RUNNING HEAD: PREDICTING CONSUMPTION OF FOODS LOW IN SATURATED FATS

Predicting the consumption of foods low in saturated fats among people diagnosed with Type 2 diabetes and cardiovascular disease: The role of planning in the theory of planned behaviour

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Abstract

The present study tested the utility of an extended version of the theory of planned behaviour that included a measure of planning, in the prediction of eating foods low in saturated fats among adults diagnosed with Type 2 diabetes and/or cardiovascular disease. Participants (N = 184) completed questionnaires assessing standard theory of planned behaviour measures (attitude, subjective norm and perceived behavioural control) and the additional volitional variable of planning in relation to eating foods low in saturated fats. Self-report consumption of foods low insaturated fats was assessed 1 month later. In partial support of the theory of planned behaviour, results indicated that attitude and subjective norm predicted intentions to eat foods low in saturated fats and intentions and perceived behavioural control predicted the consumption of foods low in saturated fats. As an additional variable, planning predicted the consumption of foods low in saturated fats directly and also mediated the intention-behaviour and perceived behavioural control-behaviour relationships, suggesting an important role for planning as a post-intentional construct determining healthy eating choices. Suggestions are offered for interventions designed to improve adherence to healthy eating recommendations for people diagnosed with these chronic conditions with specific emphasis on the steps and activities that are required to promote a healthier lifestyle.

Key words: saturated fats consumption; theory of planned behaviour; planning, diabetes; cardiovascular disease

Chronic diseases such as diabetes and cardiovascular disease (CVD) have risen substantially in developed countries in the last decade. In 2004 to 2005, approximately 18 percent of the Australian population was diagnosed with CVD, placing enormous costs on the health care system (Australian Institute of Health and Welfare, 2006). Type 2 diabetes has increased significantly over the last 20 years in Australia. According to findings from the first national diabetes lifestyle study, AusDiab, 1 in 4 individuals has diabetes or is at a high risk of developing the disease within the next 5 to 10 years (Diabetes Australia, 2004). As well as being an independent risk factor for CVD, Type 2 diabetes shares similar risk factors to CVD and many individuals suffer from symptoms of both diseases[1]. Consequently, the need for effective interventions and improved management of these conditions is essential.

It is now generally accepted that healthy eating patterns are central to the prevention and optimal management of these two chronic conditions (e.g., Vessby, 2000). For dietary behaviours, nutritional guidelines for individuals with diabetes and CVD are the same as those recommended for all Australians. The Australian Guide to Healthy Eating published by the Commonwealth Department of Health and Ageing (2001) recommends daily intake of foods based on 3 general principles; namely, (1) reducing the dietary consumption of fat, with an emphasis on decreasing saturated fat, (2) increasing the consumption of carbohydrates, particularly those that are more slowly digested and, (3) increasing the intake of vegetables and fruit.

In relation to fat intake, the focal dietary behaviour of the present study, evidence indicates that, for individuals with lowered glucose tolerance, reducing saturated fatty acids in the diet may increase insulin sensitivity (e.g., Vessby, 2000). The National Heart Foundation of Australia (1999) reports that replacing a proportion

of saturated fatty acids with carbohydrates, polyunsaturated fatty acids, or mono-unsaturated fatty acids may decrease total cholesterol and Low-Density Lipoprotein (LDL) cholesterol. Lower LDL cholesterol is associated with decreased risk of cardiovascular morbidity and mortality.

