



Deciding to exercise: The role of anticipated regret

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Objectives: Two studies tested (a) whether anticipated regret (AR) qualifies as an additional predictor of intentions to engage in a health-enhancing behaviour (exercise) after variables from the Theory of Planned Behaviour (TPB) and past behaviour have been controlled, and (b) whether a manipulation that induces participants to focus on AR causes stronger intentions to exercise.

Design: Study 1 employed a cross-sectional questionnaire design; Study 2 employed a between-participants experimental design (AR focus vs. no AR focus).

Method: Participants ($N = 385$) completed standard, multi-item, reliable measures of TPB constructs and AR and also reported their past behaviour (Study 1). Participants in Study 2 ($N = 70$) completed measures of AR and intention; salience of AR was manipulated by means of item order.

Results: Study 1 showed that even though TPB variables and past behaviour were reliable predictors of intention, and explained 51% of the variance, AR contributed a substantial increment in the variance (5%) even after these predictors had been taken into account. Study 2 showed that participants who were induced to focus on AR prior to intention formation had significantly stronger intentions to exercise compared to controls.

Conclusion: The findings indicate that AR predicts a health-enhancing behaviour (as well as the health-risk behaviours examined in previous research) and that effects of AR are independent of TPB variables and past behaviour. The findings also indicate that a simple and inexpensive manipulation of the salience of AR can be used to promote exercise intentions.

Poor physical fitness is an important risk factor for coronary heart disease and other illnesses (e.g. Blair *et al.*, 1989; US Department of Health and Human Sciences, 1996). Increasing physical activity, through occupational routines or leisure-time exercise, can reduce health risks and increase lifespan by up to 2.5 years (Blair, Kohl, Gordon, & Paffenbarger, 1992; Paffenbarger, Hyde, Wing, & Hsieh, 1986). Exercise may also benefit mental health (see Biddle & Murtire, 1991, for a review) and long-established guidelines

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are available for the prescription of exercise by medical practitioners (e.g. American College of Sports Medicine, 1986). Consequently, enhancing the effectiveness of exercise promotion could have important public health implications (Pate *et al.*, 1995).

The identification of cognitions that distinguish between those who are likely or unlikely to engage in recommended health behaviours can identify health promotion targets (Bandura, 2000), especially if such cognitions can be modified using simple interventions. A series of cognition-behaviour models have identified intention as the most immediate and important cognitive antecedent of behaviour (e.g. Ajzen, 1985; Rogers, 1983; Triandis, 1980; see Abraham, Sheeran, & Johnston, 1998, for a review). Intention refers to a person's decision to act and is assumed to reflect the effort that s/he is likely to exert in order to achieve a goal or perform a behaviour (Ajzen, 1991; Fishbein & Ajzen, 1975). Measures of intention account for between 20% and 30% of the variance in behaviour (Armitage & Conner, 2001; Sheeran, 2002; Sutton, 1998), including exercise. For example, in a meta-analysis of applications of the Theory of Planned Behaviour to exercise, Hausenblas, Carron, and Mack (1997) found an average intention-exercise correlation of .47, indicating that intention accounted for 22% of the variance in exercise behaviour.

The theory of planned behaviour (TPB)

The TPB is the most widely applied model of cognitive antecedents of intention (Ajzen, 1985, 1991, 2001) accounting for 39% of the variance in intention across studies (Armitage & Conner, 2001). The TPB proposes that *intention* is based on three cognitions: perceived behavioural control, attitude and subjective norm. Perceived behavioural control (PBC) is a determinant of both intention and behaviour because believing in the feasibility of action may bolster motivation and because perceived behavioural control may reflect actual control. PBC is closely related to 'perceived self-efficacy', as specified by social cognitive theory (Ajzen, 1998; Bandura, 1997, 2000; but see too Manstead & Van Eekelen, 1998). Intention is also determined by the person's *attitude* towards the behaviour and the relevant *subjective norm*. Attitudes refer to the person's overall evaluation of the behaviour while subjective norm is based on beliefs about whether significant others think that the actor should engage in the behaviour. In summary, the TPB proposes that a more positive attitude towards a behaviour (e.g. 'Exercising tomorrow would be good'), a more positive subjective norm (e.g. 'Most people who are important to me think that I should exercise tomorrow') and greater perceived behavioural control (e.g. 'For me, exercising tomorrow would be easy') result in stronger behavioural intentions (e.g. 'I intend to exercise tomorrow').

