people may act on the basis of their attitudes independent of formulation of plans to execute that behaviour. They suggested that the attitude-behaviour path may operate when intentions were unstable and likely to change such as in the case of someone who has not yet formed a concrete plan to act. Children who have not yet formed intentions, may act on the basis of their attitudes, which reflect their prior beliefs about the behaviour. Alternatively, those who have formed intentions are likely to act according to those intentions rather than their attitudes.
Another explanation was put forward by Liska (1984) who stated that intentions “do not completely mediate the effects of attitudes on behaviour” (p. 72). Findings of the present study suggest, as Liska does, that people sometimes do not do what they intend. In fact, the presence of an attitude-behaviour path regulated the significant correlation between intention and behaviour in the present study to zero. People may therefore act according to their previously formed attitudes as their intentions may not satisfactorily describe a suitable or usable plan of behaviour. Fazio (1990) corroborates this view and states that when an individual is faced with engaging in a behaviour for which their intentions are not entirely certain, instead of acting on those intentions they may ‘fall back’ on previously held beliefs towards that behaviour and act according to their more deeply rooted attitudes. In such cases intention would not be indicative of subsequent behaviour and the intention would be viewed as ‘unstable’. Attitudes, on the other hand, may predict behaviour independent of intentions and therefore attitudes may be more stable than intentions.

The issue of intention stability within the Theory of Planned Behaviour and its relation to behaviour was addressed by Chatzisarantis and Biddle (1998a). They used the perceived locus of causality and Deci and Ryan’s (1985) self-determination theory to assess whether plans to act or intentions were autonomous or not. Perceived locus of causality is an assessment of the degree of autonomy a person has over their behaviour or whether they believe they are the originator or cause of their own actions. They found that intentions were most stable under conditions when the behaviour or action was autonomous or self-regulated. Analogously, intentions were unstable when the person’s locus of causality was perceived as external. Under such conditions if the extrinsic controlling force fluctuates, so does the intent to act. However, an internal locus of causality will encourage persistence regardless of external forces and therefore be reflected in more stable intentions. In the present study, a source of uncertainty in intentions may be present from the perceptions of uncontrollable external influences by the individual. For example, a child might feel like they have to engage in activities in which they have low competence and autonomy such as a novel activity during school physical education. Under such conditions, individuals’ attitudes would be more likely to influence behaviour than stated intentions because they may represent more stable and less changeable beliefs compared to intention.

4.5.4 THE ROLE OF CONTROL IN THE REVISED TPB

While perceived behavioural control was related to both behaviour and intention as indicated by the unconfounded correlations, neither relationship was significant in the
current model. This is contrary to the findings of Study 1 which indicated that there was a direct relationship between control and intention. The significant attitude-intention path in the present model was enough to attenuate the direct effect of control on intention and the significant attitude-behaviour path attenuated the direct effects of control on behaviour. Evidence for this was provided from the respecification of the model fixing the attitude-intention and attitude-behaviour paths to zero. In relation to previous research on the role of control in the TPB, previous studies hypothesising the control-intention and control-behaviour relationship are inconclusive. Some have reported high correlations between control and intentions, such as Study 1, or between control and behaviour (Terry & O'Leary, 1995), or both (Dzewaltowski, 1994). The problem might be that different samples may report different degrees of control over physical activity and that the reported control may vary in its true reflection of actual control. It may therefore be necessary to differentiate the components of control, for example as the influence of barriers as well as different concepts as postulated by Skinner (1995) in order to fully understand how control can affect intentions and behaviour. In addition, it is important to stress that the influences may be behaviour-specific and control may have varying effects for different behaviours or behavioural categories.

The relative contribution of perceived control to intention and behaviour may be a result of how much perceived control reflects actual control over behaviour. As a boundary condition of the TPB, Ajzen and Madden (1986) state that perceived control is expected to be a good ‘proxy’ measure of actual control. Terry and O'Leary (1995) found that the control-behaviour path was significant and the control-intention path non-significant. They explained that if perceived control sufficiently reflected actual control then it would more likely predict behaviour as it represents the actual external constraints on the action. Conversely, they postulated that if perceived control reflected mostly or only internal perceptions about control such as perceived ability then it would be expected to predict only intentions, that is considerations about engaging in the behaviour. If the control variable measured both aspects then both intentions and behaviour would be influenced. These authors further contend that the differentiation between perceived control and other ability-related expectations about engaging in the behaviour (e.g. self-efficacy), would better describe how internal and external constraints would affect intentions and behaviour. In the present study, the control variable may have been sufficiently broad to tap aspects of actual control as well as perceived control. This may explain the significant control-intention and control-behaviour correlations.
However, the attenuation of both control-intention and control-behaviour paths in the present study due to the influence of attitudes on control or more specifically, due to the indirect effect of control on intentions and behaviour via attitudes requires a more elaborate interpretation of the role of control in the TPB. As the intention-behaviour relationship was regulated to zero by the inclusion of an attitude-behaviour relationship, it may be that the mediating effect of intention on the control-behaviour relationship was also accounted for by attitudes. In Study 1, the ideas of Fazio (1990) were applied to the dual role that perceived control had in the prediction of intention. It was said that the direct control-intention relationship represented a more spontaneous pathway to action and it reflected how control beliefs could directly result in the formation of a plan to act. This plan of action was then converted into behaviour via intention. Conversely, a more deliberative path was in operation when novel behaviours, behaviours with few control beliefs and possibly problems with control were present. This was represented by the indirect effect of control on intentions via the mediation of attitudes. This was deemed a more deliberative route to action as the formation of intention on the basis of control was done only through the mediation of attitudes. In the present study, a possible explanation for a non-significant intention-behaviour path and control-intention path can be found in the direct influence of attitudes on behaviour. The deliberative path remains and results in the formation of intentions on the basis of control via attitudes. However, the influence of intention in the decision making process is by-passed and instead the spontaneous path takes a route to behaviour by the mediation of attitudes instead of intention. This possibly reflects the inclusion of past behaviour in the model as a contributor to control beliefs, but also suggests that the motivational aspects of control have a greater effect on behaviour than intentions. Therefore, while control may be important in the direct formation of intentions, it is probably most motivationally adaptive when it contributes positively to the formation or consideration of attitudes.

4.5.5 PAST BEHAVIOUR INFLUENCES INTENTION AND PROSPECTIVE BEHAVIOUR VIA PERCEIVED CONTROL

In Study 1, it was postulated that the control-intention relationship reflected the direct effect of beliefs about control fostered from past experiences on a persons' formulation of a behavioural plan, a more spontaneous process of intention formation. Further evidence for this was provided by the present study. While no control-intention path was freed, a high and significant correlation was observed between the variables ($r=.60, p<.01$). Instead of a direct effect, past behaviour predicted intentions due to an indirect path through perceived control and attitudes. Therefore, some aspects of control, attitudes and intention may be due to past experience. Consequently, past
experience positively contributes to the formation of control beliefs and influences intention via attitudes.

In addition, some aspects of past behaviour contributed directly to behaviour via an indirect effect through attitudes. This indirect effect ($\lambda = .12$) was equal to the small, non-significant correlation between behaviour and past behaviour ($r = .13$), indicating that the effect was completely accounted for by the indirect path through control and attitude. Therefore past behaviour contributes to both future intentions to act and future behaviour by positively affecting attitudes. As well, the significant correlation between past behaviour and intentions ($r = .23, p < .01$) was also reduced to zero by the inclusion of a path between past behaviour and control. Hypothesis H4.4 must therefore be rejected. Past behaviour may only affect intentions via an indirect effect through control and attitudes. Theoretically, this implies that past behaviour does not lead to the automatic formation of intentions to participate or directly to the engagement in the behaviour as postulated by previous researchers (Bentler & Speckart, 1979; Fredricks & Dossett, 1983). Instead, past behaviour contributes to the consideration of perceptions of control and attitudes about a given behaviour before an intention is formed or before any action takes place. Indeed, Bentler and Speckart (1979), whose model did not include a measure of control, concluded that the influence of past behaviour on intentions and behaviour may be due to "some other factor(s) linearly related to these antecedents" (p. 461) and this may have been perceived behavioural control. A possible mechanism for this may be that attitudes reflect control beliefs which are formed due to the past experiences of control, a notion which mirrors Skinner’s (1995) sentiments that experience feeds control beliefs which then affect subsequent action. In relation to other research on the role of past behaviour and control, researchers have reported significant correlations between past behaviour (habit) and control, but its salience in explaining the influence over the other model relationships has not been documented (Godin et al., 1993; Godin et al., 1991). A possible reason for this is that it does not fit in with the recursive nature of the TPB as postulated by Ajzen and Madden (1986).

4.5.6 THE DUAL EFFECT OF ATTITUDES IN THE REVISED MODEL

The dual effect of attitudes on intention and behaviour of increasing the influence of control on attitudes indicates the diverse role of attitudes in decision making. According to Fazio (1990), there are two types of attitudes and they have differing effects on behaviour. Attitudes which are predominantly memory based are less accessible and may entail more cognitive effort when using these to make decisions to act (Sanbonmatsu & Fazio, 1990). These less accessible aspects of attitudes may predict
behaviour only via the mediation of intentions. More accessible attitudes, on the other hand, are those based on past experience and particularly recent experiences. It is these aspects of attitude which may result in a decision being made to act directly on the basis of these attitudes. In the present study, control contributes to the formation of attitudes as listed earlier, but it does not affect the influences of attitude on either intentions or behaviour as the unconfounded correlation coefficients are identical to the estimates in the model.

4.5.7 THE INTENTION-BEHAVIOUR RELATIONSHIP

As in the previous study, the relationship between intention and behaviour was non-significant. The significant unconfounded correlation coefficient (r=.30) indicated that there was some shared variance between intention and behaviour. However, in the modification of the present model the LM-tests recommended that the path between attitude and behaviour be freed and this consequently resulted in the intention-behaviour relationship being regulated by attitudes and recommended fixed by the W-test. In Study 1, this path attained marginal significance and this was attributed to the low temporal correspondence the measures of intention and behaviour. In the present study this issue was resolved and it was the contribution of attitudes and, indirectly, control and past behaviour which was responsible for the attenuation of the intention-behaviour path. Bentler and Speckart (1979) also observed that attitudes and past behaviour may have an attenuating effect on the intention-behaviour relationship. It may be that intentions directly affect behaviour only when perceived control and past behaviour are not considered. Indeed, Bentler and Speckart hypothesise that there may be other, underlying mechanisms which cause intention to be the closest proximal predictor of behaviour. In the present study, inclusion of control removed the small direct influences of past behaviour on behaviour and shifted the path of influence to being indirect through control and attitudes. The suggestion, therefore, is that past behaviour and perceived control attenuate the intention-behaviour relationship by encouraging the child to examine their past experiences of control and their attitudes. This may result in a more spontaneous engagement in the behaviour on the basis of attitudes without the need for intentions (Fazio, 1990). The more spontaneous path or influence of control on intentions in the current study may, instead, be redirected through attitudes and directly on to behaviour. Therefore the past experiences of control which spontaneously lead to the formation of intentions and then a prediction of behaviour in Study 1, observes a different route in the present study through the mediation of attitudes and bypassing intentions.
This finding is similar to those of Fredricks and Dossett (1983) who demonstrated in a test of Fishbein and Ajzen's (1975) and Bentler and Speckart's (1979) models that the intention-behaviour relationship was unstable and achieved non-significance for some behaviours. The authors suggested that this lack of a relationship may have been due to the inclusion of the past behaviour variable and provide two possible explanations which are relevant to the findings of the present study. They firstly suggest that including past behaviour in the model effectively results in a construct predicting itself. In Fredricks and Dossett's (1983) model there was a direct relationship from past behaviour to future behaviour, while in the current study the direct past behaviour-prospective behaviour relationship was only indirect through control and attitudes. The authors suggest that perhaps some unmeasured constructs may regulate the effect of past behaviour on prospective behaviour. Results from the present study indicate that perceived control may be one of these variables and it does have a relationship with past behaviour and prospective behaviour. If control was an unmeasured construct it may explain why past behaviour has previously been shown to predict prospective behaviour. As Fredricks and Dossett's (1983) study did not include a measure of perceived control in their experiment, the direct past behaviour-prospective behaviour relationship was instead observed.

Fredricks and Dossett (1983) also suggest that the attenuation of the intention-behaviour relationship may be a measurement issue. They suggest that assessing behaviour by the same means by which intentions and attitudes are measured may result in the distortion of the behaviour measure to the extent that relationships between the two are inflated. It may also inflate the past behaviour-prospective behaviour relationship through 'cognitive consistency', the tendency for psychometric measures to predict each other. The correlation between these measures will therefore reflect the individual's tendency to provide consistent responses rather than true relationships between the constructs. In the present study, this explanation has less credibility. The measures of prospective or future behaviour and past behaviour were obtained using different types of self-report. The measure of prospective behaviour was obtained from responses from an interview which asked children about the activities they did on the previous day. The interview was such that the children had less tendency to reflect the responses to the psychometric measures because the questions in the interview do not follow the same format and the purpose of the interview was not overtly revealed. Children in the interview were asked about the activities they did the previous day and were not told that the interview measured physical activity behaviour. All possible means were used to make the interview as 'objective' as possible. This is in contrast to the measure of past behaviour in the present study which was similar to that used in other studies i.e. a single item self report. By its very nature, the measure reveals the
objective of the researcher which may distort responses and also lack the objectivity of
the interview measure. Such differences in measurement may have reduced the
likelihood that the children responded to the measures of past behaviour and
prospective behaviour in a cognitively consistent manner.

Another issue which may provide further explanation for the non-significant intention-
behaviour relationship may lie in the type of behaviour and its significance to the
participants. It is clear that the inclusion of a direct attitude-behaviour path resulted in
the intention variable having no motivational function in the model. It may be that those
subjects with a regular engagement in physical activity do not use intentions to form
plans or engage in a large amount of cognition prior to the engagement in the
behaviour. Rather, it is more spontaneous based directly on attitudes and control
beliefs. Bentler and Speckart (1979) and Fredricks and Dossett's (1983) findings
corroborate this opinion. These authors suggest that the inclusion of past behaviour is
an important aspect of the model and provides a better explanation of the relationships
between the theory variables. Clearly, in the present study, the addition of control is
also an important step as it illustrates that control, too, has an important role to play in
explaining the motivational influences behind future engagement in the target
behaviour.

4.5.8 SOCIAL PRESSURES ARE PREDICTED BY CONTROL

While subjective norm was significantly correlated with intention, the correlation was
reduced to zero by the attitude-intention path. Instead, subjective norms were predicted
by perceived behavioural control. This highlights the opinion suggested by others that
behavioural beliefs (attitudes) are superior in the prediction of physical activity
intentions than normative beliefs (subjective norms) (Blue, 1995; Godin & Kok, 1996;
Godin & Shephard, 1990; Hausenblas et al., 1997). Further, it indicates that positive
attitudes negate the influence of the perceived opinions of others towards doing
physical activity. Therefore, holding strong, positive beliefs is not only a more
important contributor to the formation of intentions, it also reduces the reliance on
significant others' opinions when making decisions to do activities. This may be
particularly important for children and their participation in physical activity during their
leisure time. If they hold strong beliefs and attitudes towards engaging in the
behaviour, then they are less likely to be influenced by the perceived pressures of
others and are therefore likely to engage in physical activity for their own personally
held beliefs. This is particularly true if they have high control over the behaviour,
because a high perception of control is an antecedent of positive beliefs towards
physical activity. Therefore perceived control may dictate whether a child has positive
beliefs towards engaging in physical activity and determine whether they do physical activity for their own beliefs or because of the perceived beliefs of others.

The control-subjective norms path is contrary to the findings of Study 1 in which norms were not related to any variable in the model. Research on the TRA and TPB have reported varying degrees of significance and magnitude in the correlation between norms and intention (for review see Blue, 1995; Godin & Kok, 1996; Hausenblas et al., 1997). Ajzen and Fishbein (1980) recognise that the valence of subjective norms in the model is dependent upon the behaviour and the sample. This assists the interpretation of the results from Study 1 and the present study. In both cases, subjective norms did not have an influence on intentions, and in the present study, subjective norms were predicted by control. Fredricks and Dossett (1983) also recognised that the subjective norms-intention relationship was non-significant but recognised the covariation between attitudes and subjective norms. They suggested that for some samples and behaviours subjective norms may influence intention through the mediation of attitudes. In the present study, the attitude-subjective norm relationship was significant and moderate (r=.43, p<.01) which suggests some conceptual overlap. However, the fact that attitude-intention path reduced the subjective norm-intention relationship to zero suggests that the influence of subjective norm is not necessary when attitudes are considered.

The control-subjective norm path suggests that some aspects of control might therefore represent a consideration of normative pressures to engage in the behaviour. As Ajzen (1985) assumes that the perceived control variable represents a consideration of the barriers and constraints to engage in the behaviour, it would be logical, from the present findings, to assume that those barriers also comprise elements of social pressure. An example of how subjective norms could act as a barrier can be seen in the social pressure placed on an individual by significant others. Friends might pressure a child to do other activities such as playing games on a computer or going shopping in favour of the behaviour in question i.e. physical activity. In this respect, subjective norms can be viewed as an external pressure and could therefore be predicted by the aspects of perceived control which account for such barriers. It is possible that the consideration of normative pressures provides additional variance in the control variable that is regressed on intentions because it represents a further weighing up of barriers and constraints due to social pressures. This would entail more deliberation by the individual before the formation of intentions via the indirect path through attitudes.
4.6 CONCLUSIONS AND RECOMMENDATIONS

4.6.1 SUMMARY

In both the present study and Study 1, a strong, significant 'causal' relationship was found between control and attitudes and between attitude and intention supporting the notion that some aspects of control are accounted for by attitudes. These relationships help explain the considerable covariance observed between attitudes and control in previous studies and adds an additional pathway to the TPB. In terms of mechanisms, the control-attitude path was interpreted in Study 1 and the present study using Skinner's (1995) concept of perceived control and her 'competence system'. She contends that control experiences are related to the innate human need for competence.

In Study 1 and the present study, it was hypothesised that the perceived behavioural control variable accounts for two aspects of control: firstly, a general consideration by the individual of the barriers and constraints to his/her engagement in physical activity and secondly, beliefs about control due to previous experience with the behaviour. As experiences of control motivate further action, it was hypothesised that the experiential aspect of control will be regressed on intentions. This was supported in Study 1 by the direct relationship between control and intention. In the present study, the control-intention path was reduced to zero by the inclusion of the attitude-intention and attitude-behaviour relationships. Therefore the motivational aspects of control previously directed on intentions, instead formed an indirect effect via attitudes and affected both intentions and behaviour. Indeed, the reduction in the intention-behaviour relationship to zero by the direct influence of attitudes indicates that attitudes have important motivational valence and negate the need for intentions. In the present study the influence of control on behaviour via intentions was instead mediated by attitudes.

Another mechanism which may be at work is the dual influence of control first introduced in Study 1. Control was shown to have two effects on intentions: a more spontaneous one formed from the direct effect of control on intention and a more deliberative one formed from the indirect path through attitudes. Fazio (1990) suggests that problems with control may result in further deliberation over attitudes before a behavioural intention is formed. It was therefore hypothesised that the aspects of control which are related to a consideration of potential barriers will be related to attitudes and indirectly predict intention by way of attitudinal mediation. On the other hand, those behaviours not requiring the formation or consultation of attitudes and having fewer barriers are instead regressed directly on intentions. However, because the attitude-intention and attitude-behaviour relationships reduce the spontaneous path
between control and intention and between control and behaviour to zero in the present study, the spontaneous path is negated. It is possible that considering attitudes is important in both respects, but when attitudes predict behaviour the spontaneous control-intention path falls away in favour of a path from control to behaviour via the mediation of attitudes rather than intentions. It may be that the aspects of intention relating control to behaviour are better accounted for by attitudes. Indeed, it is probable that the role of intention as a mediator in the influence of control on behaviour is instead adopted by attitudes. In terms of previous research, the direct relationship between past behaviour and prospective behaviour may have been observed in previous studies because the control variable was not considered or a control-attitude path was not hypothesised. This therefore provides additional information as to how intentions are formed and behaviour is predicted from the cognitive antecedents of control and attitudes.

4.6.2 PRACTICAL AND THEORETICAL IMPLICATIONS

In Study 1 and the present study the cognitive antecedents of physical activity behaviour in children were described within a theoretical framework, that of a modified TPB. In examining a child's intentions, attitudes and perceptions of control, the present study and Study 1 has provided an overview of what happens when a child engages in a behaviour. Clearly this is important to practitioners in physical education and exercise promotion as it provides a reasoned description of the expected pattern of thought which will lead to the adoption or avoidance of physical activity behaviour in children. The findings are also relevant to social psychology theorists as it provides some evidence of the psychological antecedents of physical activity participation and may help in interpreting the control-attitude relationship in the study of human motivation.

4.6.3 RECOMMENDATIONS FOR SUBSEQUENT STUDY

The interpretation of the theoretical relationships studied here serves as a starting point to provide explanations for the observed relationships in terms of 'deeper human motives'. Such interpretations may assist in explaining the origins of human behaviours such as physical activity (Deci & Ryan, 1985). Recent research in motivational psychology has shifted towards an 'organismic' approach which centres on deeper motivational and emotional constructs which are integral to human psychological needs. The previous discussion accounted for the relationships observed in Study 1 and the present study from a human needs perspective, drawing particularly from Skinner's (1995) ideas on competence and Deci and Ryan's (1985) self-determination theory. Specifically, the explanation of control, a focal variable in the TPB, was made in
relation to needs for the individual to satisfy competence. Deci and Ryan (1985) take this idea further and theorise that needs for competence are inextricably linked to an overall need by the individual to become self-determining. The needs for autonomy and competence are therefore pivotal aspects of meta-theoretical approaches which attempt to explain expectations, cognitions and behaviour from the perspective of motivational phenomena, and in particular, psychological needs. It is expected therefore that a complete explanation of the origins of attitudes, intentions and control must make reference to human needs and how these needs drive cognitions to satisfy these needs. Subsequent studies, therefore, will not only interpret the variable relationships in the modified TPB from the perspective of human needs, but examine variables related to human needs for competence and autonomy in order to provide insight into the origins of the variables in the TPB.
CHAPTER V

STUDY 3

Elaborating on Perceived Control in the Theory of Planned Behaviour: The Role of Self-Efficacy

5.1 INTRODUCTION

Findings of the previous study indicate that aspects of perceived control are related to both attitudes and intention. It is clear that the measure of perceived control represents a broad range of control beliefs, some of which are external perceptions of control (such as those aspects related directly to intention and behaviour) and some internal (such as that related to attitudes). This was interpreted as more spontaneous versus more deliberative paths to the formation of intentions. The direct control-intention and control-behaviour relationships are termed spontaneous as they result in plans to act being formed or direct action being taken on the basis of control beliefs alone. The indirect path from control to intention via attitude implies a more deliberative path and indicates that attitudinal consultation or formation may be considered prior to action. The more direct path of control on behaviour via intentions alone (Study 1) or attitudes alone (Study 2) reflect more spontaneous decisions to act on the basis of past experiences of control and positive, well-formed attitudes.

However, the origins of these perceptions of control have not been identified and the application of motivational theories to the formation of such beliefs may shed further light on these relationships. In particular, establishing exactly which aspects of perceived control contribute to the formation of intentions and which aspects of perceived control are related to the deliberation or formation of attitudes needs to be addressed. Skinner (1995) suggests that “a comprehensive analysis of the entire profile of control-related beliefs...may be better predictors of performance than single constructs” (p. 29), indicating the need to differentiate between the control constructs available. Further, the origins of these control beliefs may have their roots in deeper, more organismic psychological needs for competence proposed by Deci and Ryan (1985) and Skinner (1995). The present study will draw on the distinction made in Chapter 2, Section 2.8.2 regarding the differentiation of control beliefs into capacity and strategy beliefs with explicit reference to the influential self-efficacy theory proposed by Bandura (1977). The purpose of the present study is to examine whether
control beliefs can be logically differentiated according to self-efficacy theory and whether this will enhance the utility of the predictions made by control in the TPB.

Skinner's (1995) proposed agent, means and ends conceptualisation of perceived control suggested that control beliefs can be viewed as a function of capacity and strategy beliefs and this would have relevance to the prediction of behaviour. In particular, reference was made to Bandura's (1986) work on self-efficacy, which effectively measures the agent-means relations (self-efficacy beliefs) and means-ends relations (outcome expectations) referred to by Skinner. Further, self-efficacy theorists measure these constructs using behaviour and context specific items. This consequently makes self-efficacy an ideal means to further differentiate the specific measure of control beliefs in the context of the TPB (as measured in the previous study) into its constituent components. Indeed, previous studies examining the utility of self-efficacy in exercise behaviour and its predictive capability within a cognitive model such as the TPB illustrated that self-efficacy beliefs, that is, the capacity to perform the behaviour, were influential in the prediction of physical activity behaviour (Dzewaltowski, 1989; Dzewaltowski et al., 1990).

However, questions remain over whether a true distinction can be made between self-efficacy and the perceived behavioural control variable. Recently, Ajzen (1991) corroborated his earlier position and aligned himself with the notion that perceived behavioural control is a measure of self-efficacy. Conversely, other researchers recognise the similarities between these variables but also their subtle differences (Brawley, 1993; Terry, 1993; Terry & O'Leary, 1995) and proposed that each variable may have unique effects on intention and behaviour. For example, Terry and O'Leary (1993) illustrated that self-efficacy had a separate, additional influence in the TPB and, in particular, predicted intentions to engage in the behaviour. However, the distinction made by Terry and O'Leary was on the basis that perceived behavioural control was measured on items using the term 'control' and self-efficacy with items using the words 'easy or difficult'. This is contentious as it is unlikely that people can make the distinction between control and perceived difficulty in engaging in the behaviour - both measures are very similar, a notion acknowledged by the high correlation observed between these variables. Consequently, it is proposed that this distinction is made in the present study on the basis of Skinner's (1995) conceptualisation and measures of self-efficacy used in other studies. Control will be measured using items measuring control beliefs adapted from Skinner's conceptualisation and statements related largely to beliefs about engaging in the behaviour for a certain number of times per week which is largely an agent-ends relation or control beliefs conceptualisation of control. Self-efficacy, on the other hand, will be measured using items related more to the capacity
for engaging in the behaviour which is synonymous with confidence and an agent-means relation or capacity beliefs conceptualisation of control. It is anticipated this will better facilitate the distinction between control beliefs and self-efficacy and demonstrate that the perceived behavioural control variable comprises different control-related aspects which may have varying effects on the endogenous variables in the TPB.

In addition to self-efficacy beliefs, self-evaluations of past behaviour and self-evaluation of outcomes or 'satisfaction' from previous performances of the behaviour are thought to contribute to both self-efficacy beliefs and perceived control. Dzewaltowski (1989) and Dzewaltowski et al. (1990) indicate that a person's evaluation of their past behaviour, particularly a successful execution of the behaviour, may serve as an important motivating factor and is part of the overall concept of self-efficacy. Bagozzi and Warshaw (1990) also indicate that attitudes towards a successful completion of the behaviour contributed to a desire towards a goal directed behaviour. This is similar to the effects of self-evaluation of behaviour. It is expected that self-evaluation of behaviour would contribute to attitudes towards success and failure. Since attitudes towards success and failure reflect an assessment of control (see Chapter 2, Section 2.7.2), it is possible that self-evaluation of behaviour may be related to perceived behavioural control. In addition, self-evaluation of outcomes may also add to the influence of self-efficacy beliefs on intentions as shown by Dzewaltowski et al. (1990). This additive contribution is due to perceived satisfaction of past behaviour influencing feelings of control and competence. If a behaviour is perceived to be satisfying certain desirable outcomes, then performing the behaviour may satisfy the need for competence in which case satisfaction may predict perceived control. In the present study, a self-appraisal of behaviour and outcomes may account for the aspects of perceived control which are related to an appraisal of past control beliefs. Self-evaluation of behaviour and outcomes may therefore be related to perceived control, but mediated by self-efficacy beliefs as they are part of the self-efficacy construct.

The specific purpose of the present study is that the inclusion of self-efficacy beliefs and self-evaluation of behaviour and outcomes might shed further light on the triadic relationship between attitudes, control and intentions identified in Study 1 and Study 2. This notion is shared by other researchers who have suggested that social cognitive theory and the TPB contain constructs which are similar but likely to have differing influences on intentions (Maddux, 1993; Rodgers & Brawley, 1993). Maddux (1993) explains that rather than comparing the utility of the constructs, they should instead be utilised together in a 'theoretical merger' to further explain the influences of these orthogonal constructs on behaviour. The use of this conjoining theoretical approach is corroborated by Ajzen's (1991) observation that the TPB is "in principle, open to the
inclusion of additional predictors if it can be shown that they capture a significant proportion of the variance in intention or behaviour after the theory’s current variables have been taken into account” (p. 199). A post script to this standpoint is the necessity for the additional variables to adequately demonstrate discriminant validity. Indeed, while increased prediction in intentions and behaviour may occur by the inclusion of some variables, this may be due to the shared variance with others. Consequently, novel approaches must be evaluated cautiously to note that the additional variables do not result in model misspecification due to lack of discriminant validity or multicollinearity.

5.2 RESEARCH HYPOTHESES

There were three purposes to this study. Firstly, the factorial and discriminant validity of the measures of attitudes, control and self-efficacy will be examined. This is important as the justification of the distinction between control and self-efficacy is a crucial element to the aims of this study and subsequent hypotheses.

Secondly, the role of self-efficacy beliefs in the TPB will be examined. Specifically, self-efficacy was expected to have a positive influence on intention independent of perceived behavioural control and was also expected to predict aspects of perceived control as demonstrated by the following hypothesis:

H5.1 Self-efficacy beliefs will directly and positively influence perceived behavioural control and intention.

Further, as self-evaluation of behaviour and self-evaluation of outcomes are expected to be related to self-efficacy beliefs (Dzewaltowski et al., 1990), they are hypothesised to predict self-efficacy beliefs and, indirectly, perceived behavioural control via the mediation of self-efficacy beliefs.

H5.2 Self-evaluation of outcomes and self-evaluation of behaviour will directly predict self-efficacy beliefs, and indirectly influence perceived behavioural control via the mediation of self-efficacy beliefs.

Finally, hypotheses relating to the TPB relationships will be tested. In particular, tests of the triadic relationship between control, attitudes and intentions will be replicated in the present study to examine whether it supports the findings from Studies 1 and 2.
H5.3 Intentions will be significantly predicted by both control and attitudes, and attitudes will be predicted by control.

5.3 METHOD

Participants. 1152 school children (555 boys, 597 girls) aged 12 to 14 years were recruited from 11 schools in the counties of Leicestershire, Derbyshire, Nottinghamshire, Cheshire and Hertfordshire. All volunteered to participate in this study. The schools were contacted on the basis of their accessibility to the researcher. Consent from the headteachers and pupils involved were obtained prior to the commencement of the study. OFSTED reports for each school were also obtained and catchment area and free school meal eligibility were used as a means for assessing the socio-economic status (SES) of the participants. The reports indicated that the areas were predominantly suburban middle class although some lower SES areas were involved particularly in schools close to the inner-city areas. The average proportion of pupils eligible for free school meals was 10.9% (range: 5.0 - 29.3%). This indicates that the schools were typically from higher income families and were generally below the national average for free school meals (17.2%).

Measures. The TPB questionnaire used in Study 2 was modified to include further measures for the purposes of the present study. The questionnaire included additional items to measure self-efficacy beliefs (four items), self-evaluation of behaviour (one item) and self-evaluation of outcomes (six items). The modified questionnaire can be viewed in Appendix 9.

Self-efficacy beliefs. Previous studies examining the influence of self-efficacy beliefs on physical activity behaviour have measured self-efficacy as a person’s confidence in their ability to engage in the behaviour (Dzewaltowski et al., 1990). Consequently, the following item was used to measure self-efficacy beliefs: “How confident are you that you will participate in physical activities at least three times in the next week?” Responses were given on a scale which ranged from 0 to 100 percent in increments of ten. The question was worded in a very specific manner to agree with measures of attitude, perceived control and intention. This is in accordance with Bandura’s (1986) notion that the “degree of correspondence between self-efficacy judgements and performance will vary according to the strength of the belief in one’s capabilities” (p. 396). Therefore self-efficacy beliefs must represent confidence in ability toward engaging in the specific behaviour in order to be related to intentions.
In addition, a measure of self-efficacy in the face of barriers was also used. Previous researchers have reported that self-efficacy perceptions when presented with barriers was a powerful predictor of exercise intention (Dzewaltowski, 1989). A free response format questionnaire was initially administered to one class (37 pupils) with the question: “Can you list all the things that might get in your way of you doing sports or physical activities?” The three most popular answers from an examination of the frequency of responses provided the following salient barriers: going out with friends, bad weather and doing homework. An expectancy x value question format as proposed by Dzewaltowski et al. (1990) was used to evaluate self-efficacy beliefs in the face of salient barriers to physical activity. The use of an expectancy x value method is important in the prediction of intention and behaviour. DuCharme and colleagues (in press) state that “by not measuring outcome value, one might erroneously conclude that efficacy (assessed without the value component) is not predictive of behaviour when, in fact the behaviour [or outcome] is not valued and thus very unlikely to be performed even when the individuals are confident they can” (p. 18). It was therefore necessary to attach a value to the self-efficacy beliefs so as include and discount those beliefs which are important and unimportant respectively. Items to measure self-efficacy beliefs used the following stem: “How confident are you in doing physical activities on a day when [salient barrier]?” Responses were again on a ten point scale representing 0 to 100%. The importance or value of each barrier was assessed using the following question stem: “How often do you think that [salient barrier] will get in the way of your participation in physical activities at least three times this week?” measured on a four-point scale. Responses on the self-efficacy belief items were multiplied with the score on the corresponding value item to produce an expectancy value score for each of the three barriers. It was expected that these items would define a single self-efficacy beliefs factor along with the general item measuring self-efficacy beliefs producing a latent measure of self-efficacy beliefs.

**Self-evaluation of behaviour and self-evaluation of outcomes.** Two measures of past evaluation or satisfaction were included. Firstly, self-evaluation of behaviour was measured from the following item statement: “Are you satisfied with the amount of physical activity you do now?” Responses were measured on a seven-point semantic differential scale using the satisfied-unsatisfied word pair. Salient outcomes of the sample were tapped from responses to another question on the free response questionnaire reported in the previous section. The salient outcomes listed were all very similar and could be classified into logical categories. All the outcomes were included, and these were: to be with groups of friends, to get fit, to compete against others, to improve skills, to have fun and to get away from everyday problems. Self-evaluation of outcomes was measured using the following item stem: “Are you satisfied with [salient
outcome] you get from the physical activities you do?”. Responses were measured on a seven point semantic differential scale using the satisfied-unsatisfied word pair as endpoints.

**Social desirability.** One threat to the validity of psychometric testing procedures is the possibility that respondents give socially desirable answers. The most frequently used method of checking for this tendency is to use a scale specifically designed to assess an individual’s propensity to provide socially desirable answers and then examine correlations of these scales with test measures. These scales are frequently called ‘lie’ scales as they have their origins in Eysenck and Eysenck’s (1978) research on personality. The most popular of these measures for use with children was developed by Crandall, Crandall and Katovsky (1965). The original scale comprised 48 items and was fairly cumbersome for concurrent administration with other measures due to heavy response burden on the participant. Reynolds (1982) developed a short form of this questionnaire using 15 items which demonstrates satisfactory concurrent validity with the original form. The short form questionnaire (Appendix 10), modified to include appropriate language for the participants, was administered concurrently with the TPB questionnaire and used as a check on the possibility of socially desirable responses being elicited by the participants.

**Intentions, attitudes, subjective norms and perceived control.** The remaining variables from the TPB were measured using the same item statements and procedure reported in Study 2.

**Administration.** The questionnaires were administered to manageable group sizes (maximum 100 children per group) in quiet classroom conditions. The children were told they were filling out a survey to do with things they would normally do in their free time, including physical activity. Physical activities were defined for the children as sports and other activities which make you “out of breath” or “breathe very fast”. They were told that the questionnaires contained no right or wrong answers and it was opinions that the researcher was looking for. In addition, the children were briefly informed of how to use the scales to give their response. The children were also informed that the questionnaires were anonymous and neither their parents nor their teachers would see individual results. The children were reassured that they would have plenty of time to complete the questionnaires and were encouraged to ask questions if there was something they did not understand. The questionnaires were completed together as a class with the researcher reading each question aloud and then providing adequate time for the class to ask and questions and make their responses.
5.4 RESULTS

Discriminant validity

Figure 5.1 Four-Factor Confirmatory Factor Analysis Model for Attitudes, Self-Efficacy, Perceived Control, and Self-Evaluation of Outcomes

Discriminant validity of the attitude, control, self-efficacy beliefs and self-evaluation of outcomes factors was assessed using confirmatory factor analysis using the \texttt{MLROBUST} method. All items were specified to load on their hypothesised factor and all other loadings were set to zero. All the latent factors were made to covary to test the
predictive and discriminant validity of the unobserved constructs in the model. The confirmatory factor analysis model is represented schematically in Figure 5.1. The analysis resulted in a model which demonstrated satisfactory goodness of fit indicated by the satisfaction of multiple criteria (CFI=.93; TLI=.91; $\chi^2$/df=4.98; SRMSR=.03).

