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Applying the Reasoned Action Approach to Understanding Health Protection and Health Risk Behaviors

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Applying the Reasoned Action Approach to Understanding Health Protection and Health Risk Behaviors

Running Head: REASONED ACTION APPROACH TO HEALTH BEHAVIOR

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Abstract

Rationale: The Reasoned Action Approach (RAA) developed out of the Theory of Reasoned Action and Theory of Planned Behavior but has not yet been widely applied to understanding health behaviors. The present research employed the RAA in a prospective design to test predictions of intention and action for groups of protection and risk behaviors separately in the same sample.

Objective: To test the RAA for health protection and risk behaviors.

Method: Measures of RAA components plus past behavior were taken in relation to eight protection and six risk behaviors in 385 adults. Self-reported behavior was assessed one month later.

Results: Multi-level modelling showed instrumental attitude, experiential attitude, descriptive norms, capacity and past behavior were significant positive predictors of intentions to engage in protection or risk behaviors. Injunctive norms were only significant predictors of intention in protection behaviors. Autonomy was a significant positive predictor of intentions in protection behaviors and a negative predictor in risk behaviors (the latter relationship became non-significant when controlling for past behavior). Multi-level modelling showed that intention, capacity, and past behavior were significant positive predictors of action for both protection and risk behaviors. Experiential attitude and descriptive norm were additional significant positive predictors of risk behaviors.

Conclusion: The RAA has utility in predicting both protection and risk health behaviors although the power of predictors may vary across these types of health behavior.

Keywords: reasoned action approach; theory of planned behavior; health behavior; protection behaviors; risk behaviors.

Introduction

Identifying the key health cognitions predictive of engagement in health behaviors has been an important focus of research in health psychology. A range of health cognition models that describe these key health cognitions and their interrelationships have been applied to health behaviors (Conner and Norman, 2015). The Theory of Planned Behavior (TPB; Ajzen, 1991) is a prominent example (for reviews see Albarracin et al., 2001; Armitage and Conner, 2001; Cooke and French, 2008; Godin and Kok, 1996; Hagger et al., 2002; Hausenblas et al., 1997; McEachan et al., 2011; Sheeran and Taylor, 1999). Over the last decade researchers have developed the TPB into the Reasoned Action Approach (RAA; Ajzen and Fishbein, 2005; Fishbein and Ajzen, 2010) that distinguishes pairs of sub-components of attitudes, perceived norms, and perceived behavioral control as predictors of intention and action. A recent meta-analysis (McEachan et al., 2016) on health behaviors indicated the power of the six components of the RAA to predict intention and action. This meta-analysis suggested differences in the predictive power of RAA components for health protection and health risk behaviors. The present research reports a test of the RAA in the same sample of individuals across groups of health risk versus health protection behaviors. This is important because such comparisons might support the value of differential approaches to changing risk and protection behaviors through targeting different health cognitions.

Overview of the TPB and RAA

In the TPB, action is determined by intention and perceived behavioral control (PBC). Intention represents the motivation to engage in a behavior (Ajzen, 1991). PBC is the perceived control or confidence that the behavior can be performed. Intention is determined by attitude toward the behavior (e.g., whether engaging in the behavior is evaluated to be positive or negative), perceived norm (e.g., perceptions of whether others think one should engage in a behavior), and PBC. A meta-analysis of the TPB in relation to health behaviors indicated it explains 44.3% of the variance in intention and 19.3% of the variance in action (McEachan et al., 2011). In the RAA (Figure 1) attitude, perceived norm and PBC are tapped by pairs of distinct, but related, constructs

(Ajzen and Fishbein, 2005; Conner and Sparks, 2005, 2015; Fishbein and Ajzen, 2010; Head and Noar, 2014; see also the Integrated Behavior Model: Montano and Kasprzyk, 2008). Attitude is tapped by experiential and instrumental attitudes; perceived norm by injunctive and descriptive norms; and PBC by capacity (similar to self-efficacy) and autonomy. Fishbein and Ajzen (2010) focus on the three higher level constructs of attitude, perceived norm and PBC as predictors of intention. Intention is seen as the sole predictor of action, with PBC moderating the impact of intention on behavior rather than having a direct impact. However, based on evidence of discriminant validity (Conner et al., 2015; Manning, 2009; Rodgers et al., 2008), an increasing number of studies have tested the six lower level constructs (instrumental attitude, experiential attitude, injunctive norm, descriptive norm, capacity, autonomy) as predictors of both intention and behavior (see McEachan et al., 2016 for a review).

<<INSERT FIGURE 1 ABOUT HERE>>

Semantic differential measures of attitude can be separated into instrumental or cognitive (e.g., desirable–undesirable, valuable–worthless) compared to experiential or affective (e.g., pleasant–unpleasant, interesting–boring) components (see Ajzen and Driver, 1992; Crites et al., 1994). Experiential attitudes are more strongly correlated with intention and action (Ajzen and Driver, 1992; Ajzen and Timko, 1986; Chan and Fishbein, 1993; Lawton et al., 2007, 2009; Manstead and Parker, 1995). The two components have medium-sized intercorrelations (Conner et al., 2015) and can be discriminated based on underlying beliefs (Trafimow and Sheeran, 1998) and functions (Breckler and Wiggins, 1989) and based on experimental manipulations (Conner et al., 2011). McEachan et al. (2016) reported that both types of attitude influence action via intention but that experiential attitude may also directly influence action via an ‘impulsive’ path (Figure 1; Lawton et al., 2009; Strack and Deutsch, 2001).

Injunctive norm (social approval) has long been distinguished from descriptive norm (others’ behavior; Cialdini et al., 1991; Deutsch and Gerard, 1955). The two have discriminant validity (Manning, 2009; Rivis and Sheeren, 2003). McEachan et al. (2016) reported that both

forms of norm influence action indirectly through intentions, but that based on modelling or other processes descriptive norms may directly influence behavior (Figure 1).

