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An analysis of intentions to recycle household waste: The roles of past behaviour, perceived habit, and perceived lack of facilities

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Abstract

The theory of planned behaviour (TPB) was used to guide an analysis of intentions to recycle household waste in a geographical area (Glasgow, Scotland) with relatively poor recycling facilities. A sample of 252 members of the public completed a questionnaire (response rate of 66%). In addition to TPB variables, the contributions of past recycling behaviour, perceived habit of recycling, and perceived lack of recycling facilities were considered. The TPB components contributed 29% to the variance of intentions to recycle; attitudes and perceived behavioural control (PBC) (but not the subjective norm) were significant on entry. Past recycling and perceived habit made significant independent contributions. Contrary to expectations, there was some evidence to suggest that (a) the past behaviour–intention relationship was stronger for those with no perceived habit of recycling, and (b) the attitude–intention relationship was stronger for those who had recycled more in the past. There was also evidence to suggest that the PBC–intention relationship was weaker when facilities were perceived to be lacking. The findings highlighted methodological, theoretical, and social issues, and it was concluded that full account should be taken of the social context in such research.

1. Introduction

This paper describes an analysis, guided by the theory of planned behaviour (TPB) (Ajzen, 1985, 1987), of intentions to recycle household waste. The study was conducted in Glasgow (Scotland, UK) and the surrounding area, a city with poor recycling facilities at the time of data collection (Autumn, 2000). For the participants of the study, most household recycling involved trips to local centres or 'banks', often situated in the car parks of large supermarkets, with receptacles for glass, aluminium and sometimes paper, but seldom for plastic. There were very few home collection services; where these existed they tended to be privately run and the responsibility lay with the individual to enrol in the service.

The TPB (Ajzen, 1985, 1987) is based on the assumption that some conscious reasoning is involved in the formation of intentions to perform a behaviour, and that this behaviour is at least partly under the control of the individual. According to the theory, behaviour is predicted by attitudinal factors, normative factors, and perceived behavioural control (PBC). Attitudes reflect the evaluation of the behaviour and its outcome, while the subjective norm reflects the extent to which people important to the individual are perceived to support the behaviour, and the extent to which the individual is motivated to comply or conform. PBC reflects the extent to which the individual feels able to perform the behaviour. These three factors are thought to influence behaviour through their impact upon intentions to behave. However, PBC may also have a direct impact upon actual behaviour, particularly when the behaviour is perceived to be difficult to perform.

Support has been provided for the efficacy of the TPB components to explain a wide range of intentions and behaviours (see Armitage & Conner, 2001), including those relating to the environment (e.g. Terry, Hogg, & White, 1999; Bamberg & Schmidt, 2001; Bamberg, Ajzen, & Schmidt, 2003). The precursor to the TPB—the Theory of Reasoned Action (TRA)—forms the basis of Thøgersen's (1994) model of recycling behaviour, such that intentions are predicted by attitudes and social norms, while the intention–behaviour relationship may

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be further influenced by opportunity and ability. A feedback loop in Thøgersen's model allows for ability (habits and task knowledge) to influence the beliefs and evaluations which inform attitudes (see also Pieters, 1991). Generally speaking, the subjective norm typically contributes less to any explanation of variance than attitudes or PBC (Thøgersen, 1994; Armitage & Conner, 2001). The results reported by Terry et al. (1999), in a study of recycling of household waste in Brisbane, Australia, were consistent with this: with past recycling behaviour controlled, intentions were predicted by attitudes and PBC, but not by the subjective norm. However, the supporting environment was stronger for their participants than it was for those in the current study: all of Terry et al.'s participants appeared to have access to home recycling bins provided by the local council. The first aim of the current study was to determine the relative contributions of the TPB components (attitudes, subjective norm, and PBC) to intentions to recycle household waste for participants living in an area with relatively poor recycling facilities. The remaining aims of the study centred on the roles of (a) past behaviour and perceived habit; and (b) perceived lack of facilities, particularly in relation to PBC. These topics are considered in turn below.