Although the TPB is a powerful and parsimonious account of the intention formation, Ajzen (1991) acknowledged that the theory might be extended to achieve more accurate prediction of intentions and behaviour. Models such as the TPB have been criticized for not taking account of affective antecedents of action (*cf.* Conner & Armitage, 1998) and it has been suggested that anticipated regret may be an important additional determinant of intention formation (e.g. Richard, de Vries, & van der Pligt, 1998; Richard, van der Pligt, & de Vries, 1995).

Anticipated regret

A number theorists have proposed that emotional experiences following a decision can influence motivation by changing the subjective utilities of potential outcomes

(e.g. Bell, 1982; Janis & Mann, 1977; Loomes & Sugden, 1982). Loomes and Sugden, for example, highlight the effects of experiencing regret as a result of perceived discrepancies between 'what is' and 'what might have been'. Fishbein and Ajzen (1975) acknowledged that the theory of reasoned action (and, therefore, the TPB) treats affect as an undifferentiated aspect of the expectancy value model of attitude.

Consequently, the impact of anticipated affect on decision-making may be underestimated by the model of attitudes included in the TPB (van der Pligt, Zeelenberg, van Dijk, de Vries, & Richard, 1998). Drawing upon the work of Janis and Mann (1977), Richard, de Vries, & van der Pligt (e.g. 1998; Richard, van der Pligt, & de Vries, 1995, 1996) have investigated the extent to which measures of anticipated affect and, in particular, anticipated regret (AR) enhance the level of prediction achieved by the TPB. There is consistent evidence that AR measures increase the capacity of the TPB to predict intentions. For example, Richard *et al.* (1998, 1995) found that AR had a significant additional effect on behavioural expectations regarding refraining from sexual intercourse and condom use. Similarly, Parker, Manstead, and Stradling (1995) found that AR enhanced the prediction of intentions to commit driving violations (e.g. cutting across other traffic) while Richard *et al.* (1996) showed that AR explained additional variance in expectations regarding eating junk food, using soft drugs and drinking alcohol. In one of the few experimental studies of AR, Sheeran and Orbell (1999) found that including an AR item in a questionnaire resulted in a significantly stronger mean intention to buy lottery tickets in an experimental group, compared to a control group who completed the same questionnaire without an AR item.

Research into the effects of AR leave two questions unanswered. First, it is unclear whether the effects of AR are restricted to a particular class of behaviours, namely, those for which one lapse can lead to negative outcomes. Using drugs or alcohol or eating junk food can have immediate negative effects, as can failing to use a condom, buy a lottery ticket or drive safely. Does regret have similar effects on intentions in relation to cumulative health-protective actions? Failing to exercise on a single occasion or over a short period may be unlikely to create a large contrast between 'what is' and 'what might have been'. Following this reasoning, Richard *et al.* (1996, p. 126) noted: 'it is possible that anticipated affective reactions are more important for behaviours with negative consequences than for behaviours with positive consequences'. Thus, available evidence does not indicate whether AR effects generalize to the promotion of health-enhancing behaviours (as well as health-risk behaviours).

Secondly, none of the studies of AR reviewed above controlled for past behaviour. This leaves open the possibility that the effects of AR on intention are not independent of those of past behaviour. AR could act as proxy measure of past behaviour (i.e. 'I would regret doing/not doing X because I usually do it'). Past behaviour has been found to significantly increase variance explained in intentions to exercise after controlling for TPB variables (e.g. Bagozzi & Kimmel, 1995). Consequently, it is prudent to control for the influence of past behaviour when assessing the effects of AR on exercise.

In summary, we sought to test the generalizability of AR effects by exploring the impact of AR on exercise intention formation when controlling for past behaviour. In addition, we sought to explore whether rendering AR salient would affect exercise intention formation.

Our first study tested the hypothesis that AR would improve the prediction of exercise intentions when TPB-specified cognitions and past behaviour are controlled.

