Basis of Intentions as a Moderator of the Intention-Health Behavior Relationship

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Abstract

Objective: Previous research has shown that the degree to which individuals base their intentions on particular underlying cognitions (i.e., motives) significantly moderates the intention-behavior relationship. Studies have individually examined the moderating effect of intentions based on overall attitude, affective attitudes, injunctive norms, and moral norms. The present research used a within-persons approach to simultaneously test the moderating effects of intentions based on instrumental attitude, affective attitude, anticipated affective reactions, injunctive norms, descriptive norms, and moral norms on the intention-behavior relationship and the impact of controlling for intention stability, self-efficacy and past behavior. **Main Outcome Measures**: Self-reported performance of 20 health behaviors. **Design**: Adults (N = 366) completed questionnaires assessing instrumental attitude, affective attitude, anticipated affective reactions, injunctive norms, descriptive norms, moral norms, self-efficacy and past behavior at baseline; intentions at baseline and one month follow-up; and behavior at two month follow-up for 20 health behaviors. **Results**: When tested simultaneously using multi-level modelling the only significant moderator of the intention-behavior relationship was the extent to which intentions were based on anticipated affective reactions (intentions more strongly based on anticipated affective reactions were significantly stronger predictors of behavior). This effect remained when we also controlled for intention stability (which also moderated the intention-behavior relationship), self-efficacy and past behavior. **Conclusions**: Intentions based on anticipated affective reactions may be particularly important predictors of health behaviors. Studies manipulating such intentions to test their effects on behavior change are required.

Key words: intentions; anticipated affective reaction; health behavior.

Understanding the determinants of health behaviors has been the focus of considerable research in health psychology. Much of this research has used social cognition theories (for reviews see Conner & Norman, 2005, 2015) including Protection Motivation Theory (PMT; Maddux & Rogers, 1983), Social Cognitive Theory (SCT; Bandura, 2000), Theory of Planned Behavior (TPB; Ajzen, 1991), and the Prototype-Willingness Model (PWM; Gibbons, Gerrard, Blanton, & Russell, 1998). These theories all converge on viewing intention (i.e., decision or motivation to perform the behavior) as the key proximal determinant of behavior. However, the relationship of intention with behavior is far from perfect; it equates to only a medium-large effect size for health behaviors ($r_+ = .43$, $k = 239$; McEachan, Conner, Taylor, & Lawton, 2011). The present study contributes to our understanding by investigating the extent to which this intention-behavior gap (Sheeran, 2002) changes as a function of the motivational basis of intention.

Previous studies have examined whether the extent to which intentions are based on different cognitions impacts on the intention-behavior relationship. Sheeran, Norman, and Orbell (1999), for example, showed that individuals whose intentions were based mostly on their overall attitudes had stronger intention-behavior relations than individuals whose intentions were based mostly on subjective (injunctive) norms (see also Trafimow & Findlay, 1996). Similarly, Godin, Conner, and Sheeran (2005) showed that the more intentions were based on moral norms, the stronger was the intention-behavior relationship. While Keer, Conner, Van den Putte, and Neijens (2014) showed that individuals whose intentions were based on their affective attitudes showed stronger intention-behavior relationships than those whose intentions were based on instrumental attitudes. Although these different studies offer insights into motivational bases as moderators of the intention-behavior relationship, they also suffer from a number of weaknesses.

A first weakness of previous studies is that they focus on just one or two potential moderators. In contrast, the present research examines a broader range of motivational bases of

intention. Using the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980), previous research has focused on either attitudinal (overall attitude, instrumental attitude, affective attitude) or normative (subjective norms, moral norms) motivational moderators. The justification being that these are the variables that motivate goal pursuit (i.e., an individual may intend to exercise because he/she perceives it to have many positive outcomes [attitudinal] or because he/she perceives important others to want him/her to perform the behavior [normative]). The TPB extends the TRA by adding perceived behavioral control (PBC) or self-efficacy as predictors of both intentions and behavior. The extent to which PBC/self-efficacy represent motivational bases of intentions is a matter of debate (see Eagly & Chaiken, 1993 on how we do not intend to 'shout in the library' just because we are confident we can). Therefore, in the present research we focused on attitudinal and normative motivational moderators and controlled for effects of PBC/self-efficacy (see below). In relation to attitudinal moderators we followed Keer et al. (2014) in assessing effects of both affective and instrumental attitudes. Commonly, affective components of attitudes are tapped by semantic differentials such as 'unpleasant-pleasant' or 'unenjoyable-enjoyable', while instrumental components of attitudes are tapped by items such as 'harmful-beneficial' or 'worthless-valuable' (Crites, Fabrigar, & Petty, 1982). Following recent research that distinguished between two different types of affective influences on health behaviors (Conner, McEachan, Taylor, O'Hara, & Lawton, in press) we also considered the moderating effects of intentions based on anticipated affective reactions (i.e., affect that is anticipated to follow performance or non-performance of the behavior). In relation to normative moderators, we considered the moderating effects of injunctive norms (i.e., perceived pressure from others to perform the behavior) as considered by Sheeran et al. (1999), but also descriptive norms (i.e., perceived performance of the behavior by others) as these have been shown to be important predictors of a range of health behaviors (Manning, 2009; Rivis & Sheeran, 2003). Finally,

following Godin et al. (2005), we also examined the moderating role of moral norms (i.e.,

personal feelings of responsibility to perform, or refuse to perform, a behavior) as a further

normative variable on which intentions might be based.

