

Attitudes and exercise adherence: Test of the Theories of Reasoned Action and Planned Behaviour

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Three studies of exercise adherence and attitudes are reported that tested the Theory of Reasoned Action and the Theory of Planned Behaviour. In a prospective study of adherence to a private fitness club, structural equation modelling path analysis showed that attitudinal and social normative components of the Theory of Reasoned Action accounted for 13.1% of the variance in adherence 4 months later, although only social norm significantly predicted intention. In a second study, the Theory of Planned Behaviour was used to predict both physical activity and sedentary behaviour. Path analyses showed that attitude and perceived control, but not social norm, predicted total physical activity. Physical activity was predicted from intentions and control over sedentary behaviour. Finally, an intervention study with previously sedentary adults showed that intentions to be active measured at the start and end of a 10-week intervention were associated with the planned behaviour variables. A multivariate analysis of variance revealed no significant multivariate effects for time on the planned behaviour variables measured before and after intervention. Qualitative data provided evidence that participants had a positive experience on the intervention programme and supported the role of social normative factors in the adherence process.

Keywords: attitude, exercise adherence, planned behaviour, reasoned action.

Introduction

Physical activity and other health campaigns are often aimed at changing beliefs or knowledge working on the assumption that these will bring about a change in behaviour. Although any inference of causality between attitudes and behaviour cannot usually be sustained, it does seem reasonable that they will have some influence on behaviour. Indeed, such an assumption has occupied social psychologists for many years in health research (Conner and Norman, 1994; Stroebe and Stroebe, 1995; Conner and Sparks, 1996).

Our aim here was to use a theoretical perspective to study exercise attitudes with a view to furthering our understanding of exercise participation and adherence. Attitude is defined as 'a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour' (Eagly and Chaiken, 1993, p. 1).

The study of attitudes in social psychology has a long, yet controversial, history, particularly when trying to predict behaviours from stated attitudes. Olson and Zanna (1993, p. 118) reported that 'attitude and attitude change remain among the most extensively researched topics by social psychologists'. In addition, attitude has been a popular topic for research in exercise psychology (Biddle, 1997). Unfortunately, the extensive usage of the word 'attitude' in everyday speech has rendered it prone to misinterpretation, or to be used in a way that is ill-defined and too general. For example, the Allied Dunbar National Fitness Survey (Sports Council and Health Education Authority, 1992) used the sub-heading 'Attitudes to exercise and fitness' to cover a range of psychological factors associated with exercise participation, but they did not refer to well-known social psychological theories of attitude prominent in the health and exercise literature.

The study of attitudes has interested sport and exercise scientists for a long time (Doganis and Theodorakis, 1995), although initial research efforts were

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primarily descriptive. This descriptive approach to attitude measurement led researchers to question whether attitudes actually did predict behaviours and to suggest an 'attitude-behaviour discrepancy'. However, Eiser (1986), commenting on the attitude literature in social psychology, stated that this discrepancy is 'essentially an artefact of the haphazard selection of specific behavioural indices which researchers have tried to relate to general verbal measures of attitudes', but maintained that 'if we are as selective in our choice of behavioural indices as we are at present in our choice of verbal indices, the "attitude-behaviour discrepancy" may disappear as a substantive problem' (Eiser, 1986, p. 60).

In social psychology in general, as well as exercise psychology research in particular, the Theory of Reasoned Action and the Theory of Planned Behaviour have been used extensively in the belief that specific measures of attitude, in conjunction with social influences (for both theories) and perceived control (for the Theory of Planned Behaviour), will predict behavioural intention and subsequent behaviour.

The Theory of Reasoned Action

Proposed by Fishbein and Ajzen (1975; Ajzen and Fishbein, 1980), the Theory of Reasoned Action is concerned with 'the causal antecedents of volitional behaviour' (Ajzen, 1988, p. 117). It is based on the assumption that intention is an immediate determinant of behaviour, and that intention, in turn, is predicted from attitude and social (subjective) normative factors (see Fig. 1).

Ajzen and Fishbein suggested that the attitude component of the model is a function of the beliefs held about the specific behaviour, as well as the evaluation (value) of the likely outcomes, thus their approach is an expectancy-value interaction. The measurement

of such variables, they suggested, should be highly specific to the behaviour in question to achieve correspondence, or compatibility, between assessed attitude or social norm questions and the intention or behaviour being predicted. Fishbein and Ajzen (1975) recommended that questionnaire item content for testing the Theory of Reasoned Action be derived from a short, free-response questionnaire administered to a small sample from the population to be studied. Four factors should be considered in terms of correspondence:

- *Action*: the attitude and behaviour need to be assessed in relation to a specific action, such as taking part in an aerobic exercise class, rather than a general attitude object such as physical activity.
- *Target*: reference should be made to specific target groups, such as aerobic exercisers, or specified significant others.
- *Context*: reference should be made to the context in which the behaviour takes place (e.g. 'at this health club').
- *Time*: time should be specified in identifying attitudes (e.g. 'attending the exercise class three times a week over the next 2 months').

The subjective norm component of the Theory of Reasoned Action ('normative component') consists of the beliefs of significant others and the extent that one wishes, or is motivated, to comply with these people and beliefs. The relative importance of the attitudinal and normative components will depend on the situation under investigation.

The Theory of Reasoned Action has received widespread support in recent years. For example, Sheppard *et al.* (1988) conducted a meta-analysis of 87 studies with over 11,000 participants using the Theory of Reasoned Action in a variety of settings and found a weighted average correlation between intention and behaviour of 0.53. Similarly, the weighted average correlation between attitude and social norm with intention was 0.66. Both results give clear support to the Theory of Reasoned Action. For physical activity studies, Godin (1993) reported that approximately 30% of the variance in intention is explained by the attitudinal and normative components of the theory, although the attitudinal component is nearly always the stronger of the two predictors. Indeed, the normative component has been found to be inconsistently associated with physical activity participation (Hausenblas *et al.*, 1997).