The overlap between PBC and Bandura's (1977) definition of self-efficacy (i.e., '...the conviction that one can successfully execute the behavior required to produce the outcomes') has long been noted (Rodgers et al., 2008; Trafimow et al., 2002). The RAA distinguishes between capacity and autonomy. Capacity is defined in a very similar way to self-efficacy (Fishbein and Ajzen, 2010), while autonomy (or perceived control) is defined as involving, '…people's beliefs that they have control over the behavior, that performance or non-performance of the behavior is up to them' (Ajzen, 2006). This distinction may be a useful one, although the evidence supporting the power of autonomy measures to predict either intention or action is modest, capacity does appear to both indirectly (via intention) and directly predict action (McEachan et al., 2016) (see Figure 1).

RAA in Health Protection and Health Risk Behaviors

The RAA, like the earlier TPB and Theory of Reasoned Action (TRA), explicitly states that the power of different components to predict intention and action might vary for different populations and behaviors (Fishbein and Ajzen, 2010). Indeed, a meta-analysis of the TPB in relation to health behaviors (McEachan et al., 2011) reported behavior type to be a key moderator of model relationships. More specifically, in a meta-analysis of the RAA, McEachan et al. (2016) reported a number of significant differences in the predictors of intentions and action for protection versus risk behaviors. In particular, experiential and instrumental attitude were stronger correlates of intention in risk compared to protection health behaviors. Additionally, intention, experiential and instrumental attitudes, and injunctive and descriptive norms were each significantly stronger correlates of action in risk compared to protection behaviors.

There is relatively little previous work on which to expect differences in the power of RAA predictors of intentions. In contrast, there has been more work on how RAA predictors might differ in predicting action. Several authors have argued that for risk behaviors, in particular, that there may be a more impulsive pathway to action (i.e., a direct effect not via intentions) for attitudes and

norms. For example, Lawton et al. (2007, 2009) and Conner et al. (2015) have emphasized that affective influences such as experiential attitudes may directly influence action independent of intentions. Other researchers have adapted the TRA/TPB in order to explicitly include more impulsive pathway to action that might be particularly applicable to risk behaviors. For example, the Prototype-Willingness Model (PWM; Gibbons and Gerrard, 1995) was developed specifically for predicting risk behaviors in adolescent groups. The PWM emphasizes the role of normative influences and includes pathways to action through intentions and through behavioral willingness which is seen as the more impulsive route to action. A recent meta-analysis reported willingness to predict an additional 4.9% of variance in action after controlling for intentions (Todd et al., 2016). Together the above findings might suggest that experiential (and perhaps instrumental) attitudes and norms (injunctive or descriptive) are stronger predictors of action (independent of intentions) for risk compared to protection behaviors.

In addition, autonomy may operate in different ways in protection and risk behaviors. Although more autonomy is positively associated with intentions and action for protection behaviors (McEachan et al., 2016), there is a suggestion that autonomy may be negative associated with intentions and action for risk behaviors. For example, Cooke et al. (2016), in a meta-analysis of studies on alcohol, reported that autonomy was a marginally significant negative predictor of intentions and a significant negative predictor of action. This might suggest that while greater autonomy promotes intentions to perform and greater engagement in protection behaviors, in relation to risk behaviors greater autonomy promotes intentions not to perform and lesser engagement in risk behaviors.

Following on from McEachan et al. (2016), the present research examined differences in the predictive power of RAA components in relation to intentions and action for health protection versus health risk behaviors. The findings of McEachan et al. (2016) were limited by a number of weaknesses that the present research was designed to address. First, there were limited numbers of studies examining health risk behaviors in the McEachan et al. (2016) meta-analysis, which reduced

the power of tests of differences in correlations and precluded an examination of differences when controlling for the impact of other predictors of intention and action in the RAA. Second, the meta-analysis of McEachan et al. (2016) was not able to distinguish effects attributable to behavior differences from that attributable to sample differences. In fact, both were significant moderators for some relationships. Given that both behavior and sample may moderate relationships (McEachan et al., 2011), it is difficult to conclude confidently that the differences in power of different predictors in relation to intention and action were clearly attributable to health protection versus health risk behaviors. Third, McEachan et al. (2016) were unable to examine the effects of controlling for past behavior given that few studies reported the relevant correlations with past behavior. The present research sought to address these problems by conducting a prospective test of all constructs in the RAA plus past behavior across groups of health protection and health risk behaviors in the *same* sample of individuals. This approach allowed the power of the RAA to predict intention and action when controlling for past behavior to be tested separately in health protection and health risk behaviors. As each behavior was assessed within each individual, it removed the impact of sample variations on differences across behaviors that may have distorted differences between health protection and health risk behaviors.

Method

Measures

Participants completed questionnaires measuring the same constructs in relation to 20 health behaviors for which there were clear health recommendations. Health protection behaviors were defined as those where an increase in the behavior would be mainly associated with more beneficial health outcomes; health risk behaviors were defined as those where a decrease in the behavior would be mainly associated with more beneficial health outcomes. The behaviors included eight protection (eat five 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; take vitamin supplements; brush teeth twice a day; floss teeth daily) plus six risk (binge drinking; drinking more

than the recommended daily limits of alcohol; smoking; using illegal drugs; exceeding the posted speed limit when driving; drinking and driving) health behaviors that were the focus of attention here. Six other health behaviors were not further considered here because they were detection rather than protection or risk behaviors (testicular/breast self-examination) or because as less frequently performed behaviors they were assessed on different behavior measures (visit dentist for yearly check-ups; attend health screening appointment when invited; visit doctor for a health problem; use sunscreen of at least 15SPF [sun protection factor] when exposed to the sun; adhere to all medication prescribed by a doctor).

