

# **Efficacy of the Theory of Planned Behaviour: A meta-analytic review**

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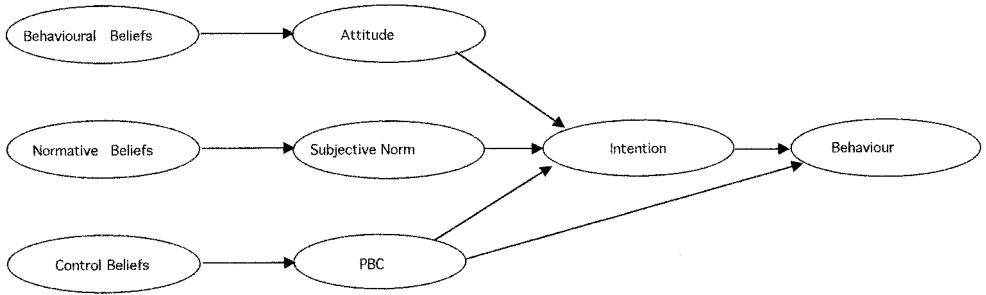
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The Theory of Planned Behaviour (TPB) has received considerable attention in the literature. The present study is a quantitative integration and review of that research. From a database of 185 independent studies published up to the end of 1997, the TPB accounted for 27% and 39% of the variance in behaviour and intention, respectively. The perceived behavioural control (PBC) construct accounted for significant amounts of variance in intention and behaviour, independent of theory of reasoned action variables. When behaviour measures were self-reports, the TPB accounted for 11% more of the variance in behaviour than when behaviour measures were objective or observed ( $R^2$ s = .31 and .21, respectively). Attitude, subjective norm and PBC account for significantly more of the variance in individuals' desires than intentions or self-predictions, but intentions and self-predictions were better predictors of behaviour. The subjective norm construct is generally found to be a weak predictor of intentions. This is partly attributable to a combination of poor measurement and the need for expansion of the normative component. The discussion focuses on ways in which current TPB research can be taken forward in the light of the present review.

Since Wicker's (1969) review of research examining the relationship between attitudes and behaviour, and his conclusion that attitudes probably do not predict behaviour, social psychologists have sought to improve the predictive power of attitudes. In recent years, the main approach within this area has been to develop integrated models of behaviour, including additional determinants of behaviour such as social norms or intentions (Olson & Zanna, 1993). Arguably the most widely researched of these models are the Theories of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) and Planned Behaviour (Ajzen, 1988, 1991). The Theory of Planned Behaviour (TPB) is essentially an extension of the Theory of Reasoned Action (TRA) that includes measures of control belief and perceived behavioural control (see Fig. 1).

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**Figure 1.** The theory of planned behaviour.

Ajzen (e.g. 1991) extended the TRA to include a measure of perceived behavioural control—a variable that had received a great deal of attention in social cognition models designed to predict health behaviours (e.g. health belief model, protection motivation theory; see Armitage & Conner, 2000; Conner & Norman, 1996a). Perceived behavioural control (PBC) is held to influence both intention and behaviour (see Fig. 1). The rationale behind the addition of PBC was that it would allow prediction of behaviours that were not under complete volitional control. Thus, while the TRA could adequately predict behaviours that were relatively straightforward (i.e. under volitional control), under circumstances where there were constraints on action, the mere formation of an intention was insufficient to predict behaviour. The inclusion of PBC provides information about the potential constraints on action as perceived by the actor, and is held to explain why intentions do not always predict behaviour.<sup>1</sup>

With respect to the influence of PBC on intention, Ajzen (1991, p. 188) states that: ‘The relative importance of attitude, subjective norm, and perceived behavioral control in the prediction of intention is expected to vary across behaviors and situations’. That is, in situations where (for example) attitudes are strong, or where normative influences are powerful, PBC may be less predictive of intentions. Thus, Ajzen (1991) argues that the magnitude of the PBC–intention relationship is dependent upon the type of behaviour and the nature of the situation. Indirect evidence for this claim has been demonstrated in studies that have shown that measures of attitude strength (e.g. Sparks, Hedderley, & Shepherd, 1992) and individual differences in sociability (e.g. Trafimow & Finlay, 1996) increase the relative predictive power of attitudes and subjective norms, respectively. In general, individuals are more disposed (i.e. intend) to engage in behaviours that are believed to be achievable (cf. Bandura, 1997).

PBC is also held to exert both direct and interactive (with behavioural intentions) effects on behaviour. This is based on the following rationale: that however strongly held, the implementation of an intention into action is at least partially determined by personal and environmental barriers, thus: ‘The addition of perceived behavioural control should become increasingly useful as volitional control over behavior decreases’ (Ajzen, 1991, p. 185). Therefore, in situations where prediction of

<sup>1</sup>The authors wish to thank Russell Spears for his helpful comments with respect to the following section.

behaviour from intention is likely to be hindered by the level of actual (i.e. volitional) control, PBC should (1) facilitate the implementation of behavioural intentions into action, and (2) predict behaviour directly.

In the prediction of social behaviours, there are no absolutes. However, it is instructive to consider Ajzen's (1991) predictions by examining the impact of PBC on behaviour under both optimal (i.e. complete volitional control) and suboptimal (i.e. problems of volitional control) conditions.<sup>2</sup>

In conditions of complete volitional control, the intention-behaviour relationship should be optimal, and PBC should not exert any influence on this relationship. In contrast, where the behaviour is not under complete volitional control, PBC should moderate (see Baron & Kenny, 1986) the relationship between intention and behaviour. Under such conditions, greater PBC should be associated with stronger intention-behaviour relationships. In earlier versions of the TPB, Ajzen (e.g. 1985) emphasized the fact that the interaction between behavioural intention and PBC should be independently predictive of behaviour. That is, under conditions where volitional control is relatively low (i.e. where intention is only weakly related to behaviour), increased PBC should facilitate the implementation of intentions into action. However, in his meta-analysis of the TPB, Ajzen (1991) reported that only one study had found the (marginally) significant ( $p < .10$ ) intention-PBC interaction that would support this moderator hypothesis. Ajzen (1991) argued that this finding reflected the fact that linear models account well for psychological data—even if interaction terms are known to be present. Yet, several, more recent studies (e.g. Terry & O'Leary, 1995) have found significant PBC-intention interactions, and the present meta-analysis examines these to test this moderator hypothesis.

Following the lack of evidence for the interactive effects of PBC on the intention-behaviour relationship, Ajzen (1991) argued for a direct relationship between PBC and behaviour which more closely fitted the available data. Thus, Ajzen argues that under conditions where behavioural intention alone would account for only small amounts of the variance in behaviour (i.e. where there are problems of volitional control), PBC should be independently predictive of behaviour. This is based on the rationale that increased feelings of control will increase the extent to which individuals are willing to exert additional effort in order successfully to perform a particular behaviour. In contrast, under conditions of very high volitional control, behavioural intention should be the only predictor of behaviour. This ceiling effect occurs because where the behaviour is relatively straightforward, exerting additional effort to engage in the behaviour will not impact on the actual performance of the behaviour, over and above the effects of intention.

However, predictions concerning the effects of PBC on behaviour are clouded by the explicit assumption that PBC is an accurate representation of actual (volitional)

<sup>2</sup>Note that by 'problems of volitional control', we are referring to environmental and personal constraints on behaviour. For example, consider cigarette smoking: here, an environmental barrier might be that everyone at work smokes; a personal barrier might be the level of craving for cigarettes (for further discussion of these issues see Armitage & Conner, 1999a, 1999b).

control. Indeed, Aizen<sup>3</sup> states that 'When PBC is inaccurate all kinds of possibilities open up' (I. Aizen, personal communication, 8 November 1999). Thus, where PBC and actual control are discrepant, the effect of PBC on behaviour is more problematic. Given the extant literature on 'illusions of control' (e.g. Langer, 1975; Lerner, 1977), it seems likely that PBC will rarely reflect actual control in a very accurate way. In short, adequate tests of predictions concerning the effects of PBC on behaviour would either (1) experimentally manipulate individuals' levels of perceived control, or (2) obtain independent measures of volition (actual control). These are matters for future research, and cannot be adequately addressed using meta-analysis.<sup>4</sup>

As we have already noted, within the TPB, PBC is held to affect both intentions and behaviour. There are two further antecedents of intention: subjective norm and attitude toward the behaviour, which are retained from the earlier TRA. Subjective norm refers to the individual's perceptions of general social pressure to perform (or not to perform) the behaviour. If an individual perceives that significant others endorse (or disapprove of) the behaviour, they are more (or less) likely to intend to perform it. Attitude towards the behaviour reflects the individual's global positive or negative evaluations of performing a particular behaviour. In general, the more favourable the attitude towards the behaviour, the stronger should be the individual's intention to perform it.

The antecedents of attitude, subjective norm and PBC are corresponding beliefs, reflecting the underlying cognitive structure. Each behavioural belief links a given behaviour to a certain outcome, or to some other attribute, such as the cost incurred in performing the behaviour. The attitude towards the behaviour is determined by the strength of these associations, and by the beliefs that are salient at the time. This works on the principle of Fishbein and Ajzen's (1975) Expectancy-value Model: the subjective value of a given outcome affects the attitude in direct proportion to the strength of the belief. Subjective norm is considered to be a function of salient normative beliefs. While subjective norm relates to perceptions of *general* social pressure, the underlying normative beliefs are concerned with the likelihood that specific individuals or groups (referents) with whom the individual is motivated to comply will approve or disapprove of the behaviour. According to Ajzen (1991), control beliefs are the antecedents of PBC, and are concerned with the perceived power of specific factors to facilitate or inhibit performance of the behaviour. Like the other beliefs, the equation takes account of the relevance of the belief to the individual, in this case by taking a measure of the frequency of occurrence of the promoting (or inhibitory) factor.

<sup>3</sup>Note that 'Ajzen' recently changed his name to 'Aizen'.

<sup>4</sup>A number of previous meta-analyses have suggested that the TPB adds very little explained variance beyond that which is explained by the TRA (e.g. Sutton, 1998). One possibility is that as volitional control decreases, the influence of PBC on intention and behaviour increases, although even studies designed to directly test this hypothesis have not produced clear-cut findings (e.g. Madden, Ellen, & Ajzen, 1992). We therefore attempted to code studies for 'level of volitional control'. On 3-point scales, raters were asked to judge whether the behaviour in question was under volitional control, not under volitional control, or whether it was unclear. Initial analysis of coding reliability indicated 68% agreement. Following discussion, this increased to 79%, leaving over 20% of cases unresolved. Analyses of the categories revealed no substantive differences between groups, and no decrement in between-study variance. An alternative procedure—suggested by one of our anonymous reviewers—was therefore adopted, which is set out in the Appendix.

PBC will therefore be increased by salient beliefs concerning adequate resources and opportunities and fewer anticipated obstacles or impediments.

Reviews have provided support for the TPB (e.g. Blue, 1995; Conner & Sparks, 1996; Godin, 1993; Jonas & Doll, 1996; Manstead & Parker, 1995; Sparks, 1994), as have four previous meta-analyses (Ajzen, 1991; Godin & Kok, 1996; Hausenblas, Carron, & Mack, 1997; Van den Putte, 1991). However, these meta-analyses have been limited in scope and sampling. For example, although Van den Putte (1991) reported that PBC explained an additional 14% of the variance in intention and 4% in behaviour (over and above attitude and subjective norm), discussion of issues surrounding this finding was limited because the focus of his study was the TRA.<sup>5</sup> Ajzen's (1991) meta-analysis of the TPB found an average multiple correlation of attitude, subjective norm and PBC, with intention of  $R = .71$  (19 correlations), and an average multiple correlation of  $R = .51$  (17 correlations) for prediction of behaviour from intention and PBC. However, these analyses considered only the direct antecedents of intention and behaviour, and were based upon a limited data set, including studies that have never been published. Godin and Kok's (1996) meta-analysis found that PBC contributed a mean additional 13% of variance to the prediction of intentions and 12% to the prediction of behaviour. However, Godin and Kok considered only health behaviours, and reported values that were derived only from studies that reported the relevant data. The tendency for authors to report only significant findings may have inflated the reported values (cf. Rosenthal, 1979). Finally, Hausenblas *et al.* (1997) report a meta-analysis on applications of the TRA and TPB to exercise behaviour. They conclude that the TPB is more useful than the TRA, but base this conclusion solely on the magnitude of correlations between PBC, intention and behaviour.