Several studies have examined the factors that influence healthy dietary behaviours in the general population (e.g., Kuppens, Eriksen, Adriaanse, Nijhuis, & Aaron, 1996; Paisley, Lloyd, & Mela, 1993; Shepherd & Stockley, 1985), as well as focussing on dietary management in specific populations, such as people with diabetes, to identify the underlying factors that may facilitate a reduction in saturated fat intake (e.g., Glasgow, Toobert, & Hampson 1996; Glasgow, Toobert, Hampson, Brown, Lewinsohn, & Donnelly,1992; Halford, Goodall, & Nicholson, 1997; Plotnikoff, Lippke, Johnson, Hotz, Birkett, & Rossi, 2009; White, Terry, Troup, & Rempel, 2007). Given the recent shift in diabetes care from a passive patient care approach to a self-management, patient-centred approach (Glasgow, Peeples, & Skovlund, 2008), examining social cognitive variables (e.g., attitudes, normative support, barriers to dietary self-care; Blue, 2007; Blue & Marrero, 2006) that predict behavioural performance and behavioural change is now even more important, especially for at-risk populations such as individuals diagnosed with Type 2 diabetes and CVD.

In line with this focus on self-management, more recent studies have highlighted the importance of goal setting (e.g., Allen, 2004) or self-management goals (e.g., Glasgow et al., 2008) for the adoption of health recommendations among individuals with diabetes. Few studies, however, have provided a theoretical examination of the importance of forming goals or plans in health-related behavioural performance (e.g., physical activity or diet) among individuals with diabetes/CVD (Hardeman, Michie,

Fanshawe, Prevost, McLoughlin, & Kinmonth, 2008; Michie, Hardeman, Fanshawe, Prevost, Taylor, & Kinmonth, 2008; Williams et al., 2004). To address this gap in knowledge, we used an extension of a well-established social cognitive theoretical framework, the theory of planned behaviour, to examine the role of planning (i.e., forming goals for action) in the prediction of eating foods low in saturated fats among adults diagnosed with Type 2 diabetes and/or CVD.

According to the theory of planned behaviour (TPB; Ajzen, 1991), the immediate antecedent of behaviour is an individual's intention to perform it. Intention, in turn, is proposed to be a function of three independent determinants: attitudes, subjective norms and perceived behavioural control (PBC). Attitude refers to an individual's overall positive or negative evaluation of performing the behaviour. Subjective norms are based on an individual's perception of whether significant other people in their life would want them to perform or not perform the behaviour. Perceived behavioural control is the extent to which the individual perceives that the behaviour is under their volitional control and is argued to influence both intentions and behaviour (when estimates of actual control are accurate). Each of the TPB constructs is, in turn, seen to be determined by underlying sets of beliefs focusing on the perceived outcomes of the behaviour, beliefs of specific referents and facilitating and inhibiting factors.

There has been much support for the predictive efficacy of the TPB across a broad range of health-related behaviours (for meta-analyses, see Armitage & Conner, 2001; Godin & Kok, 1996), including healthy eating choices in general (e.g., Åstrøm & Rise, 2001; Conner, Norman, & Bell, 2002; Payne, Jones, & Harris, 2004; Povey, Conner, Sparks, James, & Shepherd, 1999; Povey, Conner, Sparks, James, & Shepherd, 2000) and specifically for low-fat food consumption (e.g., Armitage & Conner, 1999;

Paisley & Sparks, 1998) and consumption of food high in saturated fats(e.g., de Bruijn, Kroeze, Oenema, & Brug, 2008). To date, there is a paucity of research using the TPB framework to understand the health-related decisions of people with diabetes/CVD (Blue, 2007); however, the few studies that do exist provide support for the efficacy of the model in this context (Blue, 2007; Blue & Marrero, 2006; Chapman, Ham, Liesen, & Winter, 1995; White et al., 2007). For example, Blue (2007) found that attitude, subjective norm, and PBC predicted intention to eat a healthy diet amongst adults at risk for diabetes. In addition, the TPB has been used, with some degree of success, in designing interventions to encourage the performance of health-related behaviours (for a review, see Hardeman, Johnston, Johnston, Bonetti, Wareham, & Kinmonth, 2002), including healthy eating among older people (e.g., Kelley & Abraham, 2004).