STUDY I

Method

Participants and procedure

A survey was conducted at two UK universities with volunteer undergraduates. In all, 384 people (aged 18–47, $M = 20.89$, $SD = 5.07$) completed the questionnaire which contained measures of TPB constructs, past behaviour and AR.

Measures

Consistent with previous research (e.g. Norman & Smith, 1995), a brief definition of exercise was printed on the front of the questionnaire ('Exercise includes activities such as aerobics, badminton, jogging, rugby, etc., but not activities which form part of your daily life such as walking to the bus stop, dancing at discos, etc.'). A pilot study had indicated that $N = 6$ was the median number of times that student participants would exercise over a two-week period and this is the level of exercise required to accumulate health gains (Pate *et al.*, 1995). Consequently, all TPB and AR measures specified exercising 'at least six times over the next two weeks'. Unless otherwise stated, items employed 6-point response options.

Intentions to exercise were assessed by two items (e.g. 'I intend to exercise at least six times over the next two weeks', strongly agree–strongly disagree). The mean of these items provided a composite measure. Reliability was satisfactory ($\alpha = .87$). PBC was measured by four items: (e.g. 'For me to exercise at least six times in the next two weeks would be . . .', very easy–very difficult; 'How much control do you have over exercising at least six times in the next two weeks?', no control–complete control) ($\alpha = .85$). Attitudes were measured by evaluations of exercising at least six times in the next two weeks on three bipolar scales (pleasant–unpleasant, good–bad, enjoyable–unenjoyable) ($\alpha = .76$). Subjective norms were measured by two items (e.g. 'Most people who are important to me think that I should exercise at least six times over the next two weeks', strongly agree–strongly disagree) ($\alpha = .86$). Past behaviour was measured by a single item ('How many days did you exercise in the last two weeks?'). AR was measured by two items: ('If I did not exercise at least six times in the next two weeks, I would feel regret'; 'If I did not exercise at least six times in the next two weeks, I would feel upset', 11-point scales, definitely yes–definitely no) ($\alpha = .82$).

Results

Discriminant and convergent validity

Prior to hypothesis testing, the discriminant and convergent validity of the attitude and AR measures were assessed using a factor analysis with oblique rotation. Two correlated factors ($r = .40$, $p < .001$) accounting for 78.9% of item variance were obtained. The first factor accounted for 54.1% of the variance (eigenvalue = 2.71) while the second accounted for 24.8% (eigenvalue = 1.04). Attitude items loaded on the first factor (loadings = .72, .85 and .87) but not on the second factor (loadings $< |.10|$). Anticipated regret items loaded on the second factor (loadings = .91 and .89) but not the first (loadings $< |.13|$). These results indicate that the attitude and AR measures exhibit satisfactory discriminant and convergent validity in relation to exercising.

Predictors of intention

Table 1 presents the means, standard deviations and intercorrelations for study variables. Intentions to exercise were moderately strong ($M = 4.07$ on a 1–6 scale) and participants also had positive attitudes, subjective norms and PBC. On average, participants reported that they would feel a modest amount of regret/upset if they did not exercise at least six times in the next two weeks ($M = 2.94$).

Table 1. Study 1: Means, SD, and intercorrelations for TPB variables, past behaviour, and anticipated regret ($N = 384$)

	1	2	3	4	5	6	<i>M</i>	<i>SD</i>
1. Intention	—	.56	.28	.45	.61	.57	4.07	1.86
2. Attitude		—	.22	.32	.43	.45	5.45	1.15
3. Subjective norm			—	.24	.19	.27	4.12	1.42
4. Perceived control				—	.43	.25	5.07	1.41
5. Past behaviour					—	.43	3.27	3.18
6. Anticipated regret						—	5.22	2.94

$p < .001$ for all correlations.

