



## Using past behaviour and spontaneous implementation intentions to enhance the utility of the theory of planned behaviour in predicting exercise

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**Objectives.** This study examined the utility of the theory of planned behaviour (TPB), past behaviour, and spontaneous implementation intentions in predicting exercise behaviour. The psychological correlates of spontaneous implementation intentions and the moderating effects of intention, perceived behavioural control, past behaviour, and implementation intentions at various time points were also examined.

**Design.** Data collection occurred over three phases with a 2- and 3-week interval. The attrition rate was 35.97% leaving a total of 162 participants (63 males, 99 females). In the first wave, participants completed measures of TPB, spontaneous implementation intentions, and past behaviour. Behaviour was assessed in the second and third waves, and a follow-up measure of spontaneous implementation intentions was completed in Phase 3.

**Results.** Several regression analyses were conducted. Attitude towards exercise and perceived behavioural control made a significant contribution to the prediction of intention. Intention made a significant contribution to the prediction of implementation intentions. Spontaneous implementation intentions reduced the effect of intention and past behaviour for behaviour at 2 weeks and when indexed over a 5-week period. When behaviour was measured for a 3-week period (following an initial 2-week period), the variance that intention and past behaviour accounted for in exercise behaviour decreased, and spontaneous implementation intentions were no longer a significant predictor of behaviour. Spontaneous implementation intentions were found to interact with past behaviour, such that implementation intentions predicted exercise behaviour only among participants who did not exercise frequently in the past.

**Conclusions.** Implications and future research directions are discussed.

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Regular participation in exercise contributes positively to physical and mental health (Armstrong, Bauman, & Davies, 2000; Wankel, 1993). It reduces the incidence and severity of health problems, decreases health care costs, and enhances quality of life, thus making it an important component of health promotion (Booth, Owen, Bauman, & Gore, 1995). It is therefore important for health care practitioners to understand what motivates people to exercise at a level deemed sufficient to confer health benefits. This study will integrate aspects from popular motivational theories with the purpose of understanding exercise motivation.

### ***The theory of planned behaviour***

The theory of planned behaviour (TPB; Ajzen, 1985, 1988, 1991), and its predecessor the theory of reasoned action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), is a model that has guided much research on exercise behaviour. TRA identifies the immediate antecedents of behaviour as the strength of a person's intention to perform or not to perform behaviour (i.e. 'I intend to exercise'). Stronger, more positive intentions equate to a greater likelihood that behaviour will be performed, and weaker intentions result in reduced likelihood that behaviour will be performed (Ajzen & Madden, 1986).

In TRA, intention is derived from two conceptually-independent determinants, attitude towards exercise and subjective norm. Attitudes indicate evaluative responses towards the performance of behaviour (i.e. 'my exercising is unenjoyable/enjoyable'), and are derived from behavioural beliefs pertaining to the likelihood that performing behaviour will result in a desired outcome, and whether or not the outcome will be rewarding (Ajzen & Fishbein, 1980). Subjective norm (i.e. 'other people who are important to me think that I should exercise') is based on normative beliefs regarding perceptions of social pressure from significant others and motivation to comply with this pressure (Ajzen & Madden, 1986).

TPB includes an additional determinant of intention and behaviour, perceived behavioural control, which is based on perceptions of ease or difficulty in performing behaviour (i.e. 'I have complete control over whether I exercise or not'). Perceived behavioural control is related to past experience, skill, ability, and confidence, and is a reflection of perceived barriers, such as time, opportunity, and money (Ajzen & Madden, 1986).

Research has demonstrated that attitude towards exercise is a consistent predictor of intention; however, subjective norm is not (Bozionelos & Bennett, 1999; Hagger, Chatzisarantis, Biddle, & Orbell, 2001). The addition of perceived behavioural control generally increases the prediction of intention and to some extent, behaviour (Hagger, Chatzisarantis, & Biddle, 2002; Hausenblas, Carron, & Mack, 1997). Support for the link between intention and exercise has been consistently reported (Bozionelos & Bennett, 1999; Chatzisarantis & Biddle, 1998; Courneya & McAuley, 1993, 1995), however, the magnitude of this relationship has not been robust across research. Correlations between intention and exercise behaviour are typically reported in the .30-.40 range, indicating that not all exercise intentions are enacted upon (Courneya, 1994; Courneya & McAuley, 1993).