More generally, previous meta-analyses of the TRA/TPB have tended to analyse data from participants more than once, have failed to report reliability statistics, and treated all studies as equivalent, with no attempt to weight their data in favour of studies with more participants. However, in spite of these weaknesses, evidence from narrative and meta-analytic reviews suggests that the TPB is a useful model for predicting a wide range of behaviours and behavioural intentions. The present meta-analysis aims to overcome some of the methodological weaknesses of previous meta-analyses and to focus on several of the issues in current TPB research.

### Issues surrounding the TPB

#### *Self-report*

Behavioural decision-making models such as the TRA and TPB have tended to rely on self-reports, despite evidence to suggest the vulnerability of such data to self-presentational biases (e.g. Gaes, Kalle, & Tedeschi, 1978). To a great extent, this has been ignored in the literature pertaining to the TRA/TPB, in spite of the threat to the validity and reliability of the models. Beck and Ajzen (1991) provided an exception, applying the TPB and a Marlowe–Crowne Social Desirability Scale

<sup>5</sup>Indeed, this analysis was presented in the introduction to his meta-analysis of the TRA.

(SDS; Crowne & Marlowe, 1964) to predicting dishonest intentions and actions (cheating, shoplifting and lying). SDS scores were entered into a regression equation and accounted for 5% of the variance in intentions, providing some evidence to suggest that individuals may provide socially desirable answers in terms of their attitudes and intentions.<sup>6</sup> Six months later, TPB variables were able to account for between 12% and 55% of the variance in self-reported behaviour. In contrast, however, Armitage and Conner (1999c) reported few effects of social desirability on relationships between TPB components.

More closely related to the concerns of the present study, Hessing, Elffers, and Weigel (1988) examined the TRA in relation to tax evasion, and contrasted self-reports with official documentation. Findings indicated that attitudes and subjective norms significantly correlated with self-reported behaviour, but did not correlate with documentary evidence, in spite of considerable effort to maintain the anonymity of respondents. The implication was that self-reports of behaviour were unreliable, compared with more objective behaviour measures (see also Armitage & Conner, 1999a, 1999b; Norwich & Rovoli, 1993; Pellino, 1997). In terms of the present study, we expected TPB variables (i.e. intention and PBC) to predict self-reported and observed behaviour, but that prediction of objective behaviour would be less accurate.

### *Control*

It has already been noted that the difference between the TRA and TPB lies in the control component of the TPB. Ajzen (1991) argues that the PBC and self-efficacy constructs are interchangeable. However, several authors (e.g. Terry, 1993) have suggested that self-efficacy and PBC are not entirely synonymous. For example, Bandura (1986, 1992) has argued that control and self-efficacy are quite different concepts. Self-efficacy is more concerned with cognitive perceptions of control based on internal control factors, whereas PBC also reflects more general, external factors. Researchers such as de Vries, Dijkstra, and Kuhlman (1988) have advocated the use of measures of self-efficacy, as opposed to PBC in the prediction of intentions and behaviour. Further, Dzewaltowski, Noble, and Shaw (1990), in a comparison of the theories of reasoned action, planned behaviour and social cognitive theory, found that self-efficacy, rather than PBC, had a direct impact on behaviour.

Terry and colleagues have closely examined the distinction between PBC and self-efficacy. For safer sex behaviours, White, Terry, and Hogg (1994) reported that PBC only had an effect on a behavioural measure of discussing the use of condoms with any new partner, while self-efficacy had a strong effect on intentions to discuss and intentions to use condoms. Consonant with White *et al.* (1994), Terry and O'Leary (1995) found that self-efficacy only predicted intentions, while PBC predicted exercise behaviour. These studies therefore provide support for a distinction between self-efficacy and PBC (see also Manstead & van Eekelen, 1998).

<sup>6</sup>However, this finding must be interpreted with extreme caution, as SDS measures were not taken at the same time as the six-month self-report of behaviour. Perhaps more importantly, SDS also rely on self-report.

More recently, Sparks, Guthrie, and Shepherd (1997) have proposed a distinction between 'perceived difficulty' and 'perceived control' (see also Chan & Fishbein, 1993). These authors argue that items which tap 'perceived difficulty' are both more meaningful to participants and are closer to Ajzen's (1991) original conceptualization of PBC. Sparks *et al.* (1997) report two studies to support their position. In their study 1, although they found differences in the pattern of intercorrelations, neither 'perceived difficulty' nor 'perceived control' predicted intention. In study 2, 'perceived difficulty' independently predicted intention but 'perceived control' did not. These findings were interpreted as evidence to support the use of 'perceived difficulty' over 'perceived control'. Armitage and Conner (1999a, 1999b) have critiqued this approach, arguing that asking individuals about the 'ease' or 'difficulty' of performing a particular behaviour does not allow discrimination between ease or difficulty in relation to external (e.g. 'availability') and internal (e.g. 'confidence') factors. Moreover, the Sparks *et al.* study employed a cross-sectional design, with no data to test the effects on subsequent behaviour, which formed the basis of Terry and colleagues' distinction. Armitage and Conner (1999a, 1999b) also provide evidence to support a distinction between self-efficacy and 'perceived control over behaviour', utilizing measures that do not rely on perceived ease or difficulty. The present study sought meta-analytic evidence to support this position.

### *Behavioural intentions*

The intention construct is central to both the TRA and TPB. Intentions are assumed to capture the motivational factors that influence a behaviour and to indicate how hard people are willing to try or how much effort they would exert to perform the behaviour (Ajzen, 1991, p. 181). In applications of the TRA/TPB, researchers have not always employed measures that clearly tap the intention construct. For example, Sheppard, Hartwick, and Warshaw's (1988) review of the TRA argued for the need to consider both behavioural intentions and self-predictions when predicting behaviour. Warshaw and Davis (1985) noted a number of different ways in which intentions had been measured, and distinguished measures of behavioural intentions (e.g. 'I intend to perform behaviour x') from measures of self-predictions (e.g. 'How likely is it that you will perform behaviour x?'). Sheppard *et al.* (1988) went on to argue that self-predictions should provide better predictions of behaviour as they are likely to include a consideration of those factors which may facilitate or inhibit performance of a behaviour, as well as a consideration of the likely choice of other competing behaviours. Sheppard *et al.*'s meta-analysis supported this view: measures of self-predictions were found to have stronger relationships with behaviour (mean  $r = .57$ ) than did behavioural intentions (mean  $r = .49$ ), although attitude and subjective norm accounted for more of the variance in intentions (mean  $R = .73$ ) than self-predictions (mean  $R = .61$ ).

In the TPB, the PBC construct should tap perceptions of the factors that may facilitate or inhibit performance of behaviour. One might therefore expect little difference in the predictive power of intentions vs. self-predictions once PBC is taken into account. More specifically, the relationship between PBC and behaviour

should be stronger when intention (as opposed to self-prediction) measures are used, because intention measures do not take facilitating/inhibiting factors into account.

Beyond this, Bagozzi (1992) has suggested that attitudes may first be translated into desires (e.g. 'I want to perform behaviour x'), which then develop into intentions to act, which direct action. From this perspective, one might expect that desires would inform intentions, upon which behavioural self-predictions are partly based. Given that desires take no account of facilitating/inhibiting factors, PBC should contribute more unique variance to the prediction of behaviour when measures of desires are employed than self-predictions. Congruent with the view that desires do not take account of facilitating/inhibiting influences on behaviour, PBC should be more closely associated with self-predictions than with desires. On the other hand, intentions are held to mediate the relationship between desires and self-predictions, suggesting that effects associated with intentions will fall between the desire and self-prediction findings. The present meta-analysis considers the role of intentions, desires and self-predictions in the context of the TPB.

### *Subjective norms*

The normative component was the last addition to the TRA (Fishbein & Ajzen, 1975), and several authors have argued that it is the weakest component. For example, Sheppard *et al.* (1988) and Van den Putte's (1991) meta-analyses of the TRA found that the subjective norm component was the weakest predictor of intentions (see also Godin & Kok, 1996). As a result, several authors have deliberately removed subjective norms from analysis (e.g. Sparks, Shepherd, Wieringa, & Zimmermanns, 1995). While these findings could merely reflect the lesser importance of normative factors as determinants of intentions in the behaviours studied, Trafimow and Finlay (1996) suggest that this is unlikely. Across 30 behaviours, they found evidence to suggest a distinction between individuals whose actions are driven primarily by attitudes, and those whose actions are driven primarily by subjective norms.<sup>7</sup> In addition, across several different types of behaviour, variables thought to tap different facets of normative conduct (e.g. descriptive and moral norms) have been found to be independently predictive of intentions (e.g. Beck & Ajzen, 1991; Conner, Martin, Silverdale, & Grogan, 1996; for a review see Conner & Armitage, 1998). The most likely explanation for poor performance of the subjective norm component lies in its measurement: many authors use single item measures, as opposed to more reliable multi-item scales (e.g. Nunnally, 1978). The present meta-analysis therefore considered type of measurement as a moderator of subjective norm-intention correlations.

### *Aims*

The aims of the present meta-analysis were fivefold: (1) to test the overall efficacy of the TPB; (2) to assess the predictive validity of the TPB in relation to observed

<sup>7</sup>See also Prislin and Kovrlja (1992) for an application of the TPB to high- and low self-monitors.



or self-reported behaviour; (3) to consider differences in the conceptualization of intentions, and to assess the evidence for discriminant validity between the constructs; (4) to examine the role of PBC as opposed to self-efficacy or 'perceived control over behaviour', and consider the proposed intention–PBC interaction; and (5) to consider measurement adequacy as a moderator of the subjective norm–intention relationship, given that this construct has been found to be the weakest predictor in both the TRA and TPB.

## Method

### *Selection of studies*

Mullen (1989) presents several useful strategies for the retrieval of studies for meta-analysis. In terms of the present study, the main approaches used were: ancestry and descendancy; abstracting services; on-line computer searches; the 'invisible college'; and browsing. In total, references to 161 journal articles and book chapters testing the TPB (up to the end of 1997) were found.

The decision to include only published articles renders the present meta-analysis susceptible to publication bias. The publication bias refers to the assumption that studies with significant findings are more likely to be submitted for publication. Several studies have examined this phenomenon (e.g. Greenwald, 1975; Rosenthal, 1984; White, 1982), although findings are inconsistent. Related to this, the 'file drawer problem' (Rosenthal, 1979) refers to the possibility that all published articles are the result of Type I errors, whereas all non-published (i.e. file drawer) studies are the remaining 95%. Reliability of the data included in the present study is assessed using Rosenthal's (1984) fail-safe number (the number of studies required to nullify the present findings). All relationships in the present study exceed this tolerance level, unless otherwise stated.

Tables reporting meta-analytic data also include  $\chi^2$  values. These allow assessment of between-study variance (i.e. the variability of (in this case) effect sizes around the mean presented). All  $\chi^2$  values in the present study indicate considerable variability around the mean, indicating that even moderator analysis failed to reduce between-study variance to non-significance. Used in conjunction with Rosenthal's fail-safe number, it is possible to assert that the present findings are robust (i.e. require large numbers of additional studies to overturn them), but are subject to variability around the mean.