Despite the support for the TPB in a wide range of behavioural contexts, some researchers (see Gollwitzer, 1993, 1999; Sheeran, 2002) have argued that social cognition models, such as the TPB, should be expanded to include volitional (i.e., post-intentional) variables to aid in the prediction of behaviour. Given that the TPB accounts for more variance, on average, in intentions than behaviour, researchers have attempted to identify the important determinants that may serve to reduce the "intention-behaviour gap". In this respect, Norman and Conner (2005) argue that, in addition to PBC, planning is a key volitional variable that can impact on the intention-behaviour relationship to the extent that specifying where, when and how an intended behaviour is to be performed may aid the movement from intention to action.

In their TPB studies examining exercise amongst undergraduate students, Norman and Conner (2005) found evidence for a moderating role of planning in the prediction of behaviour, suggesting that those who had formulated a plan to engage in

physical activity were more likely to translate their intentions to exercise into exercise behaviour. In addition, Norman and Conner found some evidence to suggest that the impact of intentions on behaviour may be mediated by the extent to which one undertakes planning activities (see also Gutiérrez-Doña, Lippke, Renner, Kwon, & Schwarzer, 2009; Jones, Abraham, Harris, Schulz, & Chrispin, 2001; Luszczynska & Schwarzer, 2003; van Osch, Beenackers, Reubsaet, Lechner, Candel & de Vries, 2009) . Given that food consumption usually requires a series of preparatory decisions (e.g., selecting appropriate products, purchasing the items, choosing recipes, and preparing and cooking meals), the extent to which specific planning processes had been conducted was included as an extended TPB construct in the present research to examine its direct impact on behaviour. In addition, we examined the potential mediating and moderating role of planning, as a volitional construct, in determining the consumption of foods low in saturated fats.

The present study aimed to test the role of planning in the TPB for the prediction of healthy eating choices among adults diagnosed with Type 2 diabetes and/or CVD. It was expected that attitudes, subjective norm, and PBC would predict intention to eat foods low in saturated fats and that intention and PBC would predict behaviour. In addition, the mediating and moderating roles of planning in determining the consumption of foods low in saturated fats were examined also. Specifically, planning was hypothesised to mediate the impact of intention on behaviour and to moderate the intention-behaviour relationship such that intention should be more predictive of behaviour when people engage in planning. The definition for the consumption of food low in saturated fats employed in the present study was based on recommendations contained in the Dietary Guidelines for Australians and the Australian Guide to Healthy

Eating (Commonwealth Department of Health and Ageing, 2001). These recommendations include: (1) using only low-fat dairy products, (2) using a monounsaturated or polyunsaturated cooking oil and (3) trimming all visible fat from meats.

Method

Participants

Participants were 184 adults (over 18 years of age) diagnosed with Type 2 diabetes and/or CVD recruited from 7 community health centre sites in Queensland, Australia. All participants were recruited voluntarily at an advertised information session about healthy behaviours. The Time 1 sample of participants comprised 107 (58%) females and 76 (42%) males (1 undisclosed). The mean age of participants was 60.71 years (*SD* = 8.54 years; range = 30 to 85 years). Most participants reported that they were of a Caucasian background (*n* = 175, 98%) and that they were married (*n* = 141, 78%). The most commonly reported occupations were retired (*n* = 59, 35%) and homemakers (*n* = 48, 28%). Approximately half of the participants (*n* = 88, 48%) reported being diagnosed with diabetes only, 6% of the participants (*n* = 11) having been diagnosed with CVD only and a further 46% of participants (*n* = 83) having been diagnosed with both Type 2 diabetes and CVD. The average length of time since diagnosis was 5.66 years (*SD* = 6.62 years) for those participants diagnosed with Type 2 diabetes and 10.79 years (*SD* = 11.74 years) for those participants diagnosed with CVD.

At the 1-month follow up, 133 (72.3%) participants completed a self-report assessment of their consumption of foods low in saturated fats. Analyses were conducted to assess for any differential effects between completers and non-completers

at the follow-up on the demographic factors and TPB variables; no significant differences were found.