Examination of the solution estimates provided indication of the contribution of the individual items to their respective factor and is provided in Table 5.1. Solution estimates provide factor loadings of adequate magnitude for all but the control factor, again it seems that some of the items are not contributing as well to the factor. Further, due to the presence of these items, the scale did not reflect adequate internal consistency ($\alpha$=.37). This corroborates the results from other studies (see Bunce & Birdi, 1998) which suggests that using a broad conceptualisation of control may be a detriment to the internal consistency due to some items making a poor contribution to the scale. Repeatedly problematic are items with the statements: "it is up to me if I want to do some physical activity in the next week" and "if I wanted to I could do some physical activity in the next week". This was also indicated by the multiple correlation between these items and the factor suggesting that only negligible variance in the factor are accounted for by these items. However, since these items were used to define a latent factor in subsequent analyses, the relatively weak contribution by some of the items was not an issue as the latent factor negated the error associated with these items.

In order to check that the low factorial validity of the control item did not confound the findings in subsequent analyses, the non-standard model examining the relationships between the TPB variable and the self-efficacy variables was respecified using a non-latent, single item measure of control. The best item was selected on the basis of its factor loading and $R^2$ values from the confirmatory factor analysis to serve as the single item. The respecified model indicated the same pattern of relationships as the current study albeit with lower coefficients as the analysis used a non-latent measure of control. A detailed explanation of this procedure can be found in Appendix 11.

Means, standard deviations, factor correlations and alpha coefficients of the theory variables are presented in Table 5.2. The factor correlation matrix provides some evidence to support the predictive and discriminant validity of the TPB variables and the self-efficacy variables. In terms of the TPB variables, significant and positive correlations were observed between attitudes and intention, between subjective norms and intention and between control and intention. Correlations between the TPB and self-efficacy variables and the social desirability scale scores were very low in magnitude and generally non-significant. Some correlations did achieve significance, but the shared variance between the variables was always very low.
Table 5.1 Factor Loadings, Standard Errors and Multiple Correlations for the Attitude, Control, Self-Efficacy and Self-Evaluation of Outcomes Items

<table>
<thead>
<tr>
<th>Scale and items (X_i)</th>
<th>Factor loadings (λ_i)</th>
<th>Standard error</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-evaluation of outcomes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Make enough friends when doing physical activity</td>
<td>.59</td>
<td>.04</td>
<td>.35</td>
</tr>
<tr>
<td>2. Get fit enough from physical activity</td>
<td>.69</td>
<td>.04</td>
<td>.47</td>
</tr>
<tr>
<td>3. Get enough competition from physical activity</td>
<td>.65</td>
<td>.04</td>
<td>.42</td>
</tr>
<tr>
<td>4. Learn new skills doing physical activity</td>
<td>.69</td>
<td>.04</td>
<td>.47</td>
</tr>
<tr>
<td>5. Have fun when doing physical activity</td>
<td>.75</td>
<td>.03</td>
<td>.56</td>
</tr>
<tr>
<td>6. Get away everyday problems when doing physical activity</td>
<td>.63</td>
<td>.04</td>
<td>.40</td>
</tr>
<tr>
<td><strong>Attitude</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. good-bad</td>
<td>.72</td>
<td>.03</td>
<td>.52</td>
</tr>
<tr>
<td>8. exciting-boring</td>
<td>.84</td>
<td>.03</td>
<td>.71</td>
</tr>
<tr>
<td>9. fun-unpleasant</td>
<td>.85</td>
<td>.03</td>
<td>.72</td>
</tr>
<tr>
<td><strong>Self-efficacy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Confidence in doing physical activity</td>
<td>.69</td>
<td>.06</td>
<td>.47</td>
</tr>
<tr>
<td>11. Confidence in doing physical activity when going out with friends</td>
<td>.62</td>
<td>.34</td>
<td>.38</td>
</tr>
<tr>
<td>12. Confidence in doing physical activity in face of bad weather</td>
<td>.71</td>
<td>.35</td>
<td>.51</td>
</tr>
<tr>
<td>13. Confidence in doing physical activity when there’s homework to be done</td>
<td>.63</td>
<td>.34</td>
<td>.40</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. It would be easy or difficult...</td>
<td>.68</td>
<td>.06</td>
<td>.46</td>
</tr>
<tr>
<td>15. It is up to me...</td>
<td>.16</td>
<td>.05</td>
<td>.02</td>
</tr>
<tr>
<td>16. If I wanted to...</td>
<td>.41</td>
<td>.04</td>
<td>.17</td>
</tr>
<tr>
<td>17. There is very little I could do...</td>
<td>.22</td>
<td>.06</td>
<td>.04</td>
</tr>
</tbody>
</table>
Evidence for the discriminant validity of the factors was provided by an examination of the factor correlations and the standard errors. The highest correlation was between control and self-efficacy ($\phi_{42}=.85$) which was similar in magnitude to the same relationship in Terry and O'Leary's (1995) study. However, according to Bagozzi (1995), having a correlation coefficient that is less than unity by a margin of twice the standard error or more is a necessary condition for discriminant validity to exist. The standard error estimate for the correlation was .04 which when doubled and added to the correlation falls short of 1 providing evidence for the discriminant validity of these constructs.

Path analysis

In Studies 1 and 2 the structural models were tested and modified by the LM- and W-tests using the same sample. While this has been seen as acceptable provided the changes are theoretically justified, Marsh and coworkers (1997) state that in a strict statistical sense it is necessary to test the hypothesised model on one sample and then re-test the modified model on another sample. This lends greater statistical weight to the model tested and ensures that changes made are not coincidental to sample
characteristics. However, this procedure is contingent on a sufficiently large heterogeneous sample for the correct estimation of the model. Clearly, in the previous two studies this was not possible due to the relatively small sample sizes. In the present study the large sample size enabled this procedure to be followed allowing for greater confidence in the results if the modified model is confirmed by testing it on a second sample.

A four step procedure was followed in testing and confirming the model in the present study. Firstly, the hypothesised model was tested on half the sample, randomly selected by computer. This model was modified according to the LM- and W-tests, the goodness of fit and structural coefficients estimated. This model was then retested on the second half of the sample to examine the validity and generalisability of the model. To ensure the model was statistically consistent across the two samples, a multigroup analysis was run with the path coefficients in the model constrained to be equal. Pending adequate fit and equality of constrained parameters, the model was finally retested on the full sample.

Figure 5.2 Hypothesised Relationships between Theory Variables

The initial model hypothesised the triadic relationships between attitudes, perceived control and intention. Paths between self-efficacy and intention and between self-efficacy and perceived behavioural control were included to test the first hypothesis...
In addition, self-evaluation of behaviour and outcomes were hypothesised to predict self-efficacy beliefs to test hypothesis H5.2 and a path from control to subjective norms was freed according to the relationship found in Study 2. The initial model tested is represented in Figure 5.2.

The resulting model exhibited inadequate goodness of fit statistics ($\chi^2=820.18; \text{df}=183; \text{CFI}=0.85; \text{TLI}=0.83; \chi^2/\text{df}=4.48; \text{SRMSR}=0.046$). The model was improved by modifications on the basis of the LM- and W-test results. The W-test recommended that the control-intention, self-evaluation of behaviour-self-efficacy and self-evaluation of outcomes-self-efficacy paths be fixed, while the LM-test recommended the path between self-evaluation of outcomes and control be freed. This revised model exhibited satisfactory goodness of fit statistics. The revised model was then tested on the second half of the sample, randomly selected, which also exhibited good fit. The two half-samples were then subjected to multisample (MS) analysis with equality statements constraining the hypothesised relationships between the factors and model variables to be equal. The MS analysis also exhibited good fit and LM-tests revealed that all but one of the equality constraints were invariant across the groups. The path exhibiting significant variance across the groups was that between intention and self-efficacy. However, the large sample sizes used in the current analyses and the use of latent variables which resulted in the control of measurement was likely to drastically reduce the confidence intervals for the variables. Consequently, the variables are less likely to exhibit any overlap in their confidence intervals and exhibit any significant association. Further, observing the magnitude of the invariant path coefficients showed that they are very similar in magnitude ($\lambda=0.36$ vs. $\lambda=0.38$) and in the same direction (positive). Therefore it can be argued that the significance test on this occasion was too sensitive making the hypothesis of no invariance difficult to reject. Although the paths exhibited variance in a statistical sense, they were empirically of the same magnitude and direction. Since the majority of the paths were invariant and the large sample size being responsible for the single invariant path, the model was accepted and subsequently retested on the entire sample. The goodness of fit statistics for the four path analyses are provided in Table 5.3.

The fit indices and path coefficients for the full sample analysis will be reported in the subsequent discussion of results. This is because the single sample analyses on both randomly selected halves of the sample and the MS analysis exhibited satisfactory goodness of fit. The incidence of one invariant path coefficient was not enough to provide a drastic change in the overall goodness of fit nor did it result in high variation in the magnitude of this path.
Table 5.3 Goodness of fit statistics for single and multi-sample path analyses

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>$\chi^2$</th>
<th>$\chi^2$/df</th>
<th>SRMSR</th>
<th>CFI</th>
<th>TLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Half</td>
<td>576</td>
<td>423.02</td>
<td>2.39</td>
<td>.019</td>
<td>.95</td>
<td>.94</td>
</tr>
<tr>
<td>2nd Half</td>
<td>576</td>
<td>442.055</td>
<td>2.47</td>
<td>.020</td>
<td>.94</td>
<td>.93</td>
</tr>
<tr>
<td>MS</td>
<td>1152</td>
<td>835.68</td>
<td>2.56</td>
<td>.023</td>
<td>.94</td>
<td>.93</td>
</tr>
<tr>
<td>Whole sample</td>
<td>1152</td>
<td>659.27</td>
<td>3.68</td>
<td>.018</td>
<td>.95</td>
<td>.94</td>
</tr>
</tbody>
</table>

Figure 5.3 Path Diagram for the Whole Sample Showing Standardised Coefficients between Intentions, Attitudes, Perceived Behavioural Control, Self-Evaluation of Behaviour and Outcomes and Self-Efficacy

The model for the whole sample is illustrated in Figure 5.3. Self-efficacy was related to intention ($\lambda=.37$), as hypothesised (H5.1), and this coefficient, while variant across the samples, only exhibited a small range in magnitude. Interestingly, control was predicted by self-efficacy and the inclusion of this path reduced the substantial correlation between control and intention ($r=.58$) to zero. Therefore self-efficacy served as a regulator of the control-intention relationship. In addition the control-attitude path was high and significant ($\lambda=.84$) as noted in Studies 1 and 2, lending further support to the influence of perceived control on attitudes. The expected relationship between
attitude and intention was significant ($\lambda = .32$), but was attenuated by the inclusion of self-efficacy. This was illustrated by the reduction in the unconfounded correlation coefficient between attitudes and intention ($r = .58$). Perceived control predicted subjective norms ($\lambda = .27$) which corroborated the relationship found in Study 2. Of the self-evaluation variables only a path between self-evaluation of outcomes and perceived control was significant and thus hypothesis H5.2 must be rejected. This path was not regulated by self efficacy and indicates that aspects of control are predicted by past experiences of satisfaction with certain outcomes of engaging in physical activity. A person's overall assessment of satisfaction about their behaviour or self-evaluation of behaviour was not predictive of any other variables in the model and it may be that such an assessment was not differentiated enough to account for the aspects of control related to satisfaction.

5.5 DISCUSSION

5.5.1 SUMMARY OF FINDINGS

The present study aimed to examine whether the introduction of a measure of self-efficacy would provide a more differentiated measure of perceived control and better explanation of the influence of perceived control on intention and attitudes in the theory of planned behaviour. The first step was to establish whether control and self-efficacy beliefs can be adequately differentiated. Clearly this is important, even if the perceived control and self-efficacy concepts can be theoretically distinguished, the item statements must also be distinct enough to allow respondents to tell the difference between the constructs. Tests of discriminant validity indicated that while there was some degree of shared variance, there was evidence that control could be differentiated from self-efficacy. A path analysis supported the contribution of self-efficacy to intention, and also confirmed that it regulated the direct path between control and intention, suggesting that the aspects of control previously contributing to the formation of intentions were accounted for by self-efficacy.

It was hypothesised (H5.3) that the triadic relationships between control, attitudes and intention observed in Studies 1 and 2 would be similar in the present study. However, it was found that self-efficacy altered the relationships in the triadic model. Self-efficacy not only regulated the influence of control on intention but also attenuated the attitude-intention correlation. In addition, the substantial relationship between attitudes and self-efficacy ($r = .71$) was not estimated as a path in the present study. This suggests that the effect of self-efficacy on control models the variance that the control variable shares with attitudes. Therefore, some of the aspects of control related to attitude may be a
result of self-efficacy. The current study also indicated that control predicted subjective norms, which corroborates the findings from Study 2 that some external aspects of perceived control, perhaps a relinquishment of control due to perceived social pressures, were related to subjective norms. Self-evaluation of outcomes were also related to perceived control but not to self-efficacy beliefs. It may be that past satisfactions with behavioural outcomes may enhance future beliefs about control. Finally, correlations between the TPB variables, the self-efficacy variables and the social desirability scale (Reynolds, 1982) were low and usually non-significant providing evidence to support the notion that the children were not giving socially desirable responses.

5.5.2 DISTINCTION BETWEEN CONTROL AND SELF-EFFICACY

The measures in the present study supported claims by Terry and O'Leary (1995) that self-efficacy and perceived behavioural control can be theoretically and empirically distinguished. This was evidenced from an examination of the confirmatory factor analysis, correlation coefficient and standard error of the control and self-efficacy variables. Bagozzi and Kimmel (1995) suggest that the correlation coefficient must be less than unity by an amount exceeding twice the standard error of the coefficient. This was confirmed in the present study. It has been claimed that this criterion is a necessary, but not sufficient criterion for discriminant validity. Additional subjective assessments as to the discrimination between the variables must be made; the measures must have face validity. The concepts of self-efficacy and control in the present study are theoretically distinguished through the application of Skinner's (1995) classification system of control. It was suggested that some aspects of perceived behavioural control accounted for self-efficacy. Further, it was expected that the inclusion of a measure of self-efficacy beliefs may result in isolating those aspects of control related to efficacy and how they are related to intention and attitudes. Conversely, Terry and O'Leary (1995) distinguished between self-efficacy and perceived control by suggesting that control accounted predominantly for outcome expectancies (external aspects of control) while self-efficacy accounted for considerations of ability (internal aspects of control). They found that self-efficacy predicted intentions and perceived control did not. This was attributed to control measuring external constraints and therefore a 'proxy' measure of actual control while self-efficacy measured internal perceptions of control unconfounded by external constraints. However, only subtle differences existed in the items measuring control and efficacy in their study. Conceptually, it is difficult to see how people are able to consider mainly external aspects of control when asked whether engaging in the behaviour is easy or difficult. Similarly, it is doubtful that people asked whether they have control over their behaviour report only internal aspects of control.
unconfounded with external barriers and other external constraints to their performance of the target behaviour.

In the present study, therefore, the distinction between perceived control and self-efficacy beliefs was made on the basis of an individual’s confidence rather than their perceived ease or difficulty toward engaging in the behaviour. Perceived confidence has been traditionally used as a measure of self-efficacy beliefs, and therefore its utility is assessed alongside control in this study. In addition, self-efficacy beliefs represent an individual’s assessment of their capacity beliefs which are related to overall beliefs about control from Skinner’s (1995) conceptualisation of control. Control, on the other hand, was measured by a factor which included items traditionally used to measure control and measures of control beliefs from Skinner’s (1995) competence system. This factor could therefore be seen to reflect control beliefs. As expected these demonstrated adequate discriminant validity, but the control factor was not as well defined as anticipated due to some low factor loadings and less than satisfactory reliability. It may be that the control factor taps two distinct factors, although this was not supported by the results of an exploratory factor analysis that showed this scale to be unifactorial. The use of a latent variable model is particularly advantageous in this instance as it reduces the possibility of error of prediction. The present results suggest that self-efficacy can be distinguished from control. The findings imply that control beliefs reflect a number of perceptions regarding control over the behaviour while self-efficacy reflects only an assessment of ability to perform the behaviour by the individual. This is corroborated by DuCharme and coworkers (in press) who claim that “self-efficacy represents a major component of what he [Ajzen] conceptualised as perceived behavioural control”. Therefore, self-efficacy is one important aspect of the diverse control construct.

Additional support for the notion that control beliefs reflect a number of different aspects of perceptions of control and that self-efficacy reflects mainly ability is found in the predictive validity of these variables with intentions, attitudes and subjective norms. The findings of the present study indicate that self-efficacy has a number of influences on variables in the model: (1) self-efficacy regulates the control-intention relationship to zero, (2) self-efficacy reduces the attitude-intention relationship and (3) the self-efficacy-control relationship reduces the self-efficacy-attitude relationship to zero. These effects will be discussed in turn and then related to the theories of Skinner (1995) and Fazio (1990).
5.5.3 SELF-EFFICACY REGULATES THE CONTROL-INTENTION RELATIONSHIP

Firstly, the control-intention relationship was negated by the inclusion of self-efficacy which was also significantly related to intention. Indeed, an examination of the correlation showed that the strong relationship between control and intention \((r=.58)\) was reduced to zero. This supports the findings of the previous studies; in Study 1 the control-intention relationship was strong and significant, while in Study 2 the significant relationship was reduced to zero by the direct attitude-intention relationship. It was hypothesised in Study 1 that some aspects of control, perhaps those related to past beliefs about control, resulted directly in the person formulating behavioural plans as corroborated by a direct control-intention path. Alternatively, those aspects of control which were due to a deliberation over barriers and other constraints required the formation or consultation of attitudes and therefore an indirect path from control to intention via attitude. In the present study, however, it can be seen that aspects of control which were directly related to intentions were removed by the influence of self-efficacy. It may be that the aspects of perceived control related to perceptions about ability or confidence in performing the behaviour were accounted for by the self-efficacy variable which was then regressed on intentions. Therefore, beliefs about control due to past experiences may result in an increase in a child’s confidence and beliefs about their ability. This then motivates intention to engage in the behaviour again. Although not tested in this study, it follows that past behaviour would also influence self-efficacy beliefs.

The control-intention relationship was not only regulated by the inclusion of self-efficacy, but it indicated that self-efficacy had two effects on intention. This was demonstrated by an examination of the parameter total effects. The indirect effect of self-efficacy on intention via perceived control and attitudes (.22) added to the direct effect of self-efficacy on intention (.37) was equivalent to the control-intention correlation \((r=.58)\). These paths indicate that some aspects of control which were regressed on intention were due to self-efficacy. The indirect path from control to intention was therefore accounted for by the direct effect of self-efficacy. A possible mechanism for this is that some of the variance in control which was accounted for by attitudes and then regressed on intentions was, instead, modelled by self-efficacy. In summary, self-efficacy has effects on intention which are both direct and indirect via control and attitude.
5.5.4 THE INFLUENCE OF SELF-EFFICACY ON THE TRIADIC RELATIONSHIPS BETWEEN ATTITUDES, CONTROL AND INTENTION

In Study 1 the triadic relationships between control, attitude and intention were described in terms of a model of decision making processes adapted from Fazio's (1990) ideas. Fazio suggested that attitudes would directly and spontaneously influence behaviour when the attitude was relevant and due to experience. On the other hand, a deliberative influence of attitudes on behaviour through intentions was hypothesised if the attitude was not readily accessible from memory and required further deliberation. Using Fazio's (1990) ideas as a starting point, and on the basis of the results from Study 1, it was proposed that the influence of control beliefs on intention followed one of two paths: one a more spontaneous path directly on intentions and another a more deliberative path via the mediating effect of attitudes. In the present study, the triadic relationships existed although they were altered by the inclusion of self-efficacy as an additional extraneous variable. In particular the regulation of the control-intention relationship by self-efficacy suggests that the more spontaneous path in the formation of intentions was due to children's perceptions about ability. It may be that favourable perceptions of ability (positive self-efficacy beliefs) towards a given behaviour will lead to a child being more positive about that behaviour and therefore form intentions to continue doing that behaviour. This corroborates Skinner's (1995) ideas on competence as a factor in motivation. As competence has to do with perceptions about ability in given situations, it is expected to be fed by self-efficacy. This would account for self-efficacy resulting, directly and spontaneously, in the formation of intentions. This spontaneous path may also be due to the influence of past experience with the behaviour. As the perceived control variable was shown to be predicted by past behaviour in Study 2, it follows that self-efficacy or perceptions about confidence and ability may be the result of past experiences with the behaviour during which confidence and ability perceptions are forged.

Conversely, the more deliberative path possibly represents a child's consideration of barriers, problems with control and less favourable ability. Such considerations require the formation or consultation of attitudes prior to making plans to behave. Such a path is operable when the behaviour is either novel or has problems with control such as having many barriers or costs to consider. However, in the present study, the more spontaneous path through self-efficacy beliefs attenuated the attitude-intention relationship. Therefore, the inclusion of self-efficacy may introduce to the spontaneous process some aspects of control previously related to the deliberative process. It can therefore be hypothesised that some of the aspects of control which encouraged a
consideration of attitudes prior to the formation of intentions were related to beliefs about confidence or ability and therefore accounted for by self-efficacy beliefs. This is similar to the conclusion of Study 2 where the spontaneous effects of control on intention were negated due to the direct influence on attitudes in behaviour.

5.5.5 SELF-EFFICACY PROVIDES A MORE DIFFERENTIATED VIEW OF CONTROL IN THE COMPETENCE SYSTEM

The inclusion of self-efficacy provides a more differentiated view of control in the modified TPB and provides further evidence for the existence of multiple aspects of control presented by Skinner (1995). The influence of the perceived control variable in the present study and in Studies 1 and 2 provide interpretations which reflect the diversity of the construct. For example, perceived control was hypothesised to be a direct antecedent of intentions as well as indirect via attitudes. The direct relationship was interpreted as perceived control measuring past experiences of control and the indirect relationship as perceived control as a consideration of barriers and problems with the behaviour. The inclusion of self-efficacy enriches this interpretation by suggesting that the direct relationship may be due to perceptions of ability. Skinner (1995) suggested that a more comprehensive assessment of control would further understanding of the importance of this construct to motivation. In the present study, differentiating between self-efficacy as a measure of capacity beliefs and perceived control as a measure of control beliefs has provided evidence in favour of the need to separate control aspects by belief type. Clearly, both sets of beliefs have motivational importance, but have different influences on the variables in the TPB.

This has further implications for the competence system presented by Skinner (1995). She suggests that past perceptions of control gleaned from experience with the behaviour will reinforce competence. In Study 2, it was suggested that the spontaneous path between control and intention was related to the competence feeding perceptions of control from past experience. In the present study this was confirmed and it was further introduced that perceived confidence or ability (reflected by self-efficacy beliefs) in engaging in the behaviour, was related to the formation of intentions. Therefore, the confidence building aspects of control are related to past experiences of control and the need to perpetuate the resulting sensations of competence. However, the present study did not include a direct measure of strategy beliefs about control and, according to Skinner's (1995) theory, such beliefs would also be accounted for by the control beliefs variable. It is possible that strategy beliefs, that is, the consideration of whether the means available to the actor would result in certain, desirable outcomes, may follow the more deliberative process in the formation of intentions. Therefore the inclusion of a
variable to measure strategy beliefs may result in the mediation of the direct relationship between control and attitudes in the same way that self-efficacy, the measure of capacity beliefs, regulated the relationship between control and intentions. Theoretically, this can be justified through Ajzen’s (1991) claim that attitudes reflect a number of beliefs about engaging in the behaviour. Some of these beliefs might be a child’s assessment of whether engaging in the behaviour will result in desirable outcomes which is a consideration of their control over executing a strategy to produce a certain end.

5.5.6 CONTROL AFFECTS SUBJECTIVE NORM

The present study provides more evidence to suggest that some aspects of perceived control are related to social pressures for engaging in physical activity. As reported in Study 2, there was a direct relationship between control and subjective norms while there was no relationship between subjective norm and intentions according to the original formulation of the TPB. It was found that subjective norms was not a significant contributor to the children’s intentions to participate in physical activity as hypothesised by Ajzen (1985). One possible interpretation is that subjective norm only affects intention because it reflects aspects of perceived behavioural control. It is conceivable that the perceived behavioural control variable in the present study does not differentiate between the aspects of control related to the perceived external pressures from significant others and the aspects of control related to the consideration of barriers and past experiences of control. The fact that control is related to all three variables: attitudes, subjective norms and self-efficacy, further denotes the multifaceted nature of the perceived control variable. As with the inclusion of capacity beliefs, it can therefore be anticipated that the inclusion of a measure of control in the face of social pressures may further differentiate this construct.

5.5.7 SELF-EVALUATION OF BEHAVIOUR AND OUTCOMES IN THE MODEL

The present study also examined the contribution of self-evaluation of behaviour and self-evaluation outcomes to perceived control and self-efficacy. These variables were included to test the hypothesis that past consideration of favourable experiences with the behaviour and outcomes of the behaviour will have an influence on the variables in the model. This is based on Bandura’s (1988) presentation of self-reactions which hypothesises that both dissatisfaction and satisfaction can have positive effects on motivation or intentions. The premise is such that a person’s evaluation of their performance of a behaviour is done according to a set standard of reference and their degree of success results in feelings of either satisfaction or dissatisfaction. Bandura
(1988) hypothesised that feelings of satisfaction encourage further participation as the behaviour is addressing and satisfying cognitive needs while feelings of dissatisfaction are also motivating as a person will persist in order to try to attain such feelings.

In the present study, it was hypothesised that self-evaluation of behaviour and outcomes would contribute to self-efficacy beliefs as they are part of the same construct. However, self-evaluation of behaviour, measured using a single observed variable, had no predictive capacity in the model. In contrast, the latent measure of self-evaluation of outcomes was not related to self-efficacy beliefs but positively influenced perceived behavioural control. The inclusion of this variable did not regulate any of the relationships in the model and indicated that the influence of evaluation of past behaviour which resulted in positive outcomes predicts some aspects of control. Such evaluations may operate in a similar manner to the degree of past experience with the behaviour. For example, in Study 2 past behaviour was also positively and directly related to control. It is possible that the aspects of control due to past experiences of control were also tapped by the self-evaluation of outcomes variable. Indeed, the unattenuated correlation between self-evaluation of outcomes and attitudes and between self-evaluation of outcomes and intention were significant and of similar magnitude to the past behaviour-attitude and past behaviour-intention relationships in Study 2. This indicated that self-evaluation of outcomes may have similar effects to past behaviour, but these effects are reduced to zero by the relationship between self-evaluation of outcomes and perceived behavioural control.

Other studies have reported the positive influence of self-evaluation of behaviour (Dzewaltowski et al., 1990) and self-evaluation of outcomes (Dzewaltowski, 1989) on physical activity participation. However, these studies did not investigate the influence of these constructs on perceptions of control and intentions. Dzewaltowski et al. (1990) did report that when controlling for past behaviour, self-evaluation of behaviour did not influence future behaviour. The authors concluded that self-evaluation of behaviour was not an incentive for future participation and this was corroborated by the results from the present study.

Globally, the influence of past evaluation or satisfaction with behaviour can be explained in relation to children's psychological need for competence. Skinner (1995) said that past successes result in positive sensations of control which, in turn, feed competence. As competence results from the control experiences derived from the engagement in the behaviour, the child is more likely to persist with his/her involvement in the activity which produced the feelings of competence. It may also be true that the self-evaluation or satisfaction of past behaviour is likely to affect those
aspects of the control variable which are related to past experiences of control. Therefore, a self-evaluation of outcomes may reflect past successes and contribute to perceptions of control about future behaviour (Bagozzi & Warshaw, 1990). It may also be the case that the self-evaluation of behaviour is not differentiated enough to produce any motivational influence like self-evaluation of outcomes. As the target behaviour of physical activity encompasses many behaviours, an evaluation of past experiences of behaviour may not be sensitive enough to tap a child’s successes or failures in different aspects of the activity, while the self-evaluation of outcomes refers to some of the specific events perceived to be a result of the actor’s engagement in the behaviour.

5.6 CONCLUSIONS AND RECOMMENDATIONS

The present study distinguished between perceptions of control and self-efficacy. Specifically, it was demonstrated that self-efficacy is an exogenous variable which predicted those aspects of control closely related to confidence and intentions. This suggests that a person’s confidence in their ability to do the target behaviour will motivate them to participate further. From a psychological needs perspective, the aspects of control which were hypothesised to follow a more spontaneous path to the formation of attitudes are likely to be accounted for by the inclusion of efficacy. Self-efficacy may therefore reflect past experiences of control. Skinner’s (1995) contention that such past experiences of control are competence feeding and therefore motivationally adaptive, lends a theoretical explanation for the regulation of the control-intention path by the indirect path through self-efficacy.

Two further recommendations for research can be derived from these findings. The first is related to the psychological needs of the individual and the second to the nature of the control variable. Firstly, theorists have recognised that individual needs to express competence are powerful motivational influences on behaviour. However, while authors such as Skinner (1995) and Deci and Ryan (1985) make reference to competence as an intrinsic individual need, the needs system can be further extended by the inclusion of self-deterministic or autonomy related variables. Deci and Ryan (1985) report that while competence and autonomy are closely related, it is necessary to keep them distinct. Skinner (1996), too, suggests that while competence is related to self-determination or autonomy, they are not the same. Competence refers to the relation between behaviours and outcomes and whether the individual believes he/she has the capacity to take action to make that contingency happen. Autonomy, on the other hand, is a person’s freedom to choose a course of action. It is therefore related to causality and whether the individual can be the origin of their behaviour and has a non-regulated capacity for self-expression. One can expect, as Deci and Ryan (1985) postulate, that a
sense of competence will result in greater intrinsic motivation only under conditions of autonomy. If the person felt competent at the task but felt controlled by aspects due to the situation, such as the presence of controlling extrinsic rewards, then they may not have enhanced intrinsic motivation. Consequently, it is necessary, when examining behaviour from a human needs perspective, to consider needs for both autonomy and competence in order to have a reasoned overview of the organismic motives behind actions. Future studies will therefore need to not only examine people's perceptions of control but also the degree of autonomy the individual feels in those situations. Such investigation will provide further insight into the determinants of behaviour in physical activity contexts.

In addition, it is clear from the current study that perceived control is a fundamental variable in the TPB and the modified model presented in this study. Skinner (1995) states that the tendency for perceived control to predict 'everything' is due to its link with the fundamental human need for competence. However, it is clear from the present study that the perceived control variable was sufficiently broad to incorporate aspects of control related to a number of other cognitive variables namely attitudes, self-efficacy, subjective norms and satisfaction. Indeed, it can be seen that self-efficacy represents those aspects of control related to confidence, possibly derived from engagement in past behaviour. Recent research on control has highlighted that people may be able to distinguish between sources of control (Connell, 1985; Wellborn, Connell & Skinner, 1988). Connell (1985) formulated an instrument which tapped control beliefs from an internal source and an external source (powerful others). In addition, any aspects of control from whence the individual could not ascertain the source was accounted for in beliefs about control from 'unknown' sources. Consequently, a more differentiated view of control and the competence system is represented by these measures. Studies incorporating such measures would shed more light on the origins of control beliefs because the measures reflect needs for competence. Part of the reason for this is that the measures reflect more general measures of control rather than the specific measures traditionally used to measure perceived behavioural control in the TPB. Using more global measures of control will inform researchers and practitioners as to how control beliefs may be formed on the basis of internality of the control and the source of control.
CHAPTER VI

STUDY 4

Relative Autonomy, Perceptions of Control and Perceived Behavioural Control in the Theory of Planned Behaviour

6.1 INTRODUCTION

Perceived control is clearly a focal variable in the modified versions of the TPB presented in Studies 1, 2 and 3. It was shown that control was a significant and strong predictor of attitudes which, in turn, was related to intentions. This is a unique finding and illustrates that perceived control is an important contributor to motivational constructs which precede engagement in behaviours such as physical activity. Control was also found to be a strong predictor of both subjective norms and intentions. This was discussed in relation to previous findings and the theories of Fazio (1990) and Skinner (1995). It was hypothesised that control reflected different aspects of control beliefs such as beliefs about control derived from past experiences of control and social pressures which influence control. In addition, perceived control was shown to be conceptually different from self-efficacy beliefs, another variable which has been shown to have motivational utility, particularly as it reflects confidence in engaging in the target behaviour. Finally, the control-intention path was shown to be regulated by the inclusion of self-efficacy suggesting that the variance in control which predicts intention can be attributed to those aspects of control which reflect self-efficacy or ability to perform the behaviour. The implication is that the perceived control variable is diverse and has multiple influences on intention and behaviour.

The complex web of relations between control and the TPB variables outlined previously are above and beyond the utility of the control variable hypothesised by Ajzen (1985) in his original formulation. It therefore begs the question postulated by Skinner (1995); “why does perceived control predict everything?” (p.67). Two possible explanations, both relating to theories of human needs, can be put forward. Firstly, control is fundamental to the human psychological need for competence. Perceptions of control resulting from an engagement in a behaviour result in an appraisal, by the actor, of how the behaviour satisfies their need for competence. If the behaviour does so, then the perceptions of control have value-giving properties to the person regarding the target behaviour. If the behaviour is valued by the actor in
producing sensations of control it is likely that engagement in the behaviour will persist. Skinner (1995) states that experiences of control assist in building perceptions of competence. It can therefore be seen that competence is a function of perceptions of control. This leads Skinner (1995) to posit the useful analogy that control experiences are to the need for competence as water is to thirst. In this respect the behaviours which have associated feelings of control are competence feeding and thereby satisfy the organismic psychological need for competence. The control variable predicts many constructs in the modified TPB models in Studies 1, 2 and 3 because it is related to the intrinsic psychological needs of the individual.

Secondly, the control variable incorporated in the previous three studies in this thesis is sufficiently broad to capture many types of beliefs from many different sources. For example, the inclusion of self-efficacy illustrated that some aspects of control, likely to be related to confidence, are accounted for by the perceived behavioural control measure. However, a measure of self-efficacy was also shown to be distinct from perceived control and encompassed other judgements which were additive to the prediction of intention in the model. Perceived control, therefore, whilst reaching a number of control judgements, did not include all aspects of self-efficacy warranting the inclusion of self-efficacy in the model. Another example of perceived control’s diversity is in its prediction of subjective norms. The path between perceived control and subjective norms, which regulated the action of subjective norms on intentions to zero, illustrated that control perceptions are related to social pressures. Clearly, then, perceived behavioural control also reflects control beliefs related to social constraints for engaging in physical activity. Therefore, perceptions of control will vary according whether the individual feels s/he should be acting according to the decree of significant others. The broad nature of the variable enhances its predictive capability in the model and illustrates its importance in the TPB.

However, the question arises as to whether this conceptualisation of control is too broad, making it difficult to differentiate its effects from one variable to another. The inclusion of this broad measure of control in the model can be justified on a statistical and conceptual basis. Statistically, two effects of the perceived behavioural control variable in the model provide evidence in favour of inclusion. Firstly, the control variable’s predictive validity illustrates that it has additive effects on intention beyond those provided by other predictor variables of attitude and subjective norm. This corroborates findings from other studies indicating that control explains additional variance in the prediction of behaviour (Dzewaltowski, 1989; Godin, Vezina & LeClerc, 1989; Terry & O’Leary, 1995). Secondly, results from Studies 2 and 3 indicate that the control beliefs variable exhibits satisfactory discriminant validity.
with the other factors in the model, namely attitudes and self-efficacy. These notions corroborate the opinions of other researchers concerning the independence of the control construct (Terry & O'Leary, 1995; Trafimow & Duran, 1998).

Conceptually, perceived behavioural control reflects both control beliefs and capacity beliefs which enables the construct to predict many motivational variables. However, as Skinner (1995) says, the control variable will only be predictive of others if it has motivational utility according to their psychological needs. This is particularly relevant when the target behaviour has difficulties or problems with control. Skinner (1995) suggests that people seldom pause to consider their perceptions of control over a behaviour which they have no difficulty in doing. In addition, for behaviours which are novel and control beliefs are not fully formed, or the person knows little about their control in engaging in the behaviour due to a novel situation, then control beliefs and perceptions of control may play an important role in decision making. This is therefore related to the spontaneous and deliberate paths hypothesised in the previous studies in which control and attitudes guide intention formation and behaviour. In summary, therefore, it can be seen that control is a variable with powerful predictive properties, plays an important role in the TPB and has a central role in the prediction of physical activity behaviour in children.