A second weakness of previous studies is their examination potential moderators

independently rather than considering their simultaneous influence. Such an approach gives little

insight into the combined effects of different moderators which might suppress or enhance one

another. In addition, such research has tended to rely on between-persons analyses where the

behavior of individuals with different intentions is compared. This is problematic because such

analyses address whether, for example, individuals with stronger intentions are more likely to

perform a health behavior compared to individuals with weaker intentions. Of more interest in

relation to understanding individual decision making about health behaviors is the extent to which

levels of intention and behavior covary within an individual and the factors influencing that

covariation. Multi-level modelling with random effects across multiple responses from an

individual allows us to assess that within-person association between intention and behavior and

the simultaneous effect of different motivational moderators. This allows estimation of the effects

of intention (plus other variables) on behavior within individuals and the simultaneous testing of

different motivational bases of intention as moderators of the intention-behavior relationship.

A third weakness of previous studies is their failure to control for the impact of other

important influences on behavior. The present research addressed this issue by controlling for two

other important determinants of behavior: PBC/self-efficacy and past behavior. SCT and TPB

converge in seeing intention and PBC/self-efficacy as direct determinants of behavior. Self-

efficacy is the perceived confidence the individual has that he/she can perform the behavior. PBC

is the degree of control the individual perceives he/she has over performing the behavior. Various

authors consider the two synonymous. McEachan et al. (2011) reported PBC/self-efficacy to have

a medium sized relationship with health behavior (r_+ = .31, k = 219) and to be a significant

independent predictor of health behaviors alongside intention (R^2 = .19, k = 219), despite the large

sized relationship between the two (r_+ = .54, k = 217). In addition, controlling for past behavior

allows examination of the effects of intention and PBC/self-efficacy on behavior change.

McEachan et al. (2011) showed significant effects for intention (B = .22) and PBC/self-efficacy (B

= .07) on behavior when controlling for past behavior (B = .38; R^2 = .30, k = 86).

   A fourth and final weakness of previous studies examining the impact of the motivational

basis of intentions (or motives) on the intention-behavior relationship is the failure to consider

variables that might explain any moderation effect. An exception is Keer et al. (2014) who show

that the moderating effect of basing intentions on affective attitude was partly explained by

impacts on the stability of intention. Individuals who based their intentions on their affective

attitudes also had more stable intentions and more stable intentions were more predictive of

behavior. Intentions remaining stable between the point at which they are measured and the point

at which behavior could occur is a limiting condition of theories such as the TPB (Ajzen &

Fishbein, 1980). Intention stability has been shown to be an important moderator of intention-

behavior relationships (Cooke & Sheeran, 2004), even over considerable time intervals between

the measurement of intention and behavior (Conner, Norman, & Bell, 2002). Intention stability

transports the effects of various other moderators of the intention-behavior relationship (Sheeran

& Abraham, 2003). The present study tested whether intention stability moderates the intention-

behavior relationship and whether controlling for intention stability effects removes any

significant moderating effect of motivational bases of intention. Such findings would provide

evidence that intention stability is a potential mechanism whereby the moderating effects of bases

of intention is transported to impact on behavior (see Hayes, 2013 on moderated mediation).

   In summary, the present research assessed the simultaneous moderating impact of several

motivational bases of intentions on the relationship between intentions and health behaviors using within-person analyses and controlling for the effects of past behavior and PBC/self-efficacy.

Method

Respondents and Procedure

Participants were recruited via a local newspaper advert, a Local Government newsletter, and an internet advert offering £20 (approximately $40) gift vouchers for completion of three postal questionnaires (each completed one month apart). Across baseline, one-month and two-month follow-ups 426, 387, and 366 questionnaires respectively were returned. Data predicting behavior at one month follow-up from baseline constructs were previously reported in [withheld to preserve anonymity]. Data matched across time points were available from 366 participants (approximately 61% of the number of questionnaires sent out at baseline) and included 260 females (74%) and 106 males with a median age of 39 years. The sample was similar to the population of England (Census data, 2001) from which they were drawn for age and education, but were more likely to be female.