1.1. Past behaviour and habit

Past behaviour tends to predict intentions and future behaviour (Bentler & Speckart, 1979; Ouellette & Wood, 1998; Terry et al., 1999; Conner, Sheeran, Norman, & Armitage, 2000). There is some debate, however, about the meaning of these relationships. One argument is that the relationship between past behaviour and intentions or future behaviour is mainly a reflection of temporal stability (Ajzen, 1987, 1991): in other words, the factors that influenced the past behaviour continue to influence the intentions and future behaviour, but past behaviour does not cause future behaviour. Methodology may also play a role: the relationship between past behaviour and intentions may be artificially accentuated if the items used to measure these variables use identical scales and similar wording (Ajzen, 2002; Bamberg et al., 2003). Nevertheless, the role of past behaviour in the prediction of intentions and future behaviour has continued to attract a great deal of attention from other authors (e.g. Eagly & Chaiken, 1993; Sutton, 1994; Conner & Armitage, 1998; Ouellette & Wood, 1998). Much of this attention has focused on the implications of understanding the role of past behaviour in terms of habit—a construct that is given emphasis in the environmental literature because of the impact upon the environment of high-frequency behaviours (Thøgersen, 1994; Verplanken, Aarts, van Knippenberg, & Moonen, 1998). While the central thrust of the argument concerns the influence of past behaviour on future behaviour (Ajzen, 2002), the extent to which past behaviour may be habitual also has implications for the prediction of intentions, and these are discussed below.

Habits are typically construed as learned acts that become automatic responses in specific situations (see Triandis, 1977, 1980); repetition of the behaviour is not therefore dependent upon conscious intention to repeat that behaviour, but on stimulus cues (Aarts, Verplanken, & van Knippenberg, 1998). Habits are most easily envisaged as simple routine behaviours, such as brushing one's teeth before going to bed. Behaviours that are more complex but that have become 'routinized' may be better described as habitual behavioural patterns (Verplanken et al., 1998), or as semiautomatic response patterns (Bargh, 1989; Ajzen, 2002), where there are tendencies to perform sequences of actions across different situations. With habitual patterns, responses are likely to be semiautomatic rather than automatic (Ouellette & Wood, 1998): the behaviour involves a sequence of actions and responses, and while responses within each phase may be relatively automatic, some control or thought is required between each phase (Bargh, 1989). Such a model is appropriate for understanding any habit developed for recycling household waste in the current study: items for recycling would be retained and perhaps washed; then stored; and, at a later stage, taken to the recycling receptacles. Within each phase, responses would be semiautomatic, but some thought would be required to initiate each phase. Crucially, however, as with simple habits, intentions to repeat a habitual behaviour pattern are deemed less likely to be based on conscious reasoning than are intentions to repeat nonhabitual behaviour (Ouellette & Wood, 1998; Verplanken et al., 1998).

In a meta-analysis examining the impact of habit on intentions and future behaviour, Ouellette and Wood (1998) categorized behaviours as habitual or not habitual according to the frequency of the behaviour and the stability of context in which it occurred. Habits were therefore construed as relatively frequent behaviours (performed daily or weekly) under relatively stable conditions. Ouellette and Wood's results indicated that the relationship between past behaviour and intention varied according to the type of behaviour under investigation: the relationship between past behaviour and intention was typically stronger when the behaviour was habitual ($r = 0.60$) than when the behaviour was not habitual ($r = 0.32$). In addition, the relationship between attitudes and intentions was typically weaker when the behaviour in question was habitual ($r = 0.44$) then when the behaviour was not habitual ($r = 0.51$). Thus, compared with those performing nonhabitual behaviours, those who had performed a habitual behaviour in the past had stronger intentions to

perform the behaviour in future, but these intentions were more weakly related to attitudes.

Ouellette and Wood argued that when behaviours are habitual, people tend to form intentions that are consistent with past behaviour. The authors used Bem's (1972) self-perception theory to support their argument: if people are in the habit of performing a particular behaviour, they are likely to assume that they have intended to do this, and they will therefore hold positive intentions to perform that behaviour in the future. This would explain the strength of the relationship between past behaviour and intention, and perhaps also the weakness of the relationship between attitudes and intention. In line with this interpretation, Verplanken et al. (1998) found significant interactions between attitudes and measures of habit in the explanation of intentions to use particular modes of transport, such that the relationship between attitudes and intentions was weaker in the face of strong or frequent habit. Similarly (and of relevance to the current study) Terry et al. (1999) found that the attitude–intention relationship was weaker for those who had put out more waste for recycling in the past; in this case, quantity may have overlapped sufficiently with frequency to serve as a proxy measure.