While perceived control is clearly an important variable in the TPB, one may be obliged turn to theories on motivation and human needs to discover the reasons why people’s control beliefs are so influential to their motivation. The perceived control variable provided useful interpretations of the modified TPB models presented in Studies 1, 2 and 3 from Skinner’s (1995) conceptualisation. Deci (1980) and Deci and Ryan (1985) provide a more elaborated framework based on innate human or ‘organismic’ needs in order to explain the motivated behaviour in cognitive models. They introduced the needs for autonomy and relatedness which run alongside the need to demonstrate competence as inner sources of overt motivation independent of external cues. It is because of these needs that organisms strive to see themselves as the originator of their own behaviour rather than seeing themselves as being controlled by other external forces. Deci and Ryan proposed that such needs were measured on the perceived locus of causality (PLOC) scale which measured a ‘gradient of autonomy’ and behaviour could be internal, identified, introjected or externally regulated. Identified regulated behaviours were those which are internally regulated, but the regulation is due to personal values rather than enjoyment or interest. Introjected regulations also represent an internal PLOC, but such regulations are located nearer the external endpoint of the continuum and are perceived as externally controlling by the individual. Introjected regulations may be behaviours
performed out of obligation, guilt or shame. Recent research has included PLOC measures as more general, domain-specific and time-independent measures in social cognitive models and has demonstrated that self-determination theory has a utility in such approaches (Chatzisarantis & Biddle, 1998; Chatzisarantis et al., 1997, 1998).

Also important to the motivational processes behind autonomy is that of internalisation. The process by which people exert effort to become more autonomous is labelled internalisation and refers to the person actively assimilating an attitude, behaviour or regulation which has value to the person (Deci & Ryan, 1985). Internalised behaviours may be those that are valued because they hold intrinsic interest or enjoyment and these are termed ‘intrinsically motivated’ behaviours. It is also possible for externally regulated behaviours to be come internalised as, although they can never be intrinsically motivated, they are valued as a means to assist in becoming more autonomous (Deci et al., 1994). It is possible for such externally regulated behaviours to shift and attain a more internal PLOC. Such behaviours are termed integrated and represent a ‘more optimal’ or complete form of internalisation. The needs for autonomy and the process of internalisation are important to the present study as they represent important mechanisms which may explain the formation of cognitions like attitudes, subjective norm and perceived control.

As acknowledged in Chapter 2, Section 2.10.2 the needs for competence and autonomy are closely related and both may assist in the explanation of control on the TPB variables and the motivation of behaviour. It may therefore be necessary to incorporate this distinction between competence and autonomy in the TPB, so that the full complement of organismic needs is accounted for and their influence on cognitive variables mapped. However, for the inclusion of such constructs in the model, appropriate measures must be adopted and validated. Empirically, the notions of self-regulation or autonomy as quantified by the PLOC construct, have shown construct, predictive and convergent validity. Ryan and Connell (1989) demonstrated that the PLOC scale produced two factors, an internal and external locus of causality. They also found that a correlation matrix between the different variables along the PLOC continuum exhibited a characteristic ordered pattern. The highest correlations were found at the top of the principle axis and then were reduced as one moved towards the origin. The PLOC demonstrated an expected linear pattern of correlations with the psychological variables relating to motivation. The external scale was negatively correlated or unrelated to scales measuring mastery motivation (Harter, 1981) and internal control (Connell, 1985) and correlations increased in positivity and magnitude as one moved along the PLOC continuum. The present study will adopt the PLOC continuum as a measure of a person’s degree of autonomy and utilise this
alongside the specific measure of control utilised in TPB in the previous studies. The autonomy measure, therefore, reflects an individual's global orientation or tendency in the domain of physical activity towards an autonomous or controlling locus of causality. This may provide an indication under which conditions attitude, subjective norm and intentions are likely to have motivational influence in the TPB.

In addition, measures of control will be differentiated by domain and source to create a 'competence' system of control beliefs. By increasing the diversity and generality of the control variable, more general effects on other variables such as attitudes and intentions and its interaction with autonomy can be studied. Connell (1985) differentiated between the sources of control which provides a greater emphasis on the internality and externality of control. This is a more traditional measure of control as conceptualised by researchers with the locus of control construct (Lefcourt, 1981; Rotter, 1954; Weiner et al., 1972). In such measures the focus is on the expectancy that the reinforcement of behaviour is under one's own (internal) or other (external) control. Such expectancies, Connell (1985) suggests, are likely to originate from past experiences with the behavioural reinforcement. Conceptually, the reinforcing agents will be others if the locus of control is deemed external or the person if the locus is deemed to be internal. In this respect locus of control is segmented to be domain specific, but more importantly to be specific to a source. Unlike perceived behavioural control, though, it is measured as a general variable rather than specific to a target, context and time. Therefore a differentiation between the source of control is made; internal aspects will be related to the actor's personal statements about control over the behaviour in given situations while external control will be related to powerful others and these others' controlling influences over the actor's engagement in the behaviour. Control is therefore segmented into separate internal and external (powerful others) variables. In addition a third dimension to control is added and aims to measure what the actors do not know about the sources of their control i.e. who or what determines their success or failure to achieve given outcomes. This unknown measure of control aims to measure control in situations unaccounted for by the internal and powerful other scales.

Conceptually, Connell (1985) compares these aspects of control with Skinner's (1995) notion of means-ends or strategy beliefs. This means an actor views the behaviour as an appropriate means to produce a given desirable outcome. What it does not include is the notion of agent-ends relations (capacity beliefs) or agent-means relations (control beliefs). The different perceptions of control from different sources will therefore be expected to account for the aspects of the control beliefs variable relating to strategy beliefs. In contrast, the perceived behavioural control
variable, by definition, reflects an agent-ends relations and at a specific behavioural and contextual level. By differentiating between these different aspects of control, greater light may be shed on the influences of the perceived control on behaviour and provide a greater insight into the nature of perceived control, and perceived competence, in the TPB.

In addition, the different levels of specificity may provide insight into more generalisable predictions. Such predictions may transcend the boundary condition of correspondence in the TPB. The correspondence condition enhances prediction in cognitive models, but makes generalisable results from the predictions difficult. This is because the specific measures may lack stability. This was illustrated by Chatzisarantis et al. (1997) who showed that intentions and attitudes were not stable in a longitudinal prospective study at two time points, but that more general variables relating to psychological needs had predictive utility for both time points. Therefore, control measures relating to control tendencies or states, rather than control perceptions towards specific behaviours at specific timepoints, may result in more stable and generalisable predictions of intentions.

It is expected that Connell’s (1985) perceptions of control in the physical domain will be related to perceived behavioural control in the TPB and add to the control-intention relationship. Internal perceptions of control are likely to positively contribute to perceived behavioural control because it is motivationally adaptive to have personal control over the behaviour and outcomes. Internal perceptions of control will therefore be expected to be indirectly related to intentions either through control (spontaneous) or through control and attitudes (deliberative). It is also expected that perceptions of control due to powerful others will be negatively related to perceived control as they reflect a relinquishment of control to external factors which is not motivationally adaptive. Finally, unknown perceptions of control are not expected to be related to perceived behavioural control at all as they reflect sources of control to which the individual cannot attribute a source and therefore motivational facility. The subsequent study therefore aims to further examine the role of perceived control in the TPB by incorporating measures which are conceptually different to the construct of perceived behavioural control in the two ways: (1) perceptions of control defined in terms of relative internality and from different sources (internal, powerful other, unknown) and (2) control specific to the physical domain as opposed to behaviour or outcome-specific control.
6.2 RESEARCH HYPOTHESES

A general aim of the present study is to further examine the relationships in the TPB from the perspective of human needs. In particular, it will examine how the perceptions of autonomy are related to the control or competence system proposed by Skinner (1995). Specifically, a competence system comprising the measures of control differentiating between sources will be expected to be related to both intention and attitudes via the path from perceived control to attitudes as highlighted in the previous study. The following hypotheses will be formulated:

H6.1 Perceptions of control in the physical domain relating to internal sources is expected to be directly and positively related to perceived behavioural control.

Connell (1985) demonstrated that powerful others and unknown perceptions of control were negatively related and unrelated respectively to a global measure of perceived control. This may be because perceived control generally reflects motivationally adaptive or positive perceptions of control. Therefore control due to powerful others is likely to be maladaptive and will be significantly and negatively related to perceived control. Unknown sources of control are expected to be unrelated to perceived behavioural control. These relationships will be tested by the following hypothesis:

H6.2 Perceptions of control in the physical domain relating to powerful others is expected to be significantly and negatively related to perceived behavioural control. Perceptions of control relating to unknown sources will not be related to perceived behavioural control.

The perceived locus of causality for physical activity is expected to conform to a simplexlike correlation structure as proposed by Ryan and Connell (1989). Specifically, the variables will be ordered according to degree of internality starting with external. As a consequence the largest correlations will be alongside the principle diagonal and be reduced as one moves away from the diagonal. To ensure the PLOC measures demonstrate conceptual and empirical validity, the following hypotheses will be tested:

H6.3 The PLOC measures will form an ordered pattern of correlations and exhibit a two factor structure representing the internal and external endpoints of the PLOC continuum.
The PLOC has been used in the TPB to describe the effects of attitudes on intentions. Chatzisarantis (1998) used this perspective in the TPB and demonstrated that identification was related to both intention and attitudes but regulated the attitude-intention relationship to zero. As identification is associated with a more internal perception of causality it follows that the formation of intentions and attitudes may be the result of high perceptions of autonomy. Further, it may be that the attitude-intention relationship is spurious and is observed because other mediating variables such as control or behavioural regulations were not included in the model. In the present study all aspects of perceived locus of causality will be incorporated in a single variable in order to examine the effects of the ‘degree of autonomy’ on the TPB relationships and, in particular, the control-attitude and attitude-intention relationships. Since perceived locus of causality can be viewed on a continuum, a variable reflecting the perceptions of causality of the individual relative to the different aspects of the autonomy continuum will be expected to predict both intentions and attitudes. As Deci and Ryan (1985) suggest, perceptions of control will only be competence feeding and therefore motivationally adaptive if they are experienced as being autonomous. Thus autonomy will be expected to predict perceived behavioural control. The following hypothesis will therefore be tested:

H6.4 A relative autonomy index will be positively related to intention, attitudes and perceived behavioural control.

In addition, it is expected that relative autonomy will be related to the differentiated aspects of control from different sources. Ryan and Connell (1989) suggested that autonomy is expected to be positively related to those aspects of control related to internal sources. This is because internal control reflects the perceptions that engagement in the behaviour is due to personal or internal influences i.e. the individual has the means available to him or herself to produce the behaviour or outcome. Further, autonomy is expected to be negatively related to external and unknown sources as these reflect a lack of personal control over aspects of the competence system relating to control over means. Unknown control, in particular, reflects a lack of personal control and no knowledge of the origin of events and therefore should be negatively related to autonomy. This will be tested using the following hypothesis:

H6.5 Perceptions of control from internal sources will be positively related to autonomy while external or powerful others and unknown sources of control will be negatively related to autonomy.
Finally this study will examine the relationships in the TPB previously hypothesised in Studies 1, 2 and 3. The discriminant validity of the latent factors in the model will be tested using confirmatory factor analysis. The existence of the control-attitude, attitude-intention, control-intention and control-subjective norm relationships will be standard paths tested in the model.

6.3 METHOD

Participants. 1088 children (537 girls, 551 boys) from 14 schools in three counties in the English Midlands; Leicestershire, Cheshire and Nottinghamshire volunteered to participate in the present study. Consent from parents, school teachers and the children themselves was obtained prior to data collection. The children were told they were participating in a survey to find out their opinions about some things that happened to all children their age. The schools had predominantly middle SES composition with a mean of 8.2% (range: 3.0-22.0%) of pupils eligible for free school meals. This is similar to the regional figure of 9.1% but less than the national average of 17.2%.

Perceptions of Control Questionnaire. Perceptions of control from different sources in the physical, social, academic and general domains were assessed by the physical scale of Connell's (1985) Multidimensional Measure of Children's Perceptions of Control. The questionnaire measures perceptions of control in four domains: cognitive, general, physical and social. Perceptions of control in each domain is assessed from three sources: internal, powerful other and unknown. Four items are associated with each source and refer to general tasks and situations. The items are rated on four-point Likert scales. A sample item for the physical internal domain is: "I can be good at any sport if I try hard enough". Responses range from very true (4) to not true at all (1). The items are ordered in such a way so that two consecutive items from the same domain and source of control do not appear alongside each other. All the 48 items from this scale appear in Appendix 12. A key is also provided to match each item with its respective domain and dimension in Appendix 12 (see Table A12.1). Only the scales in the physical domain were used in the present study.

Perceived Locus of Causality (PLOC) Inventory. Ryan and Connell's (1989) PLOC was used to assess relative autonomy. The scale items were modified from the PLOC developed for use in the academic domain. Four items (reasons) for engaging in physical activity in each of the four causality categories, namely, internal, identified, introjected and external were measured on four point Likert scales. Each reason was
preceded by a common stem which contextualised locus of causality and directed the respondent to the target behaviour. In the current study, the stem was: "I participate in physical activities because...". Each reason was then given followed by the scale. The reasons were arranged so that no items from the same scale were adjacent to each other. The PLOC inventory is provided in Appendix 13 and a table to match each item with its respective scale is also provided in Appendix 13, Table A13.1.

Attitude, Perceived Behavioural Control, Subjective Norms and Intentions. Items to measure the TPB variables were identical to that used in Study 2 excluding the measure of past behaviour (see Appendix 8).

Social Desirability. The short form of Reynold's (1982) social desirability questionnaire was administered concurrently with the other measures. Scores on this scale were used to check whether the participants in the present study were providing socially desirable responses.

Administration. A collated questionnaire including the Multidimensional Measure of Children's Perceptions of Control Questionnaire, the PLOC Inventory and TPB questionnaire was administered to the sample under quiet classroom conditions in relatively small numbers to ensure consistency with the other studies and minimum disruption of curriculum time in the schools. The target behaviour was initially defined for the children as all activities which make you "out of breath" or "huff and puff". Each item statement was read aloud by the researcher and time given for each child to ask questions and provide their response. The children were asked not to jump ahead and to answer the questions without discussion with others. The children were also told to treat each question as they come to it and not refer back to questions they had completed previously.

6.4 RESULTS

6.4.1 DISCRIMINANT VALIDITY

Perceived Locus of Causality Inventory. Item means, standard deviations, internal consistency alphas and bivariate correlations for the PLOC constructs are exhibited in Table 6.1. The participants appeared to endorse the internal and identified constructs the most. Alpha coefficients indicated satisfactory internal consistency for all four scales. The factorial validity of the constructs was investigated using an exploratory factor analysis using an oblique (oblimin) rotation and from the correlation matrix between the variables. The exploratory technique was adopted so that the analyses
performed by Ryan and Connell (1989) on the academic PLOC scale could be replicated. In particular, it allowed for the general examination of the structure of the items followed by a more refined ‘continuum’ of causality to be derived from an ordered pattern of correlations. According to the a priori hypotheses (H6.3) two factors were anticipated as found by Ryan and Connell. However, the exploratory factor analysis extracted three factors. One factor was defined by the external items, a second by all the internal and identified items plus two introjected items and the remaining two introjected items loaded on the third factor. It can be seen that some elements of the introjection scale, those that loaded on the second factor, can be construed to be more or less self-regulated. This is because these items represent reasons for engaging in physical activity which, while not intrinsically motivated, are still regulated by internal albeit socially constructed forces. In addition, two introjected items defined the third factor which conceptually represents an intermediate between the internal and external factors.

Further support for the separation of the PLOC items into four distinguishable constructs was provided in the correlation matrix which exhibited an ordered pattern of correlations. The correlation matrix can be seen in Table 6.1. Specifically, the matrix formed a pattern such that correlations among variables proximal to the scales at any given end of the continuum were greater than those at the distal and opposite ends of the continuum. Indeed it can be seen, for example, that the external scale was positively and significantly related to introjection, significantly and positively related to identification but with a lower coefficient and exhibited a non-significant relationship with intrinsic motivation. Ryan and Connell (1989) examined the concurrent validity of the PLOC by examining the subscale relationships with the internal scale from Connell’s (1985) perceptions of control scale. While Ryan and Connell’s (1989) analyses were in the academic domain, the present study examined the PLOC relationships with internal perceptions of control in the physical domain. The correlations between internal perceptions of control are shown in parenthesis along the principle diagonal of the matrix in Table 6.1. It can be seen, as expected, that the PLOC subscales demonstrate an ordered pattern of correlations with internal perceptions of control with the highest correlation with the identified PLOC and a low correlation with the external scale. However, a significant and similar magnitude correlation was also found between internal control scale and introjection. It is possible that some people might view introjected behaviours, such as doing something out of obligation, as internally controllable, even though it may be felt as pressuring. An example of this might be if a person made a personal commitment to attend a staff luncheon with members of staff s/he may not necessarily like to dine. But since the commitment has been made and because personal commitment is valued by the
person and is internally controllable, it is seen as an obligation but one which is under internal control - they could decide not to go if they chose. This corroborates the findings of Ryan and Connell (1989) and provides evidence for the independence of the scales and the existence of autonomy on a continuum.

Table 6.1 Means, Standard Deviations and Correlations for the PLOC Variables

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>SD</th>
<th>α</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Internal</td>
<td>3.25</td>
<td>.71</td>
<td>.87</td>
<td>(.28**)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Identification</td>
<td>3.19</td>
<td>.65</td>
<td>.74</td>
<td>.71**</td>
<td>(.36**)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Introjection</td>
<td>2.46</td>
<td>.69</td>
<td>.70</td>
<td>.50**</td>
<td>.60**</td>
<td>(.29**)</td>
<td></td>
</tr>
<tr>
<td>4. External</td>
<td>2.18</td>
<td>.65</td>
<td>.68</td>
<td>-.24**</td>
<td>-.01</td>
<td>.19**</td>
<td>(.04)</td>
</tr>
</tbody>
</table>

Note. ** p<.01

Correlations with the internal perceptions of control scale shown along principal diagonal

A relative autonomy index was calculated from an item reweighted composite of the PLOC scales. Specifically, the relative autonomy index is calculated from a procedure by Grolnick and Ryan (1987) by giving a numerical weight to children’s scores on each of the PLOC scales and then totalling the reweighted scores. The weightings for each scale are as follows: Internal (x2), Identification (x1), Introjection (x-1) and External (x-2). Consequently, this produces a composite measure of autonomy in which higher, more positive scores indicate individuals with high autonomy or greater internal regulation. Analogously, less positive scores reflect lower autonomy or a more external regulation. This composite reweighted measure was used as the construct for measuring autonomy in subsequent analyses.

Perceptions of control and TPB variables. Discriminant validity of the attitude, perceived behavioural control and perceptions of control in the internal, powerful other and unknown domains was assessed using confirmatory factor analysis using the MLROBUST method. All items were specified to load on their hypothesised factor and all other loadings were set to zero. All the latent factors were made to covary. The confirmatory factor analysis model is represented schematically in Figure 6.1. The analysis resulted in a model which demonstrated satisfactory goodness of fit indicated by the satisfaction of multiple criteria (χ²=394.12; df=178; CFI=.97; TLI=.96; χ²/df=2.21; SRMSR=.03). The good overall fit of the model and the fact that all the factor correlations were sufficiently lower than unity (by one confidence interval) were used as evidence for the discriminant validity of the unobserved variables.
In addition to overall goodness of fit of the confirmatory factor analysis model, solution estimates provided in Table 6.2 also provided an indication of model adequacy. Solution estimates exhibited satisfactory factor loadings for most observed variables on their respective variables.
Table 6.2 Factor Loadings, Standard Errors and Multiple Correlations for the Perceptions of Control in the Powerful Other, Unknown and Internal Sources, Attitude and Perceived Behavioural Control

<table>
<thead>
<tr>
<th>Scale and items (X_i)</th>
<th>Factor loadings (λ_i)</th>
<th>Standard error</th>
<th>R^2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceptions of control, powerful others</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. When I win at sport, it's usually because my opponent played badly</td>
<td>.63</td>
<td>.028</td>
<td>.39</td>
</tr>
<tr>
<td>2. When I lose at a sport it's usually because the other player played badly</td>
<td>.37</td>
<td>.025</td>
<td>.14</td>
</tr>
<tr>
<td>3. When I play a sport game with another kid and I win it's usually because the other kid played badly</td>
<td>.81</td>
<td>.029</td>
<td>.65</td>
</tr>
<tr>
<td>4. When I don’t win at a sport game, the person I was played against played badly</td>
<td>.37</td>
<td>.024</td>
<td>.14</td>
</tr>
<tr>
<td><strong>Perceptions of control, unknown</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. When I win at sport, a lot of times I can’t figure out why</td>
<td>.86</td>
<td>.028</td>
<td>.68</td>
</tr>
<tr>
<td>6. Most of the time when I fail to do well in sport, I can’t figure out why</td>
<td>.10</td>
<td>.033</td>
<td>.02</td>
</tr>
<tr>
<td>7. When I win at a sports game, a lot of the time I don’t know why I won</td>
<td>.81</td>
<td>.027</td>
<td>.65</td>
</tr>
<tr>
<td>8. When I don’t win at a sport game, most of the time I can’t figure out why</td>
<td>.10</td>
<td>.033</td>
<td>.01</td>
</tr>
<tr>
<td><strong>Perceptions of control, internal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I can be good at any sport if I try hard enough</td>
<td>.66</td>
<td>.027</td>
<td>.44</td>
</tr>
<tr>
<td>10. If I try to catch a ball and I don’t, it’s usually because I didn’t try hard enough</td>
<td>.40</td>
<td>.026</td>
<td>.16</td>
</tr>
<tr>
<td>11. I can be good at any sport if I work on it hard enough</td>
<td>.76</td>
<td>.027</td>
<td>.58</td>
</tr>
<tr>
<td>12. If I try and catch a ball and I miss it, it’s usually because I didn’t try hard enough</td>
<td>.53</td>
<td>.028</td>
<td>.28</td>
</tr>
<tr>
<td><strong>Attitude</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. good-bad</td>
<td>.78</td>
<td>.034</td>
<td>.62</td>
</tr>
<tr>
<td>14. exciting-boring</td>
<td>.75</td>
<td>.042</td>
<td>.56</td>
</tr>
<tr>
<td>15. fun-unpleasant</td>
<td>.62</td>
<td>.039</td>
<td>.60</td>
</tr>
<tr>
<td><strong>Perceived behavioural control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. It would be easy or difficult...</td>
<td>.62</td>
<td>.064</td>
<td>.38</td>
</tr>
<tr>
<td>17. It is up to me...</td>
<td>.25</td>
<td>.058</td>
<td>.08</td>
</tr>
<tr>
<td>18. If I wanted to...</td>
<td>.44</td>
<td>.041</td>
<td>.19</td>
</tr>
<tr>
<td>19. There is very little I could do...</td>
<td>.33</td>
<td>.073</td>
<td>.11</td>
</tr>
</tbody>
</table>
Two items each from the perceptions of control factor in the unknown dimension and perceived behavioural control had particularly low factor loadings. The $R^2$ estimate indicates that these items do not contribute well to the explanation of the factor. While it is recommended that such items be omitted in future research or replaced with more appropriate items, the items remained in the current study. The additional measurement error associated with these items was statistically controlled by the use of latent factors in subsequent analyses.

Possible reasons for the low factor loadings for items 6 and 8 for the unknown perceptions of control factor may lie in the item statements and the interpretation of these statements differently by children. Item 6, for example, relates to unknown control referring to "doing well" in sport while the other items refer to "winning" at sport. It may be that "doing well" is not necessarily viewed as a perception of success in the same way as "winning" and therefore the associated control perceptions may be different. In addition, both items 6 and 8 refer to 'failure' or negatively worded items. Therefore, the factor could be split into unknown perceptions of control for success (items 5 and 7) and unknown perceptions of control for failure (items 6 and 8). Future tests of the structural integrity of the perceptions of control factors may incorporate further items to enable full differentiation of factors into unknown perceptions of control for success and unknown perceptions of control for failure.

As the use of an unreliable perceived behavioural control variable in a structural model may have an adverse affect on validity, the subsequent model used to test the study hypotheses was repeated with a single item measure of perceived behavioural control selected on the basis of its factor loading in the confirmatory factor analysis. The analysis demonstrated that the pattern of relationships remained unchanged and suggests that the control variable can be used as a latent factor in subsequent analyses. A detailed explanation of this procedure can be found in Appendix 10.

Mean scores and standard deviations for the perception of control questionnaire items pertaining to the internal, powerful others and external scales were calculated. Means and standard deviations for the TPB variables and for the relative autonomy index scores were also computed. These descriptive statistics and factor correlations between the variables are shown in Table 6.3.
Table 6.3 Means, Standard Deviations and Correlations for Perceptions of Control in the Internal, Powerful Other and Unknown Sources, Relative Autonomy Index and the TPB Variables

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intention</td>
<td>5.71</td>
<td>1.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Attitude</td>
<td>5.75</td>
<td>1.19</td>
<td>.68*</td>
<td>.86</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.05)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Subjective Norm</td>
<td>5.22</td>
<td>1.66</td>
<td>.66*</td>
<td>.57*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(0.08)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Perceived control</td>
<td>5.75</td>
<td>.99</td>
<td>.73*</td>
<td>.65*</td>
<td>.53*</td>
<td>.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.07)</td>
<td>(0.04)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Internal control</td>
<td>2.87</td>
<td>.62</td>
<td>.37*</td>
<td>.44*</td>
<td>.36*</td>
<td>.33*</td>
<td>.63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.05)</td>
<td>(0.03)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Powerful others</td>
<td>2.43</td>
<td>.59</td>
<td>-.20*</td>
<td>-.25*</td>
<td>-.10</td>
<td>-.26*</td>
<td>-.32*</td>
<td>.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(0.06)</td>
<td>(0.04)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Unknown control</td>
<td>2.01</td>
<td>.54</td>
<td>-.25*</td>
<td>-.28*</td>
<td>-.12</td>
<td>-.33*</td>
<td>-.25*</td>
<td>.47*</td>
<td>.66</td>
<td></td>
</tr>
<tr>
<td>(0.05)</td>
<td>(0.04)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Relative autonomy index</td>
<td>2.87</td>
<td>2.37</td>
<td>.34*</td>
<td>.59*</td>
<td>.19</td>
<td>.61*</td>
<td>.28*</td>
<td>-.24*</td>
<td>-.23*</td>
<td></td>
</tr>
<tr>
<td>(0.12)</td>
<td>(0.07)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. * p<.01; Standard errors in parentheses; Alpha reliability coefficients along principal diagonal

Social desirability. Correlations between the PLOC, TPB and perceptions of control questionnaire items with the social desirability scale were low and mostly non-significant. Where significant correlations were reported, the shared variance between the constructs was minimal. This indicates that the children did not tend to provide socially desirable responses to these inventories.

6.42 NON-STANDARD MODEL

A non-standard model specifying paths between the theory variables (latent and measured) was used to test the specific hypotheses of the present study. The triadic relationship between attitude, intention and control was initially hypothesised. In addition, the relative autonomy index was hypothesised to be related to attitudes, intentions and perceived behavioural control. The competence system represented by the perceptions of control variables and their relationship with perceived behavioural control was also hypothesised to be related to autonomy. Paths were therefore freed between perceptions of control in the three domains; internal, powerful others and unknown and perceived behavioural control. It was also expected that autonomy would govern the influence of perceptions of control in the different domains and perceived behavioural control. Therefore paths were freed between the relative
The hypothesised model was estimated using the EQS structural equation program using the ML\textsubscript{ROBUST} method. The large sample size enabled the model to be estimated, modified and then re-tested on a separate sample for confirmation. The hypothesised model was initially estimated on half of the sample, randomly selected. Overall goodness of fit was established by multiple criteria including the CFI and TLI fit indices, the $\chi^2$/df ratio and the standardised root mean squared residual (SRMSR). The initial model exhibited satisfactory goodness of fit statistics ($\chi^2$=381.18; df=191; CFI=.94; TLI=.93; $\chi^2$/df=2.00; SRMSR=.088). The LM-Test did not recommend any further paths be freed, while the W-test recommended that the relative autonomy index-intention, relative autonomy index-attitude, powerful others-perceived control and control-intention paths be dropped from the model as they exhibited low, non-significant coefficients. This slightly increased the parsimony of the model due to the additional degrees of freedom ($\chi^2$/df=1.97). The resulting well-fitting model also fitted the data for the second randomly selected half of the sample. To ensure invariance of the parameter estimates across both halves of the sample, a multisample (MS) analysis was performed constraining the relationships between the coefficients.
to be equal. The MS analysis revealed good fit of the model to the data and only two path coefficients were significantly different across the groups. These paths were between the relative autonomy index and unknown perceptions of control and between internal perceptions of control and perceived behavioural control. Reasons for the invariance in the relative autonomy index-unknown control path was due to the second subsample parameter estimate for this relationship exhibiting only marginal significance. The internal perceptions of control-perceived behavioural control path was not invariant as the path coefficient for this path was lower in subsample 1 ($\lambda=.23$, $p<.01$) than in subsample 2 ($\lambda=.36$, $p<.01$). However, the differences did not affect the model fit statistics enough for the model to be rejected and the model therefore demonstrated good consistency across groups. Consequently, the model was retested using the entire sample and these fit statistics and parameter estimates will be used in subsequent discussions of the model. Model fit statistics for the first and second halves of the sample, the multi-sample and whole sample are illustrated in Table 6.4.

Table 6.4 Goodness of Fit Statistics for Single and Multi-Sample Path Analyses

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>$\chi^2$</th>
<th>$\chi^2$/df</th>
<th>SRMSR</th>
<th>CFI</th>
<th>TLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Half</td>
<td>544</td>
<td>385.07</td>
<td>1.97</td>
<td>.087</td>
<td>.94</td>
<td>.93</td>
</tr>
<tr>
<td>2nd Half</td>
<td>544</td>
<td>436.75</td>
<td>2.23</td>
<td>.099</td>
<td>.93</td>
<td>.92</td>
</tr>
<tr>
<td>MS</td>
<td>1088</td>
<td>914.48</td>
<td>2.27</td>
<td>.074</td>
<td>.92</td>
<td>.91</td>
</tr>
<tr>
<td>Whole sample</td>
<td>1088</td>
<td>587.79</td>
<td>3.01</td>
<td>.089</td>
<td>.94</td>
<td>.92</td>
</tr>
</tbody>
</table>

The standardised parameter estimates from the path analysis for the entire sample are provided in Figure 6.3. The only exogenous variable in the model, the relative autonomy index, was not directly related to attitude or intention as hypothesised in H6.4 and so this hypothesis was rejected. The relative autonomy index was, however, directly and positively related to perceived behavioural control. As expected, the relative autonomy index predicted all three dimensions of control and the assumptions of H6.5 were supported. External (powerful others) and unknown perceptions of control were negatively associated with the relative autonomy index implying that high scores on relative autonomy resulted in correspondingly low scores on the perceptions of control aspects. The opposite, however, was true for the internal perceptions of control which demonstrated a significant, positive relationship with the relative autonomy index ($\lambda=.28$, $p<.01$). Further, hypotheses H6.1 and H6.2 relating to the relationships between perceptions of control and perceived behavioural control were partially supported. Unknown perceptions of control were negatively related to
perceived behavioural control but the powerful others perception of control-perceived behavioural control relationship was nonsignificant. Examining the correlations between these variables indicates that the relative autonomy index attenuates the relationships of unknown and powerful others perceptions of control with perceived control. Paths relating to the tripartite relationships in the TPB between control, attitudes and intention while corroborated by the correlation matrix, were influenced by the inclusion of the relative autonomy index. The perceived control-attitude path was increased from $r=.65$ to $\lambda=.86$ while the perceived control-intention path ($r=.73$, $p<.01$) was reduced to zero. In addition, the simple correlation between perceived behavioural control and subjective norms ($r=.53$, $p<.01$) was reduced ($\lambda=.37$, $p<.01$) due to the inclusion of the relative autonomy index. It is clear then that the relative autonomy index has a number of effects on the model relationships and these changes appear to be consistent across the samples tested.

Figure 6.3 Path Diagram Showing Standardised Coefficients between Intentions, Attitudes, Perceived Behavioural Control, the Relative Autonomy Index and Perceptions of Control in the Powerful Others, Unknown and Internal Domains

Note. Model fit statistics: $\chi^2=587.79$; CFI=.94; TLI=.92; $\chi^2$/df=3.01; SRMSR=.089;
All paths significant at $p<.01$
6.5 DISCUSSION

6.5.1 SUMMARY OF FINDINGS

The present study aimed to reveal the motivational impact of autonomy perceptions, based on self-determination theory, on the cognitive variables within the TPB and in particular perceived control and the competence system of control variables. Preliminary analyses demonstrated the validity of the perceived locus of causality (PLOC) inventory in the physical domain corroborating the findings of Ryan and Connell (1989). Bivariate correlations of a relative autonomy index with variables from the TPB and the perceptions of control variables from Connell’s (1985) model indicated that autonomy was positively related to attitudes, intentions and perceived behavioural control as well as the internal perceptions of control. However, the inclusion of these variables in a non-standard structural equation model indicated that the influence of the relative autonomy index had substantial effects on the motivational mechanisms in the model and, in particular, on the triadic relationships between attitude, intention and perceived behavioural control. Specifically, the control-intention path was reduced to zero and the control-attitude path was inflated by the influence of the relative autonomy index. The relative autonomy index directly influenced perceived behavioural control and only affected attitudes and intentions indirectly via control. Additionally, the relative autonomy index affected the competence system of control which in turn had direct effects on perceived behavioural control. This corroborates the expectation that autonomy may determine whether control perceptions are competence satisfying and whether such perceptions will lend themselves to the formation of intentions. As well, the influence of control on the subjective norm variable was reduced by the inclusion of the competence system, suggesting that some aspects of social pressures regressed on control were directed elsewhere. Finally, the low and non-significant correlations of the PLOC, TPB and perceptions of control questionnaire items with the social desirability scale indicated that, according to this scale, the participants were not inclined to give socially desirable responses.

6.5.2 VALIDITY OF THE PLOC INVENTORY

The factor analysis and simplexlike pattern of correlations among the PLOC variables in the present study support hypothesis H6.3 and corroborate the findings of Ryan and Connell (1989) in their development of the PLOC scales. The exploratory factor analysis resulted in three factors being extracted and followed a similar pattern to the
analysis of Ryan and Connell (1989). In the present study the factors extracted represented the extremes of the PLOC continuum and an intermediate introjection factor. This is in contrast to Ryan and Connell (1989) whose PLOC questionnaire extracted two factors in which the introjection and identification items cross-loaded on each of the two factors. In the present study, it was clear that the internal regulation and external regulation scales were well differentiated as their items loaded on separate factors. In addition, the identification scale was more affiliated to the internal regulation scale than the external regulation scale. This is logical as identified reasons for engaging in physical activity are related to values and reasons related to the self such as beliefs that physical activity is beneficial.

More problematic, however, was the introjection scale. Two items with statements “I take part in physical activities because I will feel bad about myself if I don’t” and “I take part in physical activities because it bothers me when I don’t” reflected introjects related to guilt and shame and characterise the introjection items used in other measures of introjected regulation (Mullan & Markland, 1997; Mullan, Markland & Ingledew, 1997; Vlachopolous, 1996). While these items may appear to be unrelated to a more internal regulation as they are perceived as external pressures, they are still internal regulations. Such a regulation is just not fully integrated in the person’s system of internalised regulations. This would explain their loading on the identification/internal regulation factor. However, the remaining two introjection items: “Because I want to show to myself how good I am” and “Because I want to show others how good I am”, while still introjected items, reflect different aspects of this construct and are similar to the introjection items used by Vallerand and coworkers (1992) in the Academic Motivation Scale. Consequently, it can be expected that these items load on a separate factor. They reflect internal regulations but are still introjected as they relate to the pressure people exert on themselves to live up to socially acceptable views of themselves. In this respect these items are related to a form of ego involvement - an orientation in which people put pressure on themselves to “put their worth on the line in which one's self esteem is contingent on the outcome” (Deci et al., 1994, p. 121)

In this respect, introjection represents a problem - it does not conform to a strictly unidimensional scale and may therefore reflect different sorts of pressures. The first two introjection items represent pressures placed on a person due to guilt or shame when they don’t do physical activities, perhaps because they feel like they should do some exercise to prevent themselves from becoming unfit or putting on weight. The final two introjection items reflect the pressure a person exerts on themselves to live up to a socially acceptable standard such as being able to do physical activities with
others. The notion that introjection can be differentiated according to the different pressures people place upon themselves makes sense; people experience a variety of pressures from different sources and consequently would evaluate and self-regulate these pressures differently. In some cases, these pressures may become integrated into a series of values held by the individual in which case, after a period of internalisation of the behaviour, it is represented as an identified regulation. Other researchers have also found problems with the introjection factor. Mullan, Markland and Ingledew (1997) for example, suggested that introjection may reflect two separate components: internalisation of rules and regulation of behaviour. They reported that feelings of guilt, shame and failure represent the regulation of behaviour by guilt avoidance and used items similar to the first two introjection items from the present study. Other items, however, related to exercise as a chore, obligation or requiring effort. Items reported for this sub-scale were: “exercise is a bind but has to be done” and “it is a real effort”. The authors concluded that further research is necessary to tap the different aspects of introjection, a notion which is corroborated by the present results. Future researchers may need to identify a multidimensional introjection factor with a number of different sources of regulation which may perhaps lie at different points on the PLOC continuum.