Design and Procedure

The current study employed a prospective design and was part of a larger study examining the efficacy of a healthy behaviours intervention for adults diagnosed with Type 2 diabetes and/or CVD. The Time 1 questionnaire assessed participants' responses in relation to the TPB constructs of attitudes, subjective norms, PBC, intention, as well as planning and past behaviour, for eating foods low in saturated fats. The questionnaires were completed at an information session held 1 week prior to a healthy behaviours intervention trial that was designed to target the standard TPB constructs as well as the additional variable of planning. The healthy behaviours intervention trial consisted of weekly 2-hour sessions held over a 4-week period and targeted healthy eating behaviours (including choosing foods low in saturated fats) and the performance of regular physical activity. This intervention did not lead to any changes in participants' reports of their consumption of foods low in saturated fats, F (1, 124) = 0.90, p = .34, η^2 = .007, nor any of the extended TPB predictor variables (including planning), F (1, 110) = 1.43, p = .22, η^2 = .061. Nonetheless, any impact of the intervention on follow-up behaviour was accounted for in the analyses in the present study. Follow up questionnaires comprising a self-report measure of their consumption of foods low in saturated fats were mailed to all participants 1 month after the completion of the initial questionnaire.

Measures

The TPB items were based on guidelines specified by Ajzen (1991). Some of the measures included negatively worded items to minimise response bias. For all

measures, eating foods low in saturated fats was defined as eating low-fat dairy products, fat-trimmed meat, and use of mono- and polyunsaturated oils/spreads.

Intention. To assess the strength of intentions to eat food low in saturated fat, participants were asked the extent to which they agreed with the following statement: "It is likely that I will eat foods low in saturated fats during the next month". Responses were recorded on a 7-point Likert scale ranging from 1 *strongly disagree* to 7 *strongly agree*.

Attitude. A direct measure of attitude was assessed by asking participants to indicate their attitude to eating foods low in saturated fats on four 7-point evaluative semantic differential items: *unpleasant/pleasant, good/bad, negative/positive* and *favourable/unfavourable*. The average of the four items served as the measure of attitude. The combined scale possessed good internal reliability ($\alpha = .82$).

Subjective norm. Subjective norm was assessed by two items: "Most people who are important to me would approve of my eating foods low in saturated fats during the next month" and "Those people who are important to me would want me to eat foods low in saturated fats during the next month". Responses were recorded on a 7-point Likert scale ranging from 1 *strongly disagree* to 7 *strongly agree*. The two items were averaged to create a measure of subjective norm, and correlated highly, $r(185) = .72$, $p < .001$.

Perceived Behavioural Control (PBC). Perceived behavioural control was assessed by the item: "I have complete control over whether I eat foods low in saturated fats during the next month" with responses recorded on a 7-point Likert scale ranging from 1 *strongly disagree* to 7 *strongly agree*.

Planning. A planning index was obtained by summing and averaging responses to four items (in a similar scale to that used by Norman & Conner, 2005). Respondents were asked the extent to which they had planned: "what foods to buy to ensure you will eat foods low in saturated fats during the next month", "how to prepare meals to ensure you will eat foods low in saturated fats during the next month", "where to purchase food to ensure you will eat foods low in saturated fats during the next month ", and "how you will handle the situation if you don't feel like eating foods low in saturated fats during the next month". All items were scored on a 7-point Likert scale ranging from 1 *completely* to 7 *not at all*. The four item index was reliable (α =.86).