### *Characteristics of studies*

The 161 articles contained 185 independent empirical tests of the TPB. Of these, 44 contained prospective self-reported behaviour measures and 19 prospective measures of behaviour that were independently rated or were objective (e.g. taken from records).<sup>8</sup>

*Self-efficacy, PBC and 'perceived control over behaviour'*. The present meta-analysis distinguishes between three types of PBC measure: self-efficacy, PBC and 'perceived control over behaviour'. Congruent with Armitage and Conner (1999a, 1999b), self-efficacy was defined as 'confidence in one's own ability to carry out a particular behaviour'; perceived control over behaviour was defined as 'perceived controllability of behaviour'; and PBC was defined as the perceived ease or difficulty of performing behaviour (Ajzen, 1991), and also included studies that utilized measures of both self-efficacy and perceived control over behaviour in multiple-item scales.

Studies were coded as measuring self-efficacy if they included items such as: 'I believe I have the ability to . . .'; 'To what extent do you see yourself as being capable of . . .'; 'How confident are you

<sup>8</sup>Note that only prospective measures of behaviour were included in the present meta-analysis. This is because a measure of behaviour taken contemporaneously with intention is actually a measure of past behaviour. Measures of past behaviour have been shown to contribute unique variance to the prediction of future behaviour, over and above TPB variables, introducing a possible confound (for reviews, see Conner & Armitage, 1998; Sutton, 1994).

that you will be able to . . .'; and 'If it were entirely up to me, I am confident that I would be able to . . .' ( $N$  of studies = 28). 'Perceived control over behaviour' was coded when items such as 'Whether or not I do  $x$  is entirely up to me', 'How much personal control do you feel you have over . . .', and 'How much do you feel that whether you do  $x$  is beyond your control?' were employed ( $N = 7$ ). Items that assessed perceived ease or difficulty were not included when coding for self-efficacy or 'perceived control over behaviour'. Where studies employed mixed measures (i.e. any combination of the above or 'easy-difficult' items) these were coded as 'PBC' ( $N = 101$ ).

*Desires, intentions and self-predictions.* Desires, intentions and self-predictions were coded according to the criteria discussed in Bagozzi (1992), Fishbein and Stasson (1990), Norman and Smith (1995), Sheppard *et al.* (1988) and Warshaw and Davis (1985). Briefly, 'desire' was coded if studies employed items such as 'I want to perform behaviour  $x$ '; 'self-prediction' was coded for measures such as 'I will perform behaviour  $x$ ' or 'How likely is it that you will perform behaviour  $x$ ?'; and 'intention' was coded for studies that employed only measures such as 'I intend to perform behaviour  $x$ '. Where studies employed some combination of the above, these were coded as 'mixed' measures. We were able to locate 88 studies that used mixed measures of behavioural intentions, 20 with measures of intention, 40 with measures of self-prediction, and six of desire.

*Subjective norms.* Studies were also coded for measurements of the subjective norm component. These fell into six categories: multiple-item scale ( $N = 32$ ), single item ( $N = 52$ ), general social pressure multiplied by motivation to comply ( $N = 14$ ), normative beliefs<sup>9</sup> as direct predictors of intention ( $N = 26$ ), social support ( $N = 1$ ) and unspecified ( $N = 12$ ).

### Analyses

Analyses are based on bivariate correlations: where the appropriate statistics were not reported in the published article, the authors were contacted, and several have generously supplied copies of their correlation matrices. This allowed us to run additional analyses.

For the purpose of analysis,  $r$ s were converted to Fisher  $z$  scores, weighted by sample size ( $N - 3$ ), before a mean Fisher  $z$  was calculated (see Hedges & Olkin, 1985). The weighted mean Fisher  $z$ s were then converted back to  $r$ s, for the purpose of reporting the results.  $R^2$  change values (for effects of PBC controlling for TRA variables) were converted to  $r$ , and combined in the same way as bivariate correlations.

Comparisons between correlation coefficients were conducted using Cohen's (1977)  $q$ s statistic, which evaluates differences in the magnitude of Fisher  $z$ . For samples with unequal  $N$ s, a harmonic mean ( $n'$ ) was used. Note, however, that this only provides an estimate of differences between magnitude of correlation coefficients because the technique ignores dependencies between variables. In the case of the TPB, most of the interesting comparisons involve differences between correlations that hold intention in common.

It has been noted that the meta-analyses of Godin and Kok (1996) and Sheppard *et al.* (1988) can be criticized for analysing groups of participants more than once. For example, in the Sheppard *et al.* (1988) meta-analysis, two groups of participants from Warshaw and Davis (1985) were treated as independent tests of the TRA and included 18 times in the analysis. Clearly, this threatens the validity of meta-analysis. In order to avoid this, where studies examined more than one behaviour with one group of participants (e.g. Madden, Ellen, & Ajzen, 1992), the  $r$ s were converted to Fisher  $z$ s and meta-analysed in their own right before inclusion in the main data set.

Finally, because meta-analytic data tend to be based on large sample sizes, even the smallest correlations are likely to reach statistical significance. Cohen (1992) presents a useful guide to interpreting the magnitude of effect sizes: medium effect sizes are defined as those that approximate the average effect sizes across a variety of fields of research. Small effect sizes are 'noticeably smaller than medium, but not so small as to be trivial'; large effect sizes are 'the same distance above medium

<sup>9</sup>By 'normative beliefs', we are referring to a summed scale derived from the product referent beliefs and motivations to comply.

**Table 1.** Average component relationships for all tests of the TPB

Relationship	N of tests	$R^a$	$R^2$	Fail-safe $N$	$\chi^2$
Multiple correlation (BI + PBC) with behaviour	63	.52	.27	65,347	648***
BI-behaviour correlation	48	.47	.22	26,235	396***
PBC-behaviour correlation	60	.37	.13	27,498	677***
% variance added by PBC to behaviour	66	.14	.02	3815	285***
Multiple correlation (ATT + SN + PBC) with BI	154	.63	.39	986,974	3231***
ATT-BI correlation	115	.49	.24	326,497	1050***
SN-BI correlation	137	.34	.12	201,774	1167***
PBC-BI correlation	144	.43	.18	378,681	2224***
% variance added by PBC to BI	136	.24	.06	89,753	1086***
Behavioural belief-ATT correlation	42	.50	.25	34,201	413***
Normative belief-SN correlation	34	.50	.25	20,794	451***
Control belief-PBC correlation	18	.52	.27	6174	269***

\*\*\* $p < .001$ .

Note. <sup>a</sup>Weighted by sample size; BI = behavioural intention; PBC = perceived behavioural control; ATT = attitude; SN = subjective norm.

as small was below it' (Cohen, 1992, p. 156). These effect size categories equate with correlations of .10 (small), .30 (medium), and .50 (large), and this provides a useful heuristic that acts as a standard of comparison.

## Results

### Overall findings

Average correlations and multiple correlations (all weighted by sample size,  $N - 3$ ) are reported for TPB component relationships in Table 1. For all findings (unless otherwise stated), all fail-safe numbers far exceed Rosenthal's (1984) recommended tolerance level. Across all behaviours, the average multiple correlation of intention and PBC with behaviour is .52, accounting for 27% of the variance ( $R^2 = .27$ ). Overall, PBC adds an average of 2% to prediction of behaviour, over and above intention. Given that Ajzen (1991) argues that for behaviours where there are no problems of volitional control, PBC will contribute nothing to the prediction of behaviour, and this finding supports the usefulness of the PBC construct in predicting behaviour.

The averaging multiple correlation of attitude, subjective norm and PBC with intention is  $R = .63$ , accounting for 39% of the variance ( $R^2 = .39$ ). Not only is the PBC-intention correlation strong ( $r = .43$ ), it independently accounts for 6% of the variance, controlling for attitude and subjective norm. Congruent with several authors, who do not include a subjective norm measure (e.g. Sparks, Shepherd, Wieringa, & Zimmermanns, 1995), the subjective norm-intention correlation is significantly weaker than the other relationships with intention (compared to attitude-intention correlation  $qs = .19$ ,  $p < .01$ ; compared to PBC-intention

**Table 2.** Meta-analysis of self-reported vs. observed behaviour

Relationship	<i>N</i> of tests	<i>R</i> <sup>a</sup>	<i>R</i> <sup>2</sup>	Fail-safe <i>N</i>	$\chi^2$
TPB→Self-reported behaviour	44	.55	.31	37,695	509***
TPB→Observed behaviour	19	.44	.20	3762	86***

\*\*\**p* < .001.

Note. <sup>a</sup>Weighted by sample size; TPB = multiple correlation of intention and PBC.

correlation  $q_s = .11$ ,  $p < .05$ ). Although this does not present sufficient evidence to warrant discarding the construct, it does perhaps indicate that it is the part of the TPB that most requires further study. We return to this issue later.

In addition to these findings, Table 1 also displays the correlations between belief-based and direct measures of attitude, subjective norm and PBC.<sup>10</sup> Congruent with Fishbein and Ajzen's (1975) formulation that behavioural- and normative-belief measures inform attitude and subjective norms respectively, both are strongly correlated with each other (both  $r_s = .50$ ). Moreover, there was support for Ajzen's (1991) expectancy-value basis to control beliefs: these correlated  $r = .52$  with PBC. Perhaps more importantly, all the correlations may be classified as representing 'medium' to 'large' effect sizes (Cohen, 1992).

### *Self-report vs. observed behaviour*

Table 2 presents multiple correlations of intention and PBC, contrasting self-reported and observed behaviour. The TPB accounts for large, highly significant proportions of the variance in prospective measures of both observed ( $R^2 = .20$ ) and self-reported ( $R^2 = .31$ ) behaviour. Although this difference is significant ( $q_s = .14$ ,  $p < .01$ ), it is encouraging that the TPB can account for considerable proportions of the variance in actual behaviour (i.e. a medium-large effect size) and provides further evidence of the efficacy of the model.

### *Behavioural intentions*

Table 3 contrasts the different measures that have been employed to tap behavioural intentions: desires, intentions and self-predictions (see Method for definitions). The multiple correlation of attitude, subjective norm and PBC with desire was significantly stronger than with either intention ( $q_s = .27$ ,  $p < .01$ ), self-prediction ( $q_s = .26$ ,  $p < .01$ ) or the mixed measure ( $q_s = .19$ ,  $p < .05$ ). In addition, the role of PBC differed depending on whether desire, self-prediction or intention was the dependent variable. For self-prediction, PBC contributed an additional 7% of variance over and above attitude and subjective norm. The

<sup>10</sup>All belief-based measures are those which follow the expectancy-value format, in other words summed scales derived from outcome beliefs × evaluations (behavioural beliefs), referent beliefs × motivations to comply (normative beliefs), and facilitatory/inhibitory beliefs × power (control beliefs).

**Table 3.** Meta-analysis of intention vs. desire or self-prediction

Relationship	<i>N</i> of tests	<i>R</i> <sup>a</sup>	<i>R</i> <sup>2</sup>	Fail-safe <i>N</i>	$\chi^2$	% variance added by PBC
'Mixed', PBC→Behaviour	36	.52	.27	28,665	390***	3
Intention, PBC→Behaviour	8	.57	.33	914	58***	1
Self-predictions, PBC→Behaviour	16	.54	.29	5750	246***	2
Desire, PBC→Behaviour	3	.47	.22	105	7*	7
TPB→'Mixed'	88	.64	.42	486,334	2688***	6
TPB→Intention	20	.57	.32	17,239	246***	8
TPB→Self-predictions	40	.58	.34	68,262	401***	7
TPB→Desires	6	.73	.54	1201	21***	2

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

Note. <sup>a</sup>Weighted by sample size; TPB = multiple correlation of attitude, subjective norm and PBC.

corresponding values for desires and intentions were 2% and 8%, respectively. Consonant with predictions, the implication is that the formation of intentions and self-predictions are relatively more contingent on an assessment of perceived behavioural control than are desires.