While these factors can be conceptually distinguished as they stand, it does not identify the true differentiation a person makes between truly external (i.e. punishment avoidance) and the introjected (e.g. guilt, shame) and identified (e.g. moral reasoning) reasons for causality. These regulations are associated with and are perceived as external regulations but are, in fact, forms of self-regulation. Ryan and Connell (1989) therefore suggested that an examination of the graded relationships between the different subscales would provide a better distinction. It was reported that the pattern of correlations in the matrix demonstrated that the scales could be viewed on a continuum. Consequently, this paved the way for the reweighting of the scale scores to form a relative autonomy index which provides a measure of ‘degree of autonomy’ perceived by the person in that domain (Grolnick & Ryan, 1987). This is not to be confused with global sensations of autonomy which are described by Deci and Ryan (1985) as the overall underlying regulations determining motivation due to overall needs for self-determination or self-expression. Rather, autonomy experienced in a given domain, adds to an individual’s global perception of self-determinism and assists the organism in their selection of domains in which they are capable of demonstrating competence. Ryan and Connell’s (1989) development of the PLOC was completed in the academic achievement and prosocial domains. The present study examines PLOC in the physical domain, provides further support for the model and evidence in favour of the inclusion of a physical domain as an important area in
which people can satisfy their need for autonomy. Consequently, the use of the relative autonomy index as a measure of autonomy in the present study is justified as the underlying PLOC structure is corroborated by the preliminary analyses.

6.5.3 CONTROL AND PLOC

The relationships between perceptions of control and the PLOC variables is important as these two constructs reflect the needs for competence and autonomy respectively, and are therefore central to the current investigation. In the present study correlations between PLOC and perceptions of control exhibited a characteristic pattern similar to those of Ryan and Connell (1989). Internal perceptions of control were significantly and positively correlated with internal, identified and introjected aspects of the PLOC continuum but not the extrinsic aspects of control. Ryan and Connell (1989) suggest that one is more likely to be intrinsically motivated toward a task whose outcomes are perceived to be controllable which would explain the significant internal control-internal PLOC relationship.

Relations between internal perceptions of control and introjected and identified reasons for engaging the behaviour can be explained by the process of internalisation. Internalisation refers to the “process through which an individual acquires an attitude, belief or behavioural regulation and progressively transforms it into a personal value, goal or organisation” (Deci & Ryan, 1985, p. 130). Behaviours and actions which are valued by the individual as providing them with the means to actively accommodate their environment and increase their freedom of choice are those which are likely become internalised. As expected, intrinsically motivated behaviours are typically those which are most valued for their inherent pleasures and are likely candidates for internalisation. However, actions which are intrinsically motivated may not be the only behaviours which become internalised. Rather, some behaviours which are not intrinsically motivated, such as doing physical activity because one feels one should for fitness or weight control may become incorporated in the actor's valued repertoire of behaviours. The latter example represents a situation in which an identified behaviour becomes internalised. Therefore, behaviours which are valued by the individual or the social environment, but which are not necessarily intrinsically motivated are internalised as they are instrumental to the organism's long term effectiveness in their environment. Picture a child who engages in playing football in the playground. They do not practice alone or out of the context of the playground and are therefore not intrinsically motivated toward that behaviour. Rather, they perform that behaviour because it allows them to be part of a particular social group of the playground and because football skills are valued by that group. The child perhaps
feels an obligation that he or she should participate in playground football because his/her friends do and this represents an introjected reason for participation. In time, playing football in the playground may become internalised i.e. part of the child's values even though the locus of causality is not internal.

Perceived control is instrumental in the process of internalisation. High internal perceptions of control assist the organism in determining whether the behaviour is competence satisfying and therefore valued (Skinner, 1995). Control beliefs are competence satisfying and consequently inform the individual that a given behaviour has value in providing a sphere in which they can demonstrate their ability. It follows therefore that the system which results in the attachment of value to behaviours and actions is central to the internalisation process. As Ryan and Connell (1989) point out, intrinsically motivated behaviours tend to be those for which one believes the outcomes are controllable. As mentioned earlier, therefore, intrinsically motivated behaviours are likely to become internalised. However, as previously illustrated it is possible to have complete controllability over a behaviour which is not intrinsically regulated. An example previously cited is that of slaves on a ship who saw the outcomes of rowing the vessel as being controllable but the behaviour was not self-determined. It is therefore expected that perceived control will not only be related to intrinsic motivation, but other forms of regulation as well. This was corroborated in the present study and Ryan and Connell's (1989) study who demonstrated that perceived control is positively related to the intermediate aspects of the PLOC scale. However, because this relationship exists does not mean that identified and introjected behaviours will certainly become internalised. The previously cited notion by Ryan and Connell (1989) that control will be competence satisfying only under conditions of autonomy is also relevant. The question must therefore be raised: How can control be related to the internalisation of introjected and identified behaviours if the behaviour is not autonomous? Intuitively, under conditions which are not autonomous, perceived control will not be competence satisfying and will not result in the actor attaching value to the behaviours.

A response to this must be viewed in the conceptualisation of the identification and introjection loci of causality. These aspects are really internal regulations even though they are perceived as external regulations by the actor. This suggests that although a behaviour is not completely autonomous, it can still have some degree of autonomy for the individual. Consequently, under such conditions of relative autonomy, control will still satisfy needs for competence and have value giving properties. Therefore identified and introjected regulations may still result in control satisfying the need for competence and assist internalisation by building up the value of these behaviours. In
summary, identified and introjected perceived loci of causality in the physical domain
have been shown to be positively related to internal perceptions of control in the
physical domain. This indicates that individuals who see themselves as having control
i.e. having the means to perform the behaviour and seeing a contingency between the
behaviour and the outcome, may engage in behaviours which, while not purely
intrinsically motivated, are to some degree autonomous. The control beliefs which are
produced due to the engagement in the behaviour will result in the behaviour being
valued as a source of competence satisfaction and contribute to the process of
internalisation.

6.5.4 THE ROLE OF AUTONOMY IN THE TPB

The relative autonomy index had a substantial dual role in the current model by
reducing some of the influence of the perceptions of control on perceived behavioural
control and attenuating the perceived control-intention relationship. As expected
(H6.5) internal perceptions of control were positively related to autonomy while
external and powerful others were negatively correlated. This indicates that relative
autonomy is generally associated with positive, internal aspects of control.
Interestingly, the relative autonomy index reduced the influence of the external
(powerful other) and unknown aspects of control (H6.2) on perceived behavioural
control. This indicates that control beliefs due to external or 'less controllable' sources
are certainly governed by the degree of autonomy experienced by the individual. As
hypothesised (H6.1) internal perceptions of control were positively related to
perceived behavioural control and were not attenuated by autonomy. Instead, internal
perceptions of control added an indirect effect to the relative autonomy index-
perceived behavioural control relationship resulting in a total effect of the relative
autonomy index on perceived behavioural control of $\lambda=.65$.

Autonomy was hypothesised (H6.4) to predict intention, attitudes and perceived
control, but only the relative autonomy index-perceived behavioural control path was
significant. The influence of the relative autonomy index on the perceived behavioural
control resulted in an increase in the parameter estimate between perceived control
and attitude. This suggests that autonomy contributes directly to the formation of
positive perceived control and indirectly influences attitudes and intention. As
perceived control reflects competence, these results also corroborate the view that
competence and autonomy are intrinsically related as proposed by both Skinner
(1995) and Deci and Ryan (1985). Deci and Ryan suggest that control is a function of
autonomy and that control is only likely to satisfy competence and be intrinsically
motivating under conditions of autonomy. In the present study this must be modified
to account for the fact that intermediate levels of relative autonomy (e.g. those relating to high identification scores) also contribute to control beliefs, not just very high autonomy as shown in other studies (Chatzisarantis, 1998). It is possible to say therefore that control will only be competence satisfying under conditions of moderate-to-high autonomy. Control beliefs are indeed a function of autonomy and are seen as motivationally adaptive as this variable is related to attitudes and intentions.

However, the lack of an autonomy-intention path in the present study suggests that autonomy alone is not motivationally adaptive without a consideration of perceived control. Previous studies have indicated that identified reasons for engaging in physical activity are directly related to intentions (Chatzisarantis et al., 1997). However, the study by Chatzisarantis et al. did not examine perceived control and consequently the mediating effects of this variable on the identification-intention relationship was not examined. Biddle (1998) suggests that the needs of competence and autonomy alone are necessary but not sufficient conditions for behaviours to be internalised. It is necessary for both needs to be satisfied since controlling competence (e.g. the slave ship) or autonomous incompetence (e.g. social loafing in a team sport) are both deviant adaptations and will not lead to the behaviour being valued and truly internalised by integrative processes. Therefore variables relating to both needs positively affect the formulation of intentions to act. Theoretically, as Ajzen (1985) postulated in the original conceptualisation of the TPB, there is a direct path between perceived control and intention. In such a situation the actor may be compelled to form intentions toward the target behaviour solely on the basis of his/her control perceptions. However, control will be more motivationally adaptive in the presence of autonomy as indicated by the increased prediction of attitudes by the perceived behavioural control variable, and the attenuation of the control-intention path.

The reduction of the perceived control-intention path to zero by the inclusion of relative autonomy in the present model can be related to the spontaneous and deliberative processes behind action proposed by the models estimated in Studies 1, 2 and 3. The control-intention path was associated with a more spontaneous formulation of intentions as the result of positive control beliefs and was hypothesised in previous studies following the framework of Fazio (1990). Therefore, it seems that the consequence of the inclusion of the relative autonomy index in the model is the elimination of the spontaneous process of the formation of intentions from control beliefs and all considerations of control which are motivationally adaptive are now conducted through the deliberation of attitudes. It is possible that when autonomy is considered, the spontaneous path is re-directed through attitudes. Therefore, it seems
that children do not engage in physical activity behaviour after considering control beliefs which are primarily due to past experiences of control. Instead, the influence of autonomous decision making results in a necessary consideration of attitudes prior to the formation of intentions regardless of the previous experiences of control. Therefore, previous studies which exhibited a significant control-intention relationship failed to consider the influence of autonomy prior to the formation of intentions. Further, it suggests that autonomy provides greater utility for attitudes to serve as a mediating variable between control beliefs and the formation of intentions. This is corroborated by Chatzisarantis and Biddle (1998b) who compiled a meta-analysis of the TPB studies in an exercise context in which the behaviour was presented under autonomous and controlling conditions. Their findings suggested that the control-attitude correlation was greatly attenuated in the controlling condition compared to the autonomous condition. The suggestion, therefore, is that physical activity behaviour in children requires deliberation over their degree of autonomy, perceived control and attitudes prior to the formulation of a plan to act.

6.5.5 INTERNALISATION PROCESSES AND THE AUTONOMY-CONTROL PATH

Theoretically, the indirect effect of the relative autonomy index on intention observed in the present study can be explained by the process of active internalisation of the behaviour, a process which is deliberative or nonspontaneous, active and related to the individual's needs. According to Deci and Ryan (1985), the internalisation process is important in the organism's tendency toward expanded harmony or the need to be more self-determining as it allows for the inclusion of behaviours into an individual's value system which enables them to better cope with their environment. Complete internalisation ultimately results in the identification and integration of behavioural categories which will satisfy the individual's needs for competence and lead to greater autonomy. Deci and Ryan (1985) view the process of internalisation as being motivated by "the intrinsic need for competent self-determination" (p. 131). Therefore, the need for autonomy initiates the search for behaviours which will assist in the organism becoming self-determined with respect to their environment. If internalisation results in behaviours being included in the individual's system of values and therefore integrated, then the mechanism by which the behaviours become valued is critical to the process. Skinner (1995) states that behaviours become valued if they provide a sense of competence which is in turn fed by perceptions of control. Perceived control, as a precursor of competence, is important to internalisation because it provides the person with the propensity to attach value to the behaviours which are going to be competence satisfying. Behaviours are therefore valued by the
individual either due to their intrinsic motivation or by their satisfaction of the need of the individual to demonstrate competence at a task which is valued by the social environment. In this way internalised behaviours can be ones which are not necessarily completely self-determined but are done for introjected reasons. Deci and colleagues (1994) claim that those behaviours which are not completely autonomous can, at best, only be partially internalised and never become part of the self. Only behaviours which are done for internal and identified reasons are those which become completely internalised or integrated into a person as part of their means to become more self-determined.

Deci and Ryan (1985) also state that the process of internalisation is an active one. Therefore, to integrate behaviours so that they are among those which are perceived to satisfy competence and result in satisfaction of the need for autonomy a person must engage in “active work”. Therefore, such deliberations, like whether the behaviour is competence satisfying, whether it is internally controllable and whether it has associated barriers or costs, are all considerations which require cognitive work on behalf of the individual. In this active process the individual tries to incorporate a behaviour into their system of values in order to help them accommodate their environment and satisfy their needs for self-determination.

The process by which autonomy affects control and therefore results in a more deliberative path via attitudes in the prediction of intention is a reflection of part of the process of internalisation. This active process is illustrated on the left hand side of Figure 6.4. The need for autonomy is seen as governing the overall motivational process. Internal reasons for engaging in the behaviour is essentially engaging in the behaviour for its own sake and therefore is likely to be spontaneous. This is represented by route A in Figure 6.4 and this reflects an integrated regulation, but it is essentially a ‘ready integration’ because intrinsically motivated behaviours are, by definition, already integrated.

However, physical activity is unlikely to be a completely spontaneous behaviour as there are generally conflicts and barriers. This was illustrated by the necessity of intentions in Study 1 and attitudes in Study 2 to act as mediators of the more spontaneous route from control to behaviour. There are, therefore, some intermediate motivational variables and cognitions which mediate the path from autonomy perceptions to behaviour. Completely internalised or integrated routes to action occur under conditions of high relative autonomy such as identified regulations which come about due to the competence satisfying nature of control perceptions. This is illustrated by route B in Figure 6.4. Identified reasons for engaging in the behaviour
predict perceived control. All aspects of control are expected to be deliberated upon, whether perceived control reflects barriers, problems or past experiences of control. As the internalisation process is an active one, it requires the deliberation over attitudes alongside the considerations of control, particularly if perceived control suggests that the behaviour may not be competence satisfying or may exhibit problems with control. These considerations will then result in active deliberation by the individual of the behaviour under consideration as part of the internalisation process and these deliberations will assist in the formation of intentions to act or not to act. Clearly, as Deci and Ryan (1985) explain, the internalisation process is long term so it may take many of these 'deliberative processes' before the behaviour becomes internalised and therefore contribute to the overall autonomous perceptions of the individual.

Figure 6.4 Hypothesised Diagram Showing the Process of Internalisation which is Governed by Autonomy and Results in a Deliberative Path Predicting Intentions via the Mediation of Attitudes

Incomplete internalisation occurs when the actor has lower relative autonomy and therefore views themselves as doing the behaviour out of obligation or guilt. This is
represented by route C in Figure 6.4. Such a path to action is neither fully internalised nor integrated. Rather, it reflects a process of accommodating introjects but is not associated with enjoyment or a sense of freedom. In this process perceived control and attitudes are considered as this is also an active process. However, at the decision making level, intentions may be formed but are determined according to whether the attitudinal and control considerations lead the actor to make a decision to comply with their introjects, in which case they take action. Alternatively, they can choose to defy those introjects (there is still some degree of autonomy) in which case they will dropout or not take action. Repeated experiences of this ‘route’ will not result in the integration of the behaviour, even though it may be internalised. This is because under such conditions of low autonomy (high introjection on the PLOC), both compliance and defiance will not be met with the positive feelings of freedom of choice and personal satisfaction which are associated with high relative autonomy. Consequently, high relative autonomy and empowerment to make choices is more desirable as the behaviour will be fully integrated and part of the actor’s repertoire of behaviours which contribute to a global sense of autonomy.

A final dimension to this conceptualisation is the inclusion of external regulation and illustrated by route D in Figure 6.4. This is very low relative autonomy and performance of behaviour is contingent on external reasons for behaviour such as punishment avoidance. Such a regulation may or may not be associated with high control, but even if control is high there will not be a concomitant satisfaction of the needs for competence and autonomy, as there is no personal sense of authorship to the action. In the diagram therefore, the route is termed ‘forced compliance’ and results in amotivated action. Such actions are not observed to be different to the action which takes place in routes A and B, except that such a behaviour is independent of any internal cognitions and motivation. The behaviour will therefore cease if the regulation is removed, is not part of the internalisation process and will not contribute to attitudinal and intentional intervention.

Deci and Ryan (1985) insist that the process of internalisation is nonspontaneous and this assists in the explanation of the more spontaneous path between control and intention being reduced to zero. The spontaneous path which was hypothesised as a direct formation of intentions on the basis of past experiences of control, is explained by the inclusion of the relative autonomy index as a further aspect of the internalisation process. Past beliefs about control are incorporated in the process of integrating the behaviour and result in the deliberative process from control to intention via attitudes. This may explain why the control-attitude path is regulated upwards. The variance of intention which was previously regressed on control was
accounted for by the attitude-control relationship once the relative autonomy index was introduced to the model. In summary, the deliberative path reflects the process by which intentions are formed due to the indirect influence of two variables associated with human needs: the relative autonomy index reflecting the degree of autonomy and perceived behavioural control reflecting a person’s competence. This process is termed internalisation and explains how these needs result in a person engaging in an active process of deliberation over the attributes of the behaviour and assessing whether it is or is not likely to become part of a valued set of behaviours in which they can demonstrate competence. This process, as expected, is motivationally adaptive and will therefore result in the formulation of intentions.

The present findings are in contrast to previous applications of self-determination theory to the Ajzen-Fishbein theory. Chatzisarantis (1998) hypothesised that the attitude-intention path became spurious as a result of the contribution of autonomy to the formation of attitudes. It was suggested that attitudes were not motivationally adaptive, particularly over time, but rather were a function of the degree of autonomy a person felt under these conditions. Intentions, too, were related to autonomy which suggests that feelings of self-determination result directly in the formation of intentions independently of attitudes. This was particularly true after the passage of time, proximal intentions predicted distal behaviour, measured at a later time. This suggests that perceptions of autonomy in a given domain exhibit more stability than those of attitudes and intentions whose relationship is affected by the passage of time.

The difference between the study by Chatzisarantis (1998), however, and the present investigation is the inclusion of a measure of control in the current study. It can be seen in the present study that the correlations between the relative autonomy index and attitude (r=.59, p<.01) and the relative autonomy index and intention (r=.34, p<.01) are attenuated by the inclusion of the control variables in the model. This highlights the important role control plays in attitude formation and the relationship with subsequent intention. Not only is the relationship between control and intention attenuated, but the relative autonomy index exerts a significant indirect effect on intention. It may be that deliberation over control and attitudes is necessary for individuals to formulate a plan of action based on their general perceptions of causality. Consequently, attitudes towards the behaviour and relative autonomy alone are not enough to form a behavioural intention, perceived control is a vital intermediate variable.

This is related to self-determination theory and highlights the need for a system of competence represented by control to allow attitudes to be motivationally adaptive.
The need to become self-determining motivates a person to consider their degree of control over the behaviour. The control judgement reflects whether the behaviour is competence satisfying and this, along with the consideration of attitudes, will predict behaviour. Consequently, a person may form intentions but only after a prior deliberation of attitudes which reflect a number of beliefs including control beliefs. In summary, Chatzisarantis’ (1998) model does not include attitude as a predictor of intention and this may be due to the omission of control. Instead a direct path from the relative autonomy index to attitudes and intentions was observed but no attitude-intention path. Conversely, as control is considered in the present study, attitudes reflect a consideration of this control and therefore results in a deliberative path and a significant attitude-intention relationship.

6.5.6 RELATIVE AUTONOMY AND SUBJECTIVE NORM

The introduction of autonomy may also have reduced the effects of control on subjective norms. Studies 2 and 3 indicated that control predicted subjective norms. It was suggested that perceived social pressures are part of the perceived behavioural control variable. The path, therefore, reflected the common variance between the factors, but further indicated that perceived control was an important antecedent of subjective norms and that the aspects of perceived control related to subjective norms are related to intentions, but only through control. In the present study, however, the shared variance between perceived control and subjective norms variables as indicated by the simple correlation ($r = .53$, $p < .01$) was attenuated by the inclusion of autonomy and the competence system of control ($\lambda = .37$, $p < .01$). It is possible then, that these systems may affect the extent to which control influences perceptions of the desires of significant others. Previous researchers have claimed that the effect of subjective norms may vary across samples (Godin & Shephard, 1990; Hausenblas et al., 1997), but may also vary according to the degree of control a person possesses (Kristiansen, 1987). If a person deems themselves to be less dependent upon the input of others, which implies greater personal control and greater autonomy, the less likely perceptions about significant others desires will contribute to the individual’s consideration of intentions and attitudes. It may be that the inclusion of autonomy makes the consideration of social norms less important than behavioural or control beliefs.

6.6 CONCLUSIONS AND RECOMMENDATIONS

The link between control and autonomy is central to the formation of intentions. The inclusion of self-determination theory clearly affects the relationships in the revised
version of the TPB and sheds further light on how deeper motivations and needs affect decisions to act. In particular, the prediction of perceived behavioural control by the perceptions of control variables in the unknown, powerful others and internal domains formed a series of small indirect effects from the relative autonomy index to perceived control. Consequently, the significance of the perceptions of control variables in the model originates from the small amount of variance in control not accounted for by the direct autonomy-control path. The present findings, therefore, show that attitudes and intentions are formed or considered by the actor as a result of their perceived control and degree of autonomy.

The model also highlighted that the inclusion of autonomy reduced to zero the more spontaneous path by which control directly resulted in the formation of intentions. Theoretically, the path by which autonomy indirectly affects intention was viewed as part of the process of internalisation, an active and deliberative means by which people incorporate behaviours and actions into their own system of values. Therefore, perceptions of autonomy result in the formation of intentions after the consideration of attitudes and beliefs about control and a continual replication of this path may result in the behaviour becoming internalised. The key issue is that this path is deliberative and therefore does not involve the direct effects of control on the formation of intentions. It was proposed that the inclusion of autonomy resulted in the processes which make up the control-intention path become part of the deliberative process. Further research will examine how autonomy affects these cognitive variables over time to provide evidence as to whether stable needs are motivating despite the relative instability of the cognitive variables. In addition, the inclusion of behavioural measures, past and prospective, will provide a better understanding of the behavioural significance of the intentions formed as a result of control perceptions under the influence of autonomy.
CHAPTER VII

STUDY 5

Perceived Control as a Predictor of Attitude in the Theory of Planned Behaviour: Cumulating Research Evidence Across Studies 1-4

7.1 INTRODUCTION

The modified version of Ajzen's (1985) Theory of Planned Behaviour (TPB) model which featured the triadic relationship between perceived control, attitude and intentions was common to all four of the previous studies. While possible mediating variables such as prospective behaviour, past behaviour, self-efficacy, perceptions of control in different domains and perceived locus of causality were included in the models tested in these subsequent studies, this basic framework remained at the core. This was first introduced in Study 1. The unique aspect of this model was the hypothesis, after conceptual justification, of a path between perceived behavioural control and attitude. Evidence for the independence of the perceived control and attitude constructs and support for the perceived control-attitude path was provided in three analyses: (1) an initial path analysis using measured variables in Study 1, (2) a confirmatory factor analysis to test the discriminant validity of the control and attitude variables in Study 2 and (3) the estimation of the path in a non-standard path analysis model using latent variables in Studies 2, 3 and 4. Although the control and attitude factors were found to be clearly distinct, some aspects of control predicted variance in attitudes. In addition there was the suggestion of a dual effect of control on intention directly and indirectly via the mediation of attitudes.

Using Fazio's (1990) and Skinner's (1995) views on the relationship between attitudes and intention and between control and intention, it was postulated that the different paths from control to intentions represented two distinct decision making processes. One a more deliberative process by which aspects of control, possibly those relating to problems with control such as barriers to the execution of the behaviour or potential costs of engaging on the behaviour, resulted in a consideration of attitudes prior to the formation of intentions or 'plans to act'. Conversely, the direct control-intention path, which was originally proposed by Ajzen (1985) in his development of the TPB, represented a more spontaneous path, in which some aspects of control contributed to the formation of intentions. As past behaviour has been shown to be directly related to
perceived control (Study 2), it was suggested that those aspects of control due to past experiences with control result in the formation of intentions. This corroborated Skinner's (1995) idea that past experiences of control result in value being attached to the behaviour which provides the sensations of control. The valued behaviour, therefore, has a role in providing feelings of accomplishment and satisfaction to the individual and results in 'feeding' competence. It is motivationally adaptive; children plan to engage in a behaviour if they believe that the behaviour is a sphere in which they can be competent. In this way past experiences of control will be expected to relate to increased motivation to act which is represented by the intention variable. An additional finding in the model was the existence of a path between perceived behavioural control and subjective norms. The possible mechanism proposed for this departure from the original model was that control-attitude relationship also accounted for perceptions of social pressures on intention. Therefore, perceived control is likely to account for an assessment of the desires of others regarding the actor's engagement in the behaviour and these are related to intention via attitude, not by a direct subjective norms-intention relationship.

Since these relationships are important modifications to the TPB, it is necessary to examine whether these findings are just unusual sample-specific findings from certain cross-sections of the population or whether these relationships are consistent across studies. Certainly significant correlations between control and attitudes and between control and subjective norms have been observed in a number of studies (Godin et al., 1992; Godin et al., 1987), but this has often been attributed to the natural association between the variables and no causal relationship was expected. Further, meta-analyses of the TPB have not tested the cumulative average of the perceived control-attitude and subjective norm-control relationships across studies (Chatzisarantis, 1998; Hausenblas et al., 1997). The question therefore arises as to the generalisability of these relationships across studies. The advantage of having a number of studies is that one can make a more convincing case for the existence of these relationships by the statistical accumulation of the desired relationships from the studies. Such an analysis enables stronger inferences to be made due to larger sample sizes and the correction for sources of error.

As research evidence accumulates for a given set of relationships, it is often useful to see whether data from empirical studies highlights some common inferences. Modern syntheses of research findings have sought to utilise data from existing studies as a means for cumulating knowledge across studies. If a particular set of studies indicate a relationship between two constructs or variables it is possible, using 'averaging methods' - known as meta-analytical techniques - to deduce further inferences based on
a larger number of participants and studies. In doing so, researchers are able to make a better 'judgement call' as to the generalisability of the theoretical underpinnings inferred. Research in quantitative psychology has used the growing number of studies to provide further quantitative evidence to drive theoretical development (Hunter, Schmidt & Jackson, 1982). Increasingly, therefore, researchers are encouraged to quantify the strength of research findings on the basis of previous evidence, but also to identify the areas in which there is little cumulative evidence to support a given theory or hypothesis. Indeed, Eagly and Chaiken (1993) corroborate this in stating that "the features of meta-analysis that allow reviewers to make good use of existing research are the tests of consistency of research findings across studies" (p. 689). They claim that consistent findings may provide greater evidence for the existence of the observed relationships, but also inconsistent findings may also direct researchers to the source of such inconsistencies and help them answer more subtle questions about the nature of the relationship or areas in which further study may be necessary. Such quantitative cumulation techniques can also be used with research projects comprising a small number of studies, such as the present thesis, to provide further empirical evidence in support of the findings.

There are different types of meta-analytical techniques such as cumulating correlations or associations across studies, averaging effect sizes of differences between variables or examining the variation in a desired descriptive statistic. In the present analysis, the four previous studies will be subjected to meta-analytical methods for averaging the correlations between the main variables and examining whether the variance in these correlations between studies is predominantly due to error in the data or unmeasured extraneous variables known as 'moderators'. The meta-analytical techniques will provide evidence which will identify the sources of error in a relationship and whether those errors are the cause of differences observed between the relationships in studies. Error in the studies can come from a variety of sources or artefacts. Clearly a correlation derived from tests on a small sample will not be perfectly representative of this correlation in the population. Such error due to the size and other characteristics of the sample is labelled 'sampling error'. In addition, errors due to differing measurement techniques and item interpretation introduce unavoidable random error to the correlation and is termed 'measurement error'. In a meta-analysis, the correlation in the different samples can be corrected for both sources of error. Sampling error is eliminated by transforming the data so that the distribution of the correlation represents that of the population as opposed to the sample. This is done firstly by finding its frequency-weighted average. The frequency weighted correlation gives greater weight to larger studies under the assumption that the distribution of possible correlations in a large sample size is more likely to represent the population distribution. Further, the variance
of the statistic across studies is also corrected by subtracting the constant known as the sampling error variance. A correction is also made to the correlation by accounting for the alpha internal consistency coefficients for the scales which contribute to the association. This corrects the correlation for measurement error. If the alpha coefficients are unavailable, an estimate of the internal consistency of a variable can be made on the basis of reliability coefficients from other variables.

A meta-analysis usually refers to the cumulation of findings from a large number of studies. This is not the case in the present study, rather, meta-analytical techniques will be adopted in order to illustrate whether the TPB relationships hypothesised in Study 1 can be generalised over the four studies. As Hunter, Schmidt and Jackson (1982) state: "cumulation is also valid for 'convenience' samples of studies which happen to lie at hand" (p. 29). The suggestion is that meta-analytical techniques are useful in showing whether the average relationships between the variables are consistent even for studies which have used samples which are 'accidental' and therefore not subjected to elaborate stratified or randomly selected sampling procedures.

7.2 RESEARCH HYPOTHESES

The analysis cumulating the results of Studies 1 to 4 will be conducted in four discrete stages. It is first necessary to test the model in all four samples and provide some indication of whether the triadic relationships between attitudes, perceived behavioural control and intention is observed. The hypothesised model is similar to that tested in Study 1 without the inclusion of a measure of behaviour and the inclusion of the control-subjective norms path and is illustrated in Figure 7.1. The model will be specified and estimated for each sample. Specifically, the following relationships are hypothesised:

H7.1 Intention will be predicted by attitudes and perceived behavioural control, and attitudes will be predicted by perceived behavioural control.

In addition, the relationship between perceived behavioural control and subjective norms is also expected and estimated:

H7.2 Perceived behavioural control will directly and significantly predict subjective norms.
Figure 7.1 Hypothesised model to be tested across all four samples

Note. For Studies 2, 3 and 4, X, and Y3 are latent variables.

The second stage is to test whether the paths between the model variables are invariant across the four studies. A multi-sample path analysis will be estimated for all four samples constraining the parameter estimates to be invariant. It is expected that all equality constraints be correctly imposed and that the following hypothesis is accepted:

H7.3 The perceived behavioural control-attitude, perceived behavioural control-intention, attitude-intention and perceived behavioural control-subjective norm relationships are invariant across the four samples.

The third stage will be to use meta-analytical techniques to test the hypothesis that all the variation in the relationships in model are due to measurement and sampling error. This will be tested using a method for estimating the average correlation and variance by reweighting these statistics by sample size and correcting for reliability. The following hypothesis will therefore be tested:

H7.4 There is no significant difference between the frequency weighted average of the total error variance and the averaged error variance for the averaged correlations between the TPB variables.
Finally, the frequency-weighted averaged, corrected correlations will be entered into a path analysis model estimated to provide a test of the model relationships after the correlations have been corrected for artefacts of error. This will give a better generalisation as to which relationships are altered due to moderation by other extraneous variables and whether any attenuation or inflation of coefficients occurs due to error variance in the model.

7.3 METHOD

Path analyses. For each study, the hypothesised triadic relationships (H7.1 and 7.2) between attitude, perceived behavioural control and intention were tested by the estimation of a non-standard path model using the MLROBUST method. An additional path was hypothesised from perceived behavioural control to subjective norms. The overall goodness of fit of the models was estimated by standard multiple criteria; incremental goodness of fit indices (CFI and TLI), residuals (SRMSR) and the parsimonious Chi-square ($\chi^2/df$ ratio). Once the models had been estimated for all four studies, a multisample (MS) path analysis was conducted on all four samples with a series of equality constraints testing the invariance of the path coefficients across the groups.

Cumulation of correlations. The unattenuated correlations for each relationship between the TPB variables of intention, attitude, perceived behavioural control and subjective norms were generated. Where latent variables were used, composite scores for these variables were calculated. This included the following relationships which were eliminated in the path analyses due to mediation from other variables; the relationship between intention and subjective norm and between attitude and subjective norm. Once these relationships had been identified along with the corresponding sample size from each study, they were subjected to a meta-analysis using the Metaquick computer program. The analysis reweights the correlations for sample size, calculates the proportion of the variance due to sampling error and calculates credibility intervals which give an indication of the possible variation in the correlation across studies. The program conducts the analysis in three stages:

(1) Each correlation is individually corrected for sample size and then averaged across the studies to provide the best estimate of the population correlation for the relationship in question. This gives a correlation which provides greater weight for studies with larger sample sizes. This is termed the ‘bare bones’ or uncorrected average reweighted correlation for the relationship from all the studies available. The correlation is still affected by error from different ‘artefacts’ or sources of error such as sampling and measurement error.
(2) The variance for the average reweighted correlation is then calculated. The average correlation variance is a function of the frequency weighted ‘average square error’. The error in the correlation from all the studies due to sampling error is then calculated. This is subtracted from the variance of the frequency weighted average correlation to produce the amount of variance due to sources of error other than sampling error. This can be tested for significance using the Chi-square test to see if the amount of variance from other sources is a significant contributor to the variance in the average correlation. If the variance approaches zero and is non-significant this indicates that the variation in the correlations across studies is due to sampling error.

(3) Variables are never perfectly measured. Error in measurements add systematic error to the correlations which has a tendency to reduce the relationship between the two variables. The input of reliability coefficients enables a correction for attenuation to be made to the average frequency reweighted correlation due to measurement error. This provides a corrected correlation which accounts for systematic error from measurement but tends to slightly increase the effect of sampling error. Hunter, Schmidt and Jackson (1982) therefore recommend keeping measurement error to a minimum so as to prevent the necessity for correction for measurement error. This way the impact of both errors can be kept to a minimum. It is also recommended to examine the 95% confidence interval of the average corrected and uncorrected correlation coefficient to assess the accuracy of the corrected correlation across the studies and the influence of sampling error. The confidence interval reflects the upper and lower bound of the correlation for it to be statistically significant. As attenuation tends to inflate sampling error, a small confidence interval for the corrected coefficient indicates that the incidence of sampling error is minimal.

Modelling the corrected correlation coefficients. The hypothesised model in Figure 7.1 was then estimated using the matrix of corrected reweighted correlations as the input matrix for the EQS program. The triadic relationships between the attitudes, perceived control and intention variables and the relationship between the perceived behavioural control and subjective norm were all free parameters in the model. This provided an examination of the tendency of the variables within the model to attenuate or mediate other relationships without the confounding influence of measurement error.
7.4 RESULTS

*Path analyses.* The path analyses of the relationships hypothesised in H7.1 and H7.2 are illustrated in Figures 7.2 to 7.5. Goodness of fit statistics for these four single sample analyses are summarised in Table 7.1. The overall goodness of fit of the data to the model was satisfactory for all four samples. However, large variations were observed in the parameter estimates across studies. In particular it seemed that the control-attitude relationship was much lower in Study 1 than Studies 2, 3 and 4, while the attitude-intention path appeared inflated and the control-intention relationship attenuated in Study 2 when compared with the other studies. In addition, it would seem from observation that the control-subjective norm path coefficients were higher in Studies 2 and 4 than in Studies 1 and 3.