In response to such findings, Ajzen (2002) has argued that frequency of past behaviour is not a sufficient indicator of the presence of habit. Aside from the fact that frequently performed behaviours may not become 'routinized', Ajzen made the point that infrequent actions may also indicate the presence habit—in this case, the habit of *not* performing the behaviour. In the current study, participants were asked to rate the quantities of waste recycled in the 3 months prior to data collection, based on the measure used by Terry et al. (1999). In addition, participants were asked to indicate the extent to which past recycling behaviour had been performed 'because it's a habit'. Although the first question did not directly measure frequency of behaviour, it was expected to function as a proxy for frequency. Asking participants to rate perceived habit was expected to tap the extent to which they felt that the required sequence of behaviours had become routinized. The second aim of the present study was therefore to investigate the extent to which past recycling and perceived habit influenced the relationships between attitudes and intentions. In line with the findings of Ouellette and Wood (1998), the past behaviour–intention relationship was expected to be greater when there was a stronger perceived habit of recycling, and the attitude–intention relationship was expected to be weaker when more waste had been recycled in the past, and when there was a stronger perceived habit of recycling. However, since the behaviour of those who had recycled little in the past may also have been influenced by habit (Ajzen, 2002), the possibility of curvilinear components to these relationships was taken into account. Finally, both past recycling behaviour and perceived habit were expected to make significant contributions to intentions with TPB components controlled.

1.2. Perceived control and perceived lack of facilities

Although there is some argument as to the exact meaning or conceptualization of PBC (e.g. Terry, 1993; Manstead & Parker, 1995; Armitage & Conner, 1999), an issue which has received less attention recently is the accuracy of PBC, or the extent to which PBC reflects the actual possibility of performing the behaviour. As a predictor of intentions, PBC is viewed as primarily reflecting individual differences in self-efficacy and perceived control. However, the direct relationship between PBC and future behaviour (as opposed to the mediated relationship) is dependent upon the extent to which PBC is accurate (Conner et al., 2000); unrealistic beliefs concerning the ease or otherwise of performing a behaviour may explain a residual impact (i.e. with TPB variables controlled) of past behaviour on future behaviour (Ajzen, 2002). Although intentions rather than future behaviour formed the focus of the current study, the accuracy or otherwise of PBC was of interest, since it was known that there were in fact barriers to performing the behaviour in question: many of the participants would have found it difficult to locate receptacles for the recycling of paper and plastic, but it could not be assumed a priori that this difficulty would automatically result in lower PBC. Thus, while participants may have felt able, in theory, to recycle their household waste, the opportunities for doing so may have been limited (see Thøgersen, 1994). A further point concerns the role of past behaviour: while direct experience is likely to contribute to accurate PBC (Ajzen, 2002), PBC accuracy cannot always be inferred from measures of frequency of past behaviours: in the current situation, for example, it may be that recycling in the recent past had not been achieved, or even attempted, because of an accurate assessment of the difficulty of doing so.

An additional measure, the perceived availability of recycling facilities, was included in the study to illuminate the relationship between PBC and intentions. The third aim of the study was therefore to investigate the role of perceived lack of facilities in relation to PBC. Those perceiving a lack of facilities to recycle were expected to have a lower PBC. Further, perceived lack of facilities was expected to influence the relationship between PBC and intentions: the relationship between PBC and intentions was expected to be weaker when facilities were perceived to be lacking.

In summary, the first aim of the current study was to explore the contribution of TPB variables to the

variance of intentions to recycle household waste in a geographical area with relatively poor recycling facilities. The second aim was to examine the contributions of past behaviour and perceived habit: the relationship between past behaviour and intentions was expected to be stronger when there was a stronger perceived habit of recycling; and the attitude–intention relationship was expected to be weaker when more waste had been recycled in the past and/or there was a stronger perceived habit of recycling. The third aim was to examine the impact of perceived lack of facilities on the relationship between PBC and intentions: the PBC–intention relationship was expected to be weaker when facilities to recycle waste were perceived to be lacking.

2. Method

2.1. Participants and design

A cross-sectional survey design was employed. Various recruitment strategies were used, with the aim of including representatives of different sectors of the community. These strategies included the following: approaching shop assistants and employees of small businesses in the Greater Glasgow area; approaching members of the public in shopping areas, railway stations, coffee shops and other public areas; approaching volunteer workers in charity shops and in volunteer centres; contacting various local authority and environmental groups; and approaching mature part-time students attending evening classes. Overall, 62% of the completed questionnaires were collected by the research assistant employed on the project while the remainder were collected by six young people (including students) who approached friends and colleagues at their places of employment. The questionnaires were all completed between September and December 2000. Response rates varied between 30% and 100% according to strategy. The overall response rate was 66% ($N = 252$).

Of the participants, 64% ($N = 160$) were female, 36% ($N = 90$) were male, and two failed to indicate gender. Ages ranged from 16 to 77 years, with a mean age of 36.13 years (s.d. = 14.72). The majority (84%) resided in an area with a Glasgow postcode. Twelve participants failed to indicate postcode, and the remainder (11%) resided within the central belt of Scotland. Occupations were classified according to the Office of Population Censuses and Surveys' standard occupational classification (HMSO, 1991). In summary, 34% ($N = 82$) were in professional or managerial posts, 37% ($N = 91$) were in clerical or similar nonmanual occupations; and 8% ($N = 22$) were in manual occupations. The remainder (20%) were students, unemployed, retired or undertook voluntary work ($N = 52$).