All questions except past behavior and action were responded to on a 1-7 scale rescored such that higher values represented more positive views of protective health behaviors (or more negative view of risk health behaviors). *Intention* (two items; e.g., 'I intend to eat five fruit and vegetables a day over the next four weeks, strongly disagree-strongly agree'; 'I am likely to eat five fruit and vegetables a day over the next four weeks, very unlikely-very likely'; *r*s = 0.62 to 0.77, 0.43 to 0.74 for protection and risk behaviors respectively); *Instrumental attitude* (two items; e.g., 'Eating five fruit and vegetables a day over the next four weeks would be: harmful-beneficial, worthless-valuable'; *r*s = 0.32 to 0.71, 0.41 to 0.66 for protection and risk behaviors respectively); *Experiential attitude* (two items; e.g., 'Eating five fruit and vegetables a day over the next four weeks would be: unpleasant-pleasant, not enjoyable-enjoyable', *r*s = 0.60 to 0.78, 0.68 to 0.90 for protection and risk behaviors respectively); *Injunctive norm* (one item; e.g., 'Most people that are important to me think that… I should-I should not… eat five fruit and vegetables a day over the next four weeks'); *Descriptive norm* (one item; 'I think that most people who are important to me will eat five fruit and vegetables a day over the next four weeks, definitely no-definitely yes'); *Capacity* (one item; e.g., 'If it were entirely up to me, I am confident that I could eat five fruit and vegetables a day over the next four weeks, strongly disagree-strongly agree'); and *Autonomy* (one item; 'I have control over whether or not I eat five fruit and vegetables a day over the next four weeks, strongly disagree-strongly agree').

Past behavior and *action* were measured with single items tapping the number of days on which the behavior was engaged in (e.g., 'On how many days in the past four weeks have you eaten five fruit and vegetables?'). These measures were dichotomized (median splits) because they were highly skewed and to allow analyses across all protection and risk behaviors (higher scores indicated healthier behavior; i.e., health behaviors with more protection and less risk).

Respondents and Procedure

Following ethical approval, participants were recruited in England via a variety of means (e.g., local newspaper advert, Local Government newsletter, internet advert) to a study requiring the completion of questionnaires on three occasions each approximately one month apart. Respondents received £20 (approximately $40) worth of gift vouchers following the return of the final questionnaire. Data from the final two phases of the study, Time 2 and Time 3 (one month later) are reported here. Although aspects of the data have been previously published (Conner et al., 2015), tests of the RAA for protection and risk behaviors have not been reported. A maximum of 385 participants provided useable data on at least one behavior (approximately 90% of the number of questionnaires sent out at baseline). The sample included 285 females (74%) and 100 males with a mean age of 39.0 years; the majority was in a relationship (70%), either married (41%), cohabiting (16%) or living separately (13%); 57% had at least one child. The highest educational qualification of the sample was: GCSE (American high school diploma at 10^{th} grade; 31%), A-level (American SAT; 19%), vocational qualification (12%), degree (25%) or postgraduate qualification (11%). Comparisons with statistics for England (Office for National Statistics, 2001) showed the sample to be similar to the national population from which they were drawn for age (mean age = 38.6 years for England) and education (20% at degree level or above for England), but less likely to be married (49% for England) and more likely to be female (52% for England).

Analyses

Descriptive data were analyzed in SPSS (version 20, SPSS Inc). The main regression analyses were conducted in HLM (version 7, SSI). Participants who had missing data on at least one

variable for all behaviors were excluded. ANOVA and chi-squared tests revealed no significant differences between those excluded in this way (N = 44) and those retained (N = 385) on age, gender, relationship status, number of children, or highest educational qualification (ps > .20). Cases were omitted when person-behaviors had missing data on any measured RAA variable. These procedures resulted in a total of 2,509 person-behavior data points spread across 383 individuals for the analyses of protection behaviors; and 1,559 person-behavior data points spread across 370 individuals for the analyses of risk behaviors. These figures represent 89.3% of persons and 73.1% of person-behaviors for protection behaviors and 86.2% of persons and 60.6% of person-behaviors for risk behaviors of all data that could have been available if every respondent had completed every question for every behavior at both time points.

The main regression analyses attempted to predict intentions and then action from RAA variables and past behavior separately for protection and risk behaviors. In order to control for the fact that behavior is clustered within individuals (i.e., each individual provides responses to multiple behaviors), the relationships among variables were analyzed using Hierarchical Linear Modeling using HLM7 (Raudenbush and Bryk, 2002). To allow variation across individuals, random effects were used. The data contained a two-level hierarchical structure, with Level 1 being the within-person variation and Level 2 the between-person variability. Level-1 predictor variables were centered around the group mean. To aid comparisons between protection and risk behaviors, analyses were conducted separately for the protection and risk behaviors. For predictions of intentions, a baseline intercept-only model was computed and compared this against a model that included all RAA variables (step 1) plus past behavior (step 2).

A similar approach was employed in relation to predictions of action but using a Bernoulli model (due to dichotomous behavior measure). After testing an intercept only model, the first model (step 1) included intention, while the second model (step 2) included the other main direct predictors of behavior from the RAA (capacity, autonomy), and the third model (step 3) included the interactions between intention and capacity or autonomy. The fourth model (step 4) added all

other RAA variables, while a fifth and final model (step 5) controlled for past behavior. For each model, reported are unstandardized coefficients, standard errors, and standardized coefficients (Hox, 2002) (i.e., beta weights or odds ratios). A deviance statistic (i.e., the -2 log-likelihood in logistic regressions) indicated model fit; and a χ^2 test of the change compared to the earlier model to indicate significance of improvement of fit (Cochran, 1952) are reported. Differences in unstandardized beta weights were compared for protection and risk health behaviors. Analyses do not model differences between individual protection behaviors or between individual risk behaviors because the focus was on comparing protection behaviors in general with risk behaviors in general. Similar approaches have been taken in relation to exploring health cognition-intention-action effects across behaviors (e.g., Carfora et al., 2017; Conner et al., 2015) or the stress-eating relationship across days (O'Connor et al., 2008).

Results

Table 1 reports the means and standard deviations for measured variables for protection and risk behaviors. Although several measures were skewed, there was little evidence of restricted variability (Table 1). Responses indicated that on average 74.8% of participants were engaging in the protection behaviors (ranging from 29.4% for wearing a helmet when cycling to 95.1% for brushing teeth). Responses also indicated that on average 37.8% of participants were engaging in the risk behaviors (ranging from 2.9% for drinking and driving to 96.6% for smoking).