Measures

Participants completed questionnaires measuring the same constructs for each of 20 health-related behaviors (eat 5 fruit and vegetables per day, wear a helmet when riding a bicycle, take recommended levels of physical activity, exercise regularly, eat a low fat diet, use sunscreen of at least 15SPF when exposed to the sun, adhere to all medication prescribed by a doctor, take vitamin supplements, brush teeth twice a day, floss teeth daily, binge drinking, drink more than the recommended daily limits of alcohol, smoking, using illegal drugs, exceeding the posted speed limit when driving, drinking and driving, visit dentist for yearly check-ups, attend health screening appointment when invited, visit doctor for a health problem, testicular/breast self-examination). The health-related behaviors were selected in order to represent a broad range of health behaviors

for which there were recommended guidelines. The measures taken in relation to each behavior varied by time point: baseline (intentions, instrumental attitude, affective attitude, anticipated affective reactions, injunctive norms, descriptive norms, moral norms, past behavior), one month follow-up (intentions), two month follow-up (behavior). Questions were developed to be consistent with recommendations for the wording of items to measure these constructs (Conner & Sparks, 2005). Additional measures were taken at each time point but are not reported here (full questionnaires available from first author).

Intention was measured by two items that remained consistent across behaviors (e.g., 'I intend to eat 5 portions of fruits and vegetables per day over the next four weeks, strongly disagree-strongly agree'; 'I am likely to eat 5 portions of fruits and vegetables per day over the next four weeks, very unlikely-very likely'; inter-item correlation correcting for multiple observations per respondent = .61, .53 respectively for baseline and one month follow-up). Instrumental attitude was measured using two items that were consistent across behaviors (e.g., 'Eating 5 portions of fruits and vegetables per day over the next four weeks would be: harmful-beneficial, worthless-valuable'; inter-item correlation correcting for multiple observations per respondent = .56). Affective attitude was measured as the average of two items that remained consistent across behaviors (e.g., 'Eating 5 portions of fruits and vegetables per day over the next four weeks would be: unpleasant-pleasant, not enjoyable-enjoyable', inter-item correlation correcting for multiple observations per respondent = .69). Anticipated affective reaction was measured using a single item that was consistent across behaviors (e.g., 'I will feel regret if I do NOT eat 5 portions of fruits and vegetables per day over the next four weeks, definitely no-definitely yes'). Injunctive norms were measured by a single item that remained consistent across behaviors (e.g., 'Most people that are important to me think that… I should-I should not… eat 5 portions of fruits and vegetables per day over the next four weeks'). Descriptive norms were

measured by a single item that remained consistent across behaviors (e.g., 'I think that most people

who are important to me will eat 5 portions of fruits and vegetables per day over the next four

weeks, strongly disagree-strongly agree '). Moral norms were measured by a single item that

remained consistent across behaviors (e.g., 'It would be morally wrong for me to not eat 5 portions

of fruits and vegetables per day over the next four weeks, definitely no-definitely yes'). Self-

efficacy was measured by two items that remained consistent across behaviors (e.g., 'If it were

entirely up to me, I am confident that I could eat 5 portions of fruits and vegetables per day over

the next four weeks, strongly disagree-strongly agree'; 'I have control over whether or not I eat 5

portions of fruits and vegetables per day over the next four weeks, strongly disagree-strongly

agree'; inter-item correlation correcting for multiple observations per respondent = .14), although

only the first item was used due to the low inter-item correlation[1]. Past behavior was measured

using a single item that was consistent across behaviors (e.g., In the past four weeks, I have eaten 5

portions of fruits and vegetables per day, never-always, scored 1-7). Behavior was measured

using a single item by asking participants to record the number of days on which they had engaged

in the behavior (e.g., 'On how many days in the past four weeks have you eaten 5 portions of fruits

and vegetables?'). There were six exceptions to this procedure. For sunscreen use, which is

context dependent, the question posed was: 'In the past four weeks I have used sunscreen of at

least 15SPF when exposed to the sun, never-always', scored 1-7. For the measure for self-

examination (of breasts or testicles), which was anticipated to occur only a few times in the four

week period of the study, it was 'In the past four weeks I have performed self-examination'

(Never, 1 time, 2 times, 3 times, 4 times, 5 times or 6+ times, scored 1-7). Finally, for taking

medication, visiting the dentist, attending a health screening appointment, and visiting the doctor

the measure took the form of a dichotomous choice (e.g., 'Have you visited the dentist for a check-

up in the past four weeks?, no-yes'). We dichotomized all continuous behavior measures using a

median split (medians: eat 5 fruit and vegetables per day, 19 days; wear a helmet when riding a

bicycle, 0 days; take recommended levels of physical activity, 9 days; exercise regularly, 4 days;

eat a low fat diet, 14 days; use sunscreen of at least 15SPF when exposed to the sun, 3 days; take

vitamin supplements, 0 days; brush teeth twice a day, 27 days; floss teeth daily, 1 day; binge

drinking, 0 days; drink more than the recommended daily limits of alcohol, 1 day; smoking, 27

days; using illegal drugs, 0 days; exceeding the posted speed limit when driving, 1 day; drinking

and driving, 0 days; testicular/breast self-examination, 1 day) to allow us to combine analyses

across all behaviors (0 indicated not performing more healthy behavior; 1 indicated performing

more healthy behavior one or more times).