Godin (1994, p. 122) suggested that 'when attitude is measured within a proper theoretical framework, it seems an important determinant of exercise behavior'. The Theory of Reasoned Action qualifies as one such

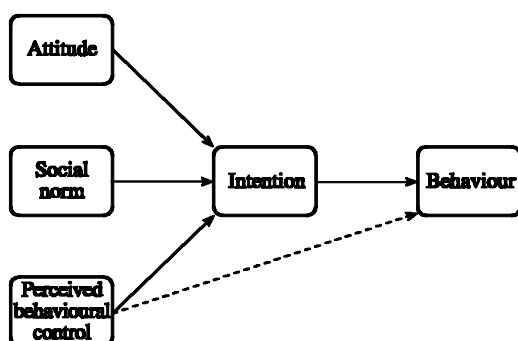


Figure 1 The Theories of Reasoned Action and Planned Behaviour. The Theory of Planned Behaviour includes the variable 'perceived behavioural control'.

'proper theoretical framework', although the model has had its critics. For example, Eiser (1986) pointed out that it is a unidirectional model and does not allow the variables in the model to act in a reciprocal manner. The model relies solely on cognitions and omits other potentially important determinants of action. The theory predicts behaviour from measures of behavioural intention usually taken at one time; rarely have studies used prospective designs. Similarly, studies have largely failed to address the change in attitudes and social norms resulting from participation in exercise or exercise interventions.

The Theory of Reasoned Action was developed to account for behaviours that are under volitional control (Ajzen, 1988). Consequently, the theory may not predict behaviours where other factors may be influential. With exercise, there may be several behavioural barriers preventing the behaviour being totally volitional (e.g. responsibilities to others, job, etc.). A revised Theory of Reasoned Action – the Theory of Planned Behaviour – is an attempt to account for behaviour under 'incomplete' volitional control.

The Theory of Reasoned Action allows the investigation of the interrelationships between attitudes, social norms, intentions and a single behaviour. Studies in the exercise domain have not taken into account alternative behaviours. For example, although many people intend to be more physically active, few actually become so (Sports Council and Health Education Authority, 1992); this may be because exercise is given lower priority than other behaviours. Attitude studies should also look at competing or alternative behaviours and choices (Sheppard *et al.*, 1988).

There appears to be a potential discrepancy between the inconsistent role of social norms in exercise research using the Theory of Reasoned Action and the belief that social support is a determinant of exercise (Dishman and Sallis, 1994). Although social support may not be exactly the same as social influence or social norm, the similarities are such that we should expect the social normative component of the theory to be more closely linked to exercise behaviour than has been the case. One explanation is that we may not be assessing social norms appropriately in Theory of Reasoned Action studies. Given that all studies testing the theory in exercise have to date used quantitative methods, the use of qualitative data appears warranted to examine more in-depth perceptions.

In summary, the Theory of Reasoned Action has been at the forefront of re-establishing attitude research as a powerful force in social psychology. It has also proved to be a viable unifying theoretical framework that has been successful in furthering our understanding of exercise intentions and behaviours. The theory has also been instrumental in moving exercise determinants

research from being largely atheoretical to theoretical in the past 10 years or so.

The Theory of Planned Behaviour

The Theory of Reasoned Action has provided a model that has been successful in predicting behaviour and intentions for actions that are primarily volitional and controllable. In the case of physical exercise, and other health-related behaviours such as smoking and weight control, volitional control may be 'incomplete' (Ajzen, 1988), although Godin (1993) suggested that different types of physical activity may differ from each other in this respect.

Ajzen's theorizing and research (e.g. Ajzen, 1985, 1988, 1991; Schifter and Ajzen, 1985; Ajzen and Madden, 1986; Ajzen and Timko, 1986) suggests that the Theory of Reasoned Action is insufficient for behaviours where volitional control is incomplete. Consequently, Ajzen has proposed an extension of this theory for such behaviours, which he calls the 'Theory of Planned Behaviour'. This is the same as the Theory of Reasoned Action but with the additional variable of 'perceived behavioural control', as illustrated in Fig. 1. Perceived behavioural control is defined as 'the perceived ease or difficulty of performing the behaviour' and is assumed 'to reflect past experience as well as anticipated impediments and obstacles' (Ajzen, 1988, p. 132). Figure 1 links perceived control with both intentions and behaviour. This suggests that the variable is proposed to have a motivational effect on intentions, such that individuals wishing to exercise but with little or no chance of doing so (because of largely insurmountable behavioural barriers at the time) are unlikely to exercise regardless of their attitudes towards exercise or the social factors in operation.

Ajzen (1988) argued that perceived behavioural control will accurately predict behaviour only when perceived control closely approximates actual control (hence the broken line in Fig. 1). For example, one would expect better predictions of exercise behaviour (e.g. frequency of exercise) from perceived control compared with exercise performance (e.g. a fitness test score), since the latter is less controllable owing to such factors as heredity, practice and the test environment.

The Theory of Planned Behaviour is appropriate for use in the study of exercise, particularly as exercise is a behaviour that potentially has many barriers and thus may only partly be under volitional control. The testing of the theory in exercise is expanding. Most studies in this area are relatively small, although Wankel and Mummery (1993) integrated items of this theory into The Campbell Survey of Well-Being (Stephens and

Craig, 1990), a large population survey involving over 4000 Canadians who had previously participated in the 1991 Canada Fitness Survey. The study provides the first population-based assessment of attitudes using the framework of the Theory of Planned Behaviour.

For the total sample in Wankel and Mummery's (1993) study, 31% of the variance in intentions was explained by the three variables of the Theory of Planned Behaviour. This compares with Godin's (1993) claim that about 30% of the variance in intention is explained by the attitude and social norm components. However, Godin (1993) also claimed that anything between 4 and 20% extra variance is accounted for by perceived behavioural control.

Criticisms of the Theory of Reasoned Action can also be applied to the Theory of Planned Behaviour, with the exception of the point concerning volition, since the inclusion of perceived behavioural control accounts for this. However, as Godin (1993) has suggested, it is unclear which physical activities are perceived to be volitionally controlled and which are not.

Here we report the results of an investigation into the relationship between attitudes, as measured by the two theories, and exercise behaviour. We report the results of three studies involving 291 participants. Four of the methodological issues previously discussed are addressed. The first study was conducted in a private sector health club and explored the relationship between the Theory of Reasoned Action and adherence to a supervised exercise programme using a prospective 4-month design. The second study used the Theory of Planned Behaviour to explore the role of alternative behaviours by examining intentions to be physically active and sedentary, this time within lifestyle physical activity rather than a supervised exercise context as in Study 1. The third study assessed pre- and post-intervention quantitative and qualitative measures of the Theory of Planned Behaviour and whether the theory can be used to evaluate the effectiveness of programmes to change exercise behaviour.