<<INSERT TABLE 1 ABOUT HERE>>

Predicting Intentions

The predictors of intentions or action for protection were tested versus risk behaviors and compared the unstandardized regression coefficients across behavior types using Z-tests. In relation to prediction of *intention*, adding RAA variables (step 1) significantly reduced the deviance statistic compared to the intercept only model for both protection ($\chi^2(27) = 1861$, $p < .001$) and risk ($\chi^2(27) = 1260.4$, $p < .001$) behaviors. All RAA variables (instrumental attitudes, experiential attitudes,

injunctive norms, descriptive norms, capacity, and autonomy) were significant positive predictors of protection behaviors, while for risk behaviors all predictors except injunctive norms were significant predictors (step 1, Table 2). Autonomy was notably a significant positive predictor of intention for protection behaviors but a significant negative predictor of intention for risk behavior, and this difference in regression weights across behavior types was significant. Injunctive norm, descriptive norm and capacity were each significantly stronger predictors of intention for protection compared to risk behaviors. Controlling for past behavior (step 2, Table 2) also significantly reduced the deviance statistic compared to the RAA-only model for both protection ($\chi^2(8) = 346.4$, $p < .001$) and risk ($\chi^2(8) = 135.2$, $p < .001$) behaviors, although the pattern of prediction for previously included variables remained very similar. All RAA variables plus past behavior were significant positive predictors of intention for protection behaviors, while past behavior plus all RAA variables except injunctive norm and autonomy were significant positive predictors of intention for risk behaviors. Injunctive norm, descriptive norm, capacity, and autonomy remained significantly stronger predictors of intention for protection compared to risk behaviors when controlling for past behavior.

<<INSERT TABLE 2 ABOUT HERE>>

Predicting Action

In relation to prediction of *action*, multilevel modelling (Table 3) indicated that adding intention (step 1) significantly reduced the deviance statistic compared to the intercept only model for both protection ($\chi^2(1) = 100.1$, $p < .001$) and risk ($\chi^2(1) = 161.9$, $p < .001$) behaviors. Intention was a significant positive predictor for both protection and risk behaviors, although a *Z* test indicated it to be significantly stronger for risk behaviors. Adding capacity and autonomy (step 2) further reduced the deviance statistic for both protection ($\chi^2(2) = 57.6$, $p < .001$) and risk ($\chi^2(2) = 48.1$, $p < .001$) behaviors. Intention and capacity were significant positive predictors for both protection and risk behaviors, while autonomy was a significant negative predictor for risk

behaviors only (Table 3, step 2). Intention and capacity were both significantly stronger positive predictors for risk compared to protection behaviors. Autonomy was a significantly stronger negative predictor for risk compared to protection behaviors.

<<INSERT TABLE 3 ABOUT HERE>>

Adding the interaction between intention and capacity and between intention and autonomy further reduced the deviance statistic for protection ($\chi^2(2) = 24.7$, $p < .001$) but not for risk ($\chi^2(2) = -4.6$, *ns*) behaviors. At step 3 (Table 3), similar patterns remained for intention, capacity, and autonomy (intention was a significant positive predictor for both sets of behaviors but significantly stronger for risk behaviors; capacity was a significant positive predictor for both sets of behaviors with no significant difference between sets of behaviors; autonomy was a significant negative predictor for risk behaviors only and significantly more negative for risk compared to protection behaviors). The intention by capacity interaction was positive but not significant for either set of behaviors, while the intention by autonomy interaction was significant and negative for risk behaviors and non-significant and positive for protection behavior (and significantly more negative for risk compared to protection behaviors).

Adding the remaining RAA predictors (step 4, Table 3) further significantly reduced the deviance statistic for risk ($\chi^2(4) = 30.9$, $p < .001$) but not protection ($\chi^2(4) = -36.1$, *ns*) behaviors. Intention and capacity remained significant positive predictors of action for both protection and risk behaviors and were the only significant predictors for protection behaviors. For risk behaviors, autonomy was a significant negative predictor, while experiential attitude and descriptive norm were each significant positive additional predictors. For autonomy, experiential attitude, and descriptive norms there were significant differences between protection and risk behaviors. The intention by autonomy interaction for risk behaviors became non-significant at this step.

Adding past behavior at a final step (step 5) further significantly reduced the deviance statistic for both protection ($\chi^2(1) = 199.2$, $p < .001$) and risk ($\chi^2(1) = 31.6$, $p < .001$) behaviors.

Intention, capacity, the intention × autonomy interaction, and past behavior were each significant positive predictors of protection behaviors at this step. Intention, capacity, experiential attitude, descriptive norms, and past behavior were significant positive predictors of risk behaviors at this step. The intention × autonomy interaction and past behavior were significantly stronger predictors for protection compared to risk behaviors, while experiential attitude and descriptive norms were significantly stronger predictors for risk compared to protection behaviors.

The two significant interactions (Table 3) were decomposed by using simple slopes analyses using Preacher's software (Model 1) at http://www.quantpsy.org/interact/hlm2.htm. For the negative interaction between intention and autonomy for risk behaviors (Table 3, step 3), simple slopes analyses indicated that intentions better predicted behavior as autonomy decreased, i.e., intentions were stronger predictors of action at lower compared to higher levels of autonomy. Intentions were positively and significantly correlated with behavior at all levels of autonomy but were significant stronger predictors at low (M - 1SD; B = 0.831, SE = 0.088, p < .001) levels of autonomy compared to moderate (M; B = 0.753, SE = 0.093, p < .001) or high (M + 1SD; B = 0.676, SE = 0.106, p < .001) levels. For the positive interaction between intention and autonomy for protection behaviors (Table 3, step 5), simple slopes analyses indicated that intentions better predicted behavior as autonomy increased; thus, intentions were stronger predictors of action at higher compared to lower levels of autonomy. Intentions were positively and significantly correlated with behavior at all levels of autonomy but were significant stronger predictors at high (M + 1SD; B = 0.534, SE = 0.122, p < .001) levels of autonomy compared to moderate (M; B = 0.481, SE = 0.102, p < .001) or low (M - 1SD; B = 0.390, SE = 0.070, p < .001) levels.