Behaviour. As for all of the other measures, participants were provided with a relevant definition for the target behaviour. Respondents were instructed that eating foods low in saturated fats can be achieved by eating low-fat dairy products, fat-trimmed meat and using mono- and poly-unsaturated oils. At Time 1, past behaviour was assessed by an item asking participants to indicate the extent to which they had eaten foods low in saturated fats (e.g., low-fat dairy products, fat-trimmed meat and mono- and polyunsaturated oils) during the past month. At the Time 2 follow-up, respondents were asked to indicate the extent to which they had eaten foods low in saturated fats (e.g., low-fat dairy products, fat-trimmed meat and mono- and polyunsaturated oils) during the past week. Responses for both time-points were rated on a 7-point scale, ranging from 1 *a small extent* to 7 *a large extent*. To increase the reliability of the behaviour measures at both time-points, a memory prompt required participants to complete a checklist indicating their food consumption (including eating foods low in saturated fats) during the previous month/week, respectively.

Results

Descriptive Statistics

Prior to hypothesis testing, a multivariate outlier was detected using Mahalanobis distance with $p < .001$ (i.e., an outlier value of 39.94; see Tabachnick & Fidell, 2007). As inclusion of this outlier changed the pattern of results substantially, this case was excluded from the analyses. The means, standard deviations, and correlations for the study's variables are reported in Table 1. Significant moderate correlations were found amongst the extended TPB predictors. As expected, all extended TPB predictors were significantly correlated with intention and behaviour. At Time 2 follow-up, the average self-rated level consumption of foods low in saturated fats was 5.91 ($SD = 1.45$), reflecting a fairly high level of consumption of foods low in saturated fats during the previous week.

Insert Table 1 about here

Regression Analysis Predicting Intention

A hierarchical multiple regression analysis was conducted to examine the predictors of intention to eat foods low in saturated fats. The standard TPB variables were entered at Step 1, with past behaviour entered at Step 2. The Step 1 variables accounted for 29% (28% adjusted) of the variance in intentions, $F(3, 163) = 22.37$, $p < 0.001$, with attitude and subjective norm emerging as significant predictors. The addition of past behaviour at Step 2 significantly increased the amount of variance explained in intention, $F(1, 162) = 8.49$, $p = 0.004$. When all the variables were entered into the equation, they explained 33% (31% adjusted) of the variance in intention with

attitude, subjective norm, and past behaviour (but not PBC) emerging as significant predictors (see Table 2).

Insert Table 2 about here

Regression Analysis Predicting Behaviour

A second regression analysis was conducted to explore the effect of the extended TPB variables in predicting a self-report measure of the consumption of foods low in saturated fats at 1-month follow-up. Step 1 controlled for any effects due to the intervention condition (control versus experimental). Intention and PBC were then entered at Step 2, with planning entered at Step 3 and past behaviour on the final step (Step 4)[2]. As expected, condition (at Step 1) did not explain a significant proportion of variance in behaviour, $F(1, 124) = 1.52$, $p = 0.22$. The addition of the Step 2 variables accounted for a significant proportion of variance in behaviour, $F(2, 122) = 8.64$, $p < 0.001$. Both intention and PBC were significant predictors at this step. The entry of planning in Step 3 accounted for additional variance, $F(1, 121) = 10.56$, $p = 0.001$. Planning emerged as the only significant predictor at this step with intention and PBC no longer significant predictors. Finally, the entry of past behaviour in Step 4 accounted for additional variance, $F(1, 120) = 7.98$, $p = 0.006$. Once all of the variables were entered into the equation, they explained 25% (22% adjusted) of the variance in behaviour, with planning and past behaviour as the only significant predictors of the consumption of foods low in saturated fats (see Table 3).

Insert Table 3 about here

Mediation Analyses

The results of the regression predicting behaviour revealed that intention and PBC predicted behaviour until entry of the planning construct, suggesting a potential

mediating role of planning on the relationship between intention and PBC on the consumption of foods low in saturated fats. Thus, we then examined the extent to which the post-intentional construct of planning mediated the impact of both intention and PBC on the target behaviour at 1-month follow-up. To examine the mediational hypotheses, analyses were conducted using the procedures developed by Preacher and Hayes (2008; see also Shrout & Bolger, 2002). Two mediational analyses were performed, one with intention as the IV and one with PBC as the IV. Mediation is shown if the path between two variables is reduced to zero (or close to zero) when a third variable related to both is statistically controlled (Baron & Kenny, 1986).