Clearly, it would not be correct to draw inferences from these observations as the sample sizes and error sources vary from study to study. Particularly, in Study 1 which used observed, non-latent measures of the constructs in the model instead of latent constructs which would introduce sampling and measurement error into the model rather than the 'error-free' latent variables. Instead, the use of the multi-sample analysis to test for the invariance of the parameter estimates is recommended. The goodness of fit statistics for the multi-sample analysis are presented in the final row of Table 7.1. It is clear that the model is well represented across all data sets from the satisfactory goodness of fit statistics. Only the fit statistics from the model from Study 1 were problematic. This may have been due to the lack of parsimony in the model as there were only 3 degrees of freedom. Further, the model used only observed variables which would increase the error in the prediction as each variable has an associated error term. The equality constraints indicated that only two of the parameter estimates were unequal across studies and both constraints applied to the same relationship. The estimate for the control-subjective norms relationship for Study 1 was significantly lower than the estimates in Studies 2 and 4. This indicates that the contribution of subjective norms to the control variable was much lower in Study 1 compared to Studies 2 and 4, but not compared to Study 3. It may be that the contribution of social pressures to perceptions of control may differ across samples. However, all the other parameter estimates were invariant across the four studies. Therefore the large observed differences in the path coefficients can be attributed to extraneous influences such as sample size or errors due to the measurement of the variables, rather than a true difference in the influence of one on the other.
Figure 7.2 Path Diagram Showing Parameter Estimates for the Hypothesised TPB Model in Study 1

Figure 7.3 Path diagram Showing Parameter Estimates for the Hypothesised TPB Model in Study 2
Figure 7.4 Path Diagram Showing Parameter Estimates for the Hypothesised TPB Model in Study 3

![Path Diagram for Study 3]

Figure 7.5 Path Diagram Showing Parameter Estimates for the Hypothesised TPB Model in Study 4

![Path Diagram for Study 4]

Table 7.1 Goodness of fit statistics for single and multi-sample path analyses

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>$\chi^2$</th>
<th>$\chi^2$/df</th>
<th>SRMSR</th>
<th>CFI</th>
<th>TLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 1</td>
<td>181</td>
<td>23.51</td>
<td>7.83</td>
<td>.045</td>
<td>.80</td>
<td>.80</td>
</tr>
<tr>
<td>Study 2</td>
<td>382</td>
<td>35.26</td>
<td>1.53</td>
<td>.025</td>
<td>.98</td>
<td>.97</td>
</tr>
<tr>
<td>Study 3</td>
<td>1152</td>
<td>60.07</td>
<td>2.73</td>
<td>.013</td>
<td>.99</td>
<td>.98</td>
</tr>
<tr>
<td>Study 4</td>
<td>1088</td>
<td>41.85</td>
<td>1.99</td>
<td>.010</td>
<td>.99</td>
<td>.99</td>
</tr>
<tr>
<td>Multi-sample</td>
<td>2803</td>
<td>201.23</td>
<td>2.65</td>
<td>.015</td>
<td>.98</td>
<td>.97</td>
</tr>
</tbody>
</table>
Cumulation of correlations across studies. The correlation coefficients between the TPB variables for Studies 1 to 4 are provided in Table 7.2. The correlations differ from the factor correlations presented in the previous studies as these represent correlations from the composite average of the scales with multiple indicators. These correlations are used as the input in meta-analysis as they are unaffected by the structural equation modelling procedure which controls for error in latent variables when the factor correlations are estimated. It is therefore expected that the correlations presented in Table 7.2 are lower in magnitude than those presented in previous studies as artefactual error tends to attenuate these relationships. It can be seen that some of the relationships appear different some cases. Observed differences in the relationships could again lead to the researcher inferring inconclusive findings across studies. Hunter, Schmidt and Jackson (1982) state that even large observed variation in correlations may only indicate that there is substantial artefactual error in the coefficients and not that there is any true variation in the correlation as a result of extraneous variables.

Table 7.2 Correlations between Composite TPB Variables Used as Input for the Meta-Analytic Cumulation of the Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Attitude-Intention</th>
<th>Attitude-Subjective Norm</th>
<th>Control-Norm</th>
<th>Control-Attitude</th>
<th>Control-Intention</th>
<th>Subjective Norm-Control</th>
<th>Subjective Norm-Intention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>181</td>
<td>.73*</td>
<td>.34*</td>
<td>.25*</td>
<td>.38*</td>
<td>.11</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>382</td>
<td>.51*</td>
<td>.34*</td>
<td>.28*</td>
<td>.32*</td>
<td>.29*</td>
<td>.31*</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1088</td>
<td>.50*</td>
<td>.30*</td>
<td>.35*</td>
<td>.27*</td>
<td>.20*</td>
<td>.25*</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1152</td>
<td>.49*</td>
<td>.20*</td>
<td>.41*</td>
<td>.31*</td>
<td>.19*</td>
<td>.15*</td>
<td></td>
</tr>
</tbody>
</table>

Note. * p<0.01

The results of the cumulation of the correlations across studies is presented in Table 7.3. In all but one of the relationships, there was a significant difference between the average total variance and the variance attributable to sampling error. It can therefore be seen that the majority of the variance in the correlation for the subjective norm-control variable can be attributed to sampling and measurement error and that the variation is unlikely to be attributable to the influence of moderating variables. The correlation corrected for sampling and measurement error, r_c, indicated that the control-subjective norm and the control-attitude relationships in particular increased after the influence of artefacts of error were removed. Other correlations did not exhibit substantial change and the subjective norm-intention correlation remained unchanged. The relatively large proportion of residual variance for all the averaged correlations across the studies, the
control-subjective norm path excepted, suggests that these relationships are affected by the influence of moderators. Since the cumulative statistic between the studies represented only the simple correlation between the variables, it is possible that some of the variables already existing in the model may act as moderators. However, there is also the possibility that other extraneous, unmeasured constructs were responsible for the unaccounted variance.

Table 7.3 Corrected Correlations, Error Variance, Confidence and Credibility Intervals for the Composite TPB Variables

<table>
<thead>
<tr>
<th>Relationship</th>
<th>N</th>
<th>r</th>
<th>r&lt;sub&gt;e&lt;/sub&gt;</th>
<th>error variance (%)</th>
<th>χ²</th>
<th>Confidence Interval&lt;sup&gt;†&lt;/sup&gt;</th>
<th>Credibility Interval&lt;sup&gt;†&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude-Intention</td>
<td>2803</td>
<td>.46</td>
<td>.51</td>
<td>5.85</td>
<td>68.34*</td>
<td>.47</td>
<td>.26</td>
</tr>
<tr>
<td>Attitude-Subjective Norm</td>
<td>2803</td>
<td>.28</td>
<td>.31</td>
<td>16.57</td>
<td>24.14*</td>
<td>.27</td>
<td>.16</td>
</tr>
<tr>
<td>Control-Attitude</td>
<td>2803</td>
<td>.36</td>
<td>.62</td>
<td>37.29</td>
<td>10.73**</td>
<td>.56</td>
<td>.49</td>
</tr>
<tr>
<td>Control-Intention</td>
<td>2803</td>
<td>.28</td>
<td>.44</td>
<td>24.44</td>
<td>16.36*</td>
<td>.38</td>
<td>.27</td>
</tr>
<tr>
<td>Subjective Norm-Control</td>
<td>2803</td>
<td>.20</td>
<td>.32</td>
<td>85.97</td>
<td>4.65</td>
<td>.26</td>
<td>.28</td>
</tr>
<tr>
<td>Subjective Norm-Intention</td>
<td>2803</td>
<td>.20</td>
<td>.20</td>
<td>26.38</td>
<td>15.16*</td>
<td>.16</td>
<td>.10</td>
</tr>
</tbody>
</table>

Note. * p<0.01 ** p<0.05  
<sup>†</sup> Lower bound on top row, upper bound on bottom row

The credibility interval indicates the degree of variability of the average correlation in the population. The larger the range, the less accurate an estimate the average correlation is of the true population correlation. This indicates that measurement error may be responsible for the correlation not being representative of that in the population. The confidence interval indicates the accuracy of the statistic from the meta-analysis. There is a 5% chance that a similar test of the relationship will reveal a correlation which falls outside this range. Hunter, Schmidt and Jackson (1982) state that this is often a better way of reporting statistical significance as it not only indicates that the correlation is significant by indicating whether the confidence interval includes the value of zero, but it also provides an estimate of the degree of uncertainty in the correlation that the researcher is faced with. In the present study, it can be seen that the confidence
intervals for the corrected correlations are relatively narrow suggesting that the probability of finding that same correlation in another observation has only a 5% chance of falling outside the given range about the averaged correlation.

Path analysis with corrected correlations. A further measurement issue is that the corrected correlations from the meta-analytical cumulation of studies did not account for directionality. Further, any shared variance between the constructs and potential mediation of the theory relationships when the constructs were considered together in a causal structure needed to be examined. Therefore the corrected correlation coefficients reported in Table 7.3 were used as an input matrix for a path analysis model. The purpose of the analysis was to examine the magnitude and direction of the relationships between the variables in the model after the cumulation of the correlations across all studies and the effect of sampling error had been removed. It is possible that some of the inflation or attenuation of the relationships in the previous studies were only a function of artefactual error and not true attenuation by variables in the model. The path analysis was estimated using the ML{ROBUST} method and used the CFI, TLI, \( \chi^2/\text{df} \) and SRMSR indices as multiple criteria for overall goodness of fit. The analysis resulted in a well fitting model according to all of the indices of good fit (\( \chi^2=22.44; \text{df}=3; \text{CFI}=0.98, \text{TLI}=0.98, \text{SRMSR}=0.037 \)) with the exception of the \( \chi^2/\text{df} \) ratio which was too high (\( \chi^2/\text{df}=7.48 \)) and therefore the results need to be interpreted with caution. The model is represented in Figure 7.6. The hypothesised paths between the theory variables were all significant and the LM- and W-tests recommended no modifications to the model.

**Figure 7.6 Path Diagram Showing Parameter Estimates for the TPB Variable Relationships from the Corrected Correlations**

![Path Diagram](image-url)
It can be seen that the averaged corrected correlations from Table 7.3 between control and intention \( r_c = .44 \) and between attitudes and intention \( r_c = .51 \) were attenuated by their inclusion in the model to \( \lambda = .20 \) \( (p<.01) \) and \( \lambda = .39 \) \( (p<.01) \) respectively. This suggests that these paths have the tendency to be reduced when they are included in the model and these reductions are independent of sampling and measurement error. In addition, a comparison of the corrected correlation and parameter coefficients for the control-attitude and control-subjective-norm variables indicated that they remained unchanged after inclusion in the model. Although this cumulation of studies examined the correlations between subjective norms and intention \( r_c = .20 \) and attitude and subjective norms \( r_c = .31 \) they were not included in the model. As neither modification test suggested any alterations to the model, it can be concluded that these relationships tended to be reduced to zero in the model.

7.5 DISCUSSION

7.5.1 SUMMARY OF FINDINGS

The present statistical cumulation of data from four studies examined the relationships between four variables in the modified TPB - perceived control, attitude, intention and subjective norms. The investigation was conducted using three separate analyses. Initially, the tripartite relationships between the principle variables of perceived control, attitude and intention was hypothesised for each study. The model included the path between control and attitudes and also a direct relationship between control and subjective norms. The analysis yielded significant parameter estimates for all the hypothesised paths with the exception of the control-subjective norm path for Study 1.

To examine whether the results were generalisable across the studies, a multisample path analysis was conducted constraining the parameter estimates to be equal. The constrained model demonstrated excellent goodness of fit and suggested that all paths were equal with the exception of the control-subjective norm path which did not demonstrate invariance between Study 1 and Study 2 and between Study 1 and Study 4. These results suggested that the observed variation in the parameter coefficients were a function of sample size and measurement error rather than true variation. This presents a more powerful case for the generalisability of the hypothesised relationships.

An additional examination of the relationships across the studies was performed using meta-analytic techniques. The simple correlations between the model variables were corrected for sample size and sampling error and confidence intervals and credibility intervals calculated. The corrected correlations indicated that the correlations were brought into line, in terms of magnitude, with the factor correlations reported in each
study as the correction for sampling error removed error principally due to sample size as is also done when latent constructs are used in structural equation modelling. Furthermore, the results for corrected standard errors indicated that the variation in correlations for the control-subjective norms relationship was principally due to measurement error, while the remaining variable correlations showed substantial residual variance which indicate the presence of moderating variables. Finally, the path analysis of the corrected correlations provided evidence that the attitude-intention and control-intention relationships tended to be reduced by their inclusion in the model. It is possible that the inclusion of the control-attitude relationship resulted in the reduction of the influence of each path by sharing the influence of these variables on intention between the two paths.

7.5.2 THE ROLE OF CONTROL IN THE CUMULATED MODEL

From a theoretical perspective the results of the present study corroborate the triadic relationships between attitude, control and intention first reported in Study 1. It was hypothesised that perceived behavioural control exerted a dual influence on intentions; directly as hypothesised by Ajzen (1985) in his original version of the TPB and indirectly via a path from perceived control to attitudes. Skinner (1995) stated that beliefs about behaviours, the natural precursor of attitudes, were built up as a result of a consideration of beliefs about control. In addition, she claimed that past experiences of control result in the satisfaction of competence. As people, particularly young people, tend to try to perpetuate experiences in which they can feel or demonstrate competence, they will be compelled to continue participating in a behaviour which provides those sensations. As a result of past experiences of control, a child may therefore formulate plans or intentions to act again on the basis of these past experiences. Therefore, the hypothesised path between control and intention represented a spontaneous process by which intentions were formed on the basis of past experiences of control. Conversely, a more deliberative path which represented a consideration of both control and attitudes prior to the formulation of intentions was hypothesised. This may reflect a person’s considerations when s/he had problems with control, such as many barriers to consider or much potential cost in terms of effort and planning, or when there were not control beliefs to fall back on such as in the case of a novel behaviour. Therefore, theoretically, these relations seem to be consistent across the samples studied and make the modified ‘core’ of the TPB seem empirically justified.
7.5.3 THE CONTROL-SUBJECTIVE NORMS RELATIONSHIP

Only the relationship between control and subjective norms was not generalisable across studies according to the multi-sample analysis, indicating differences in this coefficient across samples. It may be that the influence of subjective norms differs greatly between different groups. Some authors (Ajzen, 1985; Blue, 1995; Hausenblas et al., 1997) have reported that the contribution of subjective norms to intention in the TPB is typically lower in magnitude and sometimes non-significant relative to the relationship between attitude and intention and between perceived behavioural control and intention. However, this has been shown to differ depending on the behaviour, an observation made by Fishbein and Ajzen (1980) in their initial tests of the model. However, in an exercise and physical activity context the attitude and perceived behavioural control variables consistently contribute more to the prediction of intentions than subjective norm. A possibility may be that physical activity is a behaviour which requires substantial personal planning and evaluation and is less subject to others' opinions. Further, it may be that children generally participate in physical activity due to the personal beliefs and perceptions of control they hold over that behaviour rather than the perceived pressures of others.

The fact that for most of the correlations of interest in the present model the variance attributable to sampling error is very low can be seen as positive from a methodological and theoretical viewpoint. Methodologically, it indicates that the selection of samples was adequately representative of the population and minimal error could be attributed to this artefact. The exception to this is the subjective norms-control variable. This exhibited no significant difference between the variance accounted for by sampling error and the total variance. This finding may provide an indication as to why this path was exhibited variance across the studies. The large amount of sampling error in this particular correlation was causing path coefficients to exhibit variance particularly between studies 2 and 3. In addition, it can be seen that this correlation was increased from \( r = 0.20 \) to \( r = 0.32 \) with correction, indicating that sampling error tends to attenuate the true correlation between variables.

7.5.4 THE ROLE OF MODERATORS

The significant contribution of the residual error variance to the overall error variance suggests that some of the variance in the correlations were the result of error other than the artefacts corrected for in the cumulation of results using the meta-analytical techniques. This points to the influence of moderating variables which may account for the observed differences in the correlations. Some of these moderating variables may be
those already included in the augmented TPB models presented in Studies 1 to 4. An example would be the past behaviour construct. This was found to predict perceived behavioural control in Study 2. However, although not tested in Study 2, past behaviour may also have acted as a moderator of the control-intention relationship as was shown by Bagozzi and Kimmel (1995).

7.5.5 ROLE OF THE CONTROL-ATTITUDE PATH

The path analysis using the model correlations corrected for sampling and measurement error provided a model which indicated the attenuation of both the attitude-intention and control-intention relationships. Theoretically, this can be seen to be the result of the control-attitude path. The inclusion of this path may result in some of the variance in attitudes regressed on intentions being removed by the inclusion of control and some of the influence of control on intention being regressed on intention via the indirect path through attitudes. An examination of the total effect of control on intentions produces a coefficient of \( \lambda = .44 \) which, of course, mirrors the corrected correlation for the control-intention path. Therefore the inclusion of the control-attitude path is responsible for attenuating the attitude-intention path from \( r_c = .51 \) to \( \lambda = .39 \). This indicates that the cumulation of these relationships across the studies and including them in a causal model results in a tendency of control attenuate the influence of attitudes on the process of forming intentions to act. This has implications in terms of those wishing to influence children's physical activity. The fostering of positive attitudes towards physical activity may not be enough to perpetuate participation. Positive beliefs about control can contribute to the process of continuing involvement by perpetuating the formation of intentions to act. This is advantageous as helping children form 'positive' attitudes is difficult - how does one change a person's personal views or beliefs towards a behaviour? Instead it is worthwhile recommending that physical educators, sports leaders and other involved in promoting physical activity in children provide scenarios which empower children to feel as if they are doing the activity for themselves. This will enable the fostering of positive experiences of control over the activity. This may lead children to experiencing feelings of or a sense of control when they next engage in the activity. Positive control beliefs may result in a spontaneous plan to act the next time they come into contact with the appropriate environmental cues or at least allow them to form positive attitudes on the basis of the control experiences they have.
7.6 CONCLUSIONS AND RECOMMENDATIONS

In conclusion it can be seen that the triadic relationships of intention, attitudes and perceived behavioural control hypothesised in Study 1 which formed the central framework about which the series of current investigations was conducted, received further confirmation. As a starting point, the triadic relationships between control, attitude and intention seems logical and theoretically justifiable. The modified model is theoretically justified in relation to Skinner’s (1995) theory on the need for competence and Fazio’s (1990) ideas on spontaneous and deliberate formations of intentions. The model also highlights the important role of perceived behavioural control in the model and assists in the explanation of the covariance between perceived control and attitudes which was unexplained in previous studies. However, one must exercise caution in interpreting these results. While these results represent the cumulation of four separate empirical studies with a total sample size of 2803 children, the meta-analytical techniques of cumulating the correlations between the study variables indicated that there still remains a great deal of unexplained variance for the correlations between the studies. This represents variation not attributable to the artefacts corrected for in the present study. The presence of moderating variables can be held accountable for the observed variation. Some were put forward of possible moderators may be responsible for changing the relationships and there may be a number of other unmeasured constructs which may affect the triadic relationships between control, attitude and intention in the modified TPB (Sheeran & Orbell, 1998). Nevertheless, these results indicate that this modified TPB model is a viable starting point in the explanation of the motivations behind children’s actions and plans to act in the area of physical activity.
CHAPTER VIII

GENERAL DISCUSSION

8.1 SUMMARY OF FINDINGS

This thesis examined the role of perceived behavioural control in a modified theory of planned behaviour (TPB) from the perspective of human needs theories. Specifically, a broader role of perceived behavioural control in the TPB was identified and it was shown that control was an antecedent of attitudes as well as intentions. The direct and indirect paths from control to intentions were hypothesised as the spontaneous and deliberative processes behind the formation of intentions (Fazio, 1990). Further, the examination of perceived behavioural control in the TPB was related to theories on the conceptualisation of competence and control proposed by Skinner (1995) and organismic integration theory proposed by Deci and Ryan (1985). In addition, measurement issues regarding the distinction between control and attitudes and between control and self-efficacy as well as the measurement of behaviour were addressed.

The first two studies examined the role of control and its effects on attitudes and intention, as precursors of behaviour. The results of these two studies indicated that control had a more elaborate role in the TPB as a predictor of both attitudes and intentions or, in the presence of an attitude-behaviour relationship, prospective behaviour. Two further studies investigated the role of control in the TPB taking more elaborated control and control-related variables into consideration. Firstly, the utility of self-efficacy, a variable often likened to control (Ajzen, 1985; Terry et al., 1993; Terry & O'Leary, 1995), was included in the model. Subsequently, variables relating to perceived locus of causality and domain specific, more global measures of control were included in a model to examine how the model was affected by perceptions of autonomy and a competence system comprising different control measures. Finally, the role of control as a predictor of attitudes within the TPB excluding the mediating influences of the attitude-intention and attitude-behaviour relationships, efficacy and perceived locus of causality, was examined in a cumulation of relationships across the studies using meta-analysis and path analysis techniques. These studies are summarised in Table 8.1.
Table 8.1 Summary of Studies 1 to 5.

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample</th>
<th>Purpose</th>
<th>Measures</th>
<th>Results</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>181 children, 12-14 yrs.</td>
<td>To examine the role of control as a predictor of attitudes and intention and the relationship of these variables to behaviour.</td>
<td>TPB questionnaire, Four by one day recall physical activity questionnaire.</td>
<td>Triadic relationship found. Control predicts intention both directly and indirectly through attitudes. Behaviour weakly predicted by intentions.</td>
<td>Children may form attitudes toward physical activity on the basis of their control beliefs. This was hypothesised to be due to control predicting aspects of attitudes relating to behavioural beliefs. Intentions may be formed on the basis of perceived control either through a deliberative path, including the consideration or formation of attitudes, or spontaneously on the basis of control beliefs.</td>
</tr>
<tr>
<td>2.</td>
<td>382 children, 12-14 yrs.</td>
<td>To examine the role of past behaviour in the triadic relationships between attitudes, control and intention.</td>
<td>TPB questionnaire including a measure of past behaviour, Four by one day recall physical activity questionnaire.</td>
<td>Past behaviour predicted perceived control. Control-intention relationship reduced to zero by the inclusion of direct attitude-intention and attitude-behaviour paths. Attitudes directly predicted behaviour and regulated the intention-behaviour relationship.</td>
<td>Control-attitude path further supported. The significant past behaviour-perceived control relationship indicates that the control variable may include judgements on past experiences of control. Consideration of intention may not be necessary if direct attitude-intention and attitude-behaviour paths are included in the model. The spontaneous path from control to intentions was redirected through attitudes.</td>
</tr>
<tr>
<td>3.</td>
<td>1152 children, 12-14 yrs.</td>
<td>To assess the utility of self-efficacy as a distinct aspect of control in the prediction of attitudes and intention.</td>
<td>TPB questionnaire, Self-efficacy questionnaire, SD scale.</td>
<td>Self-efficacy shown to be distinguishable from but related to perceived control. Self-efficacy affects the deliberative and spontaneous processes in the model.</td>
<td>Control-attitude path remains, but relationship between control and intention is regulated by inclusion of self-efficacy. Self-efficacy attenuates both the deliberative and spontaneous processes by which children form physical activity intentions and is likely to be related to their need for competence.</td>
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<td></td>
</tr>
<tr>
<td>4.</td>
<td>1088 children, 12-14 yrs.</td>
<td>To examine the influence of relative autonomy on a competence system comprising perceptions of control and perceived behavioural control.</td>
<td>TPB questionnaire, PLOC questionnaire, Perceptions of Control Questionnaire, SD scale.</td>
<td>Relative autonomy index related to perceived control which forms deliberative path to intentions via attitude. Spontaneous control-intention path attenuated to zero.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Control predicts attitude as previously hypothesised but not intention, suggesting that autonomy and perceptions of control reduce this relationship to zero. Model may represent part of the process of internalisation. Autonomy governs the process by which perceived control feeds competence and attaches value to behaviours and this results in the formation of attitudes and intentions to act.</td>
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<td>5.</td>
<td>2803 children, 12-14 yrs.</td>
<td>To test the generalisability of the triadic relationships between perceived control, attitudes and intention across Studies 1, 2, 3 and 4.</td>
<td>TPB variables from all four studies.</td>
<td>Only subjective norm-control path shown not to be invariant. Variation in correlations shown to be due to more than just sampling error. A path analysis of the corrected correlations showed that the attitude-intention and control-intention paths tended to be attenuated.</td>
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<td>Control-attitude path exhibited strong correlation and is consistent across studies, but may be influenced by other variables. While all the triadic relationships are consistent across the studies, any variation in coefficients may be due to the presence of moderating variables.</td>
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The studies indicate that control was a strong predictor of attitudes and this explained the high covariance and correlations reported between these variables in other studies (Ajzen, 1985; Godin et al., 1993; Godin et al., 1987). A triadic relationship was initially proposed in which attitudes and perceived control predicted intentions as hypothesised in the original formulation of the TPB (Ajzen, 1985) but, additionally, perceived control was presumed to predict attitudes. It was shown that perceived behavioural control, when viewed as an exogenous variable in the model, governs the formation of intentions via a deliberative process which includes attitudes and a spontaneous process in which perceived control directly predicts intentions (Study 1). Cumulation of the results showed these results to be consistent across the four studies (Study 5). It was found, though, that the perceived control-intention relationship may have been the result of other moderating variables.

The triadic relationship was then used as a framework for testing the inclusion of variables related to the human needs for competence and autonomy: self-efficacy as a further differentiation of control and perceived locus of causality. Self-efficacy was found to represent aspects of control due to perceived ability and is therefore related to perceptions of competence (Study 3). It was found that self-efficacy, as an exogenous variable, governed the triadic relationship and regulated the control-intention path. Interpretation from Skinner’s conceptualisation of control suggested that a more differentiated role of perceived behavioural control in the model could be identified. The inclusion of self-efficacy differentiated between capacity beliefs (self-efficacy) and control beliefs (perceived behavioural control). Finally, a variable representing the ‘degree of autonomy’ in a physical activity context, a reweighted composite of the perceived locus of causality scale, was shown to be a predictor of perceived control but did not predict intentions or attitudes directly as hypothesised. Autonomy was shown to be a precursor of perceived control and reflected part of the process of internalisation in which the behaviour is actively and deliberately assimilated by the individual to accommodate his/her environment (Study 4).

This discussion will focus on general points regarding the findings from this series of five studies. Specifically, the utility of the perceived control variable in the modified model and the usefulness of theories of needs in explaining these relationships will be highlighted. In addition, the implications of these findings for both theory and practice will be outlined. Finally, some recommendations for future research projects to extend these ideas will be proposed.
8.2 THE UTILITY OF PERCEIVED BEHAVIOURAL CONTROL IN THE PREDICTION OF ATTITUDES AND INTENTIONS

Perceived behavioural control has been identified as a focal variable in the formation of intentions and attitudes towards physical activity in children. Perceived behavioural control had a dual effect on intentions directly and indirectly via attitudes. This was explained as the existence of deliberative and spontaneous paths according to Fazio's (1990) and Skinner's (1995) conceptual models. Clearly, the perceived control-attitude path is an addition to the model which was not previously hypothesised by any other paper. The current investigation has conceptually and empirically supported its inclusion in the TPB. This path was initially reported in Study 1 and further empirical support was provided by (1) the consistency in the control-attitude and control-intention paths in the meta-analysis across all 4 studies conducted in Study 5 and (2) the distinction made between attitudes and control in Study 2.

Conceptually there is evidence to suggest that perceived control may be a precursor of attitudes. Skinner (1995) proposed that as control feeds a child's competence towards an action or behaviour it will affect a child's perception of ability towards that behaviour. Past experiences of control, then, may lead to attitudes or 'behavioural orientations' being formed on the basis of those past experiences, particularly if they are negative. In this way, attitudes may reflect a possible agenda which either motivates or defies action based on past experiences of control and, in particular, possible problems with control such as barriers and low perceived ability. Therefore when asked about whether engaging in a physical activity will be easy or difficult or up to them a child may make an assessment of their ability to perform that behaviour as well as potential costs and barriers. This may lead to a consideration of attitudes prior to the formulation of intentions.

The notion of control as an antecedent of attitudes has been corroborated by other researchers who have indicated that attitudes may be a function of control. Bagozzi (1990), for example, hypothesised that perceived control over a behaviour, as reflected by expectations and attitudes towards success and failure, was related to attitudes towards making a behavioural attempt or 'attitudes towards trying'. Logically, the influence of perceived control on attitudes may form a route by which attitudes are either formed or considered in the face of considerations about past control and possible problems with control in relation to ability, expectation of success and possible barriers. This leads to the variable of perceived control possessing a very diverse set of
experiential beliefs about control and expectancies about control over the behaviour in question. This may be why perceived control exhibits two pathways to the formation of intentions - directly and indirectly via attitudes.

Recently, Chatzisarantis and Biddle (1998b) have conducted a 40-study meta-analytic review of the physical activity research using the TPB. The analysis examined the theory relationships by reporting correlations corrected for sampling and measurement error. These correlations with the standard errors were then used as input for the EQS computer program to estimate a path analyses model in a similar procedure to Study 5. This enabled the specification of causal relationships between the TPB variables to provide evidence for unidirectional paths. Findings indicated that there was a high and significant corrected correlation between attitude and control ($r_c=.52, p<.01$) which was modelled in the path analyses as a significant control-attitudes path ($\lambda=.52, p<.01$). Such evidence provides data which are more reliable and have predictive, concurrent and nomological validity within the final model.

One possible reason for the existence of the control-attitude relationship might be the substantial shared variance between these constructs. It is clear that while attitudes and control are distinct concepts, perceived control may represent some aspects of attitudes. Trafimow and Fishbein (1998) hypothesise that perceived control measured in terms of an assessment of how easy or difficult a behaviour is to perform can be seen as a behavioural belief. Children may view the fact that it could be an advantage if the behaviour was easy to perform and therefore include this assessment as a behavioural belief which is a precursor of attitudes. This might be why control predicts attitudes, because some aspects of control are related the beliefs system which underlies the formation of attitudes. This can be supported through the definitions of behavioural beliefs and perceived control. Behavioural beliefs reflect a person's expectancies regarding outcomes as a results of behaviour. This is paralleled with Skinner's (1995) definition of control beliefs as the ability of the actor to produce outcomes. Therefore, outcome expectancies, a proximal predictor of attitudes incorporates elements of control beliefs and this may be the mechanism behind the control-attitude causal relationship. DuCharme and colleagues also recognise that outcome expectancies are related to attitudes and behavioural beliefs: "Outcome expectancy provides another overlapping concept with the Theory of Planned Behaviour. This additional overlap is observed in the valued outcomes thought to be a reflection of attitudes towards an action" (p. 4). The authors therefore highlight the conceptual overlap between control and attitudes.

Trafimow and Fishbein (1998) refute this argument by showing that the concepts are distinct at the level of beliefs. Although they did not indicate the degree of shared
variance in the two constructs. Their analysis might have indicated, as many other studies have, including the present one, that perceived control and attitudes are related at the empirical level. Therefore, while they may be distinct, the perceived control variable may be sufficiently broad to account for assessments which are akin to behavioural beliefs and can predict attitudes as well as other control beliefs. Indeed, the presence of relationships with other variables is an indicator of the broad nature of the perceived control construct, particularly as it predicts other variables which attitudes do not. This is corroborated by the multi-sample analysis and meta-analytic cumulation of the studies conducted in Study 5 which indicated that while the model is consistent across these studies, the variance due to artefactual error for many of the relationships, including that between control and attitudes, may be high indicating the presence of moderating variables.

Some of the mediating variables included in the present study had implications for the proposed relationship between control and attitudes. While control was a predictor of attitudes it was also shown to have utility in predicting intentions via a 'spontaneous' process. This was in addition to its effects on attitudes. It was proposed that the control-intention relationship may have been due to the perceived control variable accounting for other aspects of control other than the beliefs which predict intentions. It is therefore possible that the control variable includes a number of different aspects relating to a person's overall perception of their control over a behaviour. Some researchers have suggested that perceived control predicts intentions when it represents difficulties or 'problems with control' and behaviour when it is more a reflection of 'real control' (Ajzen, 1985; Blue, 1995; Terry & O'Leary, 1995). In the present study it was proposed that when children view engaging in physical activity behaviour as difficult to do, has associated costs or barriers or is a novel behaviour, it requires active thought regarding previously held attitudes or beliefs. Such deliberations are responsible for the more deliberative path through which control guides behaviour via attitudes. The spontaneous path may be due to people formulating plans to act purely on the basis of their past experiences of control over that behaviour. Evidence in favour of this comes from the inclusion of self-efficacy in the model in Study 3. Self-efficacy was found to regulate the control-intention relationship. As self-efficacy reflects confidence about engaging in a behaviour it must therefore account for past experiences with that behaviour in order to make such an assessment. Consequently, this perception of past experiences of ability may cause the actor to form intentions spontaneously on the basis of these perceptions. This indicates that perceived control reflects other aspects of control and it is the aspects of control relating to past experiences of control such as perceived ability which are responsible for the spontaneous control-intention path.
The role of self-efficacy in the regulation of the control-intention path is more complex than this. Self-efficacy also has an indirect effect on intention through the mediation of control and attitudes. Such an indirect effect may be the result of considerations about ability which are negative. It may therefore reflect a barrier or problem with control and require the consideration of attitudes. Hence the deliberative and spontaneous paths still exist with the inclusion of self-efficacy and this illustrates the diversity of the perceived control construct.

In some cases the spontaneous path between control and intentions may not exist. In Study 2 the attitude-intention path attenuated the control-intention path to zero, possibly due to the relationship between attitude and behaviour. It may be that the control-intention path was really in existence only because intention, rather than attitude, served as a the mediator between control and behaviour. These results indicate that perhaps the spontaneous path was accounted for by the inclusion of the attitude-behaviour relationship. Further evidence for the attenuation of the control-intention path was provided in Study 4 when control-intention path was reduced to zero by the inclusion of a relative autonomy index. It can therefore be suggested that the spontaneous exists only because other variables remain unmeasured. Rather it is a by-product of the variance which should be modelled by the inclusion of a direct attitude-behaviour path, self-efficacy beliefs or the relative autonomy index.

The inclusion of autonomy in Study 4 resulted in different aspects of control to be directly involved in a deliberative process which may have been part of 'internalisation'. It is possible that since internalisation is an active process; all aspects of control are considered before the formation of intentions whether they be advantages or disadvantages, positive or negative. In summary, the perceived control variable in the triadic relationship represents a number of different aspects of control such as past beliefs about control, confidence and a consideration of the problems of control. This is clear from its effects on intention through a direct, spontaneous process and an indirect, deliberative process via attitudes. The direct relationship, however, is subject to mediation by other extraneous variables which are related to control such as self-efficacy.

8.3 THE TPB AND THE NEEDS FOR COMPETENCE AND AUTONOMY

While the TPB offers a useful starting point in the explanation of the antecedents of physical activity behaviour and is a step forward from the 'mechanistic' views offered
in operant or behaviourist theories on human behaviour, this cognitive approach neglects 'deeper human motives' (Deci & Ryan, 1985). The current study aimed to approach Ajzen's (1985) cognitive approach from a perspective offered by recent organismic paradigms (Deci & Flaste, 1995; Deci & Ryan, 1985; Deci & Ryan, 1987; Ryan & Connell, 1989) which serve to explain, at a general level, the origins of the cognitive, antecedent variables. The variables used to predict intentions and behaviour in the current series of investigations can be seen as having their origins in the innate human needs for competence and autonomy (Deci & Ryan, 1985). Of particular relevance to this perspective is the role of perceived behavioural control.

Skinner's (1995) recent operationalisations of control indicate that experiences of control contribute to the person's feelings of competency for a given behaviour making perceived control a useful benchmark for the degree of competency a person feels toward a given situation. In Study 1, the relationship of control with attitudes and intentions was explained through the competence-satisfying properties of control experiences. It was suggested that aspects of the perceived control variable relating to an assessment of past experiences with control were related to feelings of competency. In this way these aspects of control were seen to be motivational. The person acts spontaneously on the basis of the control experiences so as to perpetuate the behavioural conditions under which control was experienced and maintain feelings of competency. However, as hypothesised earlier, the control variable may also account for other aspects of control such a perceived barriers or costs and control perceived where there are many barriers or problems with control to consider were more likely to follow a deliberative route through attitude.

The role of control altered somewhat when other variables were included in the model. In Study 2, past behaviour directly predicted perceived behavioural control and this indicated that past experience of the target behaviour predicted the variance in perceived control relating to considerations of past control. Therefore past experiences of control could lead to spontaneous acts which are independent of intentions. The control variable was also differentiated by the inclusion of self-efficacy. As self-efficacy has to do with perceptions of ability, it would be expected to be related to competence. Indeed, the aspects of control which were regressed on intention were regulated by the inclusion of efficacy and indicated that the aspects of control which were responsible for the spontaneous path were due to perceptions about ability. Finally, the control variable was further differentiated into different sources of control in the general domain of physical activity and included in a model alongside perceived locus of causality, a measure of autonomy. The results of this final study indicated that the competence system made up of the control variables was predicted by relative
autonomy. This variable reduced the spontaneous path to zero and had a direct effect and indirect effects via the domain-specific perceptions of control (powerful others, internal and unknown) on perceived behavioural control.

The indirect prediction of intention by the relative autonomy index via the mediation of attitude and perceived behavioural control was hypothesised as a path representing the process of internalisation. According to Deci and Flaste (1995), a behaviour will become internalised if it is valued, assimilated and regulated by the individual in order to "learn to competently negotiate the social terrain" (p. 93). The process is governed by a person's need to be self-determining. Therefore the need for autonomy initiates the process of internalisation. However, a person must also value the behaviour if it is to become internalised. According to Skinner (1995), behaviours are valued if they satisfy competence. Therefore if a person exhibits a high degree of control over a given situation, they are likely to have a high degree of competence toward that behaviour and this may lead to a person attaching value to that behaviour. As the internalisation process is an active one, the path from control to intentions is not considered as it is spontaneous and therefore the formation or consultation of attitudes is included in the path to intentions. In addition, as internalisation is an ongoing process, it may take many experiences of the behaviour for the person to attach value to the behaviour and to feel competent. Therefore what is represented by the path from autonomy to intentions via control and attitudes is only part of the process and therefore the need for autonomy motivates continued participation if the behaviour is to become integrated and assist in the actor becoming autonomous.