2.2. Measures

These measures formed part of a larger data set, and only the measures relevant to the current study are given here.

2.3. Intentions to recycle

For each type of waste (newspaper, glass, plastic, and aluminium), participants were asked to rate their intention to recycle during the next month ('We want to know what you intend to recycle within the next month'). Ratings were made on 7-point scales from 'no intention' to 'firm intention'. A global measure of intentions was derived from the mean of the four ratings.

2.4. Attitudes

These were measured with six items: 'I find the idea of recycling distasteful' (reversed), 'I find the idea of recycling pleasing', 'I am not interested in the idea of recycling' (reversed), 'My feelings about recycling are positive', 'I find the idea of recycling unpleasant' (reversed), and 'My feelings towards recycling are favourable'. Each was scored on a 7-point scale from 'strongly disagree' to 'strongly agree', and the mean of contributing items was used.

2.5. Subjective norm

This was measured with three items: 'Most of my friends think that household recycling is a good thing to do', 'Most people who are important to me want me to engage in household recycling', and 'Most of my family think that household recycling is a good thing to do'. Each was scored on a 7-point scale from 'strongly disagree' to 'strongly agree', and the mean of contributing items was used.

2.6. Perceived behavioural control

This was measured with two items: 'There are plenty of opportunities for me to engage in household recycling' and 'It will be easy for me to engage in household recycling during the next month'. Each was scored on a 7-point scale from 'strongly disagree' to 'strongly agree', and the mean of contributing items was used.

2.7. Past recycling behaviour

Participants were asked to rate the proportions of each of the four types of waste recycled within the 3 months prior to data collection ('We want to know how much of your household waste you have recycled in the

last three months'). Ratings were made on 7-point scales, from 'none of it' to 'all of it'. A global measure of past recycling was obtained from the mean of the four ratings.

2.8. Perceived habit and lack of facilities

From the results of an earlier qualitative study, lists were compiled of reasons for recycling or not recycling each type of household waste. Three are relevant to the current study: recycling 'because it's a habit', and failing to recycle because 'recycling facilities are not easily available' and 'there are no local collections'. Participants were asked to indicate on a 5-point scale the extent to which each reason was relevant to their recycling behaviour in the previous 3 months, for each of type of waste, on a scale of 0 ('not at all important or relevant') to 4 ('extremely important or relevant'). Perceived habit was calculated as the mean of the scores on the four contributing items (relating to the four types of waste). Perceived lack of facilities was calculated by first summing scores on the two measures for each type of waste, and by then taking a mean of this score across all four types of waste.

3. Results

3.1. Plan of analysis

Descriptive statistics and bivariate relationships were calculated. Following this, the first aim (the examination of the contribution of the TPB variables to the explanation of intentions) was addressed through hierarchical multiple regression analysis. This analysis also encompassed the examination of the contributions of past recycling behaviour, perceived habit, and perceived lack of facilities.

The second aim of the analysis concerned the impact of perceived habit on the past behaviour–intention relationship, and the impact of perceived habit and past behaviour on the attitude–intention relationship. This aim was addressed in the first instance by examining the contributions of three interaction components (Attitudes × Past Behaviour; Attitudes × Habit; Past Behaviour × Habit) to the explanation of intentions. Following this, the past behaviour–intention relationship and the attitude–intention relationship were examined in more detail. A similar approach was taken to the examination of the impact of perceived lack of facilities on the PBC–intention relationship.

3.2. TPB analysis

Descriptive statistics and relationships amongst variables are shown in Table 1. Note that no attempt was made to reconstruct missing data, leading to differences in degrees of freedom (with listwise deletion employed). Cronbach's alpha coefficients of internal consistency were satisfactory. Where variables showed skew of ± 0.6 or above (attitudes, subjective norm, PBC, past recycling behaviour, perceived habit, and age), square root transformations were applied (Tabachnick & Fidell, 1996). In all cases, this transformation served to reduce skew.