In the analyses examining whether planning mediated the effects of intention on behaviour, intervention condition (control versus experimental) and PBC were first entered as covariates followed by intention. The analysis revealed that intention (the IV) had a significant effect on behaviour (DV), $B = 0.30$, $SE = 0.13$, $p = 0.022$. Intention also had a significant effect on planning, $B = 0.53$, $SE = 0.11$, $p < 0.001$, which, in turn, was predictive of behaviour, $B = 0.33$, $SE = 0.10$, $p = 0.002$. The effect of intention on behaviour was reduced to non-significance when controlling for the effect of planning, $B = 0.13$, $SE = 0.14$, $p = 0.356$. Examination of the bootstrapped indirect effects indicated that planning significantly mediated the relationship between intention and behaviour, $B = 0.18$, $SE = 0.08$, $CI = 0.05$ to 0.35.

In the analyses examining whether planning mediated the effects of PBC on behaviour, intervention condition (control versus experimental) and intention were entered as covariates followed by PBC. The analysis revealed that PBC (the IV) had a significant effect on behaviour (DV), $B = 0.38$, $SE = 0.16$, $p = 0.016$. PBC also had a significant effect on planning, $B = 0.53$, $SE = 0.14$, $p < 0.001$, which, in turn, was

predictive of behaviour, $B = 0.33$, $SE = 0.10$, $p = 0.002$. The effect of perceived behavioural control on behaviour was reduced to non-significance when controlling for the effect of planning, $B = 0.21$, $SE = 0.16$, $p = 0.198$. Examination of the bootstrapped indirect effects indicated that planning significantly mediated the relationship between PBC and behaviour, $B = 0.17$, $SE = 0.08$, $CI = 0.06$ to 0.37.

Moderation Analysis

A moderated regression analysis was conducted to assess whether planning moderated the intention-behaviour relationship. An intention x planning interaction term was created (using centred variables to reduce multicollinearity; see Aiken & West, 1991) and entered, along with intention and planning, in a regression analysis to predict behaviour; however, the interaction term was non-significant ($\beta = 0.07$, $p = 0.47$).

Discussion

The aim of the present study was to examine the predictive utility of the TPB in the context of eating foods low in saturated fats among a sample of people diagnosed with chronic illness (Type 2 diabetes and/or CVD). In addition, the role of planning in determining people's adherence to the consumption of foods low in saturated fats was examined. There was some evidence in support of the study's predictions as attitudes and subjective norms (but not PBC) predicted people's intentions to eat foods low in saturated fats. In addition, intention and PBC were found to be predictive of the consumption of foods low in saturated fats at 1- month follow-up. However, further analyses revealed that the effects of intention and PBC on behaviour were both mediated by planning. Thus, the findings suggest that it is the extent of planning people have undertaken that directly influences self-reported eating of foods low in saturated

fats and that this planning mediates the effects of intentions and PBC on subsequent eating behaviour.

Considering intentions to eat foods low in saturated fats, attitude, subjective norm, and past behaviour emerged as significant predictors. Thus, participants diagnosed with Type 2 diabetes and/or CVD who had a more favourable attitude towards eating foods low in saturated fats, who felt that important others would approve of their consumption of foods low in saturated fats, and who had eaten foods low in saturated fats in the previous month were more likely to intend to eat foods low in saturated fats. PBC did not emerge as a significant predictor of intentions, with the high mean suggesting that most participants felt that the consumption of foods low in saturated fats was within their control. Interestingly, subjective norm - which is usually a weak predictor of intentions in general (see Armitage & Conner, 2001) and often less important that attitude in food-related studies (e.g., Armitage & Conner, 1999; Åstrøm & Rise, 2001; Povey et al., 2000) - emerged as the construct with the highest beta weight. Given that eating is often a shared, social activity, it is not surprising that the views of others are important. This general support for the TPB constructs in predicting people's healthy eating intentions is consistent with prior research (e.g., Povey et al., 1999; Povey et al., 2000) including in the context of low-fat food consumption (e.g., Armitage & Conner, 1999) and for at-risk groups such as those diagnosed with chronic conditions (e.g., Blue, 2007).