Consistent with this position, intentions and self-predictions were stronger predictors of behaviour than desires ( $qs = .07, .12$ , respectively; both  $ps < .05$ ) when PBC was included as a predictor. Furthermore, PBC contributed more unique variance to prediction of behaviour when a measure of desire was used ( $R^2_{\text{change}} = .06$ ) than when either intention ( $R^2_{\text{change}} = .01$ ) or self-prediction ( $R^2_{\text{change}} = .02$ ) was included. Thus, PBC is a less important determinant of behaviour when measures of intention or self-prediction are employed.

### Control

Findings relating to the impact of different conceptualizations of control on intention and behaviour are presented in Table 4. Self-efficacy and PBC have a comparable level of correlation with both intention (both  $rs = .44$ ) and behaviour ( $rs = .35$  and  $.40$ , respectively). The corresponding correlations for perceived control over behaviour were significantly weaker, for both behaviour ( $qss = .18$  and  $.24$ ,  $ps < .01$  for comparisons with self-efficacy and PBC, respectively) and intention ( $qss = .24$ ,  $ps < .01$  for both comparisons). Thus, self-efficacy and PBC correlate with intention and behaviour significantly more strongly than perceived control over behaviour.

Controlling for intention, self-efficacy and PBC contribute an additional 2% to explained variance in behaviour. The corresponding value for perceived control over behaviour was .003%, although this must be interpreted with caution, as only two additional studies reporting null results would overturn this finding (i.e. it failed

**Table 4.** Average control–intention and control–behaviour relationships

Relationship	<i>N</i> of tests	<i>r</i> <sup>a</sup>	Fail-safe <i>N</i>	$\chi^2$	% variance added <sup>b</sup>
Self efficacy→Behaviour	13	.35	1092	25*	2
PBC→Behaviour	40	.40	13,904	582***	2
Perceived control over Behaviour→Behaviour	6	.18	69	19***	<1
Self-efficacy→Intention	28	.44	17,113	365***	7
PBC→Intention	101	.44	198,869	1697***	5
Perceived control over Behaviour→Intention	7	.23	174	18**	1

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

Note. <sup>a</sup>Weighted by sample size; <sup>b</sup>% Variance refers to the percentage variance added by the perceived control construct (i.e. self-efficacy, PBC or perceived control over behaviour) to the prediction of intention or behaviour, controlling for other TPB variables (i.e. attitude and subjective norm for prediction of intention; intention for prediction of behaviour). Fail-safe values are calculated separately for these values; note that perceived control over behaviour relationships with intention and behaviour fail to exceed Rosenthal's (1984) acceptable tolerance level.

to achieve Rosenthal's (1984) tolerance level). For prediction of intention, self-efficacy explains an additional 7%, and PBC an additional 5%, of explained variance. Perceived control over behaviour contributed an additional 1%, although only eight additional studies reporting null results would be required to render this finding non-significant.

We were able to locate 19 studies that appropriately tested the intention  $\times$  perceived control (i.e. PBC, self-efficacy or perceived control over behaviour) interaction hypothesis. Of these studies, nine (47%) reported evidence of a significant interaction effect. In each case, higher levels of PBC were associated with stronger intention–behaviour relationships. However, it is difficult to draw firm conclusions from such empirical data because relatively few of the studies employing the TPB actually reported tests of the interaction effect (30%, 19 out of 63). Ajzen (1991, p. 188) suggests that failure to find an effect may be attributable to the fact that linear models provide good accounts of psychological data even when interaction effects are known to be present. Also, if perceived control (i.e. PBC, self-efficacy, perceived control over behaviour) is unrelated to actual control, the extent to which perceived control would moderate intention–behaviour relationships or show a direct link to behaviour is unclear.

### *Subjective norms*

The measurement explanation of the weak predictive power of subjective norms relates to the fact that norms are typically measured by a single item, despite the

**Table 5.** Meta-analysis of single vs. multiple-item measures of subjective norms in regression with intentions

Measure	N of tests	$r^a$	Fail-safe N	$\chi^2$
Multiple items	32	.38	11,403	237***
Single item	52	.28	17,936	270***
Subjective norm $\times$ Motivation to comply	14	.30	1195	45***
Social support	1	.25	[-]	[-]
Normative beliefs	26	.38	9987	213***
Unspecified	12	.45	4095	188***

\*\*\* $p < .001$ .

Note. <sup>a</sup>Weighted by sample size.

potentially low reliability of such measures. From Table 5, multiple-item measures of subjective norm and normative beliefs had significantly stronger correlations with intention than any of the other measures ( $q_s = .09-.15$ , all  $ps < .05$ ). The weak predictive power of the subjective norm component within the TPB may therefore be partially accounted for by weaknesses in measurement.

Although it is perhaps unsurprising that multiple measures of subjective norms are more strongly related to intentions, the impact of normative beliefs on intention should be mediated through the subjective norm component. Equivalent subjective norm–intention and normative belief–intention correlations of .38 and a normative belief–subjective norm correlation of .50 (cf. Table 1) suggest that the two measures closely map onto one another. Subjective norms are posited as global perceptions of social pressure that derive from judgments of social pressure from salient others weighted by the motivation to comply with these groups or individuals. That the two correlate strongly implies that the operationalization of normative beliefs represents an accurate analysis of the process underlying the formation of global perceptions of subjective norm.

## Discussion

The present meta-analysis provides evidence supporting the use of the TPB for predicting intention and behaviour, although the prediction of self-reported behaviour is superior to observed behaviour. Moreover, there is some evidence for discriminant validity between desire, intention and self-prediction, and for a distinction between self-efficacy and perceived control over behaviour. Finally, subjective norm shows a reasonably strong relationship with intention when appropriately measured with multiple-item scales.

### Overall findings

The present meta-analysis of the TPB compares favourably with previous meta-analyses. The present study found  $R = .52$  ( $R^2 = .27$ ) for the multiple correlation of

intention and PBC with behaviour; previous meta-analyses have reported similar findings (range of  $R = .46-.58$ ). Further, congruent with these studies, PBC was found to contribute uniquely to the prediction of behaviour, demonstrating the efficacy of the PBC construct. Similarly, the intention-behaviour correlation from the present meta-analysis is comparable with those of recent meta-analyses devoted to intention-behaviour relations. The intention-behaviour correlation in the present meta-analysis is  $r = .47$ . Randall and Wolff (1994) report a corresponding relationship of .45 (98 studies), while Sheeran and Orbell (1998) reported a mean correlation of .44 (28 studies of condom use).

Further support for the efficacy of the TPB over the TRA is provided by the multiple correlation of attitude, subjective norm and PBC with intention. The findings of the present meta-analysis are comparable with those of previous studies ( $R_s = .64-.71$ ). More importantly, from the present meta-analysis, PBC adds—on average—6% to the prediction of intention, over and above attitude and subjective norm. Therefore, it would appear that PBC influences behaviour directly and indirectly, independent of TRA variables, and therefore represents a useful addition to the TRA.

#### *Self-report vs. objective behaviour*

It is clear that many TPB studies do not employ prospective designs or measure behaviour. Where behaviour is measured, it is typically through self-report. Congruent with Hessing *et al.* (1988), intention and PBC were better predictors of self-reported behaviour than observed behaviour. Clearly this is not a problem specific to the TRA/TPB, but provides indication of the wider debate within social psychology.

Potentially, however, this may simply reflect the fact that measurement correspondence is typically maximized where subjective measures of behaviour are used (cf. Fishbein, 1980). For example, in a study of low-fat diet consumption, Armitage and Conner (1999a) reported a comparable discrepancy between self-reported behaviour (e.g. 'I ate a low-fat diet') and a more objective assessment of behaviour (validated measure of percentage of calories derived from fat). While the difference between the two may represent a subjective-objective distinction, it may also reflect the fact that the subjective measure of behaviour directly mapped onto the prior measure of intention, whereas the objective measure could not. Sutton (1998) has suggested that showing participants the measure of behaviour on which they will later be assessed is one way of circumventing such problems. Researchers should be cognizant of the problems of self-report data and, wherever possible, take accurate multiple measures of actual behaviour.

#### *Desire, intention and self-prediction*

The present study provides some support for work proposing a distinction between intention, desire and self-prediction (e.g. Bagozzi, 1992). TPB variables were most closely associated with desires, although PBC contributed relatively little additional



variance. In turn, desires were the weakest predictors of behaviour, with PBC contributing the most additional variance. PBC contributed most additional variance to the explanation of intention and self-prediction, and contributed least to prediction of behaviour when intention and self-prediction were statistically controlled. These findings can be accounted for by the fact that PBC takes account of factors that may facilitate or inhibit behaviour; under such circumstances, one would expect little difference between intention and self-prediction.

Overall, the present findings provide some support for Bagozzi's (1992) position: intentions and self-predictions were superior predictors of behaviour than desires; attitudes, subjective norm and perceived control (i.e. self-efficacy, PBC or perceived control over behaviour) were the best predictors of desires. Thus, individuals may first translate their attitudes into desires, taking perceptions of social pressure and (to a lesser extent) control into account. However, these desires are weak direct predictors of behaviour, but may instead be mediated by intentions or self-predictions, or may co-determine behaviour with perceived control. Further evidence for this is reported in Bagozzi and Kimmel (1995), who showed that the impact of attitudes on intention was almost entirely mediated by desires. Future work is required to test the proposed causal relationships between these variables.

### *Perceptions of control*

The present meta-analysis found differences between measures of PBC, self-efficacy and perceived control over behaviour. Self-efficacy and PBC were significantly more strongly correlated with both intention and behaviour than was perceived control over behaviour. Congruent with this, analysis of the proportion of additional variance explained indicated that the findings for perceived control over behaviour were both weak and unreliable. In general, self-efficacy accounted for the most additional variance in intention, and both PBC and self-efficacy accounted for equivalent proportions of variance in behaviour. The implication is that individuals form intentions that they are confident they can enact (i.e. those they perceive self-efficacy over), and that translation of intention into action may be facilitated both by self-efficacy and an assessment of more external factors tapped by PBC.

The analyses concerning the proportion of additional explained variance contributed by perceived control over behaviour were shown to be unreliable: more studies are required that more fully investigate this construct. Indeed, the possibility exists that the predicted differential effects of self-efficacy and perceived control over behaviour may vary as a function of behaviour studied (see Armitage & Conner, 1999a, 1999b; Manstead & van Eekelen, 1998). However, where the data were reliable, perceived control over behaviour was significantly more weakly related to intention and behaviour. The findings also suggest that self-efficacy and PBC are both useful predictors of intention and behaviour. While there is no clear evidence for which is to be preferred, self-efficacy is more clearly defined and operationalized than is PBC (cf. Bandura, 1997), which consists of 'mixed measures' (see Method). Moreover, while self-efficacy and PBC account for equivalent proportions of the variance in behaviour, self-efficacy explains somewhat more of the variance in intention than does PBC. The implication is that

self-efficacy should be the preferred measure of 'perceived control' within the TPB, but further research is required that more fully evaluates the impact of different operationalizations of perceived control on intention and behaviour.