Study 1: A prospective test of the Theory of Reasoned Action in the prediction of attendance

Given the extensive use of the Theory of Reasoned Action in exercise and health research, the first study was a test of this model. Our main aim was to establish the utility of the theory in predicting adherence to a supervised exercise programme in a private sector health club using a prospective design. Exercise attendance at the club was recorded for each participant over a 4-month period.

Methods

Participants

The new members of a private sector health club located in a small rural town in south-west England participated in this study ($n = 96$; 51 females and 44 males). All were over the age of 18 years ($\text{mean} \pm s$: 34.0 ± 12.6) and agreed to participate following normal informed consent procedures. Although no direct measures were taken, it is known that most participants were Caucasian of at least middle socio-economic status.

Procedure

The participants recruited to the study had just purchased membership for 1 year to the health club. This entitled them to attend the club as often as they wished. After signing the membership agreement, but before attending their first exercise session, participants were asked to complete a pre-exercise questionnaire. Their attendance was then monitored over 4 months and variables from the Theory of Reasoned Action were used to predict, prospectively, adherence to the exercise programme.

Pre-exercise questionnaire

In accordance with Fishbein and Ajzen (1975), the Theory of Reasoned Action questionnaire was designed with the aid of a small pilot study. Fourteen members (7 males and 7 females) of the club completed an open-ended questionnaire that contained items pertaining to attitudes and normative beliefs towards attendance. The results from this pilot study were used to assist in the wording of the measures of attitude and social norm in the pre-exercise questionnaire. All responses were on 7-point bipolar scales scored from +3 through 0 to -3.

Behavioural intention was measured by asking the participants to respond to the statement 'I intend to stick to the health club's exercise programme regularly over the coming months'. *Attitudes* to the target behaviour were measured by four bipolar evaluatory statements with end-points of harmful-beneficial, good-bad, rewarding-punishing and unpleasant-pleasant. *Social norm* was measured using one item asking if sticking to the programme was something 'people who are important to me believe I should do'. Finally, for the *measurement of behaviour*, participants' attendance to the supervised exercise programme was monitored over a period of 4 months using the club's mandatory signing-in procedure.

Results

Descriptive and attendance data

Seventy of the 96 participants (72.9%) provided complete sets of data. The mean ($\pm s$) number of visits per week to the club was 1.44 ± 0.81 . Descriptive data for all variables of the Theory of Reasoned Action are shown in Table 1.

Correlations between Theory of Reasoned Action variables and attendance

To test the degree of association between the reasoned action variables and exercise behaviour, as measured by visits per week, correlation coefficients were computed (see Table 2). The only variable showing a significant relationship with exercise behaviour was intention ($r = 0.35, P < 0.01$).

To test the viability of the model for our data, a structural equation modelling path analysis was conducted using the EQS package (Bentler, 1995). Composite variables were used, since latent variables demanded a larger sample: item ratio than existed (Bentler, 1995). The hypothesized model was the standard Theory of Reasoned Action (see Fig. 1) with behaviour modelled to predict intention. Intention, in turn, was modelled to be predicted by attitude and social norm. Attitude and social norm were modelled as uncorrelated variables.

Table 1 Descriptive statistics for all measures of the Theory of Reasoned Action (Study 1)

Variable	Mean $\pm$ s
Behavioural intention	2.65 $\pm$ 0.51
Social norm	1.63 $\pm$ 1.53
Pleasant–unpleasant	1.58 $\pm$ 1.17
Rewarding–unrewarding	2.38 $\pm$ 0.83
Good–bad	2.49 $\pm$ 0.86
Beneficial–unbeneficial	2.54 $\pm$ 0.84

Table 2 Correlation matrix showing the relationship between exercise adherence (number of visits per week) and the Theory of Reasoned Action variables (Study 1)

Variables	Exercise behaviour	Intention	Attitudes
Intention	0.35*	—	—
Attitudes	0.28	0.12	—
Social norm	0.07	0.32*	0.32*

* $P < 0.01$.

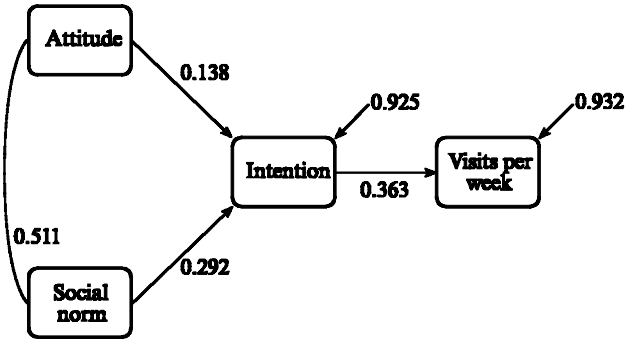


Figure 2 Model predicting attendance (visits per week) from Theory of Reasoned Action variables in Study 1 (curved lines represent co-variations).

Our data were found to be multivariately normally distributed (Mardia’s coefficient = 2.08). However, in predicting the number of visits per week, the data did not fit the model well. Two modification indexes provided by EQS were inspected to determine if a re-specified model would improve the fit. The Lagrange Multiplier Test is used for freeing (adding) parameters and the Wald Test is used for fixing (dropping) parameters from the model. Loehlin (1992) rightly highlighted the caution that is required when modifying a model in this way. Modifications were only made if they were, in our opinion, theoretically defensible or consistent with a substantial body of the literature.

The Lagrange Multiplier Test showed that, if attitude and social norm were allowed to be correlated, the chi-square value changed significantly and the fit of the model improved. This change was made as it was believed that it was theoretically defensible. Although Ajzen (1988) suggested that the two variables might be related, studies have rarely reported the strength of this relationship. Therefore, allowing co-variation between attitude and social norm does not violate a test of the Theory of Reasoned Action.

The newly specified model showed an excellent fit of the data, although the path from attitude to intention was not significant ($\chi^2_2 = 4.62, P > 0.05$; LISREL goodness-of-fit = 0.968; comparative fit index = 0.934). Overall, 14.4% of the variance in intention was predicted from social norm and attitude. The model explained 13.1% of the variance in the number of visits per week (see Fig. 2). The direct effects of attitude and social norm on number of visits per week were not significant, supporting the mediating role of intention.