TPB is based on the premise that behaviour is mediated by conscious decision-making and deliberate reasoning (Fazio, 1990). However, research has demonstrated that automatized cognitive processes also have a role in explaining behaviour (Bargh, 1997; Bargh & Chartrand, 1999; Sheeran & Orbell, 1999, 2000). By integrating

alternative concepts to TPB's framework, that take into account automatized cognitive processes, the explained variance in exercise behaviour can be increased beyond that provided by TPB (Bozionelos & Bennett, 1999; Milne, Orbell, & Sheeran, 2002; Orbell & Sheeran, 2000). These concepts are habitual behaviour (Bagozzi & Kimmel, 1995; Bozionelos & Bennett, 1999), and implementation intentions (Milne *et al.*, 2002; Orbell & Sheeran, 2000).

### **Habitual behaviour**

When a particular goal-directed behaviour is repeated frequently and consistently in a similar situation, with positive reinforcement, it eventually becomes automatic or habitual (Bargh & Chartrand, 1999). The execution of habitual behaviour requires less conscious attention, decision-making processing, and deliberate reasoning than non-habitual behaviour (Aarts, Verplanken, & van Kippenberg, 1997; Verplanken, Aarts, & van Kippenberg, 1997; Verplanken, Aarts, van Kippenberg, & Moonen, 1998). Habitual behaviour appears to be under the control of automatic or unconscious cognitive processes (Aarts & Dijksterhuis, 2000; Aarts, Verplanken, & van Knippenberg, 1998), and once habitual, can be automatically elicited by environmental cues without conscious guidance (Bargh & Chartrand, 1999).

Based on the reasoning that frequent repetitions of behaviour lead to the development of a habit (Aarts *et al.*, 1998), habit strength is commonly assessed by a measure of self-reported frequency of past behaviour (Bagozzi & Kimmel, 1995; Leone, Perugini, & Ercolani, 1999; Ouellette & Wood, 1998). The more frequently behaviour is performed in the past, the more behaviour is assumed to be habitual. Several studies found that the inclusion of a measure of past exercise behaviour significantly improved the prediction of future exercise behaviour, beyond the prediction of TPB (Bozionelos & Bennett, 1999; Hagger *et al.*, 2002, 2001).

### **Implementation intentions**

Implementation intentions are another method of promoting execution of action. They are a self-regulatory strategy that prepares a person to automatically respond to certain situations expected to occur in the future. During the formation of implementation intentions people specify where, when, and how to perform behaviour (Gollwitzer, 1999; Gollwitzer & Brandstätter, 1997; Gollwitzer & Schaal, 1998). In doing this, strong memory traces and heightened activation of cognitive processes are formed between the anticipated cues and goal-directed behaviour. Once an opportunity or relevant situation is encountered, the memory traces are easily accessed and goal-directed behaviour is automatically activated (Gollwitzer & Brandstätter, 1997; Gollwitzer & Oettingen, 2000; Gollwitzer & Schaal, 1998).

Findings indicate that forming implementation intentions assists in translating physical activity intentions into behaviour. Milne *et al.* (2002) found that college students who formed implementation intentions were more likely to exercise at least once in the following week than those who formed exercise intentions alone. Orbell and Sheeran (2000) found that speed of regaining life-style physical activity 3 months following joint-replacement surgery was sooner on 18 out of 32 activities for those who formed implementation intentions compared with those who only formed intentions.

Research has also found that the formation of implementation intentions can override habitual behavioural tendencies (Bamberg, 2000; Orbell, Hodgkins, & Sheeran, 1997;

Sheeran & Orbell, 2000). Gollwitzer (1999) and Sheeran and Orbell suggested that the strategic act of specifying that one 'will' perform behaviour when encountering specific environmental cues, as implied in an implementation intention, suppresses previous action tendencies associated with these cues, allowing for new behaviour to be performed automatically.

Although previous research has shown that implementation intentions facilitate the translation of intentions into actions (Orbell *et al.*, 1997), the effect size associated with implementation intentions is generally modest (Sheeran & Orbell, 1999). Such modest effects imply that the observed effects for implementation intentions lack validity generalizability (Schmidt, 1996). It is suggested that the predictive validity of implementation intentions may be affected by the degree of autonomy or choice associated with setting implementation intentions. In other words, whether a person has freedom in deciding when, where, and how to exercise, or whether others plan this for them.