In addition, researchers have paid relatively little attention to precisely what PBC is tapping: up to the end of 1997, only 18 published studies reported control belief–PBC relationships. Given the role of PBC as a powerful determinant of both intention and behaviour, further exploration of both the nature and antecedents of the PBC construct is clearly required. For example, a recent study by Armitage and Conner (1999a) provides some evidence to suggest that control beliefs (as conceptualized by Ajzen, 1991) are the antecedents of self-efficacy, but correlate only weakly with perceived control over behaviour.

### *Subjective norms*

Several researchers have argued that the subjective norm component of the TPB is inadequate and rarely predicts intention, and so have removed it from analysis (e.g. Sparks, Shepherd, Wieringa, & Zimmermanns, 1995). The present meta-analysis provides some support for this view: subjective norm was the TPB component most weakly related to intention. However, when type of measure was used as a moderator, the poor performance of the subjective norm component was shown to be a function of measurement. Clearly, this component requires further empirical attention, and the present study points to measurement as its principal weakness, given that the majority of TPB studies have used single-item measures. Beyond this, a number of authors have argued that the way in which norms are conceptualized within the TRA/TPB framework fails to tap important facets of social influence (e.g. Conner & Armitage, 1998; Terry, Hogg, & White, 1999).

Some researchers have suggested a reconceptualization of the mechanism by which normative pressure is exerted. Trafimow and Finlay (1996) have argued that the weakness in the subjective norm component stems from a minority of individuals whose actions are driven primarily by perceived social pressure. Although they provide some evidence to support this view (see also DeBono & Snyder, 1995), it seems unlikely that the majority of people's behaviour is unaffected by social pressure. There is also evidence to suggest that alternative conceptualizations of norms exert independent effects on intentions, controlling for subjective norms.

Subjective norm is operationalized as a global perception of social pressure either to comply with the wishes of others or not (Ajzen, 1991). However, social pressure is rarely so direct or explicit, leading a number of researchers to suggest alternative conceptualizations. For example, Terry and colleagues (e.g. Terry & Hogg, 1996; Terry *et al.*, 1999; Terry, Hogg, & White, 2000; White *et al.*, 1994) have drawn on Self-categorization and Social Identity Theories (see Hogg & Abrams, 1988; Turner, 1985). Specifically, Terry and colleagues have shown that identification with a behaviourally relevant group moderates the effects of group norm on intention (Terry & Hogg, 1996). In addition, they present some evidence to support a distinction between group- and subjective-norms (Terry *et al.*, 1999; cf. Deutsch and Gerard's (1995) distinction between informational and normative influence).

Related work has investigated a number of different types of norm. Cialdini, Kallgren, and Reno (1991) distinguish between personal, descriptive and injunctive norms. Injunctive norms map onto subjective norms. Personal norms have been operationalized as either self-identity or moral norms (see Conner & Armitage, 1998). A number of studies have shown that self-identity explains additional proportions of the variance in intentions over and above TPB variables (e.g. Armitage & Conner, 1999a, 1999b; Sparks & Shepherd, 1992; for a review, see Conner & Armitage, 1998). There is also evidence to support the inclusion of moral (e.g. Beck & Ajzen, 1991; Conner & Armitage, 1998) and descriptive (e.g. Conner *et al.*, 1996) norms within the TPB. Further research is required to test the sufficiency of such additional variables by testing them against adequate measures of subjective norm.

### Conclusions

The present meta-analysis provides support for the efficacy of the TPB as a predictor of intentions and behaviour. Although prediction is superior for self-reported than observed behaviour, the TPB is still capable of explaining 20% of the variance in prospective measures of actual behaviour (i.e. a medium to large effect size). The present findings therefore corroborate those of previous TPB meta-analyses, as well as expanding on some of the theoretical debate surrounding the model. The present study showed that PBC independently predicted intentions and behaviour in a wide number of domains. There was also evidence to suggest that measures of intention, self-prediction and desires possess discriminant validity, although only relatively weak evidence for the proposed self-efficacy–perceived control over behaviour distinction. Finally, work on additional normative variables (e.g. moral or descriptive norms) may increase the predictive power of the normative component of the model.

### References

*Note:* References marked with \* indicate TPB studies used in the meta-analysis

- Ajzen, I. (1985). From intentions to action: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action control: From cognitions to behaviors* (pp. 11–39). New York: Springer.
- Ajzen, I. (1988). *Attitudes, personality and behavior*. Milton Keynes: Open University Press.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211.
- \*Ajzen, I., & Driver, B. L. (1992). Application of the theory of planned behavior to leisure choice. *Journal of Leisure Research*, 24, 207–224.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- \*Ajzen, I., & Madden, T. J. (1986). Prediction of goal directed behavior: Attitudes, intentions and perceived behavioral control. *Journal of Experimental Social Psychology*, 22, 453–474.
- Armitage, C. J., & Conner, M. (1999a). The theory of planned behaviour: Assessment of predictive validity and ‘perceived control’. *British Journal of Social Psychology*, 38, 35–54.
- Armitage, C. J., & Conner, M. (1999b). Distinguishing perceptions of control from self-efficacy: Predicting consumption of a low fat diet using the theory of planned behavior. *Journal of Applied Social Psychology*, 29, 72–90.

- Armitage, C. J., & Conner, M. (1999c). Predictive validity of the theory of planned behaviour: The role of questionnaire format and social desirability. *Journal of Community and Applied Social Psychology, 9*, 261–272.
- Armitage, C. J., & Conner, M. (2000). Social cognition models and health behaviour: A structured review. *Psychology and Health, 15*, 173–189.
- \*Arnscheid, R., & Schomers, P. (1996). Attitude and performance in groups: A test of the theory of planned behavior on basketball players. *Zeitschrift für Sozialpsychologie, 27*, 61–69.
- \*Atsalakis, M., & Sleaf, M. (1996). Registration of children in a physical activity program: An application of the theory of planned behavior. *Pediatric Exercise Science, 8*, 166–176.
- \*Babrow, A. S., Black, D. R., & Tiffany, S. T. (1990). Beliefs, attitudes, intentions, and a smoking-cessation program: A planned behavior analysis of communication campaign development. *Health Communication, 2*, 145–163.
- Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions and behavior. *Social Psychology Quarterly, 55*, 178–204.
- \*Bagozzi, R. P., & Kimmel, S. K. (1995). A comparison of leading theories for the prediction of goal-directed behaviours. *British Journal of Social Psychology, 34*, 437–461.
- \*Bakker, A. B., Buunk, B. P., & Siero, F. W. (1993). Condoomgebruik door heteroseksuelen. Een vergelijking van de theorie van gepland gedrag, het health belief model en de protectie-motivatietheorie [Condom use among heterosexuals: A comparison of the theory of planned behaviour, the health belief model and protection motivation theory]. *Gedrag and Gezondheid Tijdschrift voor Psychologie and Gezondheid, 21*, 238–254.
- \*Bamberg, S. (1995). When does the car-user change to the bus? Problems and results of an application of the theory of planned behavior in the context of practical traffic planning. *Zeitschrift für Sozialpsychologie, 26*, 243–262.
- \*Bamberg, S. (1996). General or specific attitudes in explaining ecological responsible behavior? An enlargement of the theory of planned behavior by the concept 'attitudes towards objects'. *Zeitschrift für Sozialpsychologie, 27*, 47–60.
- \*Bamberg, S., & Lüdemann, C. (1996). An empirical test of the theory of planned behavior in two choice situations with two behavioral alternatives: Bike versus car and container versus garbage can. *Zeitschrift für Sozialpsychologie, 27*, 32–46.
- \*Bamberg, S., & Schmidt, P. (1993). Choosing between means of transportation—an application of the theory of planned behavior. *Zeitschrift für Sozialpsychologie, 24*, 25–37.
- \*Bamberg, S., & Schmidt, P. (1997). Theory-driven evaluation of an environmental policy measure: Using the theory of planned behavior. *Zeitschrift für Sozialpsychologie, 28*, 280–297.
- Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1992). On rectifying the comparative anatomy of perceived control: Comments on 'Cognates of personal control'. *Applied and Preventive Psychology, 1*, 121–126.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman & Co.
- Baron, R. M. & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.
- \*Basen-Engquist, K., & Parcel, G. S. (1992). Attitudes, norms, and self-efficacy: A model of adolescents' HIV-related sexual risk behavior. *Health Education Quarterly, 19*, 263–277.
- \*Beale, D. A., & Manstead, A. S. R. (1991). Predicting mothers' intentions to limit frequency of infants' sugar intake: Testing the theory of planned behavior. *Journal of Applied Social Psychology, 21*, 409–431.
- \*Beck, L., & Ajzen, I. (1991). Predicting dishonest actions using the theory of planned behavior. *Journal of Research in Personality, 25*, 285–301.
- \*Biddle, S., Goudas, M., & Page, A. (1994). Social-psychological predictors of self-reported actual and intended physical activity in a university workforce sample. *British Journal of Sports Medicine, 28*, 160–163.
- \*Black, D. R., & Babrow, A. S. (1991). Identification of campaign recruitment strategies for a stepped smoking cessation intervention for a college campus. *Health Education Quarterly, 18*, 235–247.

- Blue, C. L. (1995). The predictive capacity of the theory of reasoned action and the theory of planned behavior in exercise research: An integrated literature review. *Research in Nursing and Health, 18*, 105–121.
- \*Boissoneault, E., & Godin, G. (1990). The prediction of intention to smoke only in designated work site areas. *Journal of Occupational Medicine, 32*, 621–624.
- \*Boldero, J. (1995). The prediction of household recycling of newspapers: The role of attitudes, intentions, and situational factors. *Journal of Applied Social Psychology, 25*, 440–462.
- \*Borgida, E., Conner, C., & Manteufel, L. (1992). Understanding living kidney donation: A behavioural decision perspective. In S. Spacapan & S. Oskamp (Eds.), *Helping and being helped: Naturalistic studies* (pp. 183–211). Newbury Park, CA: Sage.
- \*Borland, R., Owen, N., Hill, D., & Schofield, P. (1991). Predicting attempts and sustained cessation of smoking after the introduction of workplace smoking bans. *Health Psychology, 10*, 336–342.
- \*Boudreau, F., Godin, G., Pineau, R., & Bradet, R. (1995). Health risk appraisal in an occupational setting and its impact on exercise behavior. *Journal of Occupational and Environmental Medicine, 37*, 1145–1150.
- \*Brubaker, R. G., & Fowler, C. (1990). Encouraging college males to perform testicular self-examination: Evaluation of a persuasive message based on the revised theory of reasoned action. *Journal of Applied Social Psychology, 20*, 1411–1422.
- \*Brubaker, R. G., & Wickersham, D. (1990). Encouraging the practice of testicular self-examination: A field application of the theory of reasoned action. *Health Psychology, 9*, 154–163.
- \*Brug, J., Lechner, L., & de Vries, H. (1995). Psychosocial determinants of fruit and vegetable consumption. *Appetite, 25*, 285–296.
- \*Burak, L. J. (1994). Examination and prediction of elementary school teachers' intentions to teach HIV/AIDS education. *AIDS Education and Prevention, 6*, 310–321.
- \*Carvajal, S. C., Photiades, J. R., Evans, R. I., & Nash, S. G. (1997). Relating a social influence model to the role of acculturation in substance use among latino adolescents. *Journal of Applied Social Psychology, 27*, 1617–1628.
- \*Chan, D.-K., & Fishbein, M. (1993). Determinants of college women's intentions to tell their partners to use condoms. *Journal of Applied Social Psychology, 23*, 1455–1470.
- Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 24, pp. 201–234). New York: Academic Press.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences*. New York: Academic Press.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155–159.
- \*Collette, M., Godin, G., Bradet, R., & Gionet, N. J. (1994). Active living in communities: Understanding the intention to take up physical activity as an everyday way of life. *Canadian Journal of Public Health, 85*, 418–421.
- Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology, 28*, 1429–1464.
- \*Conner, M., & Graham, S. (1994). Situational and attitudinal influences upon students' intentions to use condoms. In H. Schroder, K. Reschke, M. Johnston, & S. Maes (Eds.), *Health psychology: Potential in diversity* (pp. 91–100). Regensburg: Verlag.
- \*Conner, M., Martin, E., Silverdale, N., & Grogan, S. (1996). Dieting in adolescence: An application of the theory of planned behaviour. *British Journal of Health Psychology, 1*, 315–325.
- \*Conner, M., & Norman, P. (1994). Comparing the health belief model and the theory of planned behaviour in health screening. In D. R. Rutter & L. Quine (Eds.), *Social psychology and health: European perspectives* (pp. 1–24). Aldershot: Avebury.
- Conner, M., & Norman, P. (Eds.) (1996a). *Predicting health behaviour*. Buckingham: Open University Press.
- \*Conner, M., & Norman, P. (1996b). Body weight and shape control: Examining component behaviours. *Appetite, 27*, 135–150.
- \*Conner, M., & Sherlock, K. (1994). Attitudes and ecstasy use. *Multidisciplinary Association for Psychedelic Studies, 4*, 18–19.