The inclusion of autonomy as a 'deeper motivational force' and a need which drives action is included in the model as a single variable known as the relative autonomy index, a weighted composite of the perceived locus of causality variables (Grolnick & Ryan, 1987). In this respect it can be seen as cognitive variable serving as an antecedent of intention just like attitude and control. However, the difference between this variable and the cognitive variables in the model is its level of specificity. The relative autonomy index is a representation of the perceived locus of causality (PLOC) continuum which assesses general reasons for engaging in physical activities rather than measures which are specific so as to adhere to the boundary condition of correspondence in the TPB. It therefore reflects more of a disposition in terms of self-determination in the domain but not specific situations and thus reflects inner motives which drive engagement in physical activity. The inclusion of The relative autonomy index, therefore, serves to demonstrate how the cognitive variables are related to these inner reasons and whether an autonomy supportive disposition is related to motivation to continue.
8.4 OTHER ISSUES

8.4.1 MEASUREMENT OF BEHAVIOUR

One issue which was raised in the current study is that of a measure of behaviour in the context of the Theory of Planned Behaviour (TPB). It was reported earlier that previous studies on the TPB had assessed physical activity behaviour using predominantly two methods: (1) a single item self-report measure which uses psychometric scaling to quantify physical activity in the time period and context specified by the items measuring intentions, attitudes and perceptions of control or (2) a comprehensive self-report measure which provides an estimate of the physical activity performed in the time period of the study and at the appropriate intensity. Such measures are usually made approximately one week after the cognitive measures and the associations examined. The results from this thesis indicated that the intention-behaviour relationship was quite weak. This finding was analogous to other studies which have measured this relationship, particularly when direct the attitude-behaviour path was examined as in Study 2.

There are two measurement issues which need to be addressed in relation to these findings. The first is whether the measure addresses the condition of correspondence with the other measures used and the second is whether the measure is sufficiently valid and reliable. Addressing the first issue, the need for correspondence between measures of the TPB variables and the behavioural measure, as stressed by the original proponents of the model (Ajzen, 1985; Ajzen & Fishbein, 1980; Ajzen & Madden, 1986), is important. Courneya and McAuley (1993) stress the need to maintain correspondence when measuring the cognitive and intentional aspects of the model as well as between the intentional and behavioural measures. They arrived at a number of recommendations for the development of psychometric items to measure these constructs. Indeed, the use of such psychometric measures for the TPB makes sense because they are in the same format as measures of the cognitive variables and use the same scale and question format. However, behaviour is not a cognitive variable and does not reflect thoughts or affective emotions regarding certain stimuli, so why, then, should it be treated as such. Further, behaviour is not subject to the subjective inconsistencies of cognitive variables and is not linked to thought processes, it is merely subject to limitations of the person’s ability to recall activity events from their past. Therefore including several measures introduces error which should not be associated with a recall of behaviour. Consequently, it is not correct to include several psychometric ‘measures’ of behaviour and then formulate a latent variable of this
measure. Such a practice would treat behaviour as a cognitive construct rather than a recall based on the memory actual events.

The alternative to the psychometric-type single item recall measure is the adoption of a validated self-report or recall of physical activity behaviour. The literature is rife with many different pen and paper self-reports and recall questionnaires and each have their merits and detriments (Sallis, 1991). Suffice to say that such measures are advocated for use with studies which have large sample sizes where other 'objective' measures are not practical. The four by one day recall questionnaire used as the behavioural measure in Studies 1 and 2 represents the latest developments in physical activity measurement and has been shown to be valid and reliable for use with children alongside recognised criteria such as observation and heart rate monitoring. Provided it is administered in the time frame reported in the intentional and attitudinal items and reflects the appropriate intensity of physical activities, the recall questionnaire it is likely to correspond well with the cognitive measures.

In her review of the studies utilising the TRA and TPB in exercise research, Blue (1995) advocates the use of self-report measures of physical activity behaviour over the psychometric-type single item measures. Further, Ajzen (1985) reports the need to use means of measuring behaviour which are as objective as possible. While the evidence appears to be in favour of the self-report measure, it must be stated that such measures still do not correspond directly with the cognitive items in terms of context and action. For example, the four by one day recall can give estimates of time spent at certain intensities and energy expenditure, but it does not report the type of activities done i.e. whether they are continuous or sustained nor does it provide an estimate of which activities are performed. No study has used both types of measure and tested which is better in the prediction of behaviour. Clearly, if the relationships between attitudes, perceived control, intentions and behaviour are to be examined completely and in an unbiased manner, the measurement issue needs to be resolved and reflects an important direction for future research.

8.4.2 SOCIAL DESIRABILITY

An additional element to Studies 3 and 4 was the inclusion of a social desirability questionnaire alongside the psychometric measures. The issue of social desirability is a difficult one to quantify. Clearly, researchers using psychometric questionnaires want to collect data which is untainted by the tendency of others to provide responses that they think the researchers want to hear. This is particularly important for children who are more 'susceptible' to such tendencies. The advent of Eysenck and Eysenck's
lie scale and other measures of social desirability (Crandall et al., 1965; Reynolds, 1982) provided psychology researchers with a possible means with which to test a person's innate tendency to provide socially desirable responses. It is important to note that such scales are related to a person's personality and therefore represent stable traits rather than situational factors. In the present investigation non-significant correlations were reported between the social desirability questionnaire (Reynolds, 1982) item means and the measures of the TPB variables and self-efficacy measure in Study 3 and perceptions of control and PLOC scales in Study 4. This indicates that the results from these measures were not subject to the response biases measured by this questionnaire.

However, such questionnaires have been criticised as they may be subject to the same social desirability tendencies that they attempt to measure (Martens, Vealey & Burton, 1990). Indeed, socially desirable tendencies may not only be linked to personality but also situational and social cues. Consequently, the manner in which the questionnaire is presented to the child or groups of children may lead to such tendencies. It was therefore paramount that the questionnaire was administered in a way which minimised the possibility of socially desirable responses. These measures included informing the children that the questionnaires were anonymous, that they would not be shown to any person that they knew such as parents or teachers, that there were no right or wrong 'answers' but only opinions which may differ from person to person and that they had freedom of choice as to whether or not to respond to any part of the questionnaire. Clearly, it is difficult to ascertain or correct for a socially desirable response. The present study, however, made attempts in the administration of a social desirability questionnaire and presented the measures in an autonomy supportive context which aimed to reduce such tendencies.

8.5 IMPLICATIONS FOR THEORY

The findings of this thesis have implications for theoretical extension, confirmation and development in two areas: (1) the increased role of control in the motivation of behaviour and as an antecedent of both intentions and attitudes and (2) the theory lends itself to interpretation based on human needs perspectives. The modified TPB and the triadic relationships between attitudes, control and intention is a useful starting point for examining the motives behind human behaviour and this is corroborated by its consistency across studies. In particular, it identified control as a focal variable. However, as Ajzen (1991) says the theory is open to inclusion of other variables and the cumulation of data in Study 5 demonstrated that inconsistencies may be due to other moderating variables. The TPB therefore represents a 'modifiable' theory and by no
means represents a 'list of principles' in the examination of behaviour. The TPB has been modified and altered by numerous researchers in their attempts to suitably identify the factors behind motivation in sports and exercise (Bagozzi, 1982; McCaul, O’Neill & Glasgow, 1988; Raats et al., 1995; Rodgers & Brawley, 1993; Terry, 1993; Theodorakis, 1994; Valois et al., 1986). Therefore, while its basic tenets have been confirmed on numerous occasions, the theory is being developed in such a way that it cannot be viewed as a set of 'principles'. An example here is the differentiation of perceived behavioural control variable and the inclusion of self-efficacy in the model as in Study 3. Clearly, the control variable is seen as having the potential for diversification and self-efficacy provided a better explanation of the dual paths observed from control in previous studies. As Bagozzi (1982) says, the presence of such paths in the original model is “consistent with the possibility that key processes have been omitted” (p. 581). In summary, the inclusion of self-efficacy, a variable adopted from Bandura’s (1977) social learning theory, in the modified TPB provides an example of how the TPB can be modified according to the need to integrate theoretical approaches towards the study of the motives behind behaviour.

Recent interest in the TPB has not only moved towards the inclusion of other predictors which were not formally part of the original formulation of the model, but it has also been approached from different perspectives. This is perhaps a response to Maddux’s (1993) appeal for the proliferation of empirical research toward ‘theoretical mergers’. This calls for the identification of the key elements within existing theories and to use these theories to develop new ones as opposed to ‘pitting them against each other’ which serves to do nothing more than label which theory explains more variance in the target behaviour or action. Recent interest has suggested that adopting organismic theories may provide a useful and informed interpretation of the mechanisms within traditional cognitive approaches such as the TPB. Chatzisarantis, Biddle and Fredricks (1998) have suggested that the inclusion of more general variables relating to human needs for autonomy may help interpret the origins of the cognitions in approaches such as the TPB. In one paper, Bagozzi (1982) examined the causal relationships between TPB variables of behaviour, attitude, intentions and subjective norms with affect and past behaviour. In his discussion Bagozzi (1982) claimed he was unable to establish the reasons for the pattern of results viewed. Perhaps an organismic approach may have assisted his interpretation by providing theoretical underpinnings for the relationships found and providing additional variables related to reasons for engaging in the behaviour (like the relative autonomy index) which reflect more general dispositional motives for engaging in the behaviour. The present series of studies provide a useful examination of the cognitive approach because the interpretations are richer and the paths hypothesised can be justified theoretically. In addition, the inclusion of variables
which reflect the needs for competence (perceived control) and autonomy are able to show how such approaches might alter the influence of cognitive variables on intention and behaviour.

8.6 IMPLICATIONS FOR PRACTICE

8.6.1 CHILDREN AND PHYSICAL ACTIVITY

The human needs perspective toward examining physical activity is particularly relevant for children. Children in their early teens are still developing psychologically in terms of the areas in which they can demonstrate and exhibit competence. They are, therefore, still exploring and identifying the behaviours which can be internalised and help assist in coping with the environment (Deci & Ryan, 1985). From a very early age children naturally engage with their environment and explore, develop and take on challenges, and developmental theorists such as Piaget (1971) have hypothesised that this was not due to any external reinforcement but because it is in children’s nature to be curious and expand their knowledge of the world. Deci and Flaste (1995) claim that this exploratory behaviour is an active one and is an attempt at moving towards “greater coherence and integrity in the organisation of their inner world” (p. 80). This was related to children’s innate psychological needs for competence and autonomy. The need to become self-determining in their environment drives children to explore different activities and objects in order to satisfy their needs to ‘do things by themselves’. A child who complains if an adult or parent disrupts one of their games is not being ‘awkward’, but is asserting her/his wish to be the author of their own actions. As children develop the exploratory behaviour results in the acquisition of a series of activities which will help them to be autonomous and such behaviours become integrated in the process of internalisation. A child seeks to identify through experience and exploration the spheres and behaviours in which they can demonstrate competence. These behaviours will therefore be valued and taken ‘on board’ by the child i.e. internalised. The process of internalisation shown in Study 4 as a path from autonomy to intention via control and attitudes has implications for practice. Clearly, if behaviour is motivated by the process a child is undertaking to adopt the behaviour as their own and as a means to ‘deal’ with the world, then adults must not interfere with this process. Rather they must act as facilitators of the children’s actions by actively encouraging the behaviours and creating a climate where learning is maximised.

Clearly, if physical activity is to be promoted among children and young people, they should be encouraged rather than coerced into doing so and the onus is on significant others to foster the sort of environment that can help children be more active. Deci and
Flaste (1995) view the role of the parent, teacher or leader should be one which promotes a climate which will enable children to make decisions for themselves and feel as if they are the author of their behaviour. This has been the focus of recent research in physical activity and goal perspective theory. Treasure and Roberts (1995) stress the need to examine the role of 'motivational climate' or social climate factors which arise from social agents like coaches, parents and peers as well as personal constructs in order to understand what motivates children's physical activity behaviour. Deci and Flaste (1995) outline how influential others can foster an autonomy-supportive environment:

*The real job [of parents, teachers, managers] involves facilitating their [children] doing the activities of their own volition, at their own initiative, so they will go on doing the activities freely in the future when we are no longer there to prompt them* (p. 92).

They are effectively advocating the encouragement of children to help themselves. Clearly, this is important for persistence. Deci and Ryan (1987) claim that in situations where a person is controlled by extraneous factors like rewards where execution of the behaviour is contingent on the receiving of the reward, the behaviours only persist so long as the controlling factors are present. Consequently, if the presence of the leader, coach, teacher or parent is necessary for the execution of the behaviour, it is unlikely to persist in their absence. This may have implications for exercise adherence into adulthood. For example, if parents are controlling the child's engagement in sport in a way in which autonomy is undermined as is often seen in children in sport who have 'pushy parents', then when the child leaves their parents later in life the controlling influence of the parents is removed and the behaviour might cease. This would be particularly true if the behaviour, because it was controlled and not autonomous, was not fully internalised and, more importantly, integrated into the child's set of behaviours in which they satisfy their needs.

In terms of practical recommendations, then, children need to be provided with a wide range of tasks to give them a choice in the activities they do and allowed to practice these activities for themselves so that the behaviour feels as if it is acted on out of their own volition. This can be referred to as a ‘guided discovery’ approach where the coach is viewed as an organiser and facilitator. In this approach the coach uses 'questioning' to guide the child or young performer towards new ways of performing the activity. This provides sensations of authentication for the child toward that behaviour - a "Coach, I can do it for myself" approach. The way in which adults present activities to children will also affect perceptions and motivation. Ryan and coworkers' (1983) initial
experiments on intrinsic motivation illustrated that subtle changes in the language used when presenting a task to a person may affect their intrinsic motivation (Deci & Ryan, 1987). Deci and Flaste (1995) insist that the use of words like “should”, “have to” and “ought” when presenting a task to a person engender a controlling context which tends to undermine intrinsic motivation. Further, behaviours continually presented in this way are likely to result in introjected reasons for engaging in a behaviour i.e. people perform the behaviour because of guilt or obligation to the leader. Such behaviours are unlikely to be completely internalised as introjected behaviours are seldom integrated into the set of behaviours which children feel they are able to demonstrate self-regulation. Instead practitioners promoting activity among children should adopt language which avoids coercive words. Phrases such as “try to”, “how about...” and “what if...” are less controlling. Such an approach assists the children in engaging in the task because they “choose to” rather than “have to”. This will help to develop their own sense of competence and, through competence, attach value to behaviours which may contribute the internalisation and integration of physical activity into the child’s self.

Fostering an autonomy supportive environment may require more than just questioning and subtle language changes. Deci and associates (1994) also recommend that providing a rationale for doing the behaviour, acknowledging the feelings of the individuals performing the behaviour and minimising pressure may be important issues when presenting the activity or behaviour. Providing a rationale for an activity may assist intrinsic motivation. This is effectively providing people with information regarding the behaviour and how it may serve them. Deci and Flaste (1995) say that providing a choice may enhance autonomy but only if the actor knows the possibilities, features and constraints of that behaviour. Otherwise “being given the choice will feel more like a burden than a support for autonomy” (p. 36). Deci et al. (1994) and Chatzisarantis, Biddle and Meek (1997) report that providing children with a rationale as to why physical activity is important may enhance the adoption of ‘autonomous intentions’ which are shown to be motivationally adaptive. Therefore a rationale may assist in creating an autonomy-supportive climate by giving children information regarding the behaviour at hand. Further, acknowledging the feelings of others will help enhance motivation and intrinsic interest. This essentially is an empathic approach where the leader or promoter engages with the actors. Finally, by reducing the pressure to do well, a person can ‘have a go’ at engaging in the behaviour for themselves rather than for competing against others. Deci and Flaste (1995) claim that competition, by its nature has a tendency to undermine intrinsic motivation by distracting the performer from the execution of the task at hand and focussing on winning.
8.6.2 FOSTERING CONTROL IS IMPORTANT FOR ATTITUDE FORMATION

It is clear from this series of studies that sensations of control are important contributors to the formation of attitudes. Attitudes are clearly an important factor in the motivation of behaviour and have been the focus of many theories of social psychology. To this end, education policymakers have adopted these recommendations and used them in rationales for promoting physical education (OPCS, 1992). Further, researchers and governing bodies have encouraged the need for physical educators to foster positive attitudes among children towards physical education (Fox & Biddle, 1988). The question, however, has always been ‘how?’ How can physical educators manipulate children’s attitudes and, further, is such intervention ethical? One possible route to promoting a positive outlook of physical activity for children proposed by the findings of the present investigation is through perceived control. It can be seen that past experiences of control contribute to the formation of intentions and also attitudes. While this was hypothesised as a deliberative path concerning control over barriers or perceived costs, all aspects of control when autonomy was considered predicted attitudes. Therefore, if a teacher or leader is able to provide children with suitable autonomy supportive practices in which they experience control over the behaviour, it may both perpetuate their behaviour and enhance attitudes. Therefore games and practices sessions which are both competence and autonomy supportive will be the most motivationally and psychologically adaptive (Biddle, 1998). This is particularly true for novel behaviours, as these tend to be the behaviours in which control experiences are not fully developed and attitudes are not existent or can only guide behaviour based on attitudes formed from similar experiences.

8.7 RECOMMENDATIONS FOR FUTURE RESEARCH

8.7.1 META-ANALYSIS OF CONTROL-ATTITUDE RELATIONSHIP

Clearly, one of the main findings in this study is that the triadic relationships between attitudes, intention and control demonstrated consistency across four samples. This indicates that perhaps the control-attitude path is a viable one which may be corroborated in other studies. It may therefore be useful to examine the generalisability of this path by cumulating results across all possible studies reporting this relationship in a physical activity context. Such a meta-analysis will provide further evidence for the existence of this relationship and the contribution that artefactual error makes to the variation in this relationship. Clearly, this is contingent on studies reporting the correlations between these variables. It is usual to report a matrix of correlations
between the variables and therefore this will provide the necessary data for input in the meta-analysis. One limitation of such an analysis would be that no directional component would be included. Since a meta-analysis is only performed on associations which are bivariate in nature, no path or causality can be inferred. However, using the corrected correlations for this and the other relationships, a path analysis can be performed which will give an indication of the direction of the associations between the variables and whether the relationships are attenuated by their inclusion in such a model.

8.7.2 PROSPECTIVE STUDY

Figure 8.1 Relations between Identified Reasons for Engaging in Physical Activity, Attitude and Intention Measured at Two Points in Time, Six Weeks Apart (Adapted from Chatzisarantis, 1998)

In Study 4 it was suggested that relative autonomy was directly related to perceived control, but only indirectly to attitudes and intentions through the mediation of control. In contrast, Chatzisarantis (1998) found that identification, a measure on the PLOC related to higher scores on the relative autonomy index, predicted both attitudes and intentions measured at different time points, as illustrated in Figure 8.1. This led Chatzisarantis to suggest that the attitude-intention relationship was a spurious one; it existed only because autonomy was not included. He also concluded that the relative instability of attitude and intentions was to blame for the lack of a relationship, and only consistency in the need for autonomy, represented by the identification variable, was the predictor of both constructs at both time points. These conclusions were not
corroborated by the present study. It was found that the inclusion of the relative autonomy index did reduce the relationship between attitude and intention, but not completely. The association between the relative autonomy index and attitude ($r = .59$) and between the relative autonomy index and intention ($r = .34$) corroborated the results of Chatzisarantis (1998), but they were reduced to zero with the inclusion of the path of the relative autonomy index through control. This indicates the significant role control has to play in mediating the relationship of autonomy to attitudes and intentions. It may be that the attitude-intention relationship appears spurious only when perceived control is excluded as it was in Chatzisarantis' (1998) study. These proposals can be further investigated by repeating the prospective study of Chatzisarantis (1998) but including a measure of perceived behavioural control and perhaps scales to measure all aspects of the PLOC so that the relative autonomy index variable can be included in the model.

**8.7.3 DIFFERENTIATION OF CONTROL**

In Study 3, it was shown that self-efficacy and control could be distinguished both theoretically and empirically. However, while they are distinguishable they still remain correlated and perhaps represent similar constructs. This was clearly the reason why Ajzen (1985) likened perceived behavioural control to self-efficacy. The distinction in the present study was made, theoretically, by classifying perceived behavioural control and self-efficacy according to Skinner's (1995) conceptualisation of control. It was hypothesised that perceived behavioural control represented predominantly control beliefs or an agent-ends relation, while self-efficacy represented capacity beliefs or an agent-means relation. Future studies using the perceived control variable would do well to make these distinctions and incorporate measures of capacity, strategy and control beliefs in the TPB. Such a variable may be an 'outcome expectation' as conceptualised by Bandura (1977; 1986) such as whether the behaviour is an effective strategy to produce the desirable outcome. In this way, a more differentiated view of control could be adopted and its role with respect to the cognitive antecedents of behaviour in the TPB examined.

**8.8 CONCLUSIONS**

In conclusion, the present thesis has demonstrated that the perceived behavioural control variable has an important role as an extraneous predictor of attitudes and intentions in the TPB. In particular, the indirect or deliberative path was shown to be invariant across the four studies and demonstrated consistency. The relationship between control and intention, the more spontaneous process by which intentions are formed directly on the basis of control beliefs, also demonstrated invariance. However,
both paths, and in particular the perceived control-intention path, indicated that they may be affected by moderator variables and further research will identify these moderators. Other studies which may follow on from the present investigations would include an inquiry into the consistency with which relative autonomy predicts perceived control, attitude and intention over time.

As suggested by previous researchers, the TPB is particularly useful as a blueprint for the processes behind action when combined with theories of needs. The inclusion of the perceptions of control and the relative autonomy index, variables which reflected the needs for competence and autonomy respectively, adds a richer interpretation of how children formulate plans to act and helped identify the precursors of physical activity intention and behaviour. In particular, the role of control in the TPB can be explained as the actor satisfying the need to demonstrate competence, particularly because perceptions of control are essential to the satisfying of the need for competence. Autonomy, too, is also seen as a motivating process which drives the formation of intentions on the basis of control beliefs and attitudes. This process was hypothesised as being part of the process of internalisation, by which children attach value and accommodate behaviours in order to make themselves more self-determined in their environment. The full scope of the interpretative and predictive utility of organismic integration and self-determination theory has yet to be fully realised, and is in its infancy in both exercise psychology and general social psychology. The present work is indicative of the potential these motivational approaches have to complement the explanation of behaviour from the social cognitive approach.
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APPENDIX 1

Glossary of Terms

As the reader may be unfamiliar with some of the terminology relating to the theories and structural equation modelling/path analysis methods used in this thesis, the following glossary aims to provide a quick reference guide for the necessary terms and concepts. Terms and constructs are selectively included in this glossary on the basis of their relevance to the understanding of the models and theories in this investigations. In addition, the reader is guided to the pertinent references and resource books which provide more comprehensive information regarding important terms and concepts.

Attitude - The term attitude in this thesis refers to the attitude construct in the Theory of Reasoned Action/Planned Behaviour. Attitude is therefore defined in terms of Ajzen and Fishbein’s (1980) conceptualisation of the concept as a person’s affective or emotional predisposition towards engaging in a target behaviour. It is akin to the affective attitudinal construct from the tripartite model of attitudes. It is viewed as the most proximal predictor of intention, which reflects a behavioural orientation or conative aspect in the tripartite model.

Behaviour - In the present study behaviour usually refers to any action which can be performed by an individual. When used in the context of the Theory of Reasoned Action/Theory of Planned Behaviour the term ‘behaviour’ usually refers to volitional and prospective behaviours as these theories aim to describe predominantly deliberative processes (Fazio, 1990). However, when used outside this context it is usually qualified, for example, habitual behaviour or past behaviour.

Bootstrap - A resampling technique in structural equation modelling. In performing a ‘bootstrap’ resampling plan the researcher aims to provide further evidence for the robust nature of the path coefficients in a structural equation or path analysis model. When running a bootstrap procedure, a computer using the EQS structural equation program (Bentler, 1989) will randomly select subsamples of the main sample with replacement and test the hypothesised model for each subsample. Examination of the distribution and confidence intervals for the goodness of fit indices and parameter estimates will provide further evidence in favour of the significance and robust nature of the model statistics and estimates. A bootstrap is typically performed when the
sample size is small and cross-validation is not possible. For further information, the reader is directed to Bentler (1989) and Efron (1982).

Capacity Beliefs - Skinner's (1995) conceptualisation of control posits that relations between those who exert control (agents) and the faculties available for them to exert control (means) represent capacity beliefs. It is a cognitive representation of whether an individual believes s/he has the ability and confidence to engage in the behaviour. The present thesis adheres to Skinner's (1996) notion that capacity beliefs can be represented by the self-efficacy construct.

CFI (Comparative Fit Index) - As the goodness of fit chi-square statistic in path analysis and structural equation models is extremely sensitive to sample size and often significant for large or complex models, Bentler (1989) proposes other criteria for establishing overall goodness-of-fit for structural equation models. One such means is provided by the CFI which compares the chi-square statistic associated with the hypothesised model to that of the null, independence or totally-free model. If $\chi^2_0$ represents the chi-square for the null model and $\chi^2_k$ the chi-square for the hypothesised model, the CFI is given by:

$$CFI = 1 - \frac{(\chi^2_0 - df_0) - (\chi^2_k - df_k)}{(\chi^2_0 - df_0) + (\chi^2_k - df_k)}$$

Where $df_0$ represents degrees of freedom for the null model and $df_k$ the degrees of freedom for the hypothesised model. The 1 represents that the index is trimmed to be in the range 0 to 1.0. The index can therefore be interpreted in much the same way as a correlation coefficient, with values greater than .90 reflecting an adequate model fit. For a clear, lucid and non-technical discussion of the CFI and other fit indices, readers are referred to Byrne (1994).

Control Beliefs - In her conceptualisation of perceived control, Skinner (1995) presented control beliefs as reflecting both capacity beliefs and strategy beliefs. It reflects whether an individual or agent has the capacity or means to exert control over a behaviour and whether they perceived their engagement in the means as an effective strategy to produce outcomes. It is hypothesised that control beliefs are a function of both capacity beliefs (agent-means relations) and strategy beliefs (agent-ends) and represent an agent-ends relation. In the present study it is anticipated that the perceived behavioural control variable reflects control beliefs or an agent-ends relationship.
Confirmatory Factor Analysis - Confirmatory factor analysis is a statistical technique for defining a set of (usually) smaller unobserved or latent constructs which represent the data points in the sample. In principle and purpose, the confirmatory factor model is identical to the exploratory factor analytic model in that it aims to represent the underlying structure of the constructs measured. However, the confirmatory model is more powerful as it enables the researcher to set a priori which variables will define the latent constructs. Confirmatory factor analysis can be used to confirm a number of hypotheses relating to the construct validity of the observed variables. For example, it can test the convergent (the unobserved constructs are related to each other) and discriminant (the unobserved constructs are sufficiently distinct to warrant separate factors) validity of the factor structure. For a detailed explanation of validity issues with confirmatory factor analysis, the reader is directed to Bagozzi (1981) and Long (1983). For a non-technical discussion of relevant issues relating to confirmatory factor analysis, Byrne (1989) provides a good overview.

Chi-Square/Degrees of Freedom Ratio - As the chi-square statistic associated with complex models it sensitive to sample size, it has been suggested that the goodness of fit chi-square be weighted by the degrees of freedom in the model to give a measure of good fit which is less dependent on sample size. There is some question regarding the interpretation of this statistic. Some authors report that values as low as 2 and as high as 5 have been proposed to reflect as well-fitting model (Marsh & Hocevar, 1985). Recent tendency has been to use other fit indices as the chi-square/df ratio is still affected by sample size if the hypothesised model is false. Also, the fit based on this index tends to be poorer for models with a large number of parameters as this attenuates the df denominator (Marsh, Balla & McDonald, 1988).

Disturbance Term - One advantage of path analysis, confirmatory factor analysis and structural equation modelling is that the error terms for the constructs involved can be explicitly modelled. When defining the equation of a relationship in a latent variable structural equation model, the term disturbance, represented by the letter delta (δ) reflects the error associated with a latent or unobserved construct. For a latent variable model, disturbances are not estimated for exogenous variables while for latent endogenous variables the δ's represent error in the prediction of factors from other more exogenous variables.

Error Term - In a path analytic or structural equation model, the error term, represented by the letter 'E', reflects the random error associated with an observed construct, for example individual items which define a latent construct.
External Regulation - Ryan and Connell (1989) postulated that the reasons that individuals perform a given intentional behaviour can be measured on a continuum from internal to external known as the perceived locus of causality (PLOC). If individuals perform a behaviour for extrinsic reasons such as for an overjustified reward, or to avoid punishment or negative consequences, they are said to be influenced by an external regulation. External regulation is often associated with compliance or defiance, both of which are maladaptive.

Factor Loading - The relationship between an unobserved factor and an item which defines it is known as a factor loading. When presented in standardised form, it gives an indication as to how much that item contributes to the definition of the factor. In a confirmatory factor analysis squaring the factor loading will give the amount of variance in the latent factor accounted for by the individual item. The relevance of factor loadings to validity and other issues in factor analysis is given in Byrne's (1989) text.

Goodness of Fit - In path analysis and structural equation modelling, the adequacy of the model is assessed by comparing how well the hypothesised model reflects the sample data. There are a number of means at the disposal of the researcher to assess goodness of fit. The goodness of fit chi-square tests the hypothesis that the relationships between the variables in the sample data are adequately represented by the set of structural equations imposed by the researcher. The chi-square is very powerful and often significant due to model complexity and sample size. This is problematic as it can lead to the rejection of many true null hypotheses (type two error) i.e. many models which actually fit the data well are rejected due to an overly powerful (strict) alpha level. One alternative way is to examine some fit indices such as the comparative fit index (CFI) and the Tucker-Lewis index (TLI), which provide a more realistic view of the adequacy of the model compared to a totally unrestrained or null model. Descriptions of the merits and detriments of fit indices can be found in Byrne (1994) and Marsh and coworkers (1988).

Identification (Identified Regulation) - Set at an intermediate point on the perceived locus of causality (PLOC) continuum, identification represents reasons for engaging in a given behaviour which are due to personally held beliefs. While it is an external regulation, it reflects a high degree of autonomy in the actor and it therefore located in close proximity to the internal end of the PLOC continuum. Such regulations may be important to the individual's 'functioning' in their social environment and therefore may be 'taken in' and used regularly to motivate behaviour. Such regulations become integrated onto one's sense of self.
Integration - Integration is the process by which people take on board regulations which are not intrinsically motivated, but may help them function optimally in their social environment and help them satisfy their innate needs for autonomy, competence and relatedness (Deci & Ryan, 1985). Behaviours which are performed for internal and identified reasons are likely candidates for integration into an individual’s repertoire of behaviours which will help satisfy their psychological needs.

Intention - Intentionality is reflects a person’s behavioural plan to engage in an activity in the context of the action, target, context and time. Intention is motivational in nature and is the most proximal predictor of actual behaviour in the Theories of Reasoned Action and Planned Behaviour (Ajzen, 1985). In terms of the tripartite model of attitude, intention reflects the behavioural or conative aspect of attitude. Consequently, elements of the tripartite attitude theory remain intact in the Theory of Reasoned Action/Planned Behaviour, with the exception that the variables are ordered in a causal model with affective attitude acting as the most proximal predictor of intention.

Internalisation - A person may take on board a behaviour which they do not particularly like doing, but will also help them better function in their social terrain. This process is known as internalisation and is an active process. An internalised behaviour does not have to be one which is regulated internally or by identification, it can be an introjection. However, only behaviours which are values to help optimal functioning will be internalised and then integrated. Introjects can be internalised, but the internalisation is incomplete. Instead, the behaviour lies on the periphery and is not viewed as being very important to overall functioning. In addition, once the extrinsic regulator or regulatory conditions cease, it is unlikely that the internalised introjection will motivate further behaviour, and that behaviour may cease.

Internal Regulation - If a person engages in a particular behaviour or activity purely for the associated feelings of pleasure, enjoyment and competence satisfaction, they are said to be internally regulated or ‘intrinsically motivated’. Internal regulation lies at the opposite end of the perceived locus of causality (PLOC) continuum to external regulation. Deci and Ryan (1985) advocate the promotion of intrinsic motivation as it is important to an individual’s satisfaction of their psychological needs for autonomy, competence and relatedness and also assists in helping individual’s receive the positive emotions associated with such behaviours.
Introjected Regulation (Introjection) - If a person performs a behaviour because they feel they have to or should do, they are likely to possess an introjected regulation. Introjects reflect the perceived pressure that a person holds with respect to their engagement in a behaviour. Deci and Flaste (1995) view introjects as voices inside an individual's head which issue orders and tell them what to do. Introjection is located on the PLOC adjacent to the external regulation endpoint. Introjected regulations are related to the system of psychological needs which drive behaviour in organismic integration theory (Deci and Ryan, 1985). If a person avoids a behaviour and feels ashamed for not doing so, then that is a compromise in the need for competence. If an individual performs a behaviour because they would feel guilty if they did not, this is due to the need for relatedness.

Latent Variable - A latent variable is an unobserved construct in structural equation modelling which represents a factor defined by at least two common items. The use of a latent variable model is advantageous as it results in the construction of factors which (1) reflect fundamental underlying concepts within a set of data, (2) can be tested for convergent, discriminant, nomological and predictive validity and (3) have no associated error term and therefore are effectively 'error free'. For a discussion of the advantages of a latent variable model see Huba (1982) and Martin (1982).

LM-test (LaGrange Multiplier test) - A procedure in structural equation modelling which enables researchers to identify which paths to relationships contribute most to improving the model fit. The LM-test assesses, univariately and multivariately, the effect of freely estimating the fixed parameters in an initial model and identifies those which would result in a significant decrease in the goodness of fit chi-square value. In the EQS program (Bentler, 1989), the LM-test procedure provides a summary for all the paths which would result in a significant change in the goodness of fit chi-square. It is important to note that the number of significant paths flagged by the LM-test to improve fit of the model in subsequent estimations reflects the degree of inadequacy of the set of equations originally imposed by the researcher to describe the relations in the data set. This also highlights the inadequacy of the theoretical underpinnings of these relations. Therefore, when a model is revised on the basis of LM-test recommendations there are several considerations. Firstly, the new paths need to be theoretically justifiable, perhaps these can be specified in the form of alternative hypotheses. Further, the model should be retested on a further independent sample to test the generalisability of the new model (Marsh, Hey, Johnson & Perry, 1997).

ML (Maximum Likelihood) Method - ML is a method of estimation in structural equation modelling. In using this method, the estimation of parameters and overall
model fit from the set of equations imposed on the data set is executed on the assumption that the underlying distributions of the individual and group data is univariate and multivariate normal. Although the ML method is fairly robust to departures in normality, it has been advocated that a robust method of estimation of the parameter estimates be used. Satorra and Bentler (1988) recommended a correction procedure which corrects the chi-square and standard errors of parameter estimates for non-normality. If the data does not conform to normality as indicated by skewness, kurtosis and Mardia’s coefficients, the use of robust estimates is strongly recommended.

Past Behaviour - Previous engagement in behaviour, known as past behaviour, has been shown to influence the constructs and prospective behaviour in social cognitive models such as the Theory of Reasoned Action (Bagozzi, 1981; Bagozzi & Kimmel, 1995; Bentler & Speckart, 1979), the Theory of Planned Behaviour (Verplanken, Aarts, van Knippenberg & Moonen, 1998) and the Theory of Interpersonal Behaviour (Triandis, 1977). It has therefore been recommended that this variable be included in subsequent models of behaviour, but caution should be exercised as it reflects a variable predicting itself and confounds the cognitive influences in the model (Liska, 1984). For a good overview of the influence of past behaviour in the TPB see Conner and Armitage (1998).

Path Analysis - Path analysis is an extension of multiple regression and represents the simplest form of structural equation modelling. Path analysis aims to examine relationships between sets of variables providing quantitative estimates and causal connections. It differs from simple correlations as (1) directionality is inferred, (2) a true-score model is adopted so that error can be explicitly modelled and (3) the attenuation and mediation of relationships can be examined. In path analysis, the variables are all observed and therefore the error terms reflect both random error and error in prediction. For a good, clear introductory overview of path analysis and its concepts see Bryman and Cramer (1990) and Howitt and Cramer (1997).