Analyses

Data were analyzed in SPSS (version 20, SPSS Inc) and HLM (version 7, SSI). A number

of participants had missing data on at least one variable and were excluded. ANOVA and chi-

squared tests revealed no significance differences between those retained and those excluded on

age, gender, or highest educational qualification (ps > .30). These procedures resulted in a total of

4908 person-behavior data points spread across 366 individuals that were used in analysis.

We followed previous research (e.g., Keer et al., 2014) in conceptualizing the basis of

intention (i.e., degree to which intentions were based on instrumental attitudes, affective attitudes,

anticipated affective reactions, injunctive norms, descriptive norms, or moral norms) as an

individual difference measure. An advantage of this approach is that it more readily allows

comparisons between the strength of different bases. The measure was computed at the individual

level in SPSS and represents the within person correlation between baseline measures of the basis

measure (e.g., affective attitude) and intention across the various health behaviors. In order to

simplify comparisons with previous research in this area (e.g., Keer et al., 2013), we computed

these within-person correlations among measures taken at the same time point (i.e., baseline; see

Footnote 2 for effects of computing within-person correlations between baseline and one month

follow-up). We also followed previous research (e.g., Conner et al., 2002) in computing intention

stability as the within-person correlation between measures of intentions at different time points,

i.e., baseline and one month follow-up. In order to produce a set of scores with a normal

distribution, correlations were converted to Zr scores and means and SDs computed. In order to

assess the degree of independence of these moderators of intention-behavior relationships we

computed correlations among their Zr scores.

The main analyses used Hierarchical Linear Modeling using HLM7 (Raudenbush & Bryk,

2002) to test the relationship between intention and behavior, moderators of this relationship and

the impact of controlling for self-efficacy and past behavior. Although a total of 4908 pairs of

observations were available for testing the relationship between intention and behavior, our

analyses needed to control for the fact that each individual provides multiple observations, i.e., the

20 behaviors are clustered within individuals. Our model included three level 1 variables

(intention, self-efficacy, and past behavior all measured at baseline) and seven level 2 variables (Zr

transformed correlations between each of instrumental attitude, affective attitude, anticipated

affective reaction, injunctive norm, descriptive norm, and moral norm with intention measured at

baseline to tap bases; Zr transformed correlations between intention at baseline and intention at

one month follow-up to tap intention stability). In order to aid interpretation of the interaction

terms, the motivational bases and intention measures were mean-centred. In the HLM analyses the

Level 1 predictor variables were centered on the group mean, while the level 2 predictor variables

were grand mean centred. In order to allow variation across individuals we used random effects

and the Bernoulli model (due to the dichotomous nature of the dependent variable). We initially

computed an intercept only model and a baseline 'main effects' model that did not include any

cross-level interactions to compare against Model 1. Model 1 added the cross-level interactions

between level 1 intentions and level 2 bases of intentions (i.e., Zr correlations between intentions and instrumental attitudes, affective attitudes, anticipated affective reactions, injunctive norms, descriptive norms, or moral norms). Model 2 added the main effect of the level 2 variable of intention stability and the cross-level interaction between that variable and level 1 intentions. Model 3 added the level 1 variables of self-efficacy and past behavior.

For each model we report the -2 log-likelihood statistic (-2LL) to indicate model fit and a chi-squared test of the change in -2LL compared to the earlier model to indicate significance of improvement of fit. For each model we report unstandardized coefficients and standard errors, odds ratios and 95% confidence intervals around these odds ratios (all based on the population-average model with robust standard errors). The key test was the extent to which any of the cross-level interactions were significant in Model 1, as this would indicate that a moderator significantly influenced the intention-behavior relationship. Where a cross-level interaction was significant we explored the direction of effect using the free software provided by Preacher (Model 3) at http://www.quantpsy.org/interact/hlm2.htm. Given that interpretation of such effects requires the inclusion of only one moderator that includes the focal predictor (i.e., intentions) these analyses were run separately for each significant cross-level moderator. Model 2 tested the cross-level interaction for intention stability and the impact of including this moderator on the significance of other cross-level moderators. Model 3 tested the impact of controlling for self-efficacy and past behavior on the significance of the cross-level moderators

<div align="center">Results</div>

Moderator Variables

Table 1 shows the mean and SD and intercorrelations for our level 2 moderator variables. Examination of the mean intercorrelations indicated that among the baseline measures intentions were most strongly related to anticipated affective reactions and least strongly related to affective

attitudes. Examination of the SDs indicated that there was reasonable variation in each of the

moderators across individuals.