The effects of implementation intentions on behaviour should reach a maximal level when a person chooses when, where, and how to execute behaviour because there is the implicit requirement of choice. When people choose, there is active volitional control of information-processing and the maintenance of memory contents associated with volitional control is prolonged. This produces a memory advantage (Kuhl & Kazén, 1994). In contrast, when the decisions about when, where, and how to execute behaviour are regulated by others, the memory advantage associated with implementation intentions may disappear because the person is less involved in choosing between options. In accordance with this proposition, Kuhl and Kazén showed that people display a better memory of self-chosen activities than assigned activities; an effect that was not moderated by personality characteristics (i.e. state vs. action orientation).

In most of the cited research, participants were instructed to plan when, where, and how to execute behaviour (Sheeran & Orbell, 1999, 2000; Verplanken & Faes, 1999), and thus, implementation intentions were experimentally induced. Consequently, less attention has been paid to the effects that spontaneous forms of implementation intentions exert on human behaviour.

In one study investigating the effect of implementation intentions on exercise participation, it was highlighted that the experimental approach to measuring implementation intentions does not correspond with popular survey methods of measuring TPB and past behaviour variables (Rise, Thompson, & Verplanken, 2003). A measure of exercise implementation intentions that was more spontaneous and formed for a survey context, was developed. Implementation intentions added to the prediction of behaviour beyond intention and past behaviour, and was important for the translation of intention into behaviour.

Similar to Rise *et al.* (2003), this study will use a measure of implementation intentions that is designed to assess the extent to which participants self-initiate the process of forming implementation intentions for their exercise, which is also suited to the survey context of TPB and past behaviour measures. The predictive utility of TPB over a 5-week period will be examined, and it will be determined if the addition of past behaviour and spontaneous implementation intentions increases the predicted variance. Few studies have examined predictors of spontaneous implementation intentions, or the interactions between spontaneous implementation intentions, TPB variables, and past behaviour over various points. To further examine the theoretical aspects of the implementation intentions construct, this study will improve

upon previous research by examining the psychological correlates of spontaneous implementation intentions, and the moderating effects of intention, perceived behavioural control, past behaviour, and implementation intentions at various time points.

## **Method**

### **Participants**

The initial sample consisted of 253 (99 males, 153 females) Canadian University College students. After three phases of data collection the attrition rate was 91 (35.97%) leaving a total of 162 participants (63 males, 99 females). The average age was 23.15 years ( $SD = 6.05$ , range = 18–44 years). The ethnicity of the sample was 43.8% Caucasian, 13.6% Asian, 21.6% South Asian, 5.6% from other ethnicities, and 15.4% who did not record their ethnicity.

### **Procedure**

Data collection occurred in three waves. The time gap between the first and second wave of data collection was 2 weeks, and 3 weeks between the second and third waves. In the first wave, participants completed measures of TPB, spontaneous implementation intentions, and past behaviour. Behaviour was assessed in the second and third waves, and a follow-up measure of spontaneous implementation intentions was completed in Phase 3.

Participation was voluntary with no credit offered. Questionnaires were completed during normal lecture times with courses across several disciplines sampled to ensure that a variety of people from each discipline were included (i.e. Marketing, English, and Psychology). To preserve confidentiality in responding, demographic information (i.e. sex, course, date of birth, height, and weight) were used to match questionnaires completed by the same participant. Same questionnaires were coded by number.

### **Materials**

Items were phrased specifically to be congruent with the behavioural criterion in terms of action, target, context, and time (i.e. participation in moderate to vigorous exercise and sport for at least 30 minutes, 5 days per week during leisure-time, over the next 5 weeks). This intensity, duration, and frequency were based on current recommendations from the National Physical Activity Guidelines for Australians (DHAC, 1999), and the report of the United States Surgeon General on physical activity and health (USDHHS, 1996).

#### *Intention*

Intention included six items (e.g. 'I am determined to' and 'I intend to . . . with the following regularity') measured on a 7-point Likert scale. One item (e.g. 'I intend to . . . , \_\_\_\_\_ days per week') was scored with an open-ended response format. Intention was the average of the items. An alpha coefficient of .96 ( $M = 4.38$ ,  $SD = 1.84$ ) was reported.