Discussion

The correlation of 0.35 between intention and exercise adherence is modest but within the range of 0.19

(Godin *et al.*, 1993) to 0.82 (Riddle, 1980) found in the studies reviewed by Godin (1993). Godin (1993) also showed that the average relationship between intention and exercise behaviour in 14 papers published between 1980 and 1993 was 0.53. The lower figure in the present study may be due to participants' attendance being tracked over a longer period than has generally been the norm in Theory of Reasoned Action adherence research, and our use of a prospective design. Ajzen (1985, 1996) was quite clear in stating that intention-behaviour relationships will be higher when the two variables are assessed close together in time, although the meta-analysis by Hausenblas *et al.* (1997) cast doubt on this when analysing a very small number of studies. Godin (1993) also stated that measuring intention and behaviour at the same time is not always very useful. Sometimes we need to see into the future, such as deciding on new adherence strategies in fitness classes. It is then that prospective designs have a high utility value, even if they show weaker intention-behaviour relationships owing to the extended time between the assessments of the two variables.

The utility of the Theory of Reasoned Action model itself in explaining exercise adherence is supported by the good fit of the data to the model in Fig. 2. However, only relatively small amounts of variance were explained for both intention and behaviour, and the path between attitude and intention was not significant. The variance explained by the model was less than in the 14 similar studies published between 1980 and 1993, in which, on average, 31% of the variance in intention was explained by attitudes and social norm (Godin, 1993). Our results are similar to those of Dziewaltowski *et al.* (1990), who found that only 19% of the variance in intention was explained by the Theory of Reasoned Action. Kimiecik (1993) argued that this was due to the restricted range of intention scores found by Dziewaltowski *et al.* (1990). The same explanation may account for the finding in our research, as the participants had a strong intention to adhere (2.65 ± 0.51) and this homogeneity (although not skewed) in intention scores may account for the relatively low variance accounted for.

Finally, although the overall model of the Theory of Reasoned Action was supported by structural equation modelling, the path from social norm to intention was higher than that for attitude. Although most studies support the reverse trend, Hausenblas *et al.* (1997) reported in their meta-analysis that social norm is still related to intention in exercise studies (effect size = 0.56), although significantly less so than for attitude (effect size = 1.22). The reasonably substantial payment required of our participants for their membership may have restricted the strength of attitude in predicting attendance. Indeed, the effect size for the difference between those who adhered well and those who did

not was small for three of the four attitude measures. However, the effect size for social norm was also small (Cohen, 1992), suggesting that other factors (e.g. barriers) may account for adherence. In conclusion, therefore, the structure of the Theory of Reasoned Action was supported but the prediction of intention and behaviour was weak.

Study 2: A test of the Theory of Planned Behaviour in the prediction of physical activity and sedentary behaviours

The aim of this study was to determine the relationship between the Theory of Planned Behaviour and intentions to be physically active and sedentary among workplace employees. The Theory of Planned Behaviour was used in this study to extend the framework adopted in Study 1 and to determine if perceived behavioural control would account for additional variance in intention above that explained by the Theory of Reasoned Action. While a number of studies have examined the relationship between the Theory of Planned Behaviour and exercise behaviour (see Godin, 1993, for a review), none have looked at attitudes to being sedentary. Work on attitudes concerning sedentary behaviour is mirrored in the Subjective Expected Utility Theory (Edwards, 1954, 1961), which looks at the choices people make between different behaviours. Kendzierski and LaMastro (1988) used this perspective to investigate adherence to a resistance exercise programme and included items on 'not exercising'. This is significantly different from investigating a sedentary lifestyle, which is independent from, and not defined by, reference to another target behaviour.

Methods

Participants

The employees of a rural district council in south-west England participated in this study ($n = 155$; 67 females, 74 males; 14 participants did not indicate their sex). Their mean ($\pm s$) age was 36.0 ± 11.6 years and completion of the questionnaire was voluntary. Although no direct measures were taken, most participants were known to be Caucasian, but representative of a wide range of socio-economic status. A workplace setting was chosen for this study for two reasons: first, it provided a more representative group of the general population in comparison to volunteer exercisers and, secondly, the importance of workplace health promotion has been increasing in recent years.

Procedure

The participants were asked to complete a questionnaire with two distinct sections, one relating to being sedentary and the other to being physically active. The questionnaire was distributed to all administrative staff in the district council’s central office building. The participants were requested to return completed questionnaires to a central location from where the researcher collected them.

The questionnaire

As in Study 1, the questionnaire was designed with the aid of a small pilot study. An open-ended pilot questionnaire was completed by eight (4 males and 4 females) employees of the district council and used to construct the measures of attitudes and social norm. The final questionnaire also encouraged participants to refer back to the definitions and examples of what constituted ‘physical activity’ and the different types of activity that were listed in the questionnaire measure of physical activity. This was done to increase correspondence between the planned behaviour variables and physical activity. Throughout the questionnaire, responses were recorded using bipolar scales scored +3 through 0 to –3.

Behavioural intention was measured by having the participants respond to two separate statements: ‘I intend to be physically active over the coming month’ and ‘I intend to be sedentary over the coming month’. *Attitudes* to the two target behaviours were measured using three bipolar evaluatory statements with end-points of good–bad, unpleasant–pleasant and harmful–beneficial. These items were found to be internally consistent (Cronbach alpha = 0.72) and were merged to form the direct measure of attitude for all analyses. *Social norm* was measured for both target behaviours by asking if being physically active or sedentary was some-

thing ‘people who are important to me believe I should do’. *Perceived behavioural control* was measured following Ajzen and Madden’s (1986) method using three bipolar items with end-points of confident–not confident, complete control–very little control and easy–difficult. These items were internally consistent for both activity (alpha = 0.69) and sedentary behaviour (alpha = 0.70) and were merged to form a composite perceived behavioural control variable for all analyses.

Finally, *self-reported levels of physical activity* were estimated using an adaptation of Godin and Shephard’s (1985) Leisure-Time Exercise Questionnaire. The adaptation involved asking participants to report all types of physical activity (e.g. at work), as well as during their leisure time. The respondents stated how many times, in a typical week, they took part in at least 15 min of strenuous, moderate and mild activities. An overall activity index was calculated by multiplying the strenuous rating by 9, the moderate rating by 5 and the mild rating by 3 and summing the three figures (Godin and Shephard, 1985).

Results

Physical activity: Descriptive data and correlations

Table 3 shows the descriptive statistics and intercorrelations for all Theory of Planned Behaviour variables and physical activity. This shows that self-reported total physical activity was correlated with intention and perceived behavioural control.