Discussion

The findings show that for health protection behaviors, all RAA variables plus past behavior are significant positive predictors of intentions, with the strongest effects associated with capacity and past behavior. Capacity and past behavior are also the strongest predictors of intentions for health risk behaviors; instrumental attitude, experiential attitude and descriptive norms were also

significant positive predictors. Also in relation to intentions for risk behaviors, injunctive norms were not significant predictors, and autonomy was a significant negative predictor only when past behavior was *not* controlled. The differing findings for autonomy may help explain why in their meta-analysis of the RAA, McEachan et al. (2016) observed a non-significant relationship between autonomy and intentions across a range of behaviors when controlling for other RAA predictors. Injunctive norms, descriptive norms, capacity and autonomy were significantly stronger predictors of intentions for protection compared to risk behaviors. Given that these differences for predictors of intentions were not specifically predicted and were not previously observed in McEachan et al. (2016), they deserve attention in future studies.

In relation to prediction of action, the findings show intention, capacity and past behavior to be significant positive predictors for protection behaviors; and intention, capacity, past behavior plus experiential attitude and descriptive norms to be significant positive predictors for risk behaviors. The strong effects for intention are consistent with predictions from the RAA (Fishbein and Ajzen, 2010). The McEachan et al. (2016) meta-analysis of the RAA also reported intentions, capacity, experiential attitude, and descriptive norms to be significant independent predictors of action across a range of health behaviors, although this analysis did not control for past behavior. Both in the present study and the meta-analysis of McEachan et al. (2016), there were significantly stronger experiential attitude (action and descriptive norm) action relationships in risk compared to protection behaviors. In the present research, these difference remained when controlling for past behavior. Inconsistent with predictions from the RAA, these findings support the direct (i.e., an impulsive path) effect of experiential attitude and descriptive norms on action for risk behaviors.

The current findings provide stronger support for a direct impact of capacity on action rather than a moderating impact on the intention-action relationship as suggested by Fishbein and Ajzen (2010). In neither protection nor risk behaviors no evidence of an interaction between intention and capacity on action was observed. In contrast, there was some limited evidence for an interaction between intention and autonomy, although this varied between protection and risk behaviors. In

protection behaviors, we observed interaction was observed between intention and autonomy but no direct effect of autonomy. However, this was only significant when controlling for other RAA predictors and past behavior (Table 3, step 5). Decomposition of this interaction indicated that, as predicted (Fishbein and Ajzen, 2010), intention was a stronger predictor of action when autonomy was high. For risk behaviors, a negative interaction was observed between intention and autonomy and a negative direct effect of autonomy. However, the interaction was only significant when not controlling for other RAA predictors and past behavior (Table 3, step 2). Decomposition of this interaction indicated that intention was a stronger predictor of action when autonomy was low.

Future Research

The above findings highlight four important issues in relation to the application of the RAA. First, although experiential and instrumental attitudes are significant independent predictors of intention for both protection and risk behaviors, the former is also an independent predictor of action for risk behaviors. These patterns support the growing interest in experiential/affective attitudes as determinants of health behaviors in both correlational (e.g., Lawton et al., 2007, 2009) and experimental (e.g., Carfora et al., 2016; Conner et al., 2011) studies (see Conner, in press, for a review). Future research that attempts to independently manipulate experiential and instrumental attitudes and then observes effects on intentions and action in protection and risk behaviors would be valuable. The direct path whereby experiential attitude influenced action for risk behaviors in the present research may be particularly important in our view because it suggests an impulsive path to action (i.e., not mediated by intentions). This pattern might indicate that experiential attitude captures some of the more impulsive influences on action for risk behaviors and suggests the potential value of targeting experiential attitudes in interventions designed to change risk behaviors in particular. Future research might usefully explore whether manipulations of impulsive influences on health risk behaviors are reflected in changes in experiential attitude.

Relatedly, the findings in relation to the strength of RAA predictors of intentions across protection versus risk behaviors appear less consistent across studies. For example, McEachan et al.

(2016) reported the experiential attitude-intention relationship to be significantly stronger in risk compared to protection behaviors, although Conner et al. (2016) observed no significant differences. Unlike these studies, the present study controlled for other predictors of intentions and did not observe differences for experiential attitudes but did observe that injunctive and descriptive norms plus capacity were significantly stronger predictors of intentions in protection versus risk behaviors. Future research could examine whether these differences are attributable to controlling for other predictors of intentions or other factors.

Second, in relation to the impact of perceived norms, it is notable that both injunctive and descriptive norms are stronger independent predictors of intention for protection compared to risk behaviors (a pattern not observed in McEachan et al., 2016). Both emerged as significant independent predictors of protection behavior intentions, while only descriptive norms emerged as a significant independent predictor of risk behavior intentions. In contrast, descriptive norms were significantly stronger independent predictors of action for risk compared to protection behaviors (a pattern also observed in the McEachan et al., 2016, meta-analysis of the RAA), even when also controlling for past behavior. This indirect (via intentions) and direct (via impulsive path) effect for descriptive norms on action for risk behaviors suggest they may be a useful target in interventions designed to change such behaviors. The latter path may reflect modelling processes for descriptive norms that are not mediated by intentions being more important for risk behaviors (Gibbons and Gerrard, 1995) that are not present for injunctive norms. In contrast, indirect effects (via intentions) for both injunctive and descriptive norms for protection behaviors suggest they may be useful targets in interventions designed to change protection behaviors through changing intentions. Further research independently manipulating injunctive and descriptive norms and observing effects on intentions and action (and the relative size of direct/indirect paths to action) for protection and risk behaviors is required.