Attitudes, subjective norm and PBC were all significantly related to intentions in the expected directions. Significant relationships were also found between intentions and both past behaviour and perceived habit; between perceived habit and past behaviour; and between PBC and perceived lack of facilities. A number of significant differences were found in connection with demographic variables. Older participants had stronger intentions to recycle, and were more likely to have done so in the past (see Table 1). They had more positive attitudes, a stronger subjective norm, and were less likely to perceive a lack of facilities to recycle. Females had recycled more household waste in the past than males ($F(1,238) = 6.03$, $p < 0.05$), and had a stronger perceived habit of recycling ($F(1,230) = 6.32$, $p < 0.05$). In terms of occupation, those in the mid-range nonmanual occupational category were younger ($F(3,240) = 11.51$, $p < 0.001$); further, they had more negative attitudes towards recycling ($F(3,239) = 6.68$, $p < 0.001$), lower PBC ($F(3,233) = 2.80$, $p < 0.05$), and lower subjective norm scores ($F(3,238) = 3.50$, $p < 0.05$).

Table 1
Descriptive data for continuous measures (means, standard deviations, Cronbach's alpha coefficients, bivariate correlations)

Variable	N	M	S.D.	α	1	2	3	4	5	6	7
1. Intentions	239	4.00	1.95	0.81							
2. Attitudes	247	5.86	1.26	0.89	0.43***						
3. Norm	246	3.65	1.46	0.73	0.38***	0.54***					
4. PBC	241	3.12	1.58	0.82	0.44***	0.24***	0.36***				
5. Past behaviour	242	2.91	1.97	0.75	0.67***	0.27***	0.31***	0.45***			
6. Perceived habit	234	1.07	1.16	0.82	0.42***	0.14*	0.17*	0.19**	0.49***		
7. Perceived lack facilities	230	4.38	2.90	0.93	−0.31***	0.09	0.02	−0.34***	−0.38***	−0.16**	
8. Age	247	36.13	14.72	—	0.19**	0.19**	0.33***	0.10	0.23***	0.09	−0.27***

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Those who were unemployed, retired, or students had stronger intentions to recycle ($F(3, 231) = 3.16$, $p < 0.05$), and had recycled more in the past ($F(3, 233) = 3.97$, $p < 0.01$) than those in other occupational groups. These demographic variables were controlled in the multivariate analyses.

The first aim was addressed through hierarchical multiple regression analysis, with intentions to recycle as the outcome variable. At the first step, the demographic variables were entered (gender, age, and occupational category, with the mid-nonmanual group as the reference category). These variables explained 5% of the variance of intentions to recycle ($F_{\text{change}}(5, 196) = 1.92$, $p = 0.09$). Second, the TPB variables (attitudes, norm, and PBC) were entered. These variables explained an additional 29% of the variance of intentions to recycle (with attitudes and PBC making significant contributions at the 1% level) ($F_{\text{change}}(8, 193) = 28.45$, $p < 0.001$). The potential contribution of the quadratic component of each TPB variable was examined in turn at this stage; since none proved significant, these variables were not included in further analysis.

In the third to fifth steps, past recycling, perceived habit and perceived lack of facilities were added to the equation. Past behaviour contributed an additional 20% to the explanation of variance ($F_{\text{change}}(9, 192) = 82.65$, $p < 0.001$). Perceived habit contributed a further 1% ($F_{\text{change}}(10, 191) = 4.16$, $p < 0.05$), but perceived lack of facilities failed to make a significant contribution to the variance ($F_{\text{change}}(11, 190) = 1.72$, N.S.). The potential contributions of quadratic components were examined at this stage, and none proved significant.

This analysis explained 55% of the variance (53% adjusted) ($F(11, 190) = 21.27$, $p < 0.001$). The results are presented in Table 2. In summary, irrespective of demographic characteristics, those with stronger intentions to recycle had recycled more in the past, they had more positive attitudes towards recycling, and, at the 5% level, they had a stronger perceived habit of recycling. PBC was significant on entry, but lost significance when perceived lack of facilities was added to the equation.

3.3. Past behaviour and perceived habit

An examination was made of the contributions of the following interaction terms to the explanation of variance of intentions: Attitudes × Past Behaviour; Attitudes × Habit; Past Behaviour × Habit. Interaction terms were based on scores reflecting deviation from the mean (Jaccard, Turrisi, & Wan, 1990). These terms were added to the analysis described above, after the entry of perceived lack of facilities. None proved significant on entry.

Following this, an examination was made of the extent to which the measures of past behaviour and perceived habit overlapped. The correlation coefficient ($r = 0.49$) was only of medium strength (Cohen, 1988), such that the measures shared 24% of their variance. Participants were then grouped according to perceived habit and, separately, past behaviour in the following way: no perceived habit of recycling (i.e. score of 0), strong perceived habit (> 2), and the remainder (> 0 and $\leqslant 2$); no recycling in the previous 3 months (i.e. score of 1), most or all waste recycled (scores of 6 or 7), and the remainder (scores between 2 and 5). Of those who had recycled no waste in the previous 3 months ($N = 77$), the majority (73%) indicated that they had no habit of doing so. However, of those who had recycled most or all of their waste in the previous 3 months ($N = 31$), only 39% ($N = 12$) indicated that they had a strong habit, while 29% ($N = 9$) indicated that they had no habit of doing so.