To test the viability of the model for our data, a structural equation modelling path analysis was conducted using the EQS package (Bentler, 1995). Composite variables were used, since latent variables demanded a larger sample: item ratio than existed (Bentler, 1995). The hypothesized model was the standard Theory of Planned Behaviour (see Fig. 1).

Table 3 Descriptive statistics and correlation matrix for variables corresponding to physical activity (PA) (Study 2)

Variable	Mean ± s	2	3	4	5	6	7	8
1. Intention	1.40 ± 1.70	0.49*	0.08	0.60*	0.33*	0.22*	0.11	0.03
2. Attitude	1.84 ± 0.78		0.23*	0.37*	0.12	0.24*	–0.05	–0.13
3. Social norm	1.09 ± 1.40			0.10	–0.07	–0.00	–0.09	–0.18
4. Perceived behavioural control	1.00 ± 1.43				0.26*	0.24*	0.04	–0.07
5. Total physical activity ^a	45.4 ± 33.9							
6. Strenuous PA ^b	3.13 ± 1.32							
7. Moderate PA ^b	2.57 ± 2.15							
8. Mild PA ^b	2.25 ± 1.51							

^a Total activity index = (strenuous × 9) + (moderate × 5) + (mild × 3).
^b Reported statistics are for average number of weekly bouts over 15 min.
* *P* < 0.01.

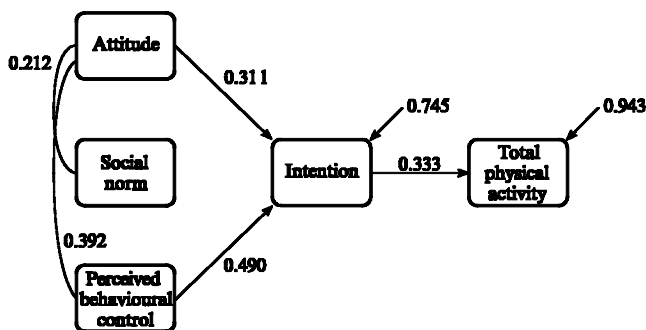


Figure 3 Model predicting total physical activity from Theory of Planned Behaviour variables associated with physical activity in Study 2 (curved lines represent co-variations).

Attitude, social norm and perceived behavioural control were modelled as uncorrelated variables.

In predicting total physical activity, our data were found not to fit the model very well. Lagrange Multiplier and Wald Tests provided by EQS were used to re-specify the model. As in Study 1, modifications were only made if they were, in our opinion, theoretically defensible or consistent with a substantial body of the literature (Loehlin, 1992).

The paths between social norm and intention, and perceived behavioural control and total physical activity, were dropped. Dropping the path between social norm and intention was justified, as social norm has been inconsistently linked with physical activity intentions (Godin, 1993). Similarly, it is unclear whether perceived behavioural control should be linked directly to the behaviour in question or only to intention. Ajzen (1988) suggested that perceived behavioural control will predict behaviour directly only when the former is strongly related to actual control. We did not know the extent to which perceptions of control were closely related to actual control in this sample. For this reason, we believe it was justified to drop the path from perceived behavioural control to physical activity.

In addition, the Lagrange Multiplier Test suggested that attitude and social norm, and attitude and perceived behavioural control, should be allowed to correlate. The modified model (see Fig. 3) showed an excellent fit to the data ($\chi^2_3 = 4.91$, $P > 0.05$; LISREL goodness-of-fit = 0.988; comparative fit index = 1.0). Overall, 44.5% of the variance in intention was predicted by perceived behavioural control and attitude; 11.1% of the variance in total physical activity was explained by the model.

Sedentary behaviour: Descriptive data and correlations

Table 4 shows the descriptive statistics for all Theory of Planned Behaviour variables corresponding to sedentary behaviour. The correlation matrix in Table 5

shows that physical activity was negatively correlated with intention to be sedentary and with planned behavioural control.

The full Theory of Planned Behaviour model was tested using EQS path analysis. The model was used to predict total physical activity from the variables associated with sedentary behaviour. The data did not fit the model well and thus the Lagrange Multiplier and Wald Tests were used to determine if a re-specification of the model was theoretically defensible. A good fit was obtained when attitude was allowed to co-vary with both social norm and perceived behavioural control, and the path from attitude to intention was dropped ($\chi^2_4 = 6.05$, $P > 0.05$; LISREL goodness-of-fit = 0.985; comparative fit index = 0.978). The model predicted 25.7% of the variance in intention to be sedentary and 16.8% of total physical activity. However, it is doubtful if this model can be defended theoretically and it is not consistent with the literature on the Theory of Planned Behaviour in exercise psychology. The model may have benefited from capitalizing on chance (Loehlin, 1992) and therefore requires further testing.

Discussion

In light of the Health Education Authority's 'Active for Life' campaign in England, research into adherence to habitual physical activity, rather than structured exercise programmes, is becoming increasingly important (Killoran *et al.*, 1994). This study has shown that the Theory of Planned Behaviour is a useful framework, at least in part, for the prediction of intention and physical activity from attitudes and perceived behavioural control associated with activity. Predicting sedentary behaviour from the model is less clear and requires further testing. However, the social norm associated with physical activity was unrelated to self-reported activity, consistent with many other studies (see Godin, 1993).

Nearly 45% of the variance of intention to be physically active was predicted; however, much less variance in actual physical activity was predicted. Total physical activity, therefore, was partially predicted by the Theory of Planned Behaviour when excluding social norm and allowing perceived behavioural control to operate indirectly through intention. This suggests that perceptions of control were inaccurate predictors of actual control (Ajzen, 1988).

Predicting sedentary behaviour has not, to our knowledge, been tested directly with the Theory of Planned Behaviour. Our results show that more research is needed. Future research into the attitudes associated with sedentary behaviour may benefit from defining the target behaviour more precisely in terms

Table 4 Descriptive statistics and correlation matrix for variables corresponding to being sedentary (Study 2) (descriptive statistics for activity data are repeated from Table 3 for sake of clarity)

Variable	Mean $\pm$ s	2	3	4	5	6	7	8
1. Intention	0.80 $\pm$ 1.92	0.19	0.34*	0.47*	-0.38*	-0.22*	-0.14	-0.05
2. Attitude	1.84 $\pm$ 0.78		0.34*	0.16	0.03	-0.06	0.09	0.13
3. Social norm	-1.11 $\pm$ 1.58			-0.13	0.04	-0.13	0.08	0.15
4. Perceived behavioural control	0.04 $\pm$ 1.56				-0.31*	-0.19	-0.15	-0.19
5. Total physical activity ^a	45.4 $\pm$ 33.9							
6. Strenuous PA ^b	3.13 $\pm$ 1.32							
7. Moderate PA ^b	2.57 $\pm$ 2.15							
8. Mild PA ^b	2.25 $\pm$ 1.51							

^a Total activity index = (strenuous $\times$ 9) + (moderate $\times$ 5) + (mild $\times$ 3).