A three-step hierarchical regression was conducted to determine the proportion of variance in exercise intentions accounted for by AR after TPB variables and past behaviour had been controlled. Attitudes, subjective norms and perceived control were entered at Step 1, past behaviour was entered at Step 2, and AR entered the equation on the final step (see Table 2). TPB variables explained 40.4% of the variance in intentions and beta coefficients were significant for attitudes, subjective norms and PBC ($ps < .01$). At Step 2, past behaviour produced a significant increment in the variance explained in intentions ($F_{\text{Change}} = 79.49$, $p < .001$, $R^2_{\text{Change}} = .10$). Attitudes, PBC and past behaviour were all significant predictors in this equation. AR entered the regression equation at Step 3 and was associated with a significantly improved fit to the model ($F_{\text{Change}} = 45.98$, $p < .001$). AR explained an additional 5.3% of the variance in intentions after TPB variables and past behaviour had been taken into account. The findings indicate that participants will have strongest intentions to exercise when they positively evaluate exercise behaviour, feel confident regarding their ability to exercise, have exercised more often in the past

Table 2. Study 1: Hierarchical regressions of exercise intentions on TPB variables, past behaviour, and anticipated regret

Step	Variable(s) entered	β	β	β
1.	Attitude	.44***	.32***	.24***
	Subjective norm	.11**	.10**	.06
	Perceived control	.28***	.16***	.16***
2.	Past behaviour	—	.38***	.30***
3.	Anticipated regret	—	—	.27***
R^2		.40	.51	.56
Model <i>F</i>		85.99***	97.68***	96.62***

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

two weeks, and anticipate feelings of regret if they do not exercise. These data support our hypothesis.

Discussion

The results of Study 1 suggest that AR qualifies as an important additional predictor of exercise intentions when past behaviour is controlled. However, the correlational design of the study does not permit confident inferences regarding causation. It remains to be seen whether focusing on AR prior to intention formation strengthens intentions to exercise. To explore this possibility, we conducted a simple experiment in which participants either did or did not focus on AR before reporting their exercise intentions. We hypothesized that those who had focused on AR would report stronger exercise intentions.

STUDY 2

Method

Participants and procedure

Participants were UK university students who volunteered to answer questions concerning exercising. Seventy people participated, of whom 35 were women. Participants were assigned randomly to an experimental ($n = 34$) or control ($n = 36$) condition and men and women were distributed equally between conditions.

In the experimental group, AR was induced by asking participants to respond to an anticipated regret item *before* being presented with a behavioural intention item. The intention item was hidden from view while participants responded to the AR item. In the control (no regret focus) condition, the order of these items was reversed. Participants responded to the intention item (but could not see the AR item). Only after completing the intention item were they presented with the AR item (so that the latter could not influence the former). This procedure ensured that all participants completed both measures but rendered anticipated regret salient for the experimental group but not for control participants.

Measures

Exercise intentions were measured by the item, 'How many times do you intend to exercise in the next two weeks?' and AR was assessed using the item, 'Would you regret it if you did *not* exercise in the next two weeks?' (8-point scale, definitely yes–definitely no).

Results

The experimental and control conditions did not differ significantly on mean AR scores (experimental: $M = 3.12$, $SD = 2.66$; control: $M = 4.14$, $SD = 2.79$); $t(68) = 1.57$, $p > .12$. This suggests that intention formation does not increase anticipated regret. However, participants who had focused on AR (following not exercising) intended to exercise more often ($M = 6.18$, $SD = 4.85$) than control participants ($M = 3.67$, $SD = 3.96$); $t(68) = 2.38$, $p < .02$ (see Fig. 1). Thus when anticipated regret was salient before exercise intentions were reported, participants had stronger intentions to exercise over the next two weeks.

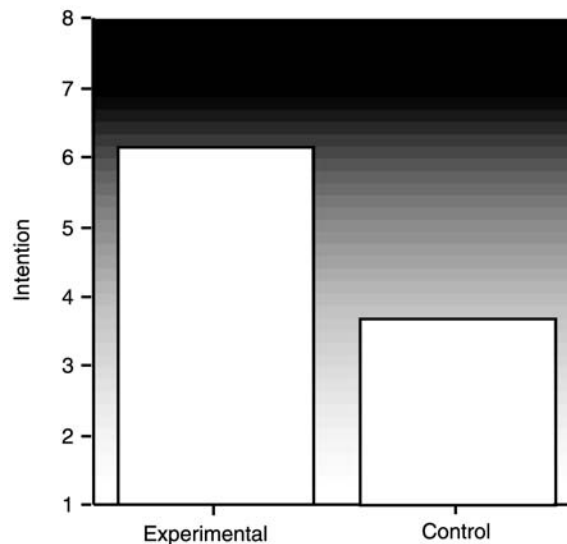


Figure 1. Mean intention scores for experimental and control groups: Study 2.