#### *Attitude towards exercise*

Attitude towards exercise was assessed with five bipolar adjectives on a 7-point semantic-differential scale (e.g. unenjoyable/enjoyable, boring/interesting, and harmful/beneficial). Attitude towards exercise was the average of the items. An alpha coefficient of .82 ( $M = 5.68$ ,  $SD = 1.13$ ) was reported.

#### *Subjective norm*

Subjective norm was assessed with two items on a 7-point Likert scale (i.e. 'others who are important to me think that I should do' and 'most people who are important to me pressurize me to do'). Subjective norm was the average of the items. For subjective norm the inter-item correlation was .72 ( $M = 4.16$ ,  $SD = 1.62$ ).

#### *Perceived behavioural control*

Four items were used to assess perceived behavioural control on a 7-point Likert scale (e.g. 'how much control do you have over whether you do' and 'if I wanted to I could do'). Perceived behavioural control was the average of the items. For this variable an alpha coefficient of .91 ( $M = 5.42$ ,  $SD = 1.52$ ) was reported.

#### *Past behaviour*

Participants were requested to indicate in a typical 2-week period, over the past year, how many days they exercised or participated in sport. The item was measured with a 15-point Likert scale. Past behaviour was the response to the item.

#### *Spontaneous implementation intentions*

Spontaneous implementation intentions consisted of five items assessed on a 7-point Likert scale (e.g. 'I have planned when/where/how I am going to' and 'I have committed myself to a certain time/place').

The question was introduced with the following statement:

In this question we are interested in whether you plan and prepare when, where, and how you do moderate and vigorous exercise and sport during your leisure-time. Some people plan their exercise and sport, and other people have no set plans, they just let it happen. Both ways can be effective in getting you to exercise or play sport, so it does not matter if you have, or have not made plans for your exercise and sport over the next 5 weeks. Please answer the following questions as honestly as possible.

The measure was scored by averaging the items. An alpha coefficient of .94 ( $M = 4.54$ ,  $SD = 1.86$ ) was reported for spontaneous implementation intentions. In Phase 1, participants detailed the nature of their plans (i.e. when, where, and how), to determine if they had actually set implementation intentions. In Phase 3, participants detailed examples of when, where, and how they exercised to determine if their plans had been acted upon.

#### *Exercise behaviour*

One item, assessed on a 6-point Likert scale, determined how many days moderate and vigorous exercise and sport was performed for at least 30 minutes over the past 2/3 weeks. To maximize reliability and maintain scale correspondence, a 2- and 3-week recall period were used. The mean of the two measurements was determined to obtain the average exercise over a 5-week period. A correlation coefficient of .72 ( $p < .05$ ,  $N = 162$ ) was reported between the second and third phases of data collection.

## **Results**

There were no significant motivational differences between participants who completed all three phases of data collection and participants who did not. Males scored higher than females on measures of TPB intention and past behaviour ( $p < .05$ ). Sex and phase differences were not found for the majority of the variables, and therefore

the data were pooled for the remainder of the analyses. As seen in Table 1, results from a correlation analysis support the validity of TPB.

**Table 1.** Pearson's correlation coefficients

|     | INT   | PBC   | ATE   | SN   | II    | PB    | BEH  |
|-----|-------|-------|-------|------|-------|-------|------|
| INT | 1.00  |       |       |      |       |       |      |
| PBC | .35** | 1.00  |       |      |       |       |      |
| ATE | .56** | .22** | 1.00  |      |       |       |      |
| SN  | .19*  | .09   | .10   | 1.00 |       |       |      |
| II  | .66** | .15   | .46** | .14  | 1.00  |       |      |
| PB  | .71** | .30** | .43** | .10  | .55** | 1.00  |      |
| BEH | .69** | .32** | .49** | .11  | .59** | .61** | 1.00 |

Note. INT = intention, PBC = perceived behavioural control; ATE = attitude towards exercise; SN = subjective norm; II = implementation intention; PB = past behaviour; BEH = behaviour. \* $p < .05$ , \*\* $p < .01$ .