^b Reported statistics are for average number of weekly bouts over 15 min.

* $P < 0.01$.

of action and context than was the case in this study. For example, instead of measuring intentions to be sedentary, future work could investigate intentions to use the car for short journeys or watch television in leisure time. Not only would such an approach enable an exploration of the attitudes associated with competing behaviours to being physically active, but it might also lead to new conceptual links between the Theory of Planned Behaviour and Subjective Expected Utility Theory (Edwards, 1954, 1961).

Study 3: Attitude change through a physical activity intervention

The aim of this study was to establish the extent to which Theory of Planned Behaviour variables changed over an 11-week exercise course run for sedentary participants. The study also explored the extent to which the variables are supported by qualitative data collected through semi-structured interviews.

Methods

Participants

The participants volunteered to take part in an 11-week exercise course ($n = 40$; 24 males and 16 females). The youngest participant was 19 years old and the oldest 65 years old (mean $\pm$ s: 43.8 $\pm$ 9.4). Twenty participants were referred by their general practitioner and 20 came from a workplace health promotion scheme. The two groups exercised at different venues but followed the same exercise course run by the same two experienced exercise leaders. No-one in the sample was currently on an exercise programme and all classified themselves as sedentary. The groups were predominantly Caucasian but with varied socio-economic status.

The intervention

The intervention consisted of participants attending a 90-min session each week for 10 weeks. These were based at two modern leisure centres within easy travelling distance of the participants in the south-west of England. Each session contained a lecture, exercise circuit and discussion. Lecture topics included cognitive (e.g. lectures on coronary heart disease) and behavioural (e.g. goal-setting) strategies to promote adherence, as suggested by Biddle and Mutrie (1991). The exercise component progressed from mild intensity (e.g. chair aerobics and walking) to more moderate activity (e.g. exercise to music). Intensity was monitored using the rating of perceived exertion (RPE) scale (Borg, 1985). The discussion groups were participant-led and covered issues as diverse as muscular stiffness and self-monitoring of physical activity levels.

Pre- and post-programme questionnaire

The participants completed a pre-programme questionnaire that included items assessing the direct measures of the Theory of Planned Behaviour. A 7-point scale scored +3 through 0 to -3 was used throughout.

Behavioural intention was measured by asking the participants to respond to the item 'I intend to be physically active over the next 11 weeks'. *Attitudes* towards exercise were measured by using the three bipolar scales good-bad, unpleasant-pleasant and harmful-beneficial. *Social norm* was measured by asking the participants if being physically active for 11 weeks was 'something people who are close to me or important to me think I should do'. *Perceived behavioural control* was measured using confident-not confident, complete control-very little control and easy-difficult, as in Study 2.

Table 5 Direct measures of the Theories of Reasoned Action and Planned Behaviour pre- and post-programme (Study 3) (mean $\pm$ s)

Variable	Pre-programme	Post-programme
Intention	1.23 $\pm$ 1.57	2.35 $\pm$ 1.02
Attitude	5.57 $\pm$ 3.08	7.12 $\pm$ 1.34
Social norm	1.96 $\pm$ 1.07	2.38 $\pm$ 0.70
Perceived behavioural control	3.00 $\pm$ 2.96	4.58 $\pm$ 3.09

Note: all pre-post differences $P > 0.05$.

At the end of the course, the participants completed a second questionnaire, identical to the first, that measured the Theory of Planned Behaviour targeted at physical activity over the 11 weeks following the end of the course.

Semi-structured interviews

Individual semi-structured interviews, each lasting 30 min, were completed at the end of the course with 16 randomly selected participants. The interview questions were constructed around the Theory of Planned Behaviour and asked participants about their intentions, attitudes and experiences on the course. In addition, the participants were asked about how the course had changed their attitudes towards exercise, if at all, and their future intentions to be physically active. The interviewers took notes and wrote detailed summaries immediately upon completion of the interviews.

Results

Pre- and post-programme questionnaire

Stepwise multiple-regression analysis revealed that the pre-programme measures of attitude, social norm and perceived behavioural control explained 69% of the variance in intention to be physically active over the 11-week period ($R = 0.82$, $F = 17.63$, $P < 0.0001$). Multiple-regression on the post-programme measures revealed that 42% of the variance in intention to be physically active after the course was explained by the Theory of Planned Behaviour variables ($R = 0.63$, $F = 5.38$, $P < 0.01$). Table 5 shows pre- and post-intervention Theory of Planned Behaviour scores. A multivariate analysis of variance revealed no significant multivariate effects for time on the planned behaviour variables.

Semi-structured interviews

Intentions. Most of the participants interviewed (81%)

expressed an intention to remain physically active once the course had finished, among whom two themes emerged. The first was a dichotomy between those who intended to take part in competitive activity ('I would like to continue with organized sport') and those who favoured non-competitive activities ('I hope to sign up for a follow-on course and use the exercise bike or rower'). Secondly, intentions were often linked with seasonal factors as the following summaries show:

- 'won't exercise in the summer but will come back in the winter';
- 'in the summer he will farm and garden and feels that he does not need to exercise, but in the winter he needs some form of exercise to do';
- 'she will be continuing to exercise but mainly in the summer'.

Attitudes and change. The interview transcripts show quite clearly that a number of the participants found the exercise intervention a positive experience: 'now she feels a new start is happening for her'; 'now she feels alive again'; 'I feel switched on to staying healthy'; 'I felt as if I'd gone back to my roots again'. This last statement was reinforced by several other interviews, which uncovered the exercise histories of participants around which they had constructed both attitudes and attributions for their behaviours.

Social norm. The interviews identified a number of both positive and negative effects of social norm on exercise behaviour: 'She thinks it is very important that she came with her husband, as now both have similar views and encourage each other'; 'His family are not very supportive, although his son attends the course as well'; 'I used to walk a lot, but my friends have scattered and I am less active now'; 'She enjoyed herself and having her husband with her helped her motivation'.