The past behaviour–intention relationship was then calculated at the three levels of perceived habit described above. The results are shown in the first row of Table 3. The relationship was significantly stronger when there

Table 2
Hierarchical multiple regression analysis of intentions to recycle household waste

Step	Variable	R^2	ΔR^2	F_{change}	β_{in}	β_{final}	F_{final}
1	Gender				0.09	−0.02	0.17
	Age				0.14	−0.09	2.57
	Professional occ.[a]				0.06	0.01	0.03
	Manual occ.				0.08	0.03	0.37
	Student/other	0.05	0.05	1.92	0.14	−0.01	0.04
2	Attitudes				0.31***	0.27	20.53***
	Norm				0.05	0.03	0.20
	PBC	0.34	0.29	28.45***	0.39***	0.11	3.38
4	Past behaviour	0.54	0.20	82.65***	0.56***	0.47	40.73***
5	Perceived habit	0.55	0.01	4.16*	0.12*	0.12	4.35*
6	Perceived lack of facilities	0.55	0.00	1.72	−0.08	−0.08	1.72

*$p < 0.05$; ***$p < 0.001$.
[a] Occupational groups ('professional', 'manual', 'student/other') dummy coded, with nonmanual occupation as the reference category.

Table 3
Correlation coefficients between past behaviour and intentions; attitudes and intentions; and PBC and intentions, according to group (perceived habit; past recycling behaviour; and perceived lack of facilities), with Fisher's z_{change} (χ^2)

Relationship	Group 1	Group 2	Group 3	z_{change} (Group 1 vs. Group 3)
	No habit (*N*)	Medium habit (*N*)	Strong habit (*N*)	
Past behaviour–intention	0.72 (85)	0.51 (94)	0.40 (39)	5.55*
	No past recycling (*N*)	Some past recycling (*N*)	Most/all recycled (*N*)	
Attitude–intention	0.37 (74)	0.27 (127)	0.74 (30)	6.13*
	No habit (*N*)	Medium habit (*N*)	Strong habit (*N*)	
Attitude–intention	0.37 (88)	0.45 (95)	0.55 (40)	1.38
	Low lack facilities (*N*)	Med. lack facilities (*N*)	High lack facilities (*N*)	
PBC–intention	0.66 (44)	0.37 (103)	0.15 (67)	10.31**

*$p<0.05$; **$p<0.01$.

was no perceived habit of recycling ($r = 0.72$) than when there was a medium ($r = 0.51$) or strong perceived habit ($r = 0.40$): $z_{change} = 4.80$ and 5.55, respectively, both $p<0.05$.

A comparable analysis was conducted to explore the attitude–intention relationship at differing levels of past behaviour and habit. The results are shown in the middle section of Table 3. When most or all of household waste had been recycled in the past, the relationship between attitudes and intentions was significantly stronger ($r = 0.74$) then when some ($r = 0.27$) or none ($r = 0.37$) of the waste had been recycled: $z_{change} = 9.90$, $p<0.01$, and $z_{change} = 6.13$, $p<0.05$, respectively. Although there appeared to be a curvilinear aspect to the results, the difference between the correlations with no past behaviour and some past behaviour was not significant ($z_{change} = 0.53$, N.S.). The attitude–intention relationship did not differ significantly according to level of perceived habit.

3.4. PBC and perceived lack of facilities

The impact of perceived lack of facilities on the PBC–intention relationship was examined in a similar way. The PBC × Lack of Facilities interaction term did not make a significant contribution to the analysis used to examine the first aim. Participants were then grouped according to perceived lack of facilities: low (i.e. scores $\leqslant 1.5$); medium (1.51–6.9); and high ($\geqslant 7$), and the PBC–intention relationship was calculated for each group. The results are shown in Table 3. The PBC–intention relationship was significantly stronger ($r = 0.66$) when perceived lack of facilities was low (i.e. when facilities were not perceived to be lacking) than when facilities were seen to be somewhat lacking ($r = 0.37$) or strongly lacking ($r = 0.15$): $z_{change} = 4.63$, $p<0.05$, and $z_{change} = 10.31$, $p<0.01$, respectively.