In the analyses predicting participants' consumption of foods low in saturated fats, the preliminary steps of the model revealed that both intention and PBC predicted behaviour directly. These findings are consistent with previous TPB studies examining healthy eating behaviours (e.g., Payne et al., 2004). However, once planning was added

to the model in a subsequent step, neither intention nor PBC remained as significant predictors of behaviour suggesting that planning may perform a mediational role in the relationship between both intentions and PBC and subsequent behaviour. As would be expected, past behaviour also predicted people's consumption of foods low in saturated fats directly, providing support for the role that people's previous dietary choices plays in predicting their current and future healthy eating decisions (e.g., Åstrøm & Rise, 2001).

According to Norman and Conner (2005), there is some evidence to suggest that the impact of intentions on behaviour can be mediated by the extent to which one undertakes sufficient planning (see also Gutiérrez-Doña et al., 2009; Jones et al., 2001; Luszczynska & Schwarzer, 2003; van Osch et al., 2009). The results of the present study revealed that planning mediated the impact of both intention and PBC on the reported intake of foods low in saturated fats. These results suggest that it is the planning strategies people engage in that serve as the means by which intention and PBC impact on actions. The emergence of planning in the present study as a mediational variable reinforces previous findings highlighting the importance of examining variables comprising the post-volitional factors proposed to bridge the intention-behaviour gap (see Gollwitzer, 1993, 1999). There was no evidence for a moderating role for planning in the relationship between intentions and behaviour, suggesting that the extent to which people engage in planning does not strengthen the intention-behaviour relationship (i.e., moderation hypothesis) but it does provide the means through which intention and PBC impact on behaviour (i.e., mediation hypothesis).

The results of the present study can be utilised to inform healthy lifestyle interventions for people who have been diagnosed with chronic conditions. In the first instance, it would seem that fostering a favourable attitude (e.g., by highlighting the benefits, rather than costs of eating foods low in saturated fats) and reinforcing the support from significant others (e.g., family, friends, doctors) for the consumption of foods low in saturated fats may be beneficial to encouraging adherence to healthy eating protocols among people diagnosed with serious medical conditions. The significant role for past behaviour in predicting people's consumption of eating foods low in saturated fats highlights the importance of efforts to encourage the habitual component of food choices. Importantly, people living with diabetes/CVD should be encouraged and assisted if necessary in developing detailed plans for how foods low in saturated fats can be consumed easily (e.g., what foods to buy and prepare and where to purchase them).

Despite the strength of a theory-based attempt to understand an important health behaviour, a number of limitations of the study should be noted. First, the majority of the sample was Caucasian and married, bringing into question the generalizability of the findings to other people (e.g., single, non-Caucasian) living with these chronic conditions. A second limitation of the study was the reliance on self-report data that may have inflated people's assessment of their consumption of foods low in saturated fats. A more detailed assessment (e.g., food frequency questionnaires) should be used in future research to validate the TPB measure of people's food consumption used in the current study. Further, although they were predictive of behaviour and the results were broadly in line with other TPB studies, both intention and PBC were assessed with single item measures which are likely to be less reliable than multi-item measures. This,

in turn, may underplay the impact of intention and PBC in the current study when compared to the 4-item planning measure. In addition, the multi-dimensional nature of PBC (e.g. Sparks, Guthrie, & Shepherd, 1997; Trafimow, Sheeran, Conner., & Finlay, 2002,) was not represented in the present study and it may be that the self efficacy element of PBC is more predictive than the perceived control component. Future research should use multi-item measures to increase the reliability of the TPB scales. Finally, in relation to the strong findings for the planning construct, it is possible that the study's participants, who were part of a healthy lifestyles intervention, may have been highly motivated to change and, therefore, were more likely to carry out planning activities.