Although the direction of influence can be positive or negative, these statements clearly demonstrate the significant effect of social norm. Indeed, in one case, social norm was directly linked to future intentions: 'I am suggesting getting together as a group after Easter, and along with my daughter exercising at home'.

Perceived behavioural control. Several of the semi-structured interviews uncovered statements relevant to perceived behavioural control. One reported that the 'course had taken away the mystique of the leisure centre . . . I felt it was a place for youngsters before'. This initial lack of confidence in the exercise environment was also reported by one participant who was 'a little nervous and self-conscious but the exercise leaders helped overcome this'. As the course progressed, one

participant reported that he 'thought it was going to be harder and was pleasantly surprised'. This may be significant in helping researchers conceptualize perceived behavioural control as a dynamic variable which may change as the participant moves from intention to behaviour.

Discussion

The results of this study must be viewed with some caution because of the relatively small sample size and the lack of a control group. Even with participant numbers similar to those found in most community-based exercise programmes, the Theory of Planned Behaviour showed it is able to explain significant amounts of variance in intentions to be physically active. This shows that attitudinal models can be used for small-scale evaluation purposes as well as public health research.

Although the mean scores for all the Theory of Planned Behaviour variables moved in a positive direction, these changes were not statistically significant. Some evidence for the success of the course was provided by the semi-structured interviews, in which subjects reported intentions to be physically active in the future and expressed positive attitudes towards the intervention.

Our results also show that quantitative attitudinal research can be supported by qualitative data, in line with Sparkes' (1992) concept of polyvocality. Future research may use qualitative methods, such as focus groups and semi-structured interviews, to replace the short questionnaire pilot study recommended by Fishbein and Ajzen (1975). It could be argued that this would generate a more valid set of variables for inclusion in the indirect measures of attitudes and social norms than is the case when using questionnaires alone.

Although it is clear that the Theory of Planned Behaviour should be used in more population studies to build on the start made by Wankel and Mummery (1993), our results show its utility in the evaluation of small exercise interventions. With the move towards evidence-based practice in primary health care in the UK, and the need to evaluate general practitioner referral exercise schemes (Hillsdon and Thorogood, 1996), the Theory of Planned Behaviour may become an important instrument in measuring the effectiveness of such programmes.

General discussion and conclusion

Both the Theory of Reasoned Action and the Theory of Planned Behaviour are built around the concept of

correspondence, which states that all attitudinal variables measured must relate specifically to a clearly defined target behaviour (Ajzen and Fishbein, 1977; Ajzen and Timko, 1986; Ajzen, 1996). Unfortunately, in much published work (beginning with Riddle, 1980), it isn't possible to evaluate to what extent the researchers achieved correspondence, as limited information is provided on the design and content of the questionnaire. In our studies, we have strived to achieve correspondence, but given the multi-action or 'process' nature of exercise behaviour, this is not always easy. It could be argued that correspondence is easier to achieve for discrete 'one-off' behaviours, such as attending a fitness test, than more ongoing lifestyle behaviour patterns, such as being habitually physically active. This is in line with recent theorizing by Ajzen (1996), who suggested that the effect of attitude on behaviour can be 'quite pronounced when attitudes and behaviors follow careful deliberation' (p. 400). He stated that it is less clear how attitudes impact on behaviour when people do not engage in such deliberation (spontaneous mode of processing). If the behaviour being predicted follows careful thought and deliberation, but not just in terms of attitude, social norms and perceived control, then the prediction of behaviour will be weakened. These issues are consistent with the results of Study 2, where the Theory of Planned Behaviour was more successful for the study of physical activity than for sedentary behaviour.

This series of studies has demonstrated the utility of adopting the Theory of Reasoned Action and the Theory of Planned Behaviour. However, more research is needed to identify both the nature of the perceived behavioural control construct and appropriate methods of measurement (Dzewaltoski *et al.*, 1990). This work should include the construction of indirect measures of perceived behavioural control to run parallel with indirect measures of attitudes (outcome beliefs $\times$ outcome evaluation) and social norm (normative beliefs $\times$ motivation to comply).

Two aspects of this research indicate that further work into exercise adherence should adopt a qualitative perspective housed within the theoretical framework of the Theory of Planned Behaviour. First, as others have noted (e.g. Biddle and Mutrie, 1991; Godin, 1993), social norm has not always been strongly related to either intention or exercise behaviour in studies of the Theories of Reasoned Action and Planned Behaviour. This may be because the questionnaire items pertaining to social norm are not sufficiently valid in measuring the multidimensional nature of social norm and group interaction. If this is the problem, qualitative methods, such as case studies, focus groups and interviews, may be needed. Secondly, the exploration of attitudes to being sedentary proved difficult given the nature of the

behaviour. This problem needs to be addressed within the literature if we are to understand fully why so many people adopt and maintain a sedentary lifestyle (Vanden Auweele *et al.*, 1997). One way to explore these inactive lifestyles may be through qualitative research.

In conclusion, these three studies have shown that:

- exercise adherence and intentions in a supervised setting can be predicted prospectively, albeit weakly, from the Theory of Reasoned Action, but intention is predicted better by social norm than by attitude;
- intention and 'free-living' physical activity for a diverse population can be predicted from attitudes and perceived behavioural control, but less so from social norm;
- the utility of the Theory of Planned Behaviour in studying sedentary behaviour is not clear;
- the participants had a positive experience on the 10-week physical activity intervention but the Theory of Planned Behaviour variables did not change significantly over time.