4. Discussion

The results of the study raised some interesting if problematic issues. The first result of note was that the TPB variables—attitudes, norm, and PBC—explained an additional 29% of the variance of intentions when demographic variables had been controlled. Attitudes and PBC both made significant contributions to the variance of intentions at this stage, but the subjective norm did not. The variance explained was somewhat less than expected: in a meta-analysis based on 154 studies, Armitage and Conner (2001) reported that, on average, the TPB variables accounted for 39% of the variance of intentions. However, this percentage can vary considerably, and in a review of a small number of recent studies, Perugini and Bagozzi (2004) reported an average explanation of 32% of the variance.

A number of explanations may be posited for the rather low percentage of variance accounted for. First, the measurement of intention deserves consideration. The failure to account for variance of intentions may reflect the way in which intentions were measured. Although the wording used was very similar to that employed by Terry et al. (1999), the intention to recycle in the current study encompassed a number of separate intentions: for example, the intention to recycle glass could be broken down into the intention to keep bottles and jars out of the household bin, the intention to store the bottles in a container in the kitchen or hall, and the intention to take the bottles to the bottle bank on the next visit to the supermarket. This may cause problems if the global intention (recycling) is positively evaluated while some of the specific intentions (e.g. trying to push bottles into dirty and overflowing receptacles in the rain) are negatively evaluated (see Eagly & Chaiken, 1993).

The latter point may highlight the limitation of the TPB noted by Perugini and Bagozzi (2001) (see also Bagozzi, 1992). These authors have proposed that motivation, or desire to perform a behaviour, mediates

the relationship between the TPB variables and intentions, a model termed the MGB; this proposal is consistent with the finding that TPB variables tend to explain a higher proportion of intentions that incorporate desires than they do other forms of intentions (Armitage & Conner, 2001). The incorporation of motivation or desire may be particularly important when, as in the current study, the anticipation of actually taking waste to the recycling centre may generate negative emotions which weaken the intention.

The failure of the subjective norm to make a significant contribution was not unexpected, since the subjective norm is often more weakly related to intentions than are the other TPB components (Terry et al., 1999; Armitage & Conner, 2001). The measure of the norm included in the study was perhaps insufficiently focused on support for recycling of specific forms of waste (*cf*. Armitage & Conner, 2001); further, it did not include a component explicitly reflecting motivation to comply or conform with the norms of others. However, the criticism regarding lack of specificity could also be levelled at the measures of attitudes and PBC, both of which were significantly related to intentions. The problem may lie with the way in which the subjective norm is conceptualized within the TPB: there is growing evidence to suggest that the key lies in understanding the ways in which people identify with the groups from which the norms are derived (Terry & Hogg, 1996; Terry et al., 1999; Terry, Hogg, & McKimmie, 2000). At a more pragmatic level, it is possible that recycling was not sufficiently established in Glasgow to provide strong norms; the level of social pressure to recycle at community level was not high. A comparison between the scores reported by Terry et al. (1999) and those reported here was possible, since both sets were based on means of 7-point scales: while the mean attitude scores were comparable, Terry et al.'s subjective norm (6.07) was substantially higher than our own (3.65).

As expected, past recycling and perceived habit made significant contributions to the analysis of intentions over and above the effects of the TPB variables. The contribution of past behaviour to the explanation of variance of intentions was comparable to that described by Terry et al. (1999). Interestingly, the measures of past recycling behaviour and perceived habit of recycling shared only 24% of their variance; while most of those who had not recycled in the previous 3 months indicated that they were not in the habit of doing so, only 39% of those who had recycled all or most of their waste in the previous 3 months indicated that they had a strong habit of recycling, while 29% indicated that they were not in the habit of recycling. The measure of perceived habit used in the current study is open to criticism, since no criteria were provided for participants regarding the meaning of habit. However, the finding lends support to Ajzen's (2002) argument regarding the problems of inferring habit from frequency of past behaviour.

There was some evidence to suggest that the relationship between past behaviour and intentions was stronger for those with no perceived habit of recycling than it was for those with some habit or a strong habit. The relationship was in the opposite direction to that predicted, although this must be treated with caution, given that the Past Behaviour $\times$ Habit interaction term did not make a significant contribution to the multiple regression analysis of intentions. With this in mind, it is possible that a number of those with no perceived habit of recycling had, in fact, a strong habit of not recycling: 26% of the participants with no habit of recycling (24 out of 93) had not recycled any household waste in the previous 3 months and had no intention of recycling in the next month. Again, this lends support to Ajzen's (2002) argument.

Typically, the attitudes of those with past experience of behaviour, and those with the habit of performing the behaviour, are more weakly related to intentions (e.g. Ouellette & Wood, 1998; Verplanken et al., 1998; Terry et al., 1999). However, in the current study there was some evidence to suggest that the impact of past recycling on the relationship between intentions and attitudes was in the opposite direction to that predicted: the attitude–intention relationship was stronger rather than weaker when there had been more recycling in the past. Again, this finding must be treated with caution, given that the relevant interaction terms did not make significant contributions to the multiple regression analysis. However, a plausible explanation for the findings emerges from a consideration of the measures. The attitude–intention relationship has been found to increase when the intention is stable (Conner et al., 2000); in the current study, the consistency between past behaviour and intention was higher for those who had recycled none of their waste, or who had recycled most or all of their waste, than it was for those in the middle group, and overall, the strong correlation ($r = 0.67$) between past behaviour and intention is suggestive of a relatively stable situation, in line with Ajzen's (1987, 2002) position on the role of past behaviour in the TPB. Further, it is likely that under certain circumstances, attitudes, as well as intentions, are inferred from past behaviours, as predicted by self-perception theory (Bem, 1972): for those participants in the current study who had recycled most or all of their waste in the past, this would result in the attitude–intention relationship being inflated by the influence of self-perception. This may be particularly relevant in the current study given that intention rather than future behaviour was the criterion variable, and all measures were taken at the same time. Alternatively, those who had recycled more in the past may have had the opportunity to develop more realistic and thoughtful attitudes towards recycling. There is

consistent evidence to suggest that attitudes developed through direct experience are more reliable predictors of subsequent behaviour than are attitudes based on little experience or reflection (Fazio & Zanna, 1978, 1981). It is possible that the attitude–intention relationship could be influenced by direct experience in a comparable way. While the interpretation must remain tentative, it is possible that in the social context of the current study, where recycling required effort and was not strongly supported at a community level, those with direct experience of recycling had been more likely than others to develop attitudes consistent with their intentions.

The impact of perceived lack of facilities for recycling on the PBC–intention relationship was consistent with expectations. There was some evidence to suggest that PBC failed to influence intentions to recycle when facilities for recycling were perceived to be lacking. The explanation for this is straightforward: people will not recycle if it is difficult to dispose of items, even if they feel that they have the ability to do so. Comparable findings have been noted in studies of recycling involving much more structured and convenient opportunities to perform the behaviour than were available to the participants in the current study: for example, in a study reported by Enviroplan A/S (1983), cited by Thøgersen (1994), significant differences in the amount recycled were found according to the design of the waste storage receptacle given to participants; those given a well-designed receptacle that could be kept outside recycled more than those given receptacles that had to be kept indoors and taken out on collection day. In the current study, perceived lack of facilities failed to make a significant contribution to the variance of intentions when it followed past behaviour and habit, but PBC lost significance when perceived lack of facilities entered the equation. Overall, therefore, some support was provided for the inclusion of opportunity to recycle, as suggested by Thøgersen (1994). This factor may be particularly relevant in situations where recycling facilities are poor.

The study was limited in a number of ways. No measure was taken of future behaviour, and the cross-sectional nature of the data meant that it was not possible to separate cause and effect. Further, the measures taken from Terry et al.'s (1999) study may not have been appropriate in such a different social context; in particular, the measures of intention and past recycling may have been lacking in sensitivity, given that the behavioural categories (and therefore intentions) covered a distinct set of behaviours. The weaknesses of other measures (particularly the social norm and perceived habit) have already been acknowledged.

Facilities for recycling in the Glasgow area have improved slightly since data were collected for the current study. However, the social context would probably still be viewed as relatively unsupportive. Thøgersen's (1994) model appears to provide a useful starting point to the interventions likely to promote recycling in a population such as this: in addition to addressing the factors directly contributing to the TPB, it is also necessary to consider people's abilities (including task knowledge) and opportunities (including facilities). Further, it is necessary to acknowledge and address the 'costs' of recycling for the individual, such as the extra work involved and the unpleasant nature of the task (Thøgersen, 1994): these costs may interfere with the motivation or desire to recycle (Perugini & Bagozzi, 2001). Finally, it is worth reiterating the point that many of the participants in the current study indicated that they failed to recycle because the facilities were lacking. Further, a number of participants added comments to their questionnaires suggesting (a) that the questionnaire itself had 'reminded' them of the need to recycle, and (b) that they felt they should recycle but that they perceived little support for this activity. One particularly worrying aspect of the results was that younger participants had quite negative attitudes towards recycling. Overall, these points suggest that efforts at the community level to support recycling could be influential. In the long run, failure to support recycling at this stage is likely to be environmentally damaging; one way of dealing with a cognitive inconsistency (the failure to behave in accord with beliefs and attitudes) is to downplay the importance of the action. The result may be a population with little motivation to recycle in the future.

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