Participants were requested to document their implementation intentions as an additional check to determine if they had actually set them (Phase 1), and had carried them out (Phase 3). The accuracy between setting implementation intentions and actually carrying them out remained fairly high over the 5 weeks (overall accuracy reduced by 5.25%).

### Prediction of intention

Using TPB as a guide, a hierarchical regression analysis was conducted. As seen in Table 2, attitude towards exercise, but not subjective norm, made a significant contribution to the prediction of intention accounting for 30% of the variance. The inclusion of perceived behavioural control significantly increased the prediction by 6%.

**Table 2.** Hierarchical regression of intention

|                               | $\beta$ | $t$   | $R$ | $R^2$ | $F$   |
|-------------------------------|---------|-------|-----|-------|-------|
| Step 1:                       |         |       |     |       |       |
| Attitude towards exercise     | 0.53    | 7.66* |     |       |       |
| Subjective norm               | 0.10    | 1.48  | .51 | .30   | 31.56 |
| Step 2:                       |         |       |     |       |       |
| Attitude towards exercise     | 0.47    | 6.88* |     |       |       |
| Subjective norm               | 0.09    | 1.27  |     |       |       |
| Perceived behavioural control | 0.25    | 3.59* | .60 | .36   | 27.05 |

\* $p < .05$ .

### Prediction of 5-week behaviour

Using TPB as a guide, a second hierarchical regression analysis was conducted. Because it has been suggested that implementation intentions can override habitual behavioural tendencies (Bamberg, 2000; Orbell *et al.*, 1997; Sheeran & Orbell, 2000), implementation intentions were entered after past behaviour to see if they added to the predicted variance. As seen in Table 3, intention made a significant prediction explaining 47% of the

**Table 3.** Hierarchical regression of 5-week exercise behaviour

|                                       | $\beta$ | $t$    | $R$ | $R^2$ | $F$    |
|---------------------------------------|---------|--------|-----|-------|--------|
| Step 1:                               |         |        |     |       |        |
| Intention                             | 0.69    | 11.42* | .69 | .47   | 130.50 |
| Step 2:                               |         |        |     |       |        |
| Intention                             | 0.65    | 10.20* |     |       |        |
| Perceived behavioural control         | 0.12    | 1.81   | .70 | .49   | 67.93  |
| Step 3:                               |         |        |     |       |        |
| Intention                             | 0.50    | 5.81*  |     |       |        |
| Perceived behavioural control         | 0.10    | 1.55   |     |       |        |
| Past behaviour                        | 0.21    | 2.40*  | .71 | .51   | 48.71  |
| Step 4:                               |         |        |     |       |        |
| Intention                             | 0.39    | 3.98*  |     |       |        |
| Perceived behavioural control         | 0.11    | 1.83   |     |       |        |
| Past behaviour                        | 0.18    | 2.14*  |     |       |        |
| Spontaneous implementation intentions | 0.19    | 2.35*  | .72 | .52   | 39.08  |

\* $p < .05$ .

variance in behaviour over 5 weeks. Although the variance increased by 2% with the addition of perceived behavioural control in Step 2, it was not significant. The predicted variance significantly increased with past behaviour included into the equation in Step 3, then spontaneous implementation intentions in Step 4, increasing the predicted variance by 2% and 1%, respectively.

#### **Prediction of implementation intentions**

As seen in Table 4, with attitude towards exercise, subjective norm, perceived behavioural control, intention, and past behaviour in the equation, the multiple correlation was statistically significant explaining 47% of the variance in implementation intentions. Intention was the only variable to make a significant contribution.

**Table 4.** Standard regression of spontaneous implementation intentions

|                               | $\beta$ | $t$   | $R$ | $R^2$ | $F$   |
|-------------------------------|---------|-------|-----|-------|-------|
| Attitude towards exercise     | 0.10    | 1.35  |     |       |       |
| Subjective norm               | 0.05    | .79   |     |       |       |
| Perceived behavioural control | −0.08   | −1.12 |     |       |       |
| Intention                     | 0.56    | 5.44* |     |       |       |
| Past behaviour                | 0.11    | 1.16  | .69 | .47   | 23.56 |

\* $p < .05$ .