References

- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action Control: From Cognition to Behavior* (edited by J. Kuhl and J. Beckmann), pp. 11–39. Berlin: Springer.
- Ajzen, I. (1988). *Attitudes, Personality and Behaviour*. Buckingham: Open University Press.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, **50**, 179–211.
- Ajzen, I. (1996). The directive influence of attitudes on behavior. In *The Psychology of Action: Linking Cognition and Motivation to Behavior* (edited by P.M. Gollwitzer and J.A. Bargh), pp. 385–403. New York: Guilford Press.
- Ajzen, I. and Fishbein, M. (1977). Attitude–behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, **84**, 888–918.
- Ajzen, I. and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Ajzen, I. and Madden, T.J. (1986). Predicting goal directed behavior: Attitudes, intentions and perceived behavioral control. *Journal of Experimental Social Psychology*, **22**, 453–474.
- Ajzen, I. and Timko, C. (1986). Correspondence between health attitudes and behavior. *Basic and Applied Social Psychology*, **7**, 259–276.
- Bentler, P.M. (1995). *EQS: Structural Equation Program Manual*. Encino, CA: Multivariate Software, Inc.
- Biddle, S.J.H. (1997). Current trends in sport and exercise psychology research. *The Psychologist: Bulletin of the British Psychological Society*, **10**, 63–69.
- Biddle, S.J.H. and Mutrie, N. (1991). *Psychology of Physical Activity and Exercise: A Health-Related Perspective*. London: Springer.
- Borg, G. (1985). *An Introduction to Borg's RPE-Scale*. Ithaca, NY: Movement.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, **112**, 115–119.
- Conner, M. and Norman, P. (1994). Comparing the Health Belief Model and the Theory of Planned Behaviour in health screening. In *Social Psychology and Health: European Perspectives* (edited by D.R. Rutter and L. Quine), pp. 1–24. Aldershot: Avebury.
- Conner, M. and Sparks, P. (1996). The Theory of Planned Behaviour and health behaviours. In *Predicting Health Behaviour: Research and Practice with Social Cognition Models* (edited by M. Conner and P. Norman), pp. 121–162. Buckingham: Open University Press.
- Dishman, R.K. and Sallis, J.F. (1994). Determinants and interventions for physical activity and exercise. In *Physical Activity, Fitness and Health* (edited by C. Bouchard, R.J. Shephard and T. Stephens), pp. 214–238. Champaign, IL: Human Kinetics.
- Doganis, G. and Theodorakis, Y. (1995). The influence of attitude on exercise participation. In *European Perspectives on Exercise and Sport Psychology* (edited by S.J.H. Biddle), pp. 26–49. Champaign, IL: Human Kinetics.
- Dzewaltowski, D.A., Noble, J.M. and Shaw, J.F. (1990). Physical activity participation: Social cognitive theory versus the theories of reasoned action and planned behavior. *Journal of Sport and Exercise Psychology*, **12**, 388–405.
- Eagly, A.H. and Chaiken, S. (1993). *The Psychology of Attitudes*. Orlando, FL: Harcourt Brace Jovanovich.
- Edwards, W. (1954). The theory of decision making. *Psychological Bulletin*, **51**, 380–417.
- Edwards, W. (1961). Behavioral decision theory. *Annual Review of Psychology*, **12**, 473–498.
- Eiser, J.R. (1986). *Social Psychology*. Cambridge: Cambridge University Press.
- Fishbein, M. and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.
- Godin, G. (1993). The theories of reasoned action and planned behavior: Overview of findings, emerging research problems, and usefulness for exercise promotion. *Journal of Applied Sport Psychology*, **5**, 141–157.
- Godin, G. (1994). Theories of reasoned action and planned behavior: Usefulness for exercise promotion. *Medicine and Science in Sports and Exercise*, **26**, 1391–1394.
- Godin, G. and Shephard, R.J. (1985). A simple method to assess exercise behaviour in the community. *Canadian Journal of Applied Sport Sciences*, **14**, 141–146.
- Godin, G., Valois, P. and Lepage, L. (1993). The pattern of influence of perceived behavioral control upon exercising behavior: An application of Ajzen's theory of Planned Behavior. *Journal of Behavioral Medicine*, **16**, 81–102.
- Hausenblas, H.A., Carron, A.V. and Mack, D.E. (1997). Application of the Theories of Reasoned Action and Planned Behavior to exercise behavior: A meta-analysis. *Journal of Sport and Exercise Psychology*, **19**, 36–51.
- Hillsdon, M. and Thorogood, M. (1996). A systematic review of physical activity promotion strategies. *British Journal of Sports Medicine*, **30**, 84–89.

- Kendzierski, D. and LaMastro, V. (1988). Reconsidering the role of attitudes in exercise behavior: A decision theoretic approach. *Journal of Applied Social Psychology*, **18**, 737–759.
- Killoran, A., Fentem, P. and Caspersen, C.J. (eds) (1994). *Moving On: International Perspectives on Promoting Physical Activity*. London: Health Education Authority.
- Kimiecik, J.C. (1993). Commentary on Dziewaltowski's commentary. *Journal of Sport and Exercise Psychology*, **15**, 101–105.
- Loehlin, J.C. (1992). *Latent Variable Models: An Introduction to Factor, Path, and Structural Analysis*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Olson, J.M. and Zanna, M.P. (1993). Attitudes and attitude change. *Annual Review of Psychology*, **44**, 117–154.
- Riddle, P.K. (1980). Attitudes, beliefs, behavioral intentions and behaviors of women and men toward regular jogging. *Research Quarterly for Exercise and Sport*, **51**, 663–674.
- Schifter, D.E. and Ajzen, I. (1985). Intention, perceived control and weight loss: An application of the Theory of Planned Behavior. *Journal of Personality and Social Psychology*, **49**, 843–851.
- Sheppard, B.H., Hartwick, J. and Warshaw, P.R. (1988). The Theory of Reasoned Action: A meta-analysis of past research with recommendations for modifications for future research. *Journal of Consumer Research*, **15**, 325–343.
- Sparkes, A.C. (1992). Toward understanding, dialogue and polyvocality in the research community: Extending the boundaries of the paradigms debate. *Journal of Teaching in Physical Education*, **10**, 103–133.
- Sports Council and Health Education Authority (1992). *Allied Dunbar National Fitness Survey: Main Findings*. London: Sports Council/HEA.
- Stephens, T. and Craig, C.L. (1990). *The Well-being of Canadians: Highlights of the 1988 Campbell's Survey*. Ottawa: The Canadian Fitness and Lifestyle Research Institute.
- Stroebe, W. and Stroebe, M.S. (1995). *Social Psychology and Health*. Buckingham: Open University Press.
- Vanden Auweele, Y., Rzewnicki, R. and Van Mele, V. (1997). Reasons for not exercising and exercise intentions: A study of middle-aged sedentary adults. *Journal of Sports Sciences*, **15**, 151–165.
- Wankel, L.M. and Mummery, W.K. (1993). Using national survey data incorporating the Theory of Planned Behavior: Implications for social marketing strategies in physical activity. *Journal of Applied Sport Psychology*, **5**, 158–177.