Path Coefficient - Quantitative estimates of the relationships between variables in a structural equation model or path analysis are known as path coefficients. These are typically given in standardised form and are therefore scales from 0 to 1.0. In a confirmatory factor analysis, the square of the coefficient gives the amount of variance in the latent factor accounted for by its indicator. This cannot be done in a path analysis or structural equation model unless the predictor variable is exogenous, otherwise, indirect effects of variables which are related to the predictor variable must be considered. Path coefficients are often referred to by the letter lambda (λ).
Perceived Behavioural Control - In an extension of the Theory of Reasoned Action, Ajzen (1985) proposed that perceived behavioural control be included as an independent predictor of intention as well as behaviour. It was supposed that the variable would account for both internal (self-efficacy, confidence) and external (barriers, actual constraints) aspects of control (Ajzen, 1991). Research has demonstrated that control may predict both intention and behaviour or each construct alone. It has been proposed that different conditions may reflect these differential predictions. The present study related perceived behavioural control to Skinner’s (1995) conceptualisation of control and labelled it an agents-ends or control beliefs construct that was related to other aspects of control such as self-efficacy.

PLOC (Perceived Locus of Causality) - A continuum bounded by internal and external end points which reflects whether an individual perceives behaviours, usually in a certain domain, to originate predominately from choice and the self (internal) or under pressure from others or perceived external controls (external PLOC). It reflects the degree of autonomy a person has over their actions in a given domain. The continuum was conceptualised by Ryan and Connell (1989) as a graded schema of regulations which represent intermediate points on the continuum. Internal and identified regulations reflect higher autonomy while introjected and external regulations reflect lower autonomy.

Perceptions of Control - Refers to control estimates from Connell’s (1985) multidimensional conceptualisation of the construct. These are typically general measures of control and reflect an individual’s estimate of their propensity to produce salient outcomes. Conceptually, this is aligned to a strategy beliefs or means-ends relation in Skinner’s (1996) conceptualisation of control. Perceptions of control are differentiated into different sources namely, internal, powerful other and unknown. These reflect how such sources can relate to the person’s estimate of the behaviour or action to produce outcomes. Connell (1985) provides a detailed overview of the conceptualisation and Skinner (1996) a classification of the perceptions.

Relative autonomy index - Vallerand and coworkers (1992) produced a means of representing the overall degree of autonomy an individual experiences in a given domain using the a weighted average of the perceived locus of causality (PLOC) constructs. The index was produced by scoring the continuum constructs so that high intrinsic motivation and identified regulations were given positive weights (x2 and x1, respectively) and introjection and extrinsic motivation negative weights (x-1 and x-2).
In the present thesis, the relative autonomy index was used to reflect how autonomous children felt in the domain of physical activity.

Self-Efficacy - Bandura (1977) advocated that human agency was largely determined by a person’s perception of their situation-specific confidence or self-efficacy in performing the behaviour. Those with higher confidence were proposed to be more efficacious in pursuing that behaviour. This was also offset by outcome evaluations which is an assessment of whether the behaviour or action will result in certain, desirable outcomes. This variable has been incorporated into the Theory of Planned Behaviour in a number of studies and has been shown to predict intention and behaviour above and beyond the effects of perceived behavioural control (Dzewaltowski, Noble & Shaw, 1990; Maher & Rickwood, 1997; Terry & O’Leary, 1995; Vanryn, Lytle & Kirscht, 1996). In the present study this construct is viewed as part of Skinner’s (1995) conceptualisation of control and related to, but conceptually and theoretically distinct from, perceived behavioural control.

Self-Evaluation of Behaviour - An individual’s estimation of the satisfaction that a given behaviour will give them is expected to motivate them to orientate toward that behaviour. Such estimations of satisfaction represent self-evaluation of the behaviour as a means to give positive feelings of satisfaction. It is measured using a single item variable and is usually measured alongside self-evaluation of outcomes.

Self-Evaluation of Outcomes - This reflects an individual’s assessment of the importance of the behaviour in producing certain outcomes. Self-evaluation of outcomes are measured from a number of questionnaire items using salient outcomes from the behaviour elicited from a free response questionnaire. Dzewaltowski, Noble and Shaw (1990) showed that this variable was effective in predicting self-efficacy beliefs in a test of the Theory of Planned Behaviour with self-efficacy theory (Bandura, 1986).

SRMSR (Standardised Root Mean Square Residual) - Structural equation models attempt to fit the covariance matrix from the model data to the estimated covariance matrix reflecting the user imposed relationship between the variables. Any misspecification between these matrices is given in the residual covariance matrix. The smaller the mean average of the residuals or error variance from the estimation of a structural equation model reflect the better the model fits the data. The SRMSR therefore provides an estimate of how deviant the model is from adequately representing the data. It is a stand-alone index (Marsh et al., 1988) and values of approximately .05 reflect a well fitting model (Byrne, 1989).
Strategy Beliefs - An assessment by the individual of the actions or means available to them as strategies to produce salient outcomes are termed ‘strategy’ beliefs (Skinner, 1995). Strategy beliefs are represented by a cognitive variable which reflects how much control an individual has over using a behaviour to produce outcomes. In the present thesis, strategy beliefs are partly represented by Connell’s (1985) perceptions of control variables.

Structural Equation Modelling - A family of statistical methods which takes a multivariate confirmatory approach to testing hypotheses between variables. As its name implies, structural equation modelling makes a representation of the relationships in the data by describing them in a series of hypothesised regression or ‘true score’ equations and then modelling or testing these relationships against real data. Advantages of structural equation modelling over multiple regression analyses is that it takes an a priori or confirmatory approach in that the user inputs the relationships according to theory and then tests them simultaneously in a structural equation model. In addition, the models enable the researcher to model the error associated with each variable explicitly and produce unobserved latent or ‘error free’ factors which are constructed from the observed variables in the data. Confirmatory factor analysis and non-standard models are specific applications of structural equation modelling. Path analysis is a related analytic technique using many similar principles, but does not fall into the category of structural equation models it does not hypothesise latent variables. Non-standard models, as used in the present thesis, reflect a structural equation model where not all the variables are latent but include some which are observed. A lucid text on this matter with little technical knowledge required is provided by Byrne (1994).

Subjective norm - Along with attitude, subjective norm is the most proximal predictor on intention in the Theory of Reasoned Action/Planned Behaviour. Subjective norm is the perception that significant others want them to engage in the target behaviour. Typically, in tests of the theory in physical activity and exercise contexts, subjective norm is less influential than attitude and perceived behavioural control (Godin, 1993; Godin, 1994; Godin & Shephard, 1990) and this reflects the overwhelming influence of personal deliberations in the motivation of behaviour.

TLI (Tucker-Lewis Index) - Bentler (1989) put forward the non-normed incremental fit index or TLI as a means to assess the goodness of fit of a structural equation model. In adopting this and other indices such as the CFI, the researcher avoids the use of the significance test associated with the chi-square statistic which is usually
significant for complex models. As with the CFI, the TLI is a scaled index which compares the hypothesised model chi-square statistic with that of the totally-free null model. If $\chi^2_0$ represents the chi-square for the null model and $\chi^2_k$ the chi-square for the hypothesised model, the TLI is given by:

$$TLI = (\chi^2_0/df_0 - \chi^2_k/df_k)/(\chi^2_k/df_k - 1.0)$$

Where $df_0$ represents degrees of freedom for the null model and $df_k$ the degrees of freedom for the hypothesised model. Values of greater than .90 for the TLI reflect adequate model fit. Details of the TLI, CFI and other fit indices are provided by Marsh et al. (1988).

TPB (Theory of Planned Behaviour) - An extension of the Theory of Reasoned Action, the TPB aimed to address the boundary condition of controllability over behaviour. The revision included a measure of perceived behavioural control which was hypothesised to reflect actual constraints on behaviour as well as perceptions relating to faculties and capacities for engaging in behaviours. The theory has been tested on many occasions and has demonstrated applicability and versatility to the study of a number of behaviours including physical activity and exercise. For reviews see Godin and Shephard (Godin & Shephard, 1990), Godin (Godin, 1994) and Hausenblas (1997).

TRA (Theory of Reasoned Action) - Drawing on the tripartite model of attitudes, Ajzen and Fishbein (1980) developed the influential Theory of Reasoned Action which aimed to provide a framework to understand the cognitions which determine intentional, deliberative behaviours. The theory posited that stated intention, the behavioural component of attitude, was the best predictor of subsequent behaviour. Intention was determined by two other components, one attitudinal or affective and the other normative or social pressures. Attitude reflected the affective predisposition towards engaging in the target behaviour while subjective norms the perceptions of significant others. The theory has been successful in describing and providing a framework for understanding many behaviours, for review see Bagozzi (1992). It is, however, subject to a number of restrictions of boundary conditions namely the need for a high degree of correspondence between the model components, the need for temporal correspondence between intention and behaviour and the relative controllability of the behaviour. The final condition was addressed by the introduction of the Theory of Planned Behaviour (Ajzen, 1985).
W-test (Wald test) - In order to test for redundant parameters in a structural equation model or path analytic model the Wald test is used. Often paths are hypothesised which do not achieve significance in a multivariate test and these can be eliminated from the model to yield increased degrees of freedom and greater model parsimony. In the EQS program (Bentler, 1989), an itemised list of the parameters which do not achieve significance in the model is provided. Post hoc model specification can then be performed omitting these paths. However, as with the freeing of additional paths on the basis of the LM-test, the changes must be theoretically justifiable and preferably retested on a further independent sample for verification. Otherwise, the revised model has limited generalisability and may not reflect any theoretical relevance.

REFERENCES


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This section reviews the social cognitive approaches which have similar constructs as the Theory of Planned Behaviour (TPB) or use the TPB as a starting point. Relevant parts of these theories were referred to in Chapter 2, Section 2.7. This appendix provides some background information on the theories, expanded detail and reviews previous research on their use.

TRIANDIS’ THEORY OF INTERPERSONAL BEHAVIOUR

Triandis’ (1977, 1980) Theory of Interpersonal Behaviour (TIB) adopted a social learning perspective in a cognitive model to explain the antecedents of behaviour. Triandis hypothesised that a person’s engagement in any behaviour was determined by prior learning about the behaviour from experience. He hypothesised that feelings towards a behaviour based on past experience or ‘habit’, and assessments of consequences of engaging in the behaviour, would determine intentions and consequently action. This clearly reflects some of the notions put forward by Ajzen and Fishbein (1977, 1980), but advances these ideas by including a measure of past behaviour and expectations about consequences. Triandis (1977) hypothesised that intentions were independent of the effects of past behaviour and consequently prospective behaviour was a function of past behaviour or ‘habit’. In addition, facilitating conditions were viewed as a weighting which determined the valence of the intentional and habit constructs. Facilitating conditions were viewed as the real and perceived factors which promote or inhibit the formation of intentions from past activities and attitudinal considerations. The theory is shown schematically in Chapter 2, Figure 2.4. This model has demonstrated utility in predicting behaviour and has been shown to be effective in a physical activity context (e.g. Valois, Desharnais & Godin, 1988; Valois, Shephard & Godin, 1986), although its use in such research has been limited.

On the surface Triandis’ (1977) hypotheses appear similar to those of Ajzen and Fishbein’s (1980) TRA. However, the actual hypotheses toward intentions and behaviour exhibit some important and fundamental differences. The variations lie in three areas: (1) facilitating conditions included as a weighting for intention and habit rather than a separate control variable, (2) the distinction between affective and cognitive attitudinal components, and (3) the inclusion of a habit or past behaviour variable.
The role of facilitating conditions as a weighting or value for habit and intention, rather than a predictor in the model, may be a useful approach to the study of perceived control. Facilitating conditions can be seen as an aspect of perceived behavioural control and the constructs can be expected to be very similar. Indeed, some studies using the TPB in the exercise domain have measured perceived control in terms of 'facilitating conditions' (Valois et al., 1988). The implication of Triandis’ theory is such that perceived control will determine the relative importance of the intentional and habit variables. It can therefore be seen as having a moderating effect on these components of the model. This was the influence that perceived control was found to exert in Studies 1 to 4 of the current thesis and Triandis’ theory indicated prior to the advent of the TPB that perceived control may act as a moderator of intention on behaviour. An alternative viewpoint may be that past behaviour has an influence on the other cognitive elements of the model such as attitude, subjective norms and perceived control and this was also demonstrated in Study 2 of the current thesis in the direct influence of past behaviour on perceived control.

Triandis also distinguished between the affective and cognitive aspects of attitude. This may have been superfluous as Ajzen (1985) states that the behavioural (conative) component of attitude is reflected by intention and the affective and cognitive component is measured by the semantic differential scaling procedure which includes both affective (happy-sad) and cognitive statements (good-bad). However, Triandis measures specific emotions in relation to attitude, while Ajzen and Fishbein’s (1980) affective component describes only general emotional disposition. This might therefore be an additional source of variation in the predictions provided by the model.

A final difference between the TPB and Triandis’ (1977) model was the inclusion of past behaviour. Other researchers have adopted this notion and demonstrated that past behaviour or habit has an influence on both intention and future behaviour, rather than behaviour alone, as Triandis hypothesised. Past behaviour, therefore has been adopted as a bone fide variable for inclusion in the TPB (Godin, Valois, Shephard and Desharnais, 1987; Valois et al., 1986) and this was confirmed in Study 2 in the current thesis. These fundamental differences provide evidence to illustrate that the TRA and TPB are not to be taken as the only approaches to the cognitions behind behaviour. Rather, they are only partial explanations of the complex processes for which a number of other explanatory systems are possible.
Research using the original version of the TRA has shown that the assumptions of the theory were different than originally proposed and the TRA represented a special case of a more general model of intentional behaviour. Papers by Bentler and Speckart (1979; 1981), Bagozzi (1981), Fredricks and Dossett (1983) and Liska (1984) all illustrated, as Triandis did, the utility of the past behaviour variable and that it has a key role within the model predicting both intentions and behaviour. The reasons for the utility of this variable in predicting physical activity were numerous. Some attributed the dual prediction of intentions and behaviour from past behaviour to the influence of unmeasured moderator variables. Bagozzi (1981) hypothesised that past behaviour may serve as an additional informational input in the decision making processes prior to the formation of intentions. On the other hand, as the models proposed by these authors were all investigations of the TRA, the influence of past behaviour on intentions may have been a surrogate for the influences of past experiences of control on the formation of intentions.

**THE THEORY OF GOAL PURSUIT**

To extend the ideas of Triandis (1977) and Ajzen and Fishbein (1980), Bagozzi and Warshaw (1990) and Bagozzi (1992) proposed a series of theoretical models to examine goal directed behaviour which included the two variables not accounted for by the original formulations of the TRA: a control measure and past behaviour measure. A precursor to Bagozzi and Warshaw's (1990) work, the Theory of Goal Pursuit (TGP) was proposed by Warshaw, Sheppard and Hartwick (in press) to explain the discrepancies shown in their meta-analysis (Sheppard, Hartwick and Warshaw, 1988). Their cumulative research indicated that Ajzen and Fishbein's (1980) model was not very effective at predicting intentions towards an outcome or goal and instead focussed on a behavioural goal. For instance, exercising or dieting are examples of *specific actions* which are related to the *behavioural goal* of maintenance of a healthy body weight. Therefore, the TPB and TRA should be utilised when behaviour is defined and measured as the outcome or action as it was in the current thesis, rather than a behavioural goal. The meta-analysis showed that variance in the intention-behaviour relationship across studies using the TRA could be attributed to the moderating effect of whether the behaviour was defined as an action or a goal. The authors found that behaviour was better predicted for actions than for goals. This was corroborated by Bagozzi and Edwards (in press) who summarised that the TRA and TPB fared better in the prediction of intentions and behaviour from attitudes and subjective norms (and in the TPB, perceived behavioural control) when examining specific actions related to an overall goal rather than the goal itself. In the present thesis, behaviour was defined as physical activity in leisure time and therefore
represented a behavioural category or a series of actions rather than a specific outcome or goal such as the benefits of exercise like weight maintenance and positive health, affective and social gains. Such outcomes are all valid reasons for participation, but are the result of the behaviour, not the behaviour itself. Thus it is the antecedents of engagement in behaviour that were the focus of the present thesis rather than the goals or outcomes related to the behaviour.

However, the "conative, motivational and emotional antecedents" (p. 441) examined by Bagozzi and Kimmel (1995) in developing theories related to goal directed behaviour may have implications and relevance to the present study. Bagozzi and Kimmel (1995) formulated a model to explain the conditions under which a behavioural goal is predicted. In order to do this, the authors returned to Ajzen's (1985) original formulation of the TPB. It was proposed that effort was possibly the reason why intentions did not predict goals. This is because the original forms of intentions were unable to account for variance related to the actor's desire to try. In addition, since the focus of the original model was aimed at goal directed behaviour, it was deemed that a measure of behaviour would not suffice as the relationship between goal achievement and degree of trying is subject to factors beyond a person's control such as real barriers. Consequently Ajzen's (1985) modified model which hypothesised intentions to try as the primary determinant of the person's trying to perform the behaviour, rather than engaging in the behaviour itself, was adopted as the new framework. This was corroborated by Bagozzi, Baumgartner and Yi's (1992) findings that intention better predicted trying to attain a goal than actual goal attainment. In addition to encompassing goals, it was recognised that Ajzen proposed that the determinants of intentions to try were attitudes and subjective norms towards trying. Ajzen was to later return to a less broad, single component measure of attitude as expressed in the original formation of the TRA (Ajzen, 1991; Ajzen & Madden, 1986), possibly because this better explained actions rather than goals. This version of the TPB, which represents a cognitive framework to explain attempts at a behavioural goal rather than behaviour itself, is shown in Chapter 2, Figure 2.5.

Warshaw, Sheppard and Hartwick (in press) adopted Ajzen's (1985) version of the TPB for behavioural attempts and modified it to produce the Theory of Goal Pursuit (TGP). The authors suggested that expectations and attitudes towards succeeding when making a behavioural attempt or 'trying', and expectations towards failing when trying, would provide a better prediction of intention. A probable reason for this is that attitudes towards success and failure are similar to beliefs about perceived behavioural control. As perceived control represents success estimates by a person based on capacities and strategies to produce outcomes, attitudes towards success are
likely to include some aspects of control. In addition, attitude towards actually performing the behaviour, as proposed by Ajzen (1985), was included in the model. It was thought that the actual performance of the behaviour may have additional predictive utility because attitudes and expectations of success and failure may not account for beliefs about actually doing the behaviour itself. Such attitudes may be similar to the degree of enjoyment a person has towards doing that behaviour. Even though the attitudes and expectancies towards success may be low, if the person deems the behaviour to be enjoyable it is likely that such a perception will contribute to any decision to engage in the behaviour. Indeed, such a variable may be related to a person’s intrinsic motivation towards a behaviour, that is, whether they are compelled to engage in the behaviour based on its inherent pleasure and satisfaction (Deci & Ryan, 1985).

The relations between the TGP model variables are illustrated in Chapter 2, Figure 2.6. Expectations serve as a weighting of attitudes towards success and failure and therefore represent, to some extent, an expectancy-value perceived behavioural control variable. Control can be viewed as an assessment of whether the behaviour can be performed successfully or not or how easy or difficult the behaviour will be. Clearly, if a person has a positive attitude towards success, but the expectation of success is low, it represents a valued behaviour which has many associated barriers either through capacities such as ability or through availability of means such as access to facilities. This is matched against beliefs about failure and expectation of failure, which can also reflect low perceptions of control. While not extensively researched, this approach has demonstrated utility in the prediction of behavioural attempts and trying in consumer research (Bagozzi & Kimmel, 1995; Bagozzi & Warshaw, 1990; Warshaw et al., in press).

THE THEORY OF TRYING

The TGP and the TPB towards goal directed behaviours or trying were fused to produce an augmented model - the Theory of Trying (TT). Bagozzi and Warshaw (1990) adapted the framework of Ajzen (1985), the attitudes towards success/failure and expectations of success/failure variables from Warshaw and colleagues’ (in press) model and included them in a model with two measures of past behaviour. This was due to the influence of research findings with the TRA, TPB and Theory of Interpersonal Behaviour. However, as the focus of Bagozzi and Warshaw’s (1990) study was on goal directed behaviours, these variables were measured in relation to past behavioural attempts rather than actual engagement in the behaviour or goal attainment. The two measures of past behaviour were termed past recency of trying.
and past frequency of trying. Past recency was proposed to predict the person's current level of trying while past frequency of behaviour was expected to contribute to both intention to try and actual trying. The resulting model is very similar to the theory of goal pursuit with the only difference being the inclusion of the past behavioural attempt variables, recency of trying and past frequency of trying. The model is illustrated schematically in Chapter 2, Figure 2.7.

The theory has demonstrated utility in the prediction of some behaviours such as weight control (Bagozzi & Warshaw, 1990), dieting and exercise (Bagozzi, & Kimmel, 1995). Bagozzi and Warshaw (1990) demonstrated that the TT accounted for a significantly larger proportion of variance in intention to try and was superior than the TGP and TPB in explaining the variance in intentions. Further, attitudes towards trying and succeeding were the most significant predictor of intentions to try. Recency and frequency of past trying were instrumental in predicting trying at two prospective points in time. Bagozzi and Kimmel (1995) found similar results and showed that intention to try only predicted behaviour once past frequency of behaviour was introduced as a predictor of intentions to try. Bagozzi and Kimmel (1995) said that this may have been due to the behaviours not being under volitional control. If a behaviour was under real control, then intentions would be expected to be a very clear predictor of behaviour. However, they were not and only the inclusion of past behavioural attempts enabled intention to predict behaviour. Bagozzi and Kimmel (1995) offer an alternative viewpoint that a person may bias their judgements on their intentions and expectations of success and failure according to their most recent experiences with the behaviour. Intuitively this makes sense as people tend to base their values and judgements on events that are most recent in memory. In this respect the past behavioural attempt variables are not the same as the past behaviour variable utilised by other researchers studying behavioural antecedents (e.g. Bagozzi, 1982; Bentler & Speckart, 1979; Bentler & Speckart, 1981; Liska, 1984; Triandis, 1977). Consequently, intentions towards a goal directed approach, may not be the same as those offered by a model examining actual engagement in the behaviour.

Bagozzi and Kimmel (1995) also compared the utility of the TT and the original version of the TPB (Chapter 2, Figure 2.2). They demonstrated the potential of past behaviour to moderate the effects of perceived behavioural control on intention. Bagozzi and Kimmel administered a measure of perceived behavioural control concurrently with the past recency and frequency of behaviour (not recency and frequency of trying). They demonstrated that perceived behavioural control has no explanatory power over behaviour and a reduced effect on intention with the inclusion of the past behaviour variables. In addition, they also found that intentions did not
predict behaviour under these conditions. This has a number of implications for the TPB. It is possible that perceived behavioural control may reflect past experiences with control and this may be why control has little utility in the prediction of behaviour when past behaviour is included. However, while the effects of control on behaviour may be due to past behaviour, not all the variance shared by perceived control on intention is accounted for by past behaviour and this was illustrated in Study 2 of the current thesis. Therefore, there may be other aspects of control which predict intentions independently of those related to past behaviour. In addition, the relationship between attitudes and past behaviour was not reported in Bagozzi and Kimmel’s (1995) study and neither was the distinction made between attitudes towards success and failure. Inclusion of these variables may have shed more light on the complex influences of perceived control on intentions and behaviour when moderated by attitudes and past behaviour.

An additional finding was the contribution of expectations and attitudes towards success to attitudes towards trying. This indicates that attitudes to try are an indirect function of the deliberations of possible success estimates for the behaviour. As expectations and attitudes toward success and failure are likely to account for perceived behavioural control estimates, further support is provided for the hypothesis in the current thesis that attitudes may be predicted by perceived behavioural control. A person asked to assess the possibility of making a successful behavioural attempt or failing at a behavioural attempt, will take into account many control-related considerations. Examples of these might be potential barriers and costs of the exercise, but also attitudes towards past experiences of control with that behaviour. As a consequence, these variables can be seen as equivocal with the perceived behavioural control variable. The implications of these findings are that variables related to how a person views their potential for success of a behaviour, which is akin to how much control they have over that behaviour, is essential to their formation of attitudes to make an attempt. Therefore perceived behavioural control is likely to predict attitudes in addition to its effects on intentions and behaviour as hypothesised in the present thesis.

**THEORY OF SELF-REGULATION**

In order to further map the processes behind goal directed behaviour, Bagozzi (1992) extended the findings of the TGP and the TT to include further intentional variables. In particular, he extended Ajzen’s (1985) revised model of behavioural attempts to incorporate a more elaborated extension behind the intentional process. Bagozzi (1992) criticised the limited scope of the TPB to encompass all aspects of the
formation of intentions. Corroborating this, Bagozzi and Edwards (in press) claimed that attitudes and subjective norms "do not supply sufficient motivational content for producing actions" (p. 3). Bagozzi (1992) therefore adopted Gollwitzer's (1990) position that desires are the true motivational antecedents of intentions and behaviour. Desire was construed to be a volitional and deliberative process which is motivational in nature and contains more than a predisposition towards an act like an attitude, it implies both orientation towards a behaviour as well as a tendency to act. Bagozzi and Kimmel (1995) present desire as a 'motivational' attitude and state that "motivational commitment resides in the magnitude of one's desire to act" (p. 441). Bagozzi (1992) insisted that the regulation of the attitude-intention relationship by the self was "through the process of outcome-desire interactions such as outcome-desire conflict, fulfilment, avoidance or pursuit" (p. 200). Desires, therefore, would have better prediction of intention and behaviour than attitudes as they reflect proximal interactions of the person with the behavioural goal. The Theory of Self-Regulation (TSR) was proposed and hypothesised that desires will have better utility in the prediction of intentions than attitudes and that the impact of attitudes would be negated with the inclusion of this variable. In addition, the TSR hypothesised that intentions toward trying would be predicted by a more general construct, known as a goal intention. Goal intentions were considered the likelihood a person was to achieve the specified goal in a given time frame. This variable was therefore assessed in the same manner as intentions from the original TPB, albeit for the behavioural goal rather than a specific action. The model is represented schematically in the Figure A2.1.

The TSR was supported empirically by Bagozzi and Edwards (in press) and Bagozzi and Kimmel (1995). Bagozzi and Edwards demonstrated that desires were the most important predictor of intentions, which in turn predicted intentions to try. This particular study differentiated between mental and physical components of desires, but only the mental component was predicted by intentions to try. Finally, two behaviours related to the behavioural goal of weight reduction, dieting and exercise were significantly predicted by intentions to try.

Bagozzi and Kimmel (1995) showed that desire was a strong predictor of intention and therefore provided partial support for the aspects of the TSR tested. They also revealed that desire predicted intentions independently of frequency and recency of past trying. Therefore, there is evidence to suggest that the inclusion of a measure of desire will assist in the prediction of intentions to try and perhaps reflect a more motivationally oriented attitude towards the process. It was indeed shown that desire had a mediating role on the attitude-intention relationship.
However, the discriminant validity of the desire and intention variable may be suspect. While Bagozzi and Kimmel (1995) demonstrated from a confirmatory factor analysis that these variables could be discriminated, their discrimination was made on the basis of the factor correlation between intention and desire being less than unity by an amount greater than twice the standard error of the factor correlation. The authors testify that this is a necessary, but not sufficient case for discriminant validity, and report that the correlation between the variables may have been too high. Thus, intentions and desire may be more or less the same variable. Bagozzi and Kimmel (1995) defend this by demonstrating that the correlation between intention and desire varies depending on the behavioural goal under scrutiny. They claim that desires and intentions to try tend to be experienced simultaneously. For example, in the face of an 'alluring dessert' one may form a plan alongside the desire. In exercise, however, they argue that while desires are omnipresent, intentions are formed distal to the engagement in the behaviour and there are seldom alluring conditions. There is therefore more time to process information other than desires.

In summary, it can be seen that the notion of desire is a complex one. In particular its discriminant validity with respect to certain behaviours requires further investigation and its relationship to control has yet to be confirmed. Further, the utility of the TSR
in predicting adoptive behaviours like physical activity may be inferior to its utility for cessative behaviours such as dieting or smoking. It may, however, provide a useful means of describing some of the more spontaneous routes to action for some behaviours in cognitive models.

REFERENCES


APPENDIX 3
The Theory of Planned Behaviour Questionnaire (Study 1)

INSTRUCTIONS: What follows are some statements about the physical activities you do. Physical activities are sports, games and other vigorous pastimes which may make your heart beat faster or make you out of breath. Think only of the activities you do outside of normal school time. Put a circle around the answer which best describes how you feel about the statement.

Remember to answer all statements and every scale for each statement.

1. I plan to do physical activities at least three or more times during my free time in the next week.

   likely 7 6 5 4 3 2 1 unlikely
            very quite slightly neither slightly quite very

2. My doing physical activities at least three or more times in the next week is

   good 7 6 5 4 3 2 1 bad
          very quite slightly neither slightly quite very

   exciting 7 6 5 4 3 2 1 boring
            very quite slightly neither slightly quite very

   fun 7 6 5 4 3 2 1 unpleasant
          very quite slightly neither slightly quite very

3. Most people important to me think I should do physical activities at least three or more times in the next week.

   likely 7 6 5 4 3 2 1 unlikely
            very quite slightly neither slightly quite very

4. Do you think it will be easy or difficult for you to participate in physical activities which make you out of breath at least three or more times in the next week?

   easy 7 6 5 4 3 2 1 difficult
          very quite slightly neither slightly quite very
APPENDIX 4
Sample Four by One Day Recall School Day Interview Form

PART ONE - IN THE MORNING

1) What time did you get up yesterday?

☐ ☐ ☐ ☐ a.m.

2) How did you get to school yesterday?  (Just report the main method of how you got there).

☐ WALK
☐ BUS
☐ CAR
☐ CYCLE
☐ OTHER
(If other, what was it?)

3) How long did the journey take?

☐ ☐ minutes
IN THE MORNING

YESTERDAY MORNING BEFORE SCHOOL

4) Did you do any of these activities?

<table>
<thead>
<tr>
<th>Activity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>watched television</td>
<td>□</td>
</tr>
<tr>
<td>listened to music</td>
<td>□</td>
</tr>
<tr>
<td>talk with friends</td>
<td>□</td>
</tr>
</tbody>
</table>

5) Did you do any light household chores, wash-up, tidy-up etc.? If so, for how long?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>light household chores</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

6) Did you do any of these activities? If so for how long? Did they make you breathe hard?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Minutes</th>
<th>Did You &quot;Breathe Hard?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>played football in the playground</td>
<td>□</td>
<td>□</td>
<td>□ □</td>
</tr>
<tr>
<td>played other ball games in the playground</td>
<td>□</td>
<td>□</td>
<td>□ □</td>
</tr>
<tr>
<td>played tag/chasing games in the playground</td>
<td>□</td>
<td>□</td>
<td>□ □</td>
</tr>
</tbody>
</table>

7) Any other activity? If so, what?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Minutes</th>
<th>Did You &quot;Breathe Hard?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□</td>
<td>□</td>
<td>□ □</td>
</tr>
</tbody>
</table>
AT SCHOOL

8) Was yesterday a P.E. day?

YES ☐  NO ☐

9) If yes, did you do any of these activities?
(If no, go to Q11 on next page)

<table>
<thead>
<tr>
<th>Activity</th>
<th>TOTAL TIME</th>
<th>DID YOU &quot;BREATHE HARD?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>hours</td>
<td>minutes</td>
</tr>
<tr>
<td>swimming</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>netball</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>hockey</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>gymnastics</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>rounders</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>basketball</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>athletics</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>football</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>rugby</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

10) Any other activity?
If so, what?

TOTAL TIME
hours      minutes
☐          ☐       ☐   | ☐   |

DID YOU "BREATHE HARD?"
yes       no
☐          ☐
AT BREAK TIME

11) Did you do any of these activities?

- talked with friends
- played card or board games
- listened to music

12) Did you do any of these activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>TOTAL TIME</th>
<th>DID YOU &quot;BREATHE HARD?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>played football in the playground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>played other ball games in the playground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>played tag/chasing games in the playground</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13) Any other activity?
If so, what?

<table>
<thead>
<tr>
<th>TOTAL TIME</th>
<th>DID YOU &quot;BREATHE HARD?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>hours</td>
<td>minutes</td>
</tr>
<tr>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>
AT LUNCH TIME

14) Did you do any of these activities?

- talked with friends
- played card or board games
- listened to music

15) TOTAL TIME

- walked to the shop
- walked home for lunch

16) TOTAL TIME

- played football in the playground
- played other ball games in the playground
- played tag/chasing games in the playground

DID YOU "BREATHE HARD?"

- yes
- no
AT LUNCH TIME (continued)

17) | **TOTAL TIME** | **DID YOU "BREATHE HARD?"**
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>hours</td>
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<tr>
<td>swimming</td>
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<td>netball</td>
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<td>hockey</td>
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<td>gymnastics</td>
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<td>basketball</td>
<td></td>
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<tr>
<td>athletics</td>
<td></td>
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<tr>
<td>football</td>
<td></td>
</tr>
<tr>
<td>rugby</td>
<td></td>
</tr>
</tbody>
</table>

18) Any other activity?
If so, what?

<table>
<thead>
<tr>
<th><strong>TOTAL TIME</strong></th>
<th><strong>DID YOU &quot;BREATHE HARD?&quot;</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>hours</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PART TWO - IN THE AFTERNOON

AFTERNOON BREAK TIME (If participant does not have an afternoon break go to Q22)

19) Did you do any of these activities?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>talked with friends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>played card or board games</td>
<td></td>
<td></td>
</tr>
<tr>
<td>listened to music</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20)

<table>
<thead>
<tr>
<th>Activity</th>
<th>TOTAL TIME</th>
<th>DID YOU &quot;BREATHE HARD?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>played football in the playground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>played other ball games in the playground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>played tag/chasing games in the playground</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21) Any other activity?

If so, what?

<table>
<thead>
<tr>
<th>TOTAL TIME</th>
<th>DID YOU &quot;BREATHE HARD?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>hours</td>
<td>minutes</td>
</tr>
<tr>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>
PART TWO - AFTER SCHOOL/IN THE EVENING

22) Before you left school did you do any of these activities?

- talked with friends [ ]
- played card or board games [ ]
- listened to music [ ]

23) Did you breathe hard? (hours minutes yes no)

- played football in the playground [ ] [ ] [ ] [ ]
- played other ball games in the playground [ ] [ ] [ ] [ ]
- played tag/chasing games in the playground [ ] [ ] [ ] [ ]

24) How did you get home from school yesterday? (Just report the main method of how you got home).

- WALK [ ]
- BUS [ ]
- CAR [ ]
- CYCLE [ ]
- OTHER [ ] (If other, what was it?)

25) How long did the journey take?

[ ] [ ] minutes

26) Any other activity? If so, what?

DID YOU BREATHE HARD? (hours minutes yes no)
IN THE EVENING

27) Did you do any of these activities?
   - watched television
   - watched videos
   - listened to music
   - played card or board games
   - drew or painted
   - played a musical instrument
   - used a computer/played computer games
   - homework
   - read for pleasure

28) TOTAL TIME

   cared for pets
   - light household chores, wash-up, tidy-up etc.
   - went for a walk/stroll
   - did a part-time job
   - went to a youthclub or disco
IN THE EVENING

29)

<table>
<thead>
<tr>
<th>Activity</th>
<th>TOTAL TIME</th>
<th>DID YOU &quot;BREATHE HARD?&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>clean/hoover or move furniture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gardening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>brisk walking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>did a paper round</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>golf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>swimming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tennis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>badminton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hockey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gymnastics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>volleyball</td>
<td></td>
<td></td>
</tr>
<tr>
<td>netball</td>
<td></td>
<td></td>
</tr>
<tr>
<td>basketball</td>
<td></td>
<td></td>
</tr>
<tr>
<td>athletics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>running</td>
<td></td>
<td></td>
</tr>
<tr>
<td>football</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rugby</td>
<td></td>
<td></td>
</tr>
<tr>
<td>disco dancing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
IN THE EVENING (continued)

30) Any other activity?
If so, what?

31) What time did you go to bed yesterday?

32) Was yesterday a typical day for you?

If no, why not?
APPENDIX 5

Inter- and Intra-Interviewer Reliability

INTRODUCTION

Interviewer reliability for the four by one day recall physical activity questionnaire used in Study 1 and Study 2 was assessed to ensure that the data collected by all of interviewers was consistent between individual interviewers and within each interviewer over time. Although the interviewers had undergone a training programme to ensure that they were familiar with the interview procedures, protocol, format and the need to ask 'probing questions', objective data on the interviewers' ability to acquire like responses from the sample was required. Two interviewer reliability studies were conducted to establish (1) the inter-interviewer reliability or objectivity of the interviewers and (2) to examine whether interviewers exhibited intra-interview reliability or the degree of consistency in their ability to conduct the interviews.