#### **Prediction of 2- and 5-week behaviour**

As seen in Table 5, two hierarchical regression analyses were conducted in the same fashion as performed for 5-week behaviour. Intention attained a significant multiple correlation explaining 45% of the variance in 2-week exercise behaviour. With perceived behavioural control included in Step 2, the prediction increased by 1%, however, this was not significant. With past behaviour included into the equation in Step 3 and spontaneous implementation intentions in Step 4, the predicted variance significantly improved, increasing the variance accounted for by 3% on each step.

**Table 5.** Hierarchical regression of 2- and 3-week exercise behaviour

|                                       | $\beta$ | $t$    | $R$ | $R^2$ | $F$    |
|---------------------------------------|---------|--------|-----|-------|--------|
| 2-week exercise behaviour             |         |        |     |       |        |
| Step 1:                               |         |        |     |       |        |
| Intention                             | 0.67    | 11.00* | .67 | .45   | 120.89 |
| Step 2:                               |         |        |     |       |        |
| Intention                             | 0.64    | 9.74*  |     |       |        |
| Perceived behavioural control         | 0.11    | 1.62   | .68 | .46   | 62.43  |
| Step 3:                               |         |        |     |       |        |
| Intention                             | 0.47    | 5.41*  |     |       |        |
| Perceived behavioural control         | 0.09    | 1.47   |     |       |        |
| Past behaviour                        | 0.24    | 2.81*  | .70 | .49   | 46.22  |
| Step 4:                               |         |        |     |       |        |
| Intention                             | 0.34    | 3.55*  |     |       |        |
| Perceived behavioural control         | 0.12    | 1.91   |     |       |        |
| Past Behaviour                        | 0.20    | 2.39*  |     |       |        |
| Spontaneous implementation intentions | 0.22    | 2.81*  | .72 | .52   | 38.31  |
| 3-week exercise behaviour             |         |        |     |       |        |
| Step 1:                               |         |        |     |       |        |
| Intention                             | 0.58    | 8.68*  | .58 | .34   | 75.41  |
| Step 2:                               |         |        |     |       |        |
| Intention                             | 0.56    | 7.80*  |     |       |        |
| Perceived behavioural control         | 0.06    | .83    | .59 | .34   | 37.97  |
| Step 3:                               |         |        |     |       |        |
| Intention                             | 0.42    | 4.34*  |     |       |        |
| Perceived behavioural control         | 0.05    | .70    |     |       |        |
| Past behaviour                        | 0.20    | 2.15*  | .60 | .36   | 27.49  |
| Step 4:                               |         |        |     |       |        |
| Intention                             | 0.33    | 3.05*  |     |       |        |
| Perceived behavioural control         | 0.07    | .95    |     |       |        |
| Past Behaviour                        | 0.18    | 1.87   |     |       |        |
| Spontaneous implementation intentions | 0.15    | 1.68   | .61 | .38   | 21.59  |

\* $p < .05$ .

In predicting 3-week exercise behaviour, after Step 1, intention made a significant contribution accounting for 34% of the variance. The addition of perceived behavioural control in Step 2 did not significantly increase the prediction. With past behaviour included in the third step, the predicted variance significantly increased by 2%. The addition of spontaneous implementation did not significantly increase the variance.

### **Moderating effects**

Finally, hierarchical regression analyses were conducted to test two-way interactions between implementation intentions with perceived behavioural control, past behaviour, and intentions. In accordance with Aiken and West's (1991) recommendations, all variables were standardized in order to avoid multicollinearity. Results revealed that the two-way interaction between past behaviour and implementation intentions predicted 2-week participation in exercise ( $F = 3.35, p < .05$ ). Probing of the interaction revealed that implementation intentions predicted 2-weeks participation in exercise only among

participants who exercised for less than three times per week ( $\beta = 0.30, p < .05$ ) and not among participants who exercised for more than three times per week ( $\beta = 0.18, p > .05$ ). All other interactions were not statistically significant in predicting 2-, 3-, or the total of 5-weeks participation in exercise.

## Discussion

The current study examined the usefulness of a measure of implementation intentions, designed to assess the extent to which participants self-initiated the process of forming implementation intentions for their exercise, which was also suited to the survey context of the TPB and past behaviour measures. The predictive utility of TPB over a 5-week period was also examined, and it was determined if the addition of past behaviour and spontaneous implementation intentions increased the predicted variance. The psychological correlates of spontaneous implementation intentions were explored, along with the moderating effects of intention, perceived behavioural control, past behaviour, and implementation intentions at various time points.