Overall, the present study provided some evidence to suggest that the TPB model is useful in predicting the consumption of foods low in saturated fats among adults diagnosed with Type 2 diabetes and/or CVD with attitudes and subjective norms predicting behavioural intentions. In addition, the study provided support for the notion that the extent of planning people undertake serves as an important post-volitional factor in facilitating the intake of foods low in saturated fats, by both directly predicting behaviour and by mediating the impact of intentions and PBC on subsequent actions. Future research should continue to examine the utility of the TPB and in particular the role of planning in predicting the performance of healthy behaviours, especially in clinical samples where the need to adhere to healthy lifestyle choices is crucial.

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Footnotes

[1]Further highlighting the similarities between the two conditions, the American Heart Association states that "from the point of view of cardiovascular medicine, it may be appropriate to say, 'diabetes *is* a cardiovascular disease'" (Grundy et al., 1999, p. 1134)

[2]Including attitude and subjective norm in the last step of the regression predicting behaviour produced a similar pattern of results

Table 1

Bivariate Correlations Between the Extended TPB Variables and Self Report Consumption of Foods Low in Saturated Fats (N = 167)

	M	SD	1	2	3	4	5	6	7
1. Attitude	6.18	1.04		0.25***	0.23**	0.36***	0.33***	0.30***	0.21**
2. Subjective norm	6.17	0.91			0.39***	0.46***	0.44***	0.22**	0.23**
3. PBC	6.24	1.01				0.33***	0.45***	0.14*	0.27***
4. Intention	6.11	0.98					0.47***	0.35***	0.29***
5. Planning[a]	5.34	1.42						0.49***	0.41***
6. Past behaviour	5.79	1.48							0.42***
7. Follow-up behaviour[a]	5.91	1.45							

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

[a]For follow-up behaviour and planning $N = 126$.

Table 2
Summary of Hierarchical Regression Analysis for Variables Predicting Intentions to Eat Foods Low in Saturated Fats (N = 167)

Variable	*B*	*SE B*	β
Step 1			
Attitude	0.23	0.07	0.24***
Subjective Norm	0.38	0.08	0.35***
PBC	0.13	0.07	0.13
Step 2			
Attitude	0.18	0.07	0.19**
Subjective norm	0.35	0.08	0.32***
PBC	0.12	0.07	0.13
Past behaviour	0.13	0.05	0.20**

Note. R^2 = 0.29 for Step 1; R^2 = 0.33 for Step 2 (*p*s < 0.005). * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.
PBC = Perceived Behavioural Control

Table 3

Summary of Hierarchical Regression Analysis for Variables Predicting Follow up Consumption of Foods Low in Saturated Fats (N = 126)

Variable	*B*	*SE B*	*β*
Step 1			
Condition	0.35	0.29	0.11
Step 2			
Condition	0.38	0.28	0.12
Intention	0.30	0.13	0.21*
PBC	0.38	0.16	0.22*
Step 3			
Condition	0.44	0.27	0.14
Intention	0.13	0.14	0.09
PBC	0.21	0.16	0.12
Planning	0.33	0.10	0.32***
Step 4			
Condition	0.41	0.26	0.13
Intention	0.06	0.13	0.04
PBC	0.18	0.16	0.10
Planning	0.23	0.10	0.22*
Past Behaviour	0.27	0.10	0.26**

Note. R^2 = 0.01 for Step 1; R^2 = 0.14 for Step 2; R^2 = 0.20 for Step 3; R^2 = 0.25 for Step 4

(*p*s < 0.006 for Steps 2 to 4).

*p < 0.05. ** p < 0.01