- Conner, M., & Sparks, P. (1996). The theory of planned behaviour and health behaviours. In M. Conner & P. Norman (Eds.), *Predicting health behaviour* (pp. 121–162). Buckingham: Open University Press.
- \*Corby, N. H., Schneider Jamner, M., & Wolitski, R. J. (1996). Using the theory of planned behavior to predict intention to use condoms among male and female injecting drug users. *Journal of Applied Social Psychology, 26*, 52–75.
- \*Courneya, K. S. (1995). Understanding readiness for regular physical activity in older individuals: An application of the theory of planned behavior. *Health Psychology, 14*, 80–87.
- \*Courneya, K. S. & Friedenreich, C. M. (1997). Determinants of exercise during colorectal cancer treatment: An application of the theory of planned behavior. *Oncology Nursing Forum, 24*, 1715–1723.
- \*Courneya, K. S., & McAuley, E. (1994). Are there different determinants of the frequency, intensity, and duration of physical activity? *Behavioral Medicine, 20*, 84–90.
- \*Courneya, K. S., & McAuley, E. (1995). Cognitive mediators of the social influence–exercise adherence relationship: A test of the theory of planned behavior. *Journal of Behavioral Medicine, 18*, 499–515.
- \*Craig, S., Goldberg, J., & Dietz, W. H. (1996). Psychosocial correlates of physical activity among fifth and eighth graders. *Preventive Medicine, 25*, 506–513.
- \*Crawley, F. E. (1990). Intentions of science teachers to use investigative teaching methods: A test of the theory of planned behavior. *Journal of Research in Science Teaching, 27*, 685–697.
- \*Crawley, F. E., & Black, C. B. (1992). Causal modeling of secondary science students' intentions to enrol in physics. *Journal of Research in Science Teaching, 29*, 585–599.
- \*Crawley, F. E., & Koballa, T. R. (1992). Hispanic-American students' attitudes toward enrolling in high school chemistry—a study of planned behavior and belief-based change. *Hispanic Journal of Behavioral Sciences, 14*, 469–486.
- Crowne, D., & Marlowe, D. (1964). *The approval motive*. New York: Wiley.
- DeBono, K. G., & Snyder, M. (1995). Acting on one's attitudes: The role of history of choosing situations. *Personality and Social Psychology Bulletin, 21*, 629–636.
- \*Dennison, C. M., & Shepherd, R. (1995). Adolescent food choice: An application of the theory of planned behaviour. *Journal of Human Nutrition and Dietetics, 8*, 9–23.
- \*Desroches, J. J.-Y., & Chebat, J.-C. (1995). Pourquoi les entrepreneurs québécois vont sur le marché boursier: Attitudes et facteurs de décision. [Why Quebec businesses go public: Attitudes and the decision-making process]. *Revue Canadienne des Sciences de l'Administration, 12*, 27–37.
- Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *Journal of Abnormal and Social Psychology, 51*, 629–636.
- \*de Vellis, B. M., Blalock, S. J., & Sandler, R. S. (1990). Predicting participation in cancer screening: The role of perceived behavioral control. *Journal of Applied Social Psychology, 20*, 639–660.
- \*de Vries, H., Backbier, E., Kok, G., & Dijkstra, M. (1995). The impact of social influences in the context of attitude, self-efficacy, intention and previous behavior as predictors of smoking onset. *Journal of Applied Social Psychology, 25*, 237–257.
- \*de Vries, H., Dijkstra, M., & Kuhlman, P. (1988). Self-efficacy: The third factor besides attitude and subjective norm as a predictor of behavioural intentions. *Health Education Research, 3*, 273–282.
- \*Dilorio, C. (1997). Neuroscience nurses' intentions to care for persons with HIV/AIDS. *Journal of Neuroscience Nursing, 29*, 50–55.
- \*Doll, J., & Ajzen, I. (1992). Accessibility and stability of predictors in the theory of planned behavior. *Journal of Personality and Social Psychology, 63*, 754–765.
- \*Doll, J., Mentz, M., & Orth, B. (1991). Zur vorhersage zielgerichteten handelns: Einstellung, subjektive handlungskompetenz und emotionen. [The production of goal-directed behaviour: Attitude, subjective estimations of competence, and emotions]. *Zeitschrift für Experimentelle und Angewandte Psychologie, 38*, 539–559.
- \*Dzewaltowski, D. A., Noble, J. M., & Shaw, J. M. (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.
- \*East, R. (1993). Investment decisions and the theory of planned behaviour. *Journal of Economic Psychology, 14*, 337–375.

- \*East, R. (1996). Redress seeking as planned behavior. *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, 9, 27–34.
- Fishbein, M. (1980). A theory of reasoned action: Some applications and implications. In H. E. Howe Jr. & M. M. Page (Eds.), *Nebraska symposium on motivation* (Vol. 27, pp. 65–116). Lincoln: University of Nebraska Press.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- \*Fishbein, M., & Stasson, M. (1990). The role of desires, self-predictions, and perceived control in the prediction of training session attendance. *Journal of Applied Social Psychology*, 20, 173–198.
- \*Flynn, B. S., Dana, G. S., Goldstein, A. O., Bauman, K. E., Cohen, J. E., Gottlieb, N. H., Solomon, L. J., & Munger, M. C. (1997). State legislators' intentions to vote and subsequent votes on tobacco control legislation. *Health Psychology*, 16, 401–404.
- Gaes, G. G., Kalle, R. J., & Tedeschi, J. I. (1978). Impression management in the forced compliance situation: Two studies using the bogus pipeline. *Journal of Experimental Social Psychology*, 9, 491–501.
- \*Gatch, C. L., & Kendzierski, D. (1990). Predicting exercise intentions: The theory of planned behavior. *Research Quarterly for Exercise and Sport*, 61, 100–102.
- \*Giles, M., & Cairns, E. (1995). Blood donation and Ajzen's theory of planned behaviour: An examination of perceived behavioural control. *British Journal of Social Psychology*, 34, 173–188.
- 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. (1996). Le non-usage du tabac (Non-use of tobacco). *Alcoolologie*, 18, 237–242.
- \*Godin, G., Fortin, C., Mahnes, G., Boyer, R., Nadeau, D., Duval, B., Bradet, R., & Hounsa, A. (1993). University students' intention to seek medical care promptly if symptoms of sexually transmitted diseases were suspected. *Sexually Transmitted Diseases*, 20, 100–104.
- \*Godin, G., Fortin, C., Michaud, F., Bradet, R., & Kok, G. (1997). Use of condoms: Intention and behaviour of adolescents living in juvenile rehabilitation centres. *Health Education Research*, 12, 289–300.
- \*Godin, G., & Gionet, N. J. (1991). Determinants of an intention to exercise of an electric power commission's employees. *Ergonomics*, 34, 1221–1230.
- Godin, G., & Kok, G. (1996). The theory of planned behavior: A review of its applications to health-related behaviors. *American Journal of Health Promotion*, 11, 87–98.
- \*Godin, G., & Lepage, L. (1988). Understanding the intentions of pregnant nullipara to not smoke cigarettes after child birth. *Journal of Drug Education*, 18, 115–124.
- \*Godin, G., Maticka-Tyndale, E., Adrien, A., Manson-Singer, S., Willms, D., & Cappon, P. (1996). Cross-cultural testing of three social cognitive theories: An application to condom use. *Journal of Applied Social Psychology*, 26, 1556–1586.
- \*Godin, G., Savard, J., Kok, G., Fortin, C., & Boyer, R. (1996). HIV seropositive gay men: Understanding adoption of safe sexual practices. *AIDS Education and Prevention*, 8, 529–545.
- \*Godin, G., Valois, P., Jobin, J., & Ross, A. (1991). Prediction of intention to exercise of individuals who have suffered from coronary heart disease. *Journal of Clinical Psychology*, 47, 762–772.
- \*Godin, G., Valois, P., & 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.
- \*Godin, G., Valois, P., Lepage, L., & Desharnais, R. (1992). Predictors of smoking behaviour—an application of Ajzen's theory of planned behaviour. *British Journal of Addiction*, 87, 1335–1343.
- \*Godin, G., Vezina, L., & Leclerc, O. (1989). Factors influencing intentions of pregnant women to exercise after giving birth. *Public Health Reports*, 104, 188–195.
- Greenwald, A. G. (1975). Consequences of prejudice against the null hypothesis. *Psychological Bulletin*, 82, 1–20.
- \*Gummesson, L., Jonsson, I., & Conner, M. (1997). Predicting intentions and behaviour of Swedish 10–16-year olds at breakfast. *Food Quality and Preference*, 8, 297–306.
- \*Hamid, P. N., & Cheng, S.-T. (1995). Predicting antipollution behavior. The role of molar behavioral intentions, past behavior, and locus of control. *Environment and Behavior*, 27, 679–698.