GENERAL DISCUSSION

Study 1 showed—for the first time—that

- (a) AR enhances the prediction of exercise intention over and above the effects of TPB-specified cognitions, and
- (b) this effect is sustained after controlling for past behaviour.

These results confirm that AR is an independent cognitive antecedent of a health behaviour that has positive cumulative benefits, implying AR effects on intention formation may be more generalizable than had previously been realized (*cf.* Richard *et al.*, 1996). However, more important to health educators is the question of whether or not focusing on AR (by, for example, reading an exercise promoting campaign literature) will promote intentions to exercise. Study 2 suggested that focusing on AR does promote exercise intentions. The experimental manipulation demonstrated that contemplating anticipated regret after not exercising in the future, before reporting one's exercise intention, resulted in stronger intentions to exercise. This effect was not reciprocal; contemplating one's intention to exercise did not amplify AR. This analogue study suggests that interventions designed to highlight anticipated regret in relation to not exercising could strengthen exercise intentions.

TPB measures accounted for 40% of the variance in exercise intentions. This is typical and supports our operationalization of TPB measures. For example, in a meta-analysis including 185 applications of the TPB, Armitage and Conner (2001) found that, on average, 39% variance in intention was explained by TPB measures. The findings also suggested that the individual's own attitude, or evaluation of exercise, rather than social norms, predicts exercise intentions.

The effects of AR were observed after controlling for past behaviour, ruling out the possibility that AR items act as proxy measures of past behaviour. Past behaviour has been found to explain additional variance in exercise intentions, after controlling for TPB (e.g. Bagozzi & Kimmel, 1995). Thus, Study 1 constitutes a robust test of the

additional effects of AR on intention, over and above TPB-specified cognitions. The findings recommend inclusion of AR in models of the antecedents of intentions to engage in a range of health behaviours, including exercise.

The studies focus on exercise intentions and we know that not all intenders act. For example, in a review of six prospective studies of cognitive predictors of health behaviours, Sheeran (2002) found that the median percentage of intenders who did not act on their intention was 47%. Intervention studies have clarified that attempts to bolster motivation alone may not be enough to prompt behaviour change (e.g. Milne, Orbell, & Sheeran, 2002) and research has distinguished between motivational and volitional processes involved in action regulation (e.g. Abraham *et al.*, 1999; Gollwitzer & Brandstätter, 1997). Thus, further research on the effects of AR on behaviour and the intention-behaviour relationship is warranted. In particular, research on the postulated moderation of the intention-behaviour relationship by AR would be informative (Abraham & Sheeran, 2003; Sheeran & Abraham, 2003; Sheeran & Orbell, 1999). Nonetheless, while health promotion must be concerned with volitional or post-intentional processes, this should not overshadow the importance of establishing motivation to act. If an intention to act is not present, action is very unlikely. Sheeran (2002) found that 93% of those who did not intend to act did not do so. Consequently, identification of cognitive interventions that can promote intention formation is an essential element of evidence-based health promotion.

Limitations of the present research should be recognized. Both studies examined one particular health-protective behaviour among samples of university students. It would be valuable to replicate these findings for other health-protective behaviours among random samples of the general population. However, given that almost one third of 18-year-olds enrol on higher education courses in the UK, research informing exercise promotion among students is valuable in its own right. Both studies also relied on self-report measures of past behaviour and, although research indicates that self-reports are valid—even in complex and controversial domains such as condom use (Sheeran & Abraham, 1994)—future studies could employ more objective estimates of exercising, such as attendance at sports facilities.

Notwithstanding these limitations, the present findings have theoretical and practical implications. They suggest that AR should be included in predictive models of the cognitive antecedents of intention. In addition, they suggest that focusing people's attention on anticipated regret may promote and strengthen their intentions to exercise. Hardeman *et al.* (2002) note that relatively few intervention studies have tested the capacity of the TPB to change behaviour. However, interventions drawing upon similar social cognitive models have been found to increase exercise intentions and behaviour (e.g. Milne *et al.*, 2002). Our results imply that it would be worth including measures and manipulations of anticipated regret in future trials of such interventions.

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