Third, in relation to capacity and autonomy as components of PBC, an inconsistent pattern emerges. Capacity emerges as the more consistent predictor of intention and action. After

controlling for other RAA predictors, capacity was a significant predictor of intentions for both risk and protection behaviors, although it was significantly stronger for the latter. Similarly, capacity was a significant predictor of action for both protection and risk behaviors when controlling for other RAA predictors and past behavior. No evidence emerged for capacity moderating the intention-action relationship in protection or risk behaviors. In contrast, for protection behaviors, autonomy was a significant positive predictor of intention when controlling for past behavior and other RAA variables but was never a significant predictor of action. For risk behaviors, autonomy was a significant negative predictor of intention when controlling for other RAA variables, although it became non-significant when controlling for past behavior. Autonomy was also a significant negative predictor of action, although not when controlling for other RAA variables and past behavior. The negative impact of autonomy is perhaps understandable as individuals may be more likely to intend to and actually perform risk behaviors when they perceive their autonomy to be low (see Cooke et al. 2016 on the negative effects of autonomy or perceived control for alcohol consumption). Overall the current findings would support the emphasis in interventions on capacity as opposed to autonomy when targeting protection or risk behaviors, which is consistent with other research perspectives such as Social Cognitive Theory (Bandura, 1997) and Protection Motivation Theory (Maddux and Rogers, 1983), where this variable is labelled *self-efficacy*. However, further research that independently manipulates capacity and autonomy and observes effects on intentions and action would be valuable before there is an exclusive focus on capacity (self-efficacy) to the exclusion of autonomy. This is particularly the case given lingering concerns about the overlap between measures of capacity/self-efficacy and intention/motivation (see Williams and Rhodes, 2016) that may not apply to measures of autonomy.

Fourth, the present research suggests a number of adaptations to the RAA when applied to protection versus risk behaviors. In relation to protection behaviors, even when taking account of past behavior, the RAA would appear to provide a good description of the influences on intentions and that such intentions may mediate the effects of most variables on action (although direct effects

of capacity and past behavior on action remain when controlling for intentions). In relation to risk behaviors, there may be reason to consider revising the RAA. In particular, injunctive norms and perhaps autonomy may not be strong determinants of intentions (when controlling for past behavior). In addition, for risk behaviors, while intentions may be the dominant predictor of action it may not fully mediate the direct effects of capacity, past behavior plus experiential attitudes and descriptive norms (see Figure 1). The direct effects for experiential attitude and descriptive norms on action in risk behaviors are worthy of further comment. A growing body of research has suggested that affective influences such as experiential attitudes may reflect more impulsive influences on action that may not be reflected in intentions (see Williams et al., in press, for a review). Similarly, the direct effects of descriptive norms on action may reflect modelling or other normative processes that impact on action through more impulsive rather than reasoned routes as suggested in the PWM.

In identifying differences between protection and risk behaviors the present research adds further support for the idea that a 'one size fits all' approach to developing interventions for health behaviors may be undesirable (McEachan et al., 2011). Future research could usefully begin to test whether interventions that change the key predictors identified here produces different effects for protection verses risk behaviors. Future research ought to examine differences in predictors between other groupings of health behaviors (e.g., protection and risk versus detection health behaviors).

Limitations

The present research has a number of strengths including examining a range of health protection and health risk behaviors in the same sample and controlling for past behavior. There are also a number of weaknesses including a reliance on self-reported action and the fact that a number of constructs were assessed with single items (although across multiple behaviors). The fact that we treated all protection and all risk behaviors as equivalent may also be considered a weakness. A further weakness is related to the dichotomizing of the behavior measure which results in a loss of variability. An important weakness is the lack of a direct comparison of the TPB and RAA,

although given the differing number of predictors in the two models, it may be difficult to do. Nevertheless, the new direct pathways to action from experiential attitude and descriptive norm identified here for the RAA, particularly if supported in subsequent research, may be considered an important advantage that partially offset the loss in parsimony for the RAA over the TPB. Moreover, further studies testing the discriminant validity of pairs of constructs (e.g., instrumental versus affective attitude) or novel studies showing that the constructs can be independently manipulated would be particularly valuable in order to more clearly demonstrate the value of the RAA over the TPB (see Sheeran et al., 2016 for a review of the impact of manipulating TPB components).

Conclusions

In summary, the present paper indicates the potential value of the RAA in helping us understand the determinants of health protection and health risk behaviors. Although less parsimonious than the TPB, the RAA offers unique insights into the determinants of health behaviors. Experiential attitude, instrumental attitude, descriptive norm, and capacity emerge as consistent predictors of intentions. Intention and capacity (plus experiential attitude and descriptive norms for risk behaviors) emerge as predictors of action when controlling for past behavior. Novel direct effects of experiential attitude and descriptive norm on action for risk behaviors, independent of intention, suggest important 'impulsive' influences on action that might form additional targets for interventions designed to change health risk behaviors (Figure 1, dashed lines). Strong impacts of past behavior on intention and action are observed for both protection and risk behaviors. An important future test of the RAA will be the extent to which the unique insights it provides into the determinants of health behaviors are supported in experimental tests of manipulations that test specific pathways in the model.

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Table 1
Means and standard deviations for measured variables (across behaviors).

	Protection Behaviors		*Risk Behaviors*	
	Mean	*SD*	*Mean*	*SD*
Instrumental Attitude	6.22	1.14	6.24	1.16
Experiential Attitude	4.71	1.59	5.05	2.02
Injunctive Norm	5.34	1.51	6.29	1.20
Descriptive Norm	4.17	1.76	5.31	1.92
Capacity	5.44	1.89	4.65	2.52
Autonomy	6.42	1.10	1.33	0.96
Intention	4.44	2.03	5.68	1.85
Past Behavior	0.52	0.50	0.62	0.48
Action	0.51	0.50	0.62	0.48

Note. For protection behaviors these data are based on $N_{participants}$ = 383; $N_{observations}$ = 2509; for risk behaviors these data are based on $N_{participants}$ = 370; $N_{observations}$ = 1559.