Examination of these inter-correlations of level 2 moderator variables (Table 1) indicated

that the degree of overlap among moderators was not excessive and unlikely to unduly bias the

subsequent analyses, i.e. largest correlation was .52 between the Zr transformed instrumental

attitude—intention correlation and the Zr transformed intention—injunctive norm correlation.

Multilevel Modelling

Table 2 reports the results of the multilevel modelling. An intercept only model (-2LL =

-6932.7) and a baseline model including the main effects but no cross-level interactions (-2LL =

-6943.5) were our comparison models (details not reported in Table 2). Model 1 added the cross-

level interactions between intentions and the six bases of intention to the equation (Table 2, Model

1) and was found to significantly reduce the -2LL compared to both the intercept only model

$(\Delta\chi^2(13) = 128.0, p < .001)$ and the baseline model, $\Delta\chi^2(7) = 138.8, p < .001$. In Model 1 only the

coefficients for intention and the cross-level interactions for anticipated affective reactions were

significant. None of the other cross-level interactions were significant, although the coefficient for

affective attitudes was marginally significant (p = .09). Simple slopes analyses indicated that the

impact of intention on behavior increased as intentions became more based on anticipated

affective reactions. The impact of intentions on behavior was significant at all levels of the extent

to which intentions are based on anticipated affective reactions, however it was weakest for those

individuals whose intentions were only weakly based on anticipated affective reactions (M − 1SD;

B = .525, SE = .027, p < .001), became stronger for those whose individuals intentions were

moderately based on anticipated affective reactions (M; B = .576, SE = .018, p < .001), and was

strongest for those individuals whose intentions were strongly based on anticipated affective

reactions (M + 1SD; B = .627, SE = .025, p < .001)[2].

        Model 2 added the main effect and the cross-level interaction for intention stability to the equation (Table 2, Model 2). This did not further significantly reduce the -2LL compared to Model 1, $\Delta\chi^2(2)$ = -6.9, ns. Nevertheless, the coefficient for the cross-level interaction for intention stability was significant in Model 2 alongside the cross-level interaction for anticipated affective reactions and the main effect for intentions. The fact that the coefficient for the cross-level interaction for anticipated affective reactions remained significant when controlling for the cross-level interaction between intentions and intention stability indicates that the latter does not fully transport the moderating effect for anticipated affective reactions on intention to behavior. The relatively modest change in the magnitude of the coefficient for the cross-level interactions for anticipated affective reactions between Model 1 and Model 2 suggests that any partial transportation of effect from intentions to behavior was relatively modest, although this was not formally tested here.

        Simple slopes analyses on the significant cross-level interaction for intention stability in Model 2 indicated that the impact of intention on behavior increased as intentions became more stable. The impact of intentions on behavior was significant at all levels of intention stability, however it was weakest for those individuals with the least stable intentions (M − 1SD; B = .484, SE = .027, p < .001), became stronger for those whose individuals with mean intention stability (M; B = .572, SE = .018, p < .001), and was strongest for those individuals with the most stable intentions (M + 1SD; B = .660, SE = .026, p < .001).

        Model 3 added self-efficacy and past behavior to the equation (Table 2, Model 3) and this significantly reduced the -2LL compared to model 2, $\chi^2(2)$ = 120.3, p < .001. In Model 3, the coefficients for intention, self-efficacy and past behavior were significant, and the the cross-level

interactions for both intentions based on anticipated affective reactions and intention stability remained significant (and little changed in magnitude). Overall, Model 3 indicated that behavior was more likely when intentions and self-efficacy were stronger and past behavior was more frequent. It also indicated that intentions were stronger predictors of behavior when they were more strongly based on anticipated affective reactions and when they were more stable.

Discussion

The findings indicated that the motivational basis (or motives) of intentions moderates the relationship between intentions and health behaviors. In particular, intentions to perform health behaviors based more strongly on anticipated affective reactions were stronger predictors of subsequent performance of these behaviors, even when controlling for self-efficacy and past behavior. In other words, the stronger the correlation between the feeling of regret associated with performing the behaviour and intention, the more likely that intention was to predict health behaviors. This effect was not fully accounted for by such intentions showing greater temporal stability.

The present research examined a number of motivational bases or motives for forming intentions, i.e. instrumental attitudes, affective attitudes, anticipated affective reactions, injunctive norms, descriptive norms, and moral norms. Our data indicated these different bases to be interrelated but relatively distinct (Table 1). Previous research had shown that intentions more strongly based on each of overall attitude, affective attitude or moral norms to be stronger predictors of behavior (Godin et al., 2005; Keer et al., 2014; Sheeran et al., 1999), although previous research had, in general, only considered these moderators individually. In the present research, all these moderators were considered simultaneously and only the extent to which intentions were based on anticipated affective reactions significantly moderated the intention-behavior relationship. Intentions became significantly stronger predictors of health behaviors as

these intentions became more closely based on anticipated affective reactions. When considered simultaneously, the extent to which individuals based their intentions on instrumental attitudes, affective attitudes, injunctive norms, descriptive norms or moral norms did not significantly impact on the strength of intentions to predict health behaviors. Importantly, the present research showed this effect for anticipated affective reactions when simultaneously considering multiple bases on which intentions could be formed and when controlling for two other key direct predictors of behavior (i.e., PBC/self-efficacy and past behavior). The current findings also showed intention stability to moderate the within-persons relationship between intentions and health behavior such that individuals with more stable intentions had intentions that were more predictive of health behavior than individuals with less stable intentions. However, the present research did not find that the intention stability moderator completely explained the moderating effects of the extent to which intentions were based on anticipated affective reactions. These findings suggest the importance of basing intentions on anticipated affective reactions in ensuring strong relationships between intentions and behavior but that the mechanism explaining this effect has not been fully identified. Future research might usefully attempt to test potential mechanisms and formally test their ability to transport the effect of the anticipated affective reaction moderator from intention to behavior (i.e., formally test the moderated mediation pathways; Hayes, 2013). For example, planning might represent one potential mechanism that has been explored in relation to both the intention-behavior relationship (Wiedemann, Schuetz, Sniehotta, Scholz, & Schwarzer, 2009) and the motives underlying intentions (Schuetz, Wurm, Warner, Wolff, & Schwarzer, 2014). The impact on health behaviors of manipulating the extent to which intentions are based on anticipated affective reactions could be usefully tested in future research.

Several previous studies using between-person comparisons point to the importance of anticipated affective reactions in moderating the intention-behavior relationship. For example,

Sandberg and Conner (2009; 2011) showed that intentions formed when one form of anticipated affective reaction (i.e., regret) is salient better predicted behavior than intentions formed when anticipated affective reaction was not salient. Abraham and Sheeran (2003) report similar results, although they found that the effect of anticipated regret on the intention-behavior relationship was explained by the temporal stability of the intention. Keer et al. (2014) reported effects for affective attitudes as a basis for forming intentions and also showed the effect was partially explained by intention stability.

The present results suggest that anticipated affective reactions may be particularly effective in binding individuals to their intentions. Keer et al. (2014) suggest that most affective consequences are generally experienced immediately or shortly after engaging in a behavior and as such may be especially salient in binding individuals to their intentions (Trope & Liberman, 2010). Therefore, people who strongly base their intentions to perform a behavior on anticipated affect are more likely to be instantly rewarded when they enact their intentions, in the sense that they immediately experience the expected affective consequences which led them to intend to perform the behavior. This might be contrasted with instrumental or normative (injunctive, descriptive or moral) outcomes that are generally experienced later. It may be through this immediate effect that affect is able to bind people to their intentions (see Kwan & Bryan, 2010; Sheeran & Orbell, 1999) in a way that other outcomes do not. However, this does not explain why the extent to which basing intentions on anticipated affective reactions significantly moderated the intention-behavior relationship, while the extent to which basing intentions on affective attitudes did not. The extent to which intentions are based on anticipated affective reactions or affective attitudes on average may have a role to play here. In the present data, on average, intentions were considerably more aligned with anticipated affective reactions than with affective attitudes (Table 1). In a meta-analysis of studies measuring anticipated affective reactions and affective attitudes for various

health behaviors, Conner et al. (in press) reported the former to be slightly stronger predictors of

intentions (r = .47 vs. .40). Future research that manipulates the degree to which intentions are

based on different forms of affect (anticipated affective reactions, affective attitudes) and other

bases and observes effects on intention-behavior relationships could provide useful insights here.

Consistent with previous research the present research showed the temporal stability of

intentions to be positively related to the size of the intention-behavior relationship (e.g., Conner et

al., 2002; Conner & Godin, 2007; Conner, Sheeran, Norman, & Armitage, 2000; Cooke &

Sheeran, 2004; Doll & Ajzen, 1992; Sheeran & Abraham, 2003). Importantly the present research

indicated that these effects previously shown in between-person analyses are also apparent in

within-person analyses. However, the present work did not find that intention stability fully

explained the moderating effects of the extent to which intentions were based on anticipated

affective reactions. Also using within-person analyses, Keer et al. (2014) previously showed that

intention stability partially mediated the effects of the extent to which intentions based on affective

attitudes moderate the intention-behavior relationship. Furthermore, Abraham and Sheeran

(2003), using between-person analyses, showed that intention stability mediated the moderating

effect of measuring anticipated affective reactions on intention-behavior relationships. Future

research might usefully explore alternative mechanisms that explain why basing intentions on

anticipated affective reactions makes them stronger predictors of behavior.

The present findings suggest that if we want to help individuals act on their intentions then

promoting greater correspondence between intentions and underlying anticipated affective

reactions to the target behavior, may be a useful approach. In the present research the focus was

on one anticipated negative affective reaction (i.e., regret), although future research might usefully

assess effects on other anticipated negative reactions like guilt, or on anticipated positive affective

reactions like pride or satisfaction (Sheeran, Harris, & Epton, 2014). More generally this research

adds to the growing body of research in showing the importance of various affective reactions

linked to behaviors in determining engagement with those behaviors. Given the present research

shows that intentions based on or aligned with anticipated affective reactions are more predictive

of behavior then interventions designed to promote behavior in this way are likely to require two

components. First, they need to promote the extent to which intentions are based on anticipated

affective reactions. Second, they need to increase positive intentions. In relation to the former,

Sheeran et al. (2014) showed that interventions targeting anticipated affective reactions produced

small to medium sized effects on intentions and behavior. Sandberg and Conner (2009) showed

that drawing attention to anticipated affective reactions through questioning was sufficient to

change cervical screening attendance, while Sandberg and Conner (2011) showed that this effect

only occurred when anticipated affective reaction questions preceded intention questions (i.e.,

anticipated affective reactions needed to be in mind when intentions were formed). Other

researchers have used either simple persuasive messages (Kellar & Abraham, 2005; Wardle et al.,

2003) or fear appeals (Cho & Salmon, 2006) to manipulate anticipated affective reactions. Further

tests of different manipulations are required in order to confirm the most effective way to

intervene to change behavior.

The present research has a number of strengths including a large sample, a prospective

design, and use of within-person analyses. There are also a number of weaknesses. The use of

self-reported measures of behavior is one important weakness and replicating the present findings

with objective measures of behavior (and past behavior) would be a useful step forward. A second

weakness was the reliance on single-item measures for a number of constructs (e.g., anticipated

affective reactions, injunctive norms, descriptive norms, moral norms, past behavior). Utilising

single-item measures may fail to capture the full range of a construct and does not permit

assessment of internal reliability. However, single-item scales have shown good predictive validity

for assessing complex constructs such as self-esteem (Robins, Hendin, & Trzesniewki, 2001). In

addition, we are not aware of any specific evidence related to the current constructs to suggest that

the use of single-item measures leads to systematic over or under-estimation of effect sizes. A

third weakness was the failure to match exactly the time frame between the intention and behavior

measures and, although additional analyses (Footnote 2) suggested that this did not unduly

influence the findings, it would be useful to confirm this in an independent study. A fourth

weakness was the reliance on correlational relationships. Future research that attempted to

manipulate the basis on which individuals form intentions and then observed effects on behavior

would be useful way to confirm that the correlational relationships observed here reflect causal

processes. Although examining effects across behaviors within individuals was presented as a key

strength of the present approach, this approach does not allow examination of the extent to which

the basis of intentions varies across behaviors. As Keer et al. (2014) note this would be an

interesting avenue for future research, particularly as previous research has shown the power of

anticipated affective reactions to predict intentions and behavior varies across different types of

health behavior (e.g., protection versus risk behaviors; Conner et al., in press).

In conclusion, the present research showed that individual differences in the degree to

which intentions were based on anticipated affective reactions (but not affective attitudes,

instrumental attitudes, injunctive norms, descriptive norms or moral norms) explained individual

differences in the intention-health behavior relationship. The findings indicate another way in

which affect may impact on health behaviors.

Footnotes

1. Including the perceived behavioral control item in the analyses did not substantively change the results reported in Table 2 (Model 3) with the cross-level interactions between intentions and anticipated affective reactions (Odds ratio = 1.110, 95%CI = 1.020—1.209) and between intentions and intention stability (Odds ratio = 1.133, 95%CI = 1.048—1.225) remaining significant.

2. Using intentions at one month follow-up to predict behavior at two month follow-up and using the within-subject correlations between bases of intention (e.g., anticipated affective reaction) at baseline and intentions at one month follow-up produced similar results to those reported for Model 1 in Table 2. The cross-level interactions between intentions and anticipated affective reactions (Odds ratio = 1.178, 95%CI = 1.038—1.338) and the cross-level interaction between intentions and affective attitude (Odds ratio = 1.228, 95%CI = 1.063—1.420) were both significant.

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Table 1.

Descriptives (Mean and SD) and Correlations for Level 2 Moderator Variables (N = 366).

	AA	AAR	IN	DN	MN	IS	Mean (SD)
Instrumental Attitudes (IA; γ_{11})	.275***	.341***	.523***	.279***	.210***	.335***	.483 (.363)
Affective Attitudes (AA; γ_{12})	-	.154**	.181***	.037	.164**	.214***	.429 (.295)
Anticipated Affective Reactions (AAR; γ_{15})		-	.449***	.299***	.333***	.385***	.653 (.399)
Injunctive Norms (IN; γ_{13})			-	.469***	.312***	.370***	.599 (.382)
Descriptive Norms (DN; γ_{14})				-	.272***	.298***	.585 (.347)
Moral Norms (MN; γ_{16})					-	.255***	.463 (.308)
Intention stability (IS; γ_{17})						-	.766 (.414)

Note Mean and SD is computed based on Zr transformation of r but was back transformed to r for ease of interpretation in the table. Correlations are based on Zr values. * p < .05; ** p < .01; *** p < .001.

Table 2.

Hierarchical Multi-Level Regressions of Behavior (Bernoulli Model) onto Intention, Self-Efficacy, Past Behavior and Cross-Level Interactions with Intentions (N of participants = 366; N of observations = 4908).

Predictors	B	SE	Odds Ratio	95%CI
Model 1				
Intercept (γ_{00})	0.200	.044		
Instrumental Attitude (γ_{01})	0.168	.141		
Affective Attitudes (γ_{02})	-0.406	.131		
Anticipated Affective Reactions (γ_{03})	0.114	.120		
Injunctive Norms (γ_{04})	0.034	.150		
Descriptive Norms (γ_{05})	-0.059	.143		
Moral Norms (γ_{06})	-0.263	.157		
Intentions (γ_{10})	0.579	.017	1.763***	1.725—1.847
Cross-level Interactions with Intentions				
Instrumental Attitude (γ_{11})	0.011	.057	1.011	0.904—1.130
Affective Attitudes (γ_{12})	0.124	.073	1.102	0.980—1.307
Anticipated Affective Reactions (γ_{13})	0.150	.0450	1.162**	1.054—1.281
Injunctive Norms (γ_{14})	-0.061	.062	0.941	0.833—1.063
Descriptive Norms (γ_{15})	0.044	.060	1.045	0.928—1.176
Moral Norms (γ_{16})	-0.090	.062	0.914	0.809—1.031
Model 2				
Intercept (γ_{00})	0.195	.043		
Instrumental Attitude (γ_{01})	0.202	.144		
Affective Attitudes (γ_{02})	-0.358	.135		

Anticipated Affective Reactions (γ_{03})	0.179	.124		
Injunctive Norms (γ_{04})	0.078	.154		
Descriptive Norms (γ_{05})	-0.021	.142		
Moral Norms (γ_{06})	-0.226	.158		
Intention stability (γ_{17})	-0.303	.116		
Intentions (γ_{10})	0.574	.017	1.776***	1.716—1.838
Cross-level Interactions with Intentions				
Instrumental Attitudes (γ_{11})	-0.018	.055	0.982	0.881—1.095
Affective Attitudes (γ_{12})	0.097	.070	1.102	0.959—1.265
Anticipated Affective Reactions (γ_{13})	0.112	.052	1.118*	1.010—1.238
Injunctive Norms (γ_{14})	-0.096	.062	0.908	0.804—1.025
Descriptive Norms (γ_{15})	0.020	.061	1.020	0.905—1.150
Moral Norms (γ_{16})	-0.106	.059	0.899	0.801—1.010
Intention stability (γ_{17})	0.202	.049	1.224***	1.112—1.347
Model 3				
Intercept (γ_{00})	0.214	.042		
Instrumental Attitude (γ_{01})	0.206	.139		
Affective Attitudes (γ_{02})	-0.351	.129		
Anticipated Affective Reactions (γ_{03})	0.181	.119		
Injunctive Norms (γ_{04})	0.038	.144		
Descriptive Norms (γ_{05})	-0.023	.135		
Moral Norms (γ_{06})	-0.217	.152		
Intention stability (γ_{17})	-0.276	.109		
Intentions (γ_{10})	0.393	.023	1.482***	1.417—1.550
Self-efficacy (γ_{20})	0.120	.016	1.127***	1.091—1.164
Past Behavior (γ_{30})	0.133	.020	1.143***	1.099—1.188

Cross-level Interactions with Intentions

Instrumental Attitudes (γ_{11})	-0.020	.050	0.990	0.888—1.082
Affective Attitudes (γ_{12})	0.072	.063	1.075	0.949—1.217
Anticipated Affective Reactions (γ_{13})	0.115	.045	1.122*	1.026—1.226
Injunctive Norms (γ_{14})	-0.075	.054	0.928	0.835—1.031
Descriptive Norms (γ_{15})	0.010	.053	1.010	0.910—1.122
Moral Norms (γ_{16})	-0.086	.053	0.918	0.827—1.018
Intention stability (γ_{17})	0.138	.42	1.147***	1.056—1.247

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

Note. B = unstandardized coefficient. Baseline Model without cross-level interactions, -2LL = -6943.5;

Model 1, -2LL = -6804.7; Model 2, -2LL = -6811.6; Model 3, -2LL = -6691.3.