- \*Haney, J. J., Czerniak, C. M., & Lumpe, A. T. (1996). Teacher beliefs and intentions regarding the implementation of science education reform strands. *Journal of Research in Science Teaching*, *33*, 971–993.
- \*Hanson, M. J. S. (1997). The theory of planned behavior applied to cigarette smoking in African-American, Puerto Rican, and non-Hispanic white teenage females. *Nursing Research*, *46*, 155–162.
- \*Harrison, D. A. (1995). Volunteer motivation and attendance decisions: Competitive theory testing in multiple samples from a homeless shelter. *Journal of Applied Psychology*, *80*, 371–385.
- Hausenblas, H. A., Carron, A. V., & 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.
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. San Diego, CA: Academic Press.
- Hessing, D. J., Elffers, H., & Weigel, R. H. (1988). Exploring the limits of self-reports and reasoned action: An investigation of the psychology of tax evasion behavior. *Journal of Personality and Social Psychology*, *54*, 405–413.
- \*Hill, M., Mann, L., & Wearing, A. J. (1996). The effects of attitude, subjective norm and self-efficacy on intention to benchmark: A comparison between managers with experience and no experience in benchmarking. *Journal of Organizational Behavior*, *17*, 313–327.
- \*Hillhouse, J. J., Adler, C. M., Drinnon, J., & Turriss, R. (1997). Application of Ajzen's theory of planned behavior to predict sunbathing, tanning salon use, and sunscreen use intentions and behaviors. *Journal of Behavioral Medicine*, *20*, 365–378.
- \*Hinsz, V. B., & Nelson, L. C. (1990). Testing models of turnover intentions with university faculty. *Journal of Applied Social Psychology*, *20*, 68–84.
- Hogg, M. A., & Abrams, D. (1988). *Social identifications: A social psychology of intergroup relations and group processes*. London: Routledge.
- \*Horne, T. E. (1994). Predictors of physical activity intentions and behavior for rural homemakers. *Canadian Journal of Public Health*, *85*, 132–135.
- \*Hounsa, A. M., Godin, G., Alihonou, E., & Valois, P. (1993). An application of Ajzen's theory of planned behaviour to predict mothers' intention to use oral rehydration therapy in a rural area of Benin. *Social Science and Medicine*, *37*, 253–261.
- \*Jemmott, J. B., Jemmott, L. S., & Hacker, C. I. (1992). Predicting intentions to use condoms among African-American adolescents: The theory of planned behavior as a model of HIV risk-associated behavior. *Ethnicity and Disease*, *2*, 371–380.
- Jonas, K., & Doll, J. (1996). A critical evaluation of the theory of reasoned action and the theory of planned behavior. *Zeitschrift für Sozialpsychologie*, *27*, 18–31.
- \*Kelly, C., & Breinlinger, S. (1995). Attitudes, intentions and behavior: A study of women's participation in collective action. *Journal of Applied Social Psychology*, *25*, 1431–1446.
- \*Kimiecik, J. (1992). Predicting vigorous physical activity of corporate employees: Comparing the theories of reasoned action and planned behavior. *Journal of Sport and Exercise Psychology*, *14*, 192–206.
- \*Kinket, B., Paans, L., & Verplanken, B. (1992). Patient education by general practitioners: Application of the theory of planned behavior. *Gedrag and Gezondheid Tijdschrift voor Psychologie and Gezondheid*, *20*, 187–195.
- \*Klobas, J. E. (1995). Beyond information quality: Fitness for purpose and electronic information resource use. *Journal of Information Science*, *21*, 95–114.
- \*Kolvereid, L. (1996). Prediction of employment status choice intentions. *Entrepreneurship Theory and Practice*, *21*, 47–57.
- \*Kurland, N. B. (1995). Ethical intentions and the theories of reasoned action and planned behavior. *Journal of Applied Social Psychology*, *25*, 297–313.
- \*Kurland, N. B. (1996). Sales agents and clients: Ethics, incentives, and a modified theory of planned behavior. *Human Relations*, *49*, 51–74.
- Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology*, *32*, 311–328.
- \*Lavoie, M., & Godin, G. (1991). Correlates of intention to use condoms among auto mechanic students. *Health Education Research*, *6*, 313–316.



- \*Lay, C. H., & Burns, P. (1991). Intentions and behavior in studying for an examination: The role of trait procrastination and its interaction with optimism. *Journal of Social Behavior and Personality, 6*, 605–617.
- \*Lechner, L., & de Vries, H. (1995). Starting participation in an employee fitness program: Attitudes, social influence and self-efficacy. *Preventive Medicine, 24*, 627–633.
- Lerner, M. J. (1977). The justice motive: Some hypotheses as to its origins and forms. *Journal of Personality, 45*, 1–52.
- \*Lloyd, H. M., Paisley, C. M., & Mela, D. J. (1993). Changing to a low fat diet: Attitudes and beliefs of UK consumers. *European Journal of Clinical Nutrition, 47*, 361–373.
- \*McCaul, K. D., O'Neill, H. K., & Glasgow, R. E. (1988). Predicting the performance of dental hygiene behaviors: An examination of the Fishbein and Ajzen model and self-efficacy expectations. *Journal of Applied Social Psychology, 18*, 114–128.
- \*McCaul, K. D., Sandgren, A. K., O'Neill, H. K., & Hinsz, V. B. (1993). The value of the theory of planned behavior, perceived control, and self-efficacy expectations for predicting health-protective behaviors. *Basic and Applied Social Psychology, 14*, 231–252.
- \*Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. *Personality and Social Psychology Bulletin, 18*, 3–9.
- \*Maher, R. A., & Rickwood, D. (1997). The theory of planned behavior, domain specific self-efficacy and adolescent smoking. *Journal of Child and Substance Abuse, 6*, 57–76.
- Manstead, A. S. R., & Parker, D. (1995). Evaluating and extending the theory of planned behaviour. In W. Stroebe & M. Hewstone (Eds.), *European Review of Social Psychology* (Vol. 6, pp. 69–95). Chichester: Wiley.
- Manstead, A. S. R., & van Eekelen, S. A. M. (1998). Distinguishing between perceived behavioral control and self-efficacy in the domain of academic achievement intentions and behavior. *Journal of Applied Social Psychology, 28*, 1375–1392.
- \*Marcoux, B. C., & Shope, J. T. (1997). Application of the theory of planned behavior to adolescent use and misuse of alcohol. *Health Education Research, 12*, 323–331.
- \*Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research, 2*, 173–191.
- \*Millstein, S. G. (1996). Utility of the theories of reasoned action and planned behavior for predicting physician behavior: A prospective analysis. *Health Psychology, 15*, 398–402.
- \*Montano, D. E., & Taplin, S. H. (1991). A test of an expanded theory of reasoned action to predict mammography participation. *Social Science and Medicine, 32*, 733–741.
- \*Morojele, N. K., & Stephenson, G. M. (1994). Addictive behaviours: Predictors of abstinence intentions and expectations in the theory of planned behaviour. In D. R. Rutter & L. Quine (Eds.), *Social psychology and health: European perspectives* (pp. 47–70). Aldershot: Avebury.
- \*Morrison, D. M., Rogers-Gillmore, M., & Baker, S. A. (1995). Determinants of condom use among high-risk heterosexual adults: A test of the theory of reasoned action. *Journal of Applied Social Psychology, 25*, 651–676.
- Mullen, B. (1989). *Advanced BASIC meta-analysis*. Hillsdale, NJ: Erlbaum.
- \*Murphy, W. G., & Brubaker, R. G. (1990). Effects of a brief theory-based intervention on the practice of testicular self-examination by high school males. *Journal of School Health, 60*, 459–462.
- \*Nash, R., Edwards, H., & Nebauer, M. (1993). Effects of attitudes, subjective norms and perceived control on nurses' intention to assess patients' pain. *Journal of Advanced Nursing, 18*, 941–947.
- \*Netemeyer, R. G., Andrews, J. C., & Durvasula, S. (1993). A comparison of three behavioral intention models: The case of Valentine's day gift-giving. *Advances in Consumer Research, 20*, 135–141.
- \*Netemeyer, R. G., & Burton, S. (1990). Examining the relationship between voting behavior, intention, perceived behavioral control and expectation. *Journal of Applied Social Psychology, 20*, 661–680.
- \*Netemeyer, R. G., Burton, S., & Johnston, M. (1991). A comparison of two models for the prediction of volitional and goal-directed behaviors: A confirmatory analysis approach. *Social Psychology Quarterly, 54*, 87–100.
- \*Nguyen, M. N., Otis, J., & Porvin, L. (1996). Determinants of intention to adopt a low-fat diet in men 30 to 60 years old: Implications for heart health promotions. *American Journal of Health Promotion, 10*, 201–207.

- \*Nguyen, M. N., Potvin, L., & Otis, J. (1997). Regular exercise in 30- to 60-year-old men: Combining the stages-of-change model and the theory of planned behaviour to identify determinants for targeting heart health interventions. *Journal of Community Health, 22*, 233–246.
- \*Norman, P., & Bonnett, C. (1995). Managers' intentions to be assessed for national vocational qualifications: An application of the theory of planned behavior. *Social Behavior and Personality, 23*, 59–68.
- \*Norman, P., & Conner, M. (1996). Predicting health-check attendance among prior attenders and non-attenders: The role of prior behavior in the theory of planned behavior. *Journal of Applied Social Psychology, 26*, 1010–1026.
- \*Norman, P., & Smith, L. (1995). The theory of planned behaviour and exercise: An investigation into the role of prior behaviour, behavioural intentions and attitude variability. *European Journal of Social Psychology, 25*, 403–415.
- \*Norwich, B., & Duncan, J. (1990). Attitudes, subjective norm, perceived preventive factors, intentions and learning science: Testing a modified theory of reasoned action. *British Journal of Educational Psychology, 60*, 312–321.
- \*Norwich, B., & Rovoli, I. (1993). Affective factors and learning behaviour in secondary school mathematics and English lessons for average and low attainers. *British Journal of Educational Psychology, 63*, 308–321.
- \*Nucifora, J., Gallois, C., & Kashima, Y. (1993). Influences on condom use among undergraduates: Testing the theories of reasoned action and planned behaviour. In D. J. Terry, C. Gallois, & M. McCamish (Eds.), *The theory of reasoned action: Its application to AIDS-preventive behaviour* (pp. 47–64). Oxford: Pergamon.
- Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.
- \*O'Callaghan, F. V., Chant, D. C., Callan, V. J., & Baglioni, A. (1997). Modes of alcohol use by young adults: An examination of various attitude-behavior theories. *Journal of Studies of Alcohol, 58*, 502–507.
- Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual Review of Psychology, 44*, 117–154.
- \*Orbell, S., Hodgkins, S., & Sheeran, P. (1997). Implementation intentions and the theory of planned behavior. *Personality and Social Psychology Bulletin, 23*, 945–954.
- \*Øygard, L., & Rise, J. (1996). Predicting the intention to eat healthier food among young adults. *Health Education Research, 11*, 453–461.
- \*Parker, D., Manstead, A. S. R., & Stradling, S. G. (1995). Extending the theory of planned behaviour: The role of personal norm. *British Journal of Social Psychology, 34*, 127–137.
- \*Parker, D., Manstead, A. S. R., Stradling, S. G., Reason, J. T., & Baxter, J. S. (1992). Intention to commit driving violations—an application of the theory of planned behavior. *Journal of Applied Psychology, 77*, 94–101.
- \*Pellino, T. A. (1997). Relationships between patient attitudes, subjective norms, perceived control, and analgesic use following elective orthopedic surgery. *Research in Nursing and Health, 20*, 97–105.
- \*Plies, K., & Schmidt, P. (1996). Intention = behavior? A representative panel-study to test the theory of planned behavior in the context of AIDS prevention. *Zeitschrift für Sozialpsychologie, 27*, 70–80.
- \*Prislin, R. (1993). Effect of direct experience on the relative importance of attitudes, subjective norms and perceived behavioral control for the prediction of intentions and behavior. *Psychology, 30*, 51–58.
- \*Prislin, R., & Kovrlja, N. (1992). Predicting behavior of high and low self-monitors—an application of the theory of planned behavior. *Psychological Reports, 70*, 1131–1138.
- \*Quine, L., & Rubin, R. (1997). Attitude, subjective norm and perceived behavioural control as predictors of women's intentions to take hormone replacement therapy. *British Journal of Health Psychology, 2*, 199–216.
- \*Raats, M. M., Shepherd, R., & Sparks, P. (1995). Including moral dimensions of choice within the structure of the theory of planned behavior. *Journal of Applied Social Psychology, 25*, 484–494.
- \*Randall, D. M., & Gibson, A. M. (1991). Ethical decision making in the medical profession—an application of the theory of planned behavior. *Journal of Business Ethics, 10*, 111–122.
- Randall, D. M., & Wolff, J. A. (1994). The time interval in the intention-behaviour relationship: Meta-analysis. *British Journal of Social Psychology, 33*, 405–418.