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Table 2
Hierarchical Multi-Level Regressions of Intention onto RAA Variables and Past Behavior.

Predictors	Protection			Risk			*Z*-test of Difference (Protection – Risk)
	B	*SE*	β	*B*	*SE*	β	
Step 1							
Intercept (γ_{00})	4.409	.053		5.732	.061		
Instrumental Attitude (γ_{10})	0.324	.040	0.182***	0.323	.052	0.203***	0.00
Experiential Attitude (γ_{20})	0.203	.027	0.159***	0.196	.032	0.214***	0.17
Injunctive Norm (γ_{30})	0.274	.031	0.204***	0.047	.041	0.030	4.42***
Descriptive Norm (γ_{40})	0.236	.022	0.205***	0.104	.027	0.108***	3.79***
Capacity (γ_{50})	0.368	.024	0.343***	0.235	.025	0.321***	3.83***
Autonomy (γ_{60})	0.087	.031	0.047**	-0.105	.048	-0.054*	3.36***
Step 2							
Intercept (γ_{00})	4.405	.053		5.734	.061		
Instrumental Attitude (γ_{10})	0.288	.038	0.162***	0.234	.048	0.147***	0.89
Experiential Attitude (γ_{20})	0.148	.024	0.116***	0.143	.029	0.156***	0.13
Injunctive Norm (γ_{30})	0.227	.027	0.169***	0.003	.046	0.002	4.20***
Descriptive Norm (γ_{40})	0.226	.021	0.196***	0.077	.026	0.080**	4.46***
Capacity (γ_{50})	0.287	.022	0.267***	0.162	.024	0.222***	3.83***
Autonomy (γ_{60})	0.082	.031	0.044**	-0.052	.046	-0.010	2.42*
Past Behavior (γ_{70})	1.091	.075	0.269***	0.924	.118	0.240***	1.19

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Note. B = unstandardized coefficient; β = standardized coefficient. For predicting *protection intention* using multilevel modelling with random effects ($N_{participants}$ = 383; $N_{observations}$ = 2509): Intercept only model at Step 0, Deviance = 10607.9; Step 1 model, Deviance = 8745.8, $\chi^2(27)$ = 1861.2, $p < .001$; Step 2 model, Deviance = 8399.4, $\chi^2(8)$ = 346.4, $p < .001$; for predicting *risk intention* using multilevel modelling with random effects ($N_{participants}$ = 370; $N_{observations}$ = 1559): Intercept only model at Step 0, Deviance = 6262.1; Step 1 model, Deviance = 5001.7, $\chi^2(27)$ = 1260.4, $p < .001$; Step 2 model, Deviance = 4866.5, $\chi^2(8)$ = 135.2, $p < .001$.

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

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Table 3
Hierarchical Multi-Level Regressions of Action (Bernoulli Model) onto RAA Variables and Past Behavior.

Predictors	Protection (P) B	SE	Odds Ratio	Risk (R) B	SE	Odds Ratio	Z-test of Difference (P – R)
Step 1							
Intercept (γ_{00})	0.014	.059		0.595	.040		
Intention (γ_{10})	0.562	.025	1.756***	1.014	.040	2.756***	-9.58***
Step 2							
Intercept (γ_{00})	0.015	.056		0.550	.063		
Intention (γ_{10})	0.481	.027	1.618***	0.654	.041	1.924***	-3.52***
Capacity (γ_{20})	0.152	.030	1.164***	0.269	.032	1.309***	-2.67**
Autonomy (γ_{30})	-0.048	.043	0.953	-0.273	.062	0.761***	2.98**
Step 3							
Intercept (γ_{00})	0.019	.055		0.549	.061		
Intention (γ_{10})	0.448	.026	1.565***	0.696	.049	2.006***	-4.47***
Capacity (γ_{20})	0.176	.038	1.193***	0.240	.032	1.271***	-1.29
Autonomy (γ_{30})	-0.001	.056	0.999	-0.240	.066	0.787***	2.76**
Intention × Capacity (γ_{40})	0.017	.012	1.017	0.018	.015	1.018	0.05
Intention × Autonomy (γ_{50})	0.037	.021	1.038	-0.050	.020	0.951*	3.00**
Step 4							
Intercept (γ_{00})	0.021	.056		0.522	.061		
Intention (γ_{10})	0.474	.032	1.611***	0.410	.052	1.506***	1.10

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Capacity (γ_{20})	0.191	.040	1.210***	0.151	.030	1.163***	0.80
Autonomy (γ_{30})	0.010	.060	1.010	-0.169	.068	0.845**	1.97*
Intention × Capacity (γ_{40})	0.022	.012	1.022	-0.004	.013	0.996	1.44
Intention × Autonomy (γ_{50})	0.039	.023	1.040	-0.018	.068	0.982	0.79
Instrumental Attitude (γ_{60})	-0.002	.053	0.998	0.072	.057	1.074	0.95
Experiential Attitude (γ_{70})	-0.016	.035	0.984	0.197	.034	1.218***	-4.35***
Injunctive Norm (γ_{80})	0.005	.039	1.005	0.047	.053	1.048	-0.65
Descriptive Norm (γ_{90})	-0.056	.030	0.946	0.239	.031	1.269***	-6.86***
Step 5							
Intercept (γ_{00})	0.006	.054		0.547	.061		
Intention (γ_{10})	0.201	.029	1.223***	0.237	.049	1.267***	-0.63
Capacity (γ_{20})	0.070	.033	1.073*	0.067	.027	1.070**	0.07
Autonomy (γ_{30})	0.016	.051	1.016	-0.098	.065	0.906	1.37
Intention × Capacity (γ_{40})	0.004	.010	1.004	-0.010	.011	0.990	0.93
Intention × Autonomy (γ_{50})	0.040	.019	1.041*	-0.013	.021	0.987	1.89*
Instrumental Attitude (γ_{60})	-0.023	.027	0.978	-0.006	.049	0.994	0.30
Experiential Attitude (γ_{70})	-0.028	.027	0.972	0.114	.031	1.121***	-3.46***
Injunctive Norm (γ_{80})	-0.004	.033	0.996	-0.013	.046	0.987	-0.15
Descriptive Norm (γ_{90})	-0.011	.024	0.989	0.137	.030	1.147***	-3.89***
Past Behavior (γ_{100})	2.383	.103	10.835***	1.975	.168	7.207***	2.07*

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

Note. B = unstandardized coefficient; β = standardized coefficient. For predicting *protection behavior* ($N_{participants}$ = 383; $N_{observations}$ = 2509): Intercept only model at Step 0, -2LL = -3528.0; Step 1, -2LL = -3427.9, $\chi^2(1) = 100.1$, $p < .001$; Step 2, -2LL = -3370.3, $\chi^2(2) = 57.6$, $p < .001$; Step 3, -2LL = -3345.6, $\chi^2(2) = 24.7$, $p < .001$; Step 4, -2LL = -3380.6, $\chi^2(4) = -36.0$, ns; Step 5, -2LL = -3181.4, $\chi^2(1) = 199.2$, $p < .001$; for

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predicting *risk behavior* ($N_{participants}$ = 370; $N_{observations}$ = 1559): Intercept only model at Step 0, -2LL = -2201.9; Step 1, -2LL = -2040.0, $\chi^2(1)$ = 161.9, $p < .001$; Step 2, -2LL = -1991.9, $\chi^2(2)$ = 48.1, $p < .001$; Step 3, -2LL = -1996.5, $\chi^2(2)$ = -4.6, ns; Step 4, -2LL = -1965.6, $\chi^2(4)$ = 30.9, $p < .001$; Step 5, -2LL = -1934.0, $\chi^2(1)$ = 31.6, $p < .001$.

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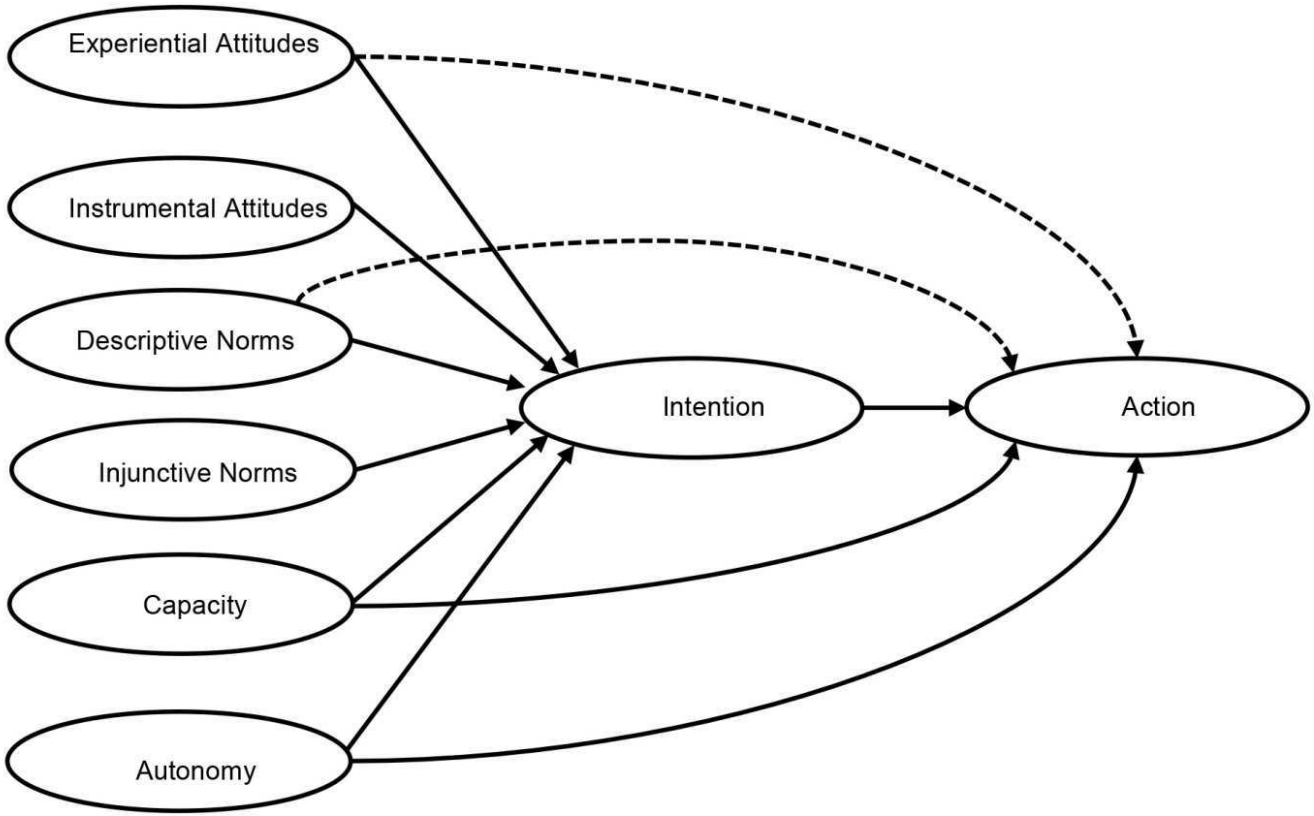

Fig. 1. The Reasoned Action Approach (RAA) indicating significant paths.

Note. All paths were significant and positive except for: dashed lines indicate additional paths that were significant and positive only for risk behaviors; injunctive norm was not a significant predictor of intention for risk behaviors; autonomy was not a significant predictor of behavior for protection behaviors but was a significant negative predictor of intention and action for risk behaviors. All paths were unchanged when controlling for past behavior except that autonomy was no longer a significant negative predictor of intentions.

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Research Highlights

- Reasoned Action Approach used to understand determinants of health behaviors.
- Examine intentions and action within individuals across health behaviors.
- Protection and risk behaviors have differing patterns of associations.
- Effects of controlling for past behavior explored.
- Within-subjects analyses in multi-level modelling aid understanding of determinants.

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