METHOD

In order to determine inter-interviewer reliability, i.e. the agreement between the different interviewers' responses from the questionnaire, the interviewers independently scored the same set of 12 taped interviews. These interviews were selected at random from interviews conducted during the initial stages of data collection. In Study 1 there were two types of interviewers: those who interviewed on school days only (i.e. administered the school day form) and those who interviewed on both school days and weekend days (i.e. administered both the school and weekend day forms). In Study 2, interviewers only scored the school day questionnaires. Consequently, for Study 1 interviewers, those who scored school day only (n=6) were asked to score a set of 12 school day interviews only, while the other group of interviewers (n=3) scored 12 school day and 12 weekend day interviews. For Study 2, the three interviewers scored only the school day interviews. As stipulated by Cale (1994) the interviewers completing both forms were given a 10 minute break between the school and weekend day forms in order to alleviate boredom and prevent scores being affected by any lapses of concentration.

Intra-interviewer reliability i.e. the interviewers' ability to score the questionnaires consistently was tested by test-retest. The interviewers were asked to complete questionnaire forms for the same 12 taped interviews again two weeks later. Those
scoring only the school day questionnaires, completed only the school day forms on
the retest while those who completed both were asked to fill out both forms on the
second occasion. The two week interval was deemed a sufficient period of time for
the interviewers to have forgotten the specific intricacies of the interviews themselves,
but short enough for the interviewers to remain familiar with the interview technique.
It was thought that a shorter test-retest period may have contaminated the results as
the interviewer would be able to remember the responses of a child and score the
questionnaire partly by memory instead of what they heard on the tape.

The interviewers' impressions of the reliability sessions was established in an
informal discussion after the second listening of the taped interviews. In general the
interviewers were surprised how similar their scores for the questionnaire were to
each other and to those stipulated by the protocol, and that once they had a small
amount of experience with using the questionnaire they were easily able to replicate
the interviews and were able to cope with the responses provided by the school
children. This is in congruence with the anecdotal evidence from Cale (1994) whose
interview team adopted to the same interview procedures and 'probing' questions as
the current study.

RESULTS

Once the interviewers had completed their forms, they were returned to the researcher
who analysed the scores and calculated energy expenditure using Blair's (1984)
estimates. The energy expenditure scores obtained from each researcher's
questionnaire were compared for between interviewer (inter-interviewer) and within
interviewer (intra-interviewer) reliability.

The mean scores were subjected to two statistical analyses for comparison. To test for
inter-interviewer reliability, a Pearson product-moment correlation matrix was
calculated to examine the association between the different interviewer's energy
expenditure scores for the taped interview. To test for intra-interviewer reliability,
questionnaire scores from the first listening session were correlated with the scores
from the second session for each interviewer. The correlations for Study 1
interviewers can be seen in Tables 5A.1 and A5.2 and the correlations for Study 2 can
be seen in Table A5.3.

In Study 1 and Study 2, there were 12 sets of measurements per interviewer for the
school day interviews. There were also 6 sets of measurements for the weekend day
interviews in Study 1. Consequently, many Pearson correlations needed to be
calculated in order to examine the pairwise relationships. However, using bivariate correlations repeatedly violates the assumption that all the variables have equal variances. A univariate, repeated measure procedure to examine the differences in the means was deemed to explain the association better as it takes into consideration the variances of all the scores. Consequently, a $2 \times 6$ (trials x interviewers) ANOVA with repeated measures on the first variable was calculated to examine the differences between the interviewers' scores for the school day questionnaires in Study 1. A $2 \times 3$ (trials x interviewers) ANOVA with repeated measures on the first variable examined the differences between interview scores on the weekend questionnaires for Study 1. A $2 \times 3$ (trials x interviewers) ANOVA with repeated measures on the first variable was conducted to test for significant differences within and between interviewers for the school day interviews conducted in Study 2. In the event of a significant main effects, Tukey HSD post hoc tests were used to locate the differences. In addition, the intraclass correlation coefficient $R_I$ was calculated from a one-way ANOVA on the interviewer's scores in each study. $R_I$ provides an estimate of the strength of association between the variables when all sources of variance are accounted for.

Table A5.1 Correlation Matrix between the School Day Interviewer's Scores for the Taped Interviews in Study 1

<table>
<thead>
<tr>
<th>Interviewer</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(.99)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.98</td>
<td>(.98)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.99</td>
<td>.98</td>
<td>(.99)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.87</td>
<td>.90</td>
<td>.88</td>
<td>(.80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>.96</td>
<td>.96</td>
<td>.97</td>
<td>.84</td>
<td>(.99)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>.98</td>
<td>.97</td>
<td>.86</td>
<td>.86</td>
<td>.97</td>
<td>(.99)</td>
</tr>
</tbody>
</table>

Note. Inter-interviewer correlations shown in main matrix and intra-interviewer correlations shown in parenthesis along principal axis.

Table A5.2 Correlation Matrix between the Weekend Day Interviewer's Scores for the Taped Interviews in Study 1

<table>
<thead>
<tr>
<th>Interviewer</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(.76)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.77</td>
<td>(.89)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.78</td>
<td>.77</td>
<td>(.62)</td>
</tr>
</tbody>
</table>

Note. Inter-interviewer correlations shown in main matrix and intra-interviewer correlations shown in parenthesis along principal axis.
Table A5.3 Correlation Matrix between the School Day Interviewer's Scores for the Taped Interviews in Study 2

<table>
<thead>
<tr>
<th>Interviewer</th>
<th>1 (.99)</th>
<th>2 (.93)</th>
<th>3 (.98)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.95</td>
<td>.98</td>
<td></td>
</tr>
</tbody>
</table>

Note. Inter-interviewer correlations shown in main matrix and intra-interviewer correlations shown in parenthesis along principal axis.

In terms agreement between interviewers, inter-interviewer reliability, correlations between the school day interviewers scores were high ranging from r=.84 to r=.99 (p<.01) for Study 1 and r=.95 to r=.98 (p<.01) for Study 2. Correlations were lower but still significant and satisfactory between the weekend day interviews in Study 1, range r=.77 to r=.78 (p<.01).

The school day interviewers exhibited a high degree of repeatability in their scoring interviews over time i.e. intra-interviewer reliability. Pearson correlation coefficients ranged from r=.80 to r=.99 (p<.01) in Study 1 and between r=.93 to r=.99 (p<.01) in Study 2. However, coefficients for the weekend day interviewers in Study 1 were not as high, but still satisfactory, range r=.62 to r=.89 (p<.01).

The trials x interviewers ANOVAs revealed no significant differences for the main effects of trials or interviewers for both the school day groups in Study 1 and Study 2 and weekend day group in Study 1. Intraclass correlation coefficients (R_I) were used to further test for inter-interviewer reliability. Correlations were R_I=.99 (p<.01) in Study 1 and R_I=.98 in Study 2 for the school day interviews and R_I=.91 (p<.01) for the weekend interviews in Study 1. This is indicative of a very strong association between the scores for the different interviewers.

DISCUSSION

Previous studies examining interviewer-administered, self-report measures of physical activity have found a high degree of inter and intra-interviewer reliability (Cale, 1994; 1995; Gross et al., 1990). Cale (1994), in the development of the four by one-day recall questionnaire, trained interviewers to use the instrument and developed a handbook for administration based on the training programme. In order to ensure the interviewers were scoring the questionnaires in a reliable manner, Cale (1994) used Pearson correlation coefficients to examine the inter interviewer reliability of the four
by one-day recall questionnaire and found that the coefficients ranged from $r = 0.88$ to $r = 0.99$ and individual interviewer reliability over time for the interviewers ranged between $0.94$ and $1.0$, indicating very high objectivity and consistency scores. Gross et al. (1990) showed that after a detailed training procedure, there were no significant differences between the scorings of physical activity from 8 videotaped interviews shown two weeks apart. Further, inter-interviewer agreement was assessed by comparing the scores of the 21 interviewers from the eight videotaped interviews and this showed a high degree of reliability in scoring high, medium and low activity subjects.

Gross et al. (1990) also used a third technique, not employed in this study, to examine the 'reliability of the entire interview procedure'. This involved the interviewers conducting interviews with twenty subjects, one hour apart and then comparing the scores for each subject. This revealed a high agreement between the interviewers, but while the subjects were asked to react only to the present interviewer and independently of the other interviews, the data would still have been contaminated by previous knowledge due to the repeated application of the treatment. Due to the limitations of this technique and on the recommendation of Cale (1994), this test was not employed in the present study, only taped interviews were used to confirm interviewer reliability. The taped interview method has the limitation that the interviewers were not employing their own technique of interviewing, however reported feedback from the interviewers after the reliability studies indicated that they utilised a similar technique and the interview questionnaire was structured in such a way that reduced the individual interpretation of the interviewer to ensure the consistency in interview questions and responses. It was concluded from the interviewers' affirmations that the two reliability measures employed by Cale (1994) and the present study were adequate measures of the objectivity and consistency of the interviewer's in scoring the questionnaires. This is important as the data gleaned from these interviewers questionnaires was used as the measure of physical activity behaviour in Study 1 and Study 2.

Overall the interviewers exhibited high intra-interviewer reliability suggesting a high degree of objectivity between the interview scores for both Study 1 and Study 2. Further, the interviewers were able to replicate their interview scores over time showing a high degree of inter-interviewer reliability (test-retest reliability). This suggests that the interviewers were suitably trained and able to provide objective, consistent interview procedures for the main study with little variance in the scores due to interviewer error.
For the school day interviews in both studies, the high intraclass correlations and the low range, high order Pearson's product-moment correlations provide good evidence for the inter-interviewer reliability. The small range in the correlations (r=.84 to r=.99 in Study 1 and r=.95 to r=.98 in Study 2) suggests there is a high degree of association between the interviewers which is a good criterion for inter-interviewer reliability. The weekend day correlations were not as high which indicates there is less agreement between the interviewers for the weekend forms. The coefficients are, nevertheless, satisfactory. Regarding intra-interviewer reliability the present results showed high intraclass correlations between the two test administrations for each school day interviewer, range r=.80 to r=.99 for Study 1 and r=.93 to r=.99 for Study 2. This suggests that the interviewers' ability to score questionnaires consistently over time is satisfactory. Again, the correlations were much lower for the weekend day forms, which again might indicate that the weekend forms are more difficult to administer consistently and there may be more scope for variation in responses.

Based on these results the researcher can be relatively confident that the scores elicited by the interviewers for the four by one-day recall questionnaire in this study agreed with each other and were stable over time. The use of a training manual to training the interviewers and subjecting them to the rigorous reliability check ensured that the interviews were administered in a consistent and objective manner. The use of the same scoring system to calculate the energy expenditure scores from each interview ensured an objective and consistent approach to the scoring procedures.

REFERENCES


APPENDIX 6
Leisure Time Exercise Questionnaire Adapted for Children

WHAT I DO

1. On average how many times in a week do you do these kinds of physical activities?

[Think of an average week - not just last week]

<table>
<thead>
<tr>
<th>HARD PHYSICAL ACTIVITIES</th>
<th>TIMES PER WEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>(that makes my heart beat fast)</td>
<td></td>
</tr>
<tr>
<td>Football; Jogging; Running; Basketball; Hockey; Fast cycling for a long time; and other things like this</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOT SO HARD ACTIVITIES</th>
<th>TIMES PER WEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>(that does not make me feel worn out)</td>
<td></td>
</tr>
<tr>
<td>Walking fast; Tennis; Easy cycling; Badminton; Disco dancing; and other things like this</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EASY ACTIVITIES</th>
<th>TIMES PER WEEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>(that does not make me feel worn out)</td>
<td></td>
</tr>
<tr>
<td>Walking fast; Tennis; Easy cycling; Badminton; Disco dancing; and other things like this</td>
<td></td>
</tr>
</tbody>
</table>

2. On average how often do you do any exercise long enough to get sweaty and make your heart beat fast?

(Put a ring around the answer which is most like you?)

<table>
<thead>
<tr>
<th>OFTEN</th>
<th>SOMETIMES</th>
<th>NOT VERY OFTEN/NEVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Remember think of an average week - not just last week]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# APPENDIX 7

## Model Covariance Matrices for Structural Equation Models
Presented in Studies 1, 2, 3 and 4

### Study 1

<table>
<thead>
<tr>
<th></th>
<th>Intention</th>
<th>Attitude 1</th>
<th>Attitude 2</th>
<th>Attitude 3</th>
<th>Sub Norm</th>
<th>Behaviour</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention</td>
<td>12.641</td>
<td>20.745</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>11.847</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub Norm</td>
<td>0.000</td>
<td>2.077</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behaviour</td>
<td>-6.861</td>
<td>-6.430</td>
<td>0.000</td>
<td>231.597</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>6.082</td>
<td>5.221</td>
<td>0.000</td>
<td>-3.301</td>
<td>20.596</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Study 2

<table>
<thead>
<tr>
<th></th>
<th>Intention</th>
<th>Attitude 1</th>
<th>Attitude 2</th>
<th>Attitude 3</th>
<th>Sub Norm</th>
<th>Control1</th>
<th>Control 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention</td>
<td>0.583</td>
<td>0.482</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude 1</td>
<td>0.264</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude 2</td>
<td>0.228</td>
<td>0.786</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude 3</td>
<td>0.270</td>
<td>0.221</td>
<td>0.393</td>
<td>0.666</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub Norm</td>
<td>0.242</td>
<td>0.198</td>
<td>0.171</td>
<td>0.202</td>
<td>1.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control1</td>
<td>0.234</td>
<td>0.191</td>
<td>0.165</td>
<td>0.195</td>
<td>0.271</td>
<td>1.027</td>
<td></td>
</tr>
<tr>
<td>Control 2</td>
<td>0.061</td>
<td>0.050</td>
<td>0.043</td>
<td>0.051</td>
<td>0.071</td>
<td>0.069</td>
<td>0.717</td>
</tr>
<tr>
<td>Control 3</td>
<td>0.126</td>
<td>0.103</td>
<td>0.089</td>
<td>0.105</td>
<td>0.146</td>
<td>0.141</td>
<td>0.184</td>
</tr>
<tr>
<td>Control 4</td>
<td>0.099</td>
<td>0.081</td>
<td>0.070</td>
<td>0.083</td>
<td>0.115</td>
<td>0.111</td>
<td>0.029</td>
</tr>
<tr>
<td>Past</td>
<td>0.101</td>
<td>0.082</td>
<td>0.071</td>
<td>0.084</td>
<td>0.117</td>
<td>0.113</td>
<td>0.030</td>
</tr>
<tr>
<td>Behaviour</td>
<td>1.258</td>
<td>1.029</td>
<td>0.889</td>
<td>1.052</td>
<td>0.941</td>
<td>0.910</td>
<td>0.238</td>
</tr>
<tr>
<td>Attitude F1</td>
<td>0.264</td>
<td>0.216</td>
<td>0.187</td>
<td>0.221</td>
<td>0.198</td>
<td>0.191</td>
<td>0.050</td>
</tr>
<tr>
<td>Control F2</td>
<td>0.234</td>
<td>0.191</td>
<td>0.165</td>
<td>0.195</td>
<td>0.271</td>
<td>0.262</td>
<td>0.069</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Control 3</th>
<th>Control 4</th>
<th>Past Behaviour</th>
<th>Behaviour</th>
<th>Attitude F1</th>
<th>Control F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 3</td>
<td>0.488</td>
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288
### Study 4 - Continued

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APPENDIX 8

The Theory of Planned Behaviour Questionnaire (Study 2 and Study 4)

INSTRUCTIONS: What follows are some statements about the physical activities you do. Physical activities are sports, games and other vigorous pastimes which may make your heart beat faster or make you out of breath. Think only of the activities you do outside of normal school time. Put a circle around the answer which best describes how you feel about the statement.

Remember to answer all statements and every scale for each statement.

1. I plan to do physical activities at least three or more times during my free time in the next week.

   likely         7 6 5 4 3 2 1    unlikely
                 very  quite  slightly  neither  slightly  quite  very

2. My doing physical activities at least three or more times in the next week is

   good           7 6 5 4 3 2 1    bad
                 very  quite  slightly  neither  slightly  quite  very

   exciting       7 6 5 4 3 2 1    boring
                 very  quite  slightly  neither  slightly  quite  very

   fun            7 6 5 4 3 2 1    unpleasant
                 very  quite  slightly  neither  slightly  quite  very

3. Most people important to me think I should do physical activities at least three or more times in the next week.

   likely         7 6 5 4 3 2 1    unlikely
                 very  quite  slightly  neither  slightly  quite  very

4. Do you think it will be easy or difficult for you to participate physical activities which make you out of breath at least three or more times in the next week?

   easy           7 6 5 4 3 2 1    difficult
                 very  quite  slightly  neither  slightly  quite  very

5. It is mostly up to me whether I do physical activities three or more times in the next week.

   true           7 6 5 4 3 2 1    false
                 very  quite  slightly  neither  slightly  quite  very
6. If I wanted to I could do physical activities three or more times in the next week.

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<th>3</th>
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<th>1</th>
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<td>slightly</td>
<td>quite</td>
<td>very</td>
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7. There is very little I can do to make sure I do three or more physical activities in the next week.

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<th>3</th>
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<td>quite</td>
<td>very</td>
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8. How many times per week have you normally participated in physical activities in the last six months.

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<th>4</th>
<th>5</th>
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<td>about twice a week</td>
<td>about three times a week</td>
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APPENDIX 9
The Theory of Planned Behaviour Questionnaire (Study 3)

INSTRUCTIONS: What follows are some statements about the physical activities you do. Physical activities are sports, games and other vigorous pastimes which may make your heart beat faster or make you out of breath. Think only of the activities you do outside of normal school time. Put a circle around the answer which best describes how you feel about the statement.

Remember to answer all statements and every scale for each statement.

1. I plan to do physical activities at least three or more times during my free time in the next week.

likely 

possible 

neither 

likely

very quite slightly neither slightly quite very unlikely

2. My doing physical activities at least three or more times in the next week is

good

bad

very quite slightly neither slightly quite very

exciting

boring

very quite slightly neither slightly quite very

fun

unpleasant

very quite slightly neither slightly quite very

3. Most people important to me think I should do physical activities at least three or more times in the next week.

likely

unlikely

very quite slightly neither slightly quite very

4. Do you think it will be easy or difficult for you to participate in physical activities which make you out of breath at least three or more times in the next week?

easy

difficult

very quite slightly neither slightly quite very

5. It is mostly up to me whether I do physical activities three or more times in the next week.

true

false

very quite slightly neither slightly quite very
6. If I wanted to I could do physical activities three or more times in the next week.

true 7 6 5 4 3 2 1 false

very quite slightly neither slightly quite very

7. There is very little I can do to make sure I do three or more physical activities in the next week.

agree 7 6 5 4 3 2 1 disagree

very quite slightly neither slightly quite very

8. Are you satisfied with the amount of physical activity you do now?

satisfied 7 6 5 4 3 2 1 unsatisfied

very quite slightly neither slightly quite very

9. Are you satisfied you make enough friends when doing physical activity?

satisfied 7 6 5 4 3 2 1 unsatisfied

very quite slightly neither slightly quite very

10. Are you satisfied you are able to get fit enough doing the physical activities you do?

satisfied 7 6 5 4 3 2 1 unsatisfied

very quite slightly neither slightly quite very

11. Are you satisfied you get enough competition from the physical activities you do?

satisfied 7 6 5 4 3 2 1 unsatisfied

very quite slightly neither slightly quite very

12. Are you satisfied with the amount of new skills you learn from the physical activities you do?

satisfied 7 6 5 4 3 2 1 unsatisfied

very quite slightly neither slightly quite very

13. Are you satisfied you get enough fun and enjoyment out of the physical activities you do?

satisfied 7 6 5 4 3 2 1 unsatisfied

very quite slightly neither slightly quite very
14. Are you satisfied you are able to get away from you everyday problems often enough by doing the physical activities you do?

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<td>quite</td>
<td>very</td>
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15. How confident are you that you will participate in physical activities at least three times in the next week?

- 0-10%
- 11-20%
- 21-30%
- 31-40%
- 41-50%
- 51-60%
- 61-70%
- 71-80%
- 81-90%
- 91-100%

16. How confident are you in doing physical activities on a day when you are going out with your friends?

- 0-10%
- 11-20%
- 21-30%
- 31-40%
- 41-50%
- 51-60%
- 61-70%
- 71-80%
- 81-90%
- 91-100%

17. How often do you think going out with your friends will get in the way of your participation in physical activities at least three times this week?

- None
- Once or twice
- About 2-3 times
- At least 3 times
18. How confident are you in doing physical activities on a day when the weather is bad?

- 0-10%
- 11-20%
- 21-30%
- 31-40%
- 41-50%
- 51-60%
- 61-70%
- 71-80%
- 81-90%
- 91-100%

19. How often do you think bad weather will get in the way of your participation in physical activities at least three times this week?

- None
- Once or twice
- About 2-3 times
- At least 3 times

20. How confident are you in doing physical activities when you have homework or household chores to do?

- 0-10%
- 11-20%
- 21-30%
- 31-40%
- 41-50%
- 51-60%
- 61-70%
- 71-80%
- 81-90%
- 91-100%

21. How often do you think homework or household chores will get in the way of your participation in physical activities at least three times this week?

- None
- Once or twice
- About 2-3 times
- At least 3 times
APPENDIX 10

Social Desirability Questionnaire

INSTRUCTIONS: Here are some questions about things that happen to all children your age. Please answer each question by putting a circle around the 'Yes' or the 'No' following the question. There are no right or wrong answers, and no trick questions. Work quickly and do not think too long about the exact meaning of each question.

*Remember to answer each of the 15 questions.*

1. Have there been times when you have felt resentful when you didn't get your way?
   1. Yes
   2. No

2. Have you ever given up doing something because you felt you were not good at it?
   1. Yes
   2. No

3. Do you sometimes dislike sharing things with your friends?
   1. Yes
   2. No

4. Do you always admit you are wrong when you make a mistake?
   1. Yes
   2. No

5. Do you always remember to say 'please' and 'thank you'?
   1. Yes
   2. No

6. Have there been times when you felt like going against what older people tell you even though you knew they were right?
   1. Yes
   2. No

7. Do you remember 'playing sick' to get out of something?
   1. Yes
   2. No

8. Have there been times when you took advantage of someone?
   1. Yes
   2. No
9. Do you sometimes try to get even rather than forgive and forget?
   1
   Yes
   2
   No

10. Are you always polite, even to people who are disagreeable?
    1
    Yes
    2
    No

11. Have you ever been bothered when people expressed different ideas to your own?
    1
    Yes
    2
    No

12. Have there ever been times when you were quite jealous of the good fortune of others?
    1
    Yes
    2
    No

13. Are you sometimes irritated by people who ask favours of you?
    1
    Yes
    2
    No

14. Have you ever deliberately said something that hurt someone’s feelings?
    1
    Yes
    2
    No

15. Is it sometimes hard for you to do your homework if you are not encouraged?
    1
    Yes
    2
    No
APPENDIX 11

Respecifying the models from Study 3 and Study 4 using a non-latent measure of control

INTRODUCTION

In Studies 3 and 4 the measures of perceived behavioural control exhibited some problems with factor loadings and $R^2$ values from the confirmatory factor analyses. In particular, the problem stemmed from two items with the statements: “it is up to me if I want to do some physical activity in the next week” and “if I wanted to I could do some physical activity in the next week”. Further, the factor loadings from the other variables were also not very high. As the latent factor is defined in terms of the common true variance from the different items with the error variance explicitly modelled for each factor, this did not necessarily pose a problem. Essentially, the scale itself lacks adequacy insofar as only two items are making any substantial contribution to the factor. However, the factor is still defined as an unobserved variable and is effectively ‘error free’ or does not carry any of the associated error related to the individual items. Therefore the existence of poor items in the model does not, in itself, present a problem in terms of the factor. Only if the items were averaged or used in a composite would the collective random error due to the inadequacy of the problematic items to represent the construct confound the findings of the model. However, the poor loadings were also reflected by relatively low internal consistency alphas. This suggests that children may not respond to the scales in a consistent manner. Therefore, in order to confirm that the latent measure of control with the two poor items did not produce discrepant results in the examination of the study hypotheses, the non-standard models from Study 3 and Study 4 were respecified using a single item representing control. The single item was selected from the best item from the confirmatory factor analysis of the perceived control scale. The item has the statement: “do you think it would be easy or difficult for you to participate in physical activities which make you out of breath at least three times or more in the next week”. The hypothesis was that if the same pattern of relationships appeared using the single item as found using the latent variable measure of control, the inferences drawn as to the relationships in the population could be better relied upon as reflections of the true sample relationships.
METHOD

The non-standard models were hypothesised using the EQS programme on the entire sample based on the revised models provided in Figure 5.3 for Study 3 and Figure 6.3 for Study 4. This was based on the assumption that the model had already been specified on one half and confirmed on the other half and via multigroup analyses and that the present study aimed to use the inclusion of a single item measure of control to test the study hypothesis which did not represent a change in the hypothesised relationships in the model itself. The model was assessed via standard overall goodness of fit indices (CFI, TLI, $\chi^2$/df and SRMSR) and standardised parameter coefficients used to examine model relationships.

RESULTS

The analyses resulted in models which represented less-than-adequate goodness of fit statistics (Table A11.1), although the deviation from the minimum criteria for satisfactory fit was small. However, a pattern of relationships identical to those given in the final models in Studies 3 and 4 emerged. The models are represented schematically in Figures A11.1 and A11.2.

Table A11.1 Goodness of Fit Statistics for Study 3 and Study 4 Models Estimated with a Non-Latent Control Measure

<table>
<thead>
<tr>
<th>Study</th>
<th>$\chi^2$</th>
<th>CFI</th>
<th>TLI</th>
<th>$\chi^2$/df</th>
<th>SRMSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1022.87</td>
<td>.89</td>
<td>.88</td>
<td>8.11</td>
<td>.08</td>
</tr>
<tr>
<td>4</td>
<td>848.15</td>
<td>.89</td>
<td>.87</td>
<td>6.02</td>
<td>.10</td>
</tr>
</tbody>
</table>

The LM-tests revealed that the goodness of fit could be improved marginally for both models by freeing additional paths. In the Study 3 model it recommended that self-evaluation of behaviour predict perceived control. When this path was freed it exhibited a significant coefficient of ($\lambda=.32, p<.01$) and improved the model fit (CFI=.90). This path represents the contribution self-evaluation of behaviour has to make to the perceived control variable and its prediction of attitudes. However, as the coefficient was moderate in magnitude and the path may have been freed due to some measurement error in the control variable it was left fixed. In Study 4 the LM-test recommended that the disturbances of the Powerful Others and Internal perceptions of control constructs covary. This indicates the existence of some common error variance across these factors which is not accounted for by their correlation. However, since control in these domains have only a small role to serve in the prediction of perceived control, as seen
from low coefficients, the covariance was perceived to be of little consequence in the model.

**Figure A11.1 Path Diagram from Study 3 Showing Standardised Coefficients between Intentions, Attitudes, Non-Latent Perceived Behavioural Control, Self-Efficacy, Self-Evaluation of Behaviour and Self-Evaluation of Outcomes**

Note. Coefficients from model using latent control shown in parentheses

**Figure A11.2 Path Diagram from Study 4 Showing Standardised Coefficients between Intentions, Attitudes, Non-Latent Perceived Behavioural Control, Relative Autonomy Index and Perceptions of Control in the Powerful Others, Unknown and Internal Sources**

Note. Coefficients from model using latent control shown in parentheses
DISCUSSION AND CONCLUSION

The most important finding of the present study is that the variable relationships represented in the models from Study 3 and Study 4 using a latent measure of control were replicated exactly in the current models using non-latent control. It is clear that the pattern of the key relationships relating to the main study hypotheses remain unchanged and this was demonstrated from the present study. The analyses indicate that utilising a measure of control which is not latent still elicits the same relationships and are unaffected by the adoption of a latent measure of control which has two weak items. Indeed, it may be more advantageous to adopt a latent measure as it strengthens the relationships and reduces the inclusion of random error.

The primary difference of the models using non-latent control to those using a latent measure of control is the magnitude of the coefficients predicting and emanating from the perceived behavioural control variable. In particular, the control-attitude path, a key path in this model, was significantly lower in the non-latent control models than in the latent control models. This was demonstrated when a multi-sample analysis was performed with the two models constraining the control-attitude paths to be invariant. The test indicated that the control-attitude relationship was lower for a non-latent measure of control than for a latent measure. This is to be expected as there is random error associated with the non-latent perceived control measure, while the latent variable has no associated error except the error in prediction arising from causal relationships with other variables. The inclusion of such error has the tendency to attenuate observed relations between variables (Hunter, Schmidt and Jackson, 1982).

Finally, it can be seen that the latent measure of perceived control includes a wide variety of control statements which aims to include control constructs from a number of different perspectives, namely Ajzen and Madden's (1986) approach and Skinner's (1995) conceptualisation of control beliefs. The items appear to be logically related to each other and do exhibit face validity. However, there is also diversity in the construct which may have been the reason that some items did not contribute much to the overall factor. In future studies it may be more appropriate to use more items and attempt to factor out the different facets of control. This could result in two or more measures of control which may strengthen hypotheses and inferences further if the construct of control and its role in motivation can be further diversified.
REFERENCES


APPENDIX 12
Perceptions Of Control Questionnaire

INSTRUCTIONS: Read the question carefully. Put a ring around the answer which is most like you.

*Answer all 48 questions.*

1. When I win at sport, a lot of times I can’t figure out why I won.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

2. When I am unsuccessful, it is usually my own fault.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

3. The best way for me to get good grades is to get the teachers to like me.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

4. If somebody doesn’t like me, I usually can’t figure out why.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

5. I can be good at any sport if I try hard enough.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

6. If a grown-up doesn’t want me to do something I want to do, I probably won’t be able to do it.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

7. When I do well in school, I usually can’t figure out why.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

8. If somebody doesn’t like me, it’s usually because of something I did.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

9. When I win at sport, it’s usually because the person I played against played badly.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>

10. When something goes wrong for me, I usually can’t figure out why it happened.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
<td></td>
</tr>
</tbody>
</table>
11. If I want to do well in school, it's up to me to do it.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

12. If my teacher doesn't like me, I probably won't be very popular with my classmates.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

13. Many times I can't figure out why good things happen to me.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

14. If I don't do well in school, it's my own fault.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

15. If I want to be an important member of my class, I have to get the popular kids to like me.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

16. Most of the time when I fail to do well in sport, I can't figure out why.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

17. I can pretty much control what will happen in my life.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

18. If I have a bad teacher, I won't do well in school.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

19. A lot of time I don't know why people like me.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

20. If I try to catch a ball and I don't, it's usually because I didn't try hard enough.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

21. If there is something I want to get, I usually have to please people in charge to get it.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>
22. If I get a bad grade in school, I usually don’t understand why I got it.

very true 3 sort of true 2 not very true 1
not true at all

23. If somebody likes me, it's usually because of the way I treat them.

very true 3 sort of true 2 not very true 1
not true at all

24. When I lose at a sports game, it's usually that the kid I played with was much better at the game to begin with.

very true 3 sort of true 2 not very true 1
not true at all

25. When I win at a sports game, a lot of times I don't know why I won.

very true 3 sort of true 2 not very true 1
not true at all

26. When I don't do well at something, it's usually my own fault.

very true 3 sort of true 2 not very true 1
not true at all

27. When I do well in school, it's because the teacher likes me.

very true 3 sort of true 2 not very true 1
not true at all

28. When another kid doesn’t like me, I usually don’t know why.

very true 3 sort of true 2 not very true 1
not true at all

29. I can be good at any sport if work on it hard enough.

very true 3 sort of true 2 not very true 1
not true at all

30. I don’t have much chance of doing what I want if grown-ups don’t want me to do it.

very true 3 sort of true 2 not very true 1
not true at all

31. When I get a good grade in school I usually don’t know why I did so well.

very true 3 sort of true 2 not very true 1
not true at all

32. If someone is mean to me, it's usually because of something I did.

very true 3 sort of true 2 not very true 1
not true at all
33. When I play a sport game against another kid, and I win, it’s probably because the other kid didn’t play well.

very true 3 sort of true 2 not very true 1 not true at all

34. A lot of times I don’t know why something goes wrong for me.

very true 3 sort of true 2 not very true 1 not true at all

35. If I want to get good grades in school, it’s up to me to do it.

very true 3 sort of true 2 not very true 1 not true at all

36. If the teacher doesn’t like me, I probably won’t have many friends in that class.

very true 3 sort of true 2 not very true 1 not true at all

37. When good things happen to me, many times there doesn’t seem to be any reason why.

very true 3 sort of true 2 not very true 1 not true at all

38. If I get bad grades, it’s my own fault.

very true 3 sort of true 2 not very true 1 not true at all

39. If I want my classmates to think that I am an important person, I have to be friends with the really popular kids.

very true 3 sort of true 2 not very true 1 not true at all

40. When I don’t win at a sports game, most of the time I can’t figure out why.

very true 3 sort of true 2 not very true 1 not true at all

41. I can pretty much decide what will happen in my life.

very true 3 sort of true 2 not very true 1 not true at all

42. If I don’t have a good teacher, I won’t do well in school.

very true 3 sort of true 2 not very true 1 not true at all

43. A lot of times there doesn’t seem to be any reason why somebody likes me.

very true 3 sort of true 2 not very true 1 not true at all
44. If I try to catch a ball and I miss it, it's usually because I didn't try hard enough.

45. To get what I want, I have to please the people in charge.

46. When I don't do well in school, I usually can't figure out why.

47. If somebody is my friend, it is usually because of the way that I treat him or her.

48. When I don't win at a sports game, the person I was playing against was probably a lot better than I was.
Table A12.1: Key for Perceptions of Control Questionnaire

<table>
<thead>
<tr>
<th>Domain</th>
<th>Source</th>
<th>Item Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Unknown</td>
<td>1, 16, 25, 40</td>
</tr>
<tr>
<td></td>
<td>Internal</td>
<td>5, 20, 29, 44</td>
</tr>
<tr>
<td></td>
<td>Powerful Others</td>
<td>9, 24, 33, 48</td>
</tr>
<tr>
<td>Social</td>
<td>Unknown</td>
<td>4, 19, 28, 43</td>
</tr>
<tr>
<td></td>
<td>Internal</td>
<td>8, 23, 32, 47</td>
</tr>
<tr>
<td></td>
<td>Powerful Others</td>
<td>12, 15, 36, 39</td>
</tr>
<tr>
<td>Academic</td>
<td>Unknown</td>
<td>7, 22, 31, 46</td>
</tr>
<tr>
<td></td>
<td>Internal</td>
<td>11, 14, 32, 38</td>
</tr>
<tr>
<td></td>
<td>Powerful Others</td>
<td>3, 18, 27, 42</td>
</tr>
<tr>
<td>General</td>
<td>Unknown</td>
<td>10, 13, 34, 37</td>
</tr>
<tr>
<td></td>
<td>Internal</td>
<td>2, 17, 26, 41</td>
</tr>
<tr>
<td></td>
<td>Powerful Others</td>
<td>6, 21, 30, 45</td>
</tr>
</tbody>
</table>
APPENDIX 13

Perceived Locus of Causality Questionnaire

INSTRUCTIONS: There is only one question on this questionnaire. It is followed by sixteen reasons. You are asked to circle how true each reason is for you.

Remember to answer all 16 reasons.

QUESTION: Why do you take part in physical activities?

1. Because others tell me that I should.
   
   very true  sort of true  not very true  not true at all

2. Because I enjoy it.
   
   very true  sort of true  not very true  not true at all

3. Because I want to learn new things.
   
   very true  sort of true  not very true  not true at all

4. Because I want to show to myself how good I am.
   
   very true  sort of true  not very true  not true at all

5. Because I think my PE teacher wants me to.
   
   very true  sort of true  not very true  not true at all

6. Because it gives me a sense of satisfaction.
   
   very true  sort of true  not very true  not true at all

7. Because I think it’s important to do physical activities.
   
   very true  sort of true  not very true  not true at all

8. Because I want to show others how good I am.
   
   very true  sort of true  not very true  not true at all

9. Because I am supposed to.
   
   very true  sort of true  not very true  not true at all
10. Because it’s fun.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

11. Because I wouldn’t like to be someone who does no physical activities.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

12. Because I will feel bad about myself if I don’t.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

13. Because my parents want me to.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

14. Because it gives me pleasure.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

15. Because I want to become good at a physical activity.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
<td>not very true</td>
<td>not true at all</td>
</tr>
</tbody>
</table>

16. Because it bothers me when I don’t.

<table>
<thead>
<tr>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>very true</td>
<td>sort of true</td>
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<td>not true at all</td>
</tr>
</tbody>
</table>
Table A13.1: Key for Perceived Locus of Causality Questionnaire

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Item Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td>1, 5, 9, 13</td>
</tr>
<tr>
<td>Intrinsic</td>
<td>2, 6, 10, 14</td>
</tr>
<tr>
<td>Identified</td>
<td>3, 7, 11, 15</td>
</tr>
<tr>
<td>Introjected</td>
<td>4, 8, 12, 16</td>
</tr>
</tbody>
</table>