- \*Rannie, K., & Craig, D. M. (1997). Adolescent females' attitudes, subjective norms, perceived behavioral control, and intentions to use latex condoms. *Public Health Nursing* 14, 51–57.
- \*Reinecke, J., Schmidt, P., & Ajzen, I. (1996). Application of the theory of planned behavior to adolescents' condom use: A panel study. *Journal of Applied Social Psychology*, 26, 749–772.
- \*Richard, L., Dedobbeleer, N., Champagne, F., & Potvin, L. (1994). Predicting child restraint device use: A comparison of two models. *Journal of Applied Social Psychology*, 24, 1837–1847.
- \*Richard, R., van der Pligt, J., & de Vries, N. (1995). Anticipated affective reactions and prevention of AIDS. *British Journal of Social Psychology*, 34, 9–21.
- \*Richard, R., van der Pligt, J., & de Vries, N. (1996). Anticipated affect and behavioral choice. *Basic and Applied Social Psychology*, 18, 111–129.
- \*Richardson, H. R. L., Beazley, R. P., Delaney, M. E., & Langille, D. B. (1997). Factors influencing condom use among students attending high school in Nova Scotia. *The Canadian Journal of Human Sexuality*, 6, 185–196.
- Rosenthal, R. (1979). The 'file drawer problem' and tolerance for null results. *Psychological Bulletin*, 86, 638–641.
- Rosenthal, R. (1984). *Meta-analytic procedures for social research*. Beverly Hill, CA: Sage.
- \*Sahni, A. (1994). Incorporating perceptions of financial control in purchase prediction: An empirical examination of the theory of planned behavior. *Advances in Consumer Research*, 21, 442–448.
- \*Schaalma, H., Kok, G., & Peters, L. (1993). Determinants of consistent condom use by adolescents: The impact of experience of sexual intercourse. *Health Education Research* 8, 255–269.
- \*Schifter, D. B., & 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.
- \*Schlegel, R. P., D'Avernas, J. R., Zanna, M. P., DeCourville, N. H., & Manske, S. R. (1992). Problem drinking: A problem for the theory of reasoned action? *Journal of Applied Social Psychology*, 22, 358–385.
- Sheeran, P., & Orbell, S. (1998). Do intentions predict condom use? Meta-analysis and examination of six moderator variables. *British Journal of Social Psychology*, 37, 231–250.
- Shepperd, B. H., Hartwick, J., & Warshaw, P. R. (1988). The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research*, 15, 325–343.
- Sparks, P. (1994). Attitudes towards food: Applying, assessing and extending the 'theory of planned behaviour'. In D. R. Rutter & L. Quine (Eds.), *Social psychology and health: European perspectives* (pp. 25–46). Aldershot: Avebury Press.
- \*Sparks, P., Guthrie, C. A., & Shepherd, R. (1997). The dimensional structure of the 'perceived behavioral control' construct. *Journal of Applied Psychology*, 27, 418–438.
- \*Sparks, P., Hedderley, D., & Shepherd, R. (1992). An investigation into the relationship between perceived control, attitude variability and the consumption of two common foods. *European Journal of Social Psychology*, 22, 55–71.
- \*Sparks, P., & Shepherd, R. (1992). Self-identity and the theory of planned behavior—assessing the role of identification with green consumerism. *Social Psychology Quarterly*, 55, 388–399.
- \*Sparks, P., Shepherd, R., & Frewer, L. J. (1995). Assessing and structuring attitudes toward the use of gene technology in food production: The role of perceived ethical obligation. *Basic and Applied Social Psychology*, 16, 267–285.
- Sparks, P., Shepherd, R., Wieringa, N., & Zimmermans, N. (1995). Perceived behavioural control, unrealistic optimism and dietary change: An exploratory study. *Appetite*, 24, 243–255.
- Sutton, S. (1994). The past predicts the future: Interpreting behaviour-behaviour relationships in social psychological models of health behaviour. In D. R. Rutter & L. Quine (Eds.), *Social psychology and health: European perspectives* (pp. 71–88). Aldershot: Avebury.
- Sutton, S. (1998). Explaining and predicting intentions and behavior: How well are we doing? *Journal of Applied Social Psychology*, 28, 1318–1339.
- \*Taylor, S., & Todd, P. (1995). An integrated model of waste management behavior: A test of household recycling and composting intentions. *Environment and Behavior*, 27, 603–630.
- \*Tedesco, L. A., Keffer, M. A., & Fleck-Kandath, C. (1991). Self-efficacy, reasoned action, and oral health behavior reports: A social cognitive approach to compliance. *Journal of Behavioral Medicine*, 14, 341–355.

- \*Terry, D. J. (1993). Self-efficacy expectancies and the theory of reasoned action. In D. J. Terry, C. Gallois, & M. McCamish (Eds.), *The theory of reasoned action: Its application to AIDS-preventive behaviour* (pp. 135–151). Oxford: Pergamon.
- \*Terry, D. J., & Hogg, M. A. (1996). Group norms and the attitude–behavior relationship: A role for group identification. *Personality and Social Psychology Bulletin*, *22*, 776–793.
- Terry, D. J., Hogg, M. A., & White, K. M. (1999). The theory of planned behaviour: Self-identity, social identity, and group norms. *British Journal of Social Psychology*, *38*, 225–244.
- Terry, D. J., Hogg, M. A., White, K. M. (2000). Attitude–behavior relations: Social identity and group membership. In D. J. Terry & M. A. Hogg (Eds.), *Attitudes, behavior and social context: The role of norms and group membership* (pp. 67–93). London: Erlbaum.
- Terry, D. J., & O’Leary, J. E. (1995). The theory of planned behaviour: The effects of perceived behavioural control and self-efficacy. *British Journal of Social Psychology*, *34*, 199–220.
- \*Theodorakis, Y. (1992). Prediction of athletic participation—a test of planned behavior theory. *Perceptual and Motor Skills*, *74*, 371–379.
- \*Theodorakis, Y. (1994). Planned behavior, attitude strength, role identity, and the prediction of exercise behavior. *The Sport Psychologist*, *8*, 149–165.
- \*Theodorakis, Y., Bagiatis, K., & Goudas, M. (1995). Attitudes toward teaching individuals with disabilities: Application of planned behavior theory. *Adapted Physical Activity Quarterly*, *12*, 151–160.
- \*Tolman, R. M., Edleson, J. L., & Fendrich, M. (1996). The applicability of the theory of planned behavior to abusive men’s cessation of violent behavior. *Violence and Victims*, *11*, 341–354.
- \*Towler, G., & Shepherd, R. (1991). Modification of Fishbein and Ajzen’s theory of reasoned action to predict chip consumption. *Food Quality and Preference*, *3*, 37–45.
- \*Træn, B., & Nordlund, S. (1993). Visiting public drinking places in Oslo: An application of the theory of planned behaviour. *Addiction*, *88*, 1215–1224.
- Trafimow, D., & Finlay, K. A. (1996). The importance of subjective norms for a minority of people: Between subjects and within-subjects analyses. *Personality and Social Psychology Bulletin*, *22*, 820–828.
- Turner, J. C. (1985). Social categorization and the self-concept: A social cognitive theory of group behaviour. In E. J. Lawler (Ed.), *Advances in group process: Theory and research*, (Vol. 2, pp. 77–122). Greenwich, CT: JAI Press.
- Van den Putte, B. (1991). *20 years of the theory of reasoned action of Fishbein and Ajzen: A meta-analysis*. Unpublished manuscript, University of Amsterdam.
- \*Van Ryn, M., Lytle, L. A., & Kirscht, J. P. (1996). A test of the theory of planned behavior for two health-related practices. *Journal of Applied Social Psychology*, *26*, 871–883.
- \*Van Ryn, M., & Vinokur, A. D. (1992). How did it work? An examination of the mechanisms through which an intervention for the unemployed promoted job-search behavior. *American Journal of Community Psychology*, *20*, 577–597.
- \*Vermette, L., & Godin, G. (1996). Nurses’ intentions to provide home care: The impact of AIDS and homosexuality. *AIDS Care*, *8*, 479–488.
- \*Wambach, K. A. (1997). Breastfeeding intention and outcome: A test of the theory of planned behavior. *Research in Nursing and Health*, *20*, 51–59.
- \*Wankel, L. M., & 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.
- Warshaw, P. R., & Davis, F. D. (1985). Disentangling behavioral intentions and behavioral expectations. *Journal of Experimental Social Psychology*, *21*, 213–228.
- \*White, K. M., Terry, D. J., & Hogg, M. A. (1994). Safer sex behavior: The role of attitudes, norms, and control factors. *Journal of Applied Social Psychology*, *24*, 2164–2192.
- White, K. R. (1982). The relation between socio-economic status and academic achievement. *Psychological Bulletin*, *91*, 461–481.
- Wicker, A. W. (1969). Attitudes versus actions: The relationship of verbal and overt behavioral responses to attitude objects. *Journal of Social Issues*, *25*, 41–47.
- \*Wiesner, M., & Tesch-Romer, C. (1996). Use of hearing aids by the elderly: Correlation between intention and behavior. *Zeitschrift für Gerontologie und Geriatrie*, *29*, 273–279.

- \*Willemson, M. C., de Vries, H., van Breukelen, G., & Oldenburg, B. (1996). Determinants of intention to quit smoking among Dutch employees: The influence of social environment. *Preventive Medicine, 25*, 195–202.
- \*Wilson, D., Zenda, A., McMaster, J., & Lavelle, S. (1992). Factors predicting Zimbabwean students' intention to use condoms. *Psychology and Health, 7*, 99–114.
- \*Yordy, G. A., & Lent, R. W. (1993). Predicting aerobic exercise participation—social cognitive, reasoned action, and planned behavior models. *Journal of Sport and Exercise Psychology, 15*, 363–374.

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## Appendix

Coding of volition was based on participants' mean PBC responses (i.e. the degree to which they rated behaviours as controllable or uncontrollable). Mean values of PBC (including self-efficacy and 'perceived control over behaviour') measures were taken from all papers where the appropriate statistics were reported or obtained. From these 62 studies, the mean scores were transformed to a common metric (unipolar + 1 (low control) to + 7 (high control) scales). Across all these studies, the mean value of control was 4.96 (SD =  $\pm$  1.02), meaning that participants generally reported perceiving control over the behaviours in question. These data were subjected to two forms of analyses. First, a categorical 'volition' variable was created based on a mean split. This discriminated behaviours that were rated as being relatively volitional from those rated as being less volitional. These analyses revealed that—under conditions of greater volitional control—PBC accounted for more of the variance (+ 3% behaviour, + 8% intention over and above TRA variables) than under conditions of less volitional control (+ 2% behaviour, + 5% intention).

Secondly, mean PBC scores were plotted against proportion of variance contributed (to either intention or behaviour) by PBC. The latter analyses allowed us to control for the fact that participants generally report control over behaviour. This resulted in a correlation of .05 between mean PBC rating and the proportion of additional variance in intention explained by PBC. The equivalent correlation for behaviour was  $r = -.16$ . Whilst the correlation of .05 should be regarded as 'trivial' (see Cohen, 1992), the correlation for behaviour is suggestive of the fact that lower volitional control is associated with a greater impact of PBC on behaviour. Note that this finding contradicts the results of the first analyses.

A third form of analysis analysed responses above and below the mid-point (i.e. 4) of the standardized PBC scale. This produced only eight studies with PBC scores below the mid-point for the prediction of intention, and four studies below the mid-point for the prediction of behaviour. These yielded data that failed to exceed Rosenthal's (1984) tolerance level (i.e. only two further studies would have been required to overturn the findings), and these are not presented.

Overall, in attempting to code for 'volition', we found contradictory results and can only conclude—in line with the Introduction—that experimental studies, or studies that appropriately measure volitional variables, might be the only way to untangle such an issue. One possibility is that 'perceived control over behaviour' might actually tap the extent to which individuals believe that a behaviour is within their volitional control. This might explain why 'perceived control over behaviour' has rarely directly contributed to the prediction of intention or behaviour (see Armitage & Conner, 1999a, 1999b).