Consistent with previous research, the regression analysis showed that attitude towards exercise and perceived behavioural control significantly predicted intention, but not subjective norm. Further, the effects from intention, but not from perceived behavioural control, on exercise behaviour were demonstrated (Bozionelos & Bennett, 1999; Courneya & McAuley, 1993, 1995; Hagger *et al.*, 2001). Therefore, TPB provides a useful framework for predicting and explaining exercise participation.

Another trend clearly evident in the results of the present study is that intention was the only variable to contribute to the prediction of implementation intentions. This finding supports Gollwitzer's (1999) propositions that implementation intentions are formed to assist the enactment of exercise intentions and suggests that spontaneous implementation intentions help in translating intentions into exercise behaviour.

Another important finding is the effects of implementation intentions and past behaviour on exercise. Consistent with previous research, the addition of past behaviour and implementation intentions significantly increased the predicted variance in exercise behaviour (Bozionelos & Bennett, 1999; Hagger *et al.*, 2002; Milne *et al.*, 2002). In particular, the inclusion of spontaneous implementation intentions reduced the effect of intention and past behaviour, for behaviour at 2 weeks and when indexed over a 5-week period. However, when behaviour was measured for a 3-week period (following an initial 2-week period), the variance that intention and past behaviour accounted for in exercise behaviour decreased, and spontaneous implementation intentions were no longer a significant predictor of behaviour. These findings suggest that the motivating effect of intention, past behaviour, and spontaneous implementation intentions decreases over time, particularly for spontaneous implementation intentions.

Spontaneous implementation intentions were also found to interact with past behaviour, such that implementation intentions predicted exercise behaviour only when participants did not exercise frequently in the past. Implementation intentions did not predict the exercise behaviour of participants who exercised frequently in the past, indicating that spontaneous implementation intentions may be more beneficial for people just commencing an exercise programme, who have not exercised frequently in the past. These findings corroborate Gollwitzer's (1999) propositions that implementation

intentions are particularly beneficial in overruling counter-intentional habits. Specifically, because implementation intentions create automatic links between cues in the environment and behaviours that are associated with these cues, they foster behaviours that are efficient enough to suppress previous sedentary habits, by creating counter-habitual behaviours that are automatically performed (Gollwitzer, 1999; Sheeran & Orbell, 2000).

This study used a measure of spontaneous implementation intentions rather than implementation intentions formed under experimental conditions. This was based on the premise that the effects of implementation intentions would be greatest when a person has choice over the formation of implementation intentions. The findings suggest that spontaneous implementation intentions have similar motivational effects as experimentally-formed implementation intentions, therefore supporting their plausibility. The results also indicate that plans to act, as rated on the spontaneous implementation intentions measure, translated into actual behaviour 2 weeks later, and when indexed over a 5-week period. However, it was not established whether spontaneous implementation intentions did actually produce stronger effects than experimentally-induced implementation intentions. Furthermore, it cannot be overlooked that the method used to measure spontaneous implementation intentions may have actually prompted the formation of implementation intentions, and without a control group this is difficult to ascertain. It is therefore recommended that future research continue to investigate the motivational effects of spontaneous implementation intentions with the use of an experimentally-induced group and a control group for comparison.

Before concluding, it is appropriate to outline a possible limitation of this study associated with the method used to assess behaviour. Research suggested that motivation for sport and exercise differ, and should therefore be measured separately (Ajzen & Driver, 1991; Frederick & Ryan, 1995). In this study, sport and exercise were assessed together with a single item, and thus a confound between the different types of motivation may have resulted. Future research may wish to employ a behavioural measure that separately assesses sport and exercise participation.

This study found some interesting findings that could be used by health care professionals to motivate people to be physically active at a sufficient level to confer health benefits. Prior to programme commencement, if an assessment of attitude towards exercise and perceived behavioural control was conducted, an indication of where intention formation is problematic could be obtained. An assessment of intention, past behaviour, and implementation intentions would then indicate when intent is low, habitual behaviour is absent, and there are no set plans to implement actions. Health care professionals could then assist in cognitive restructuring of attitudes, perceived control, intention, and implementation intention formation, in an attempt to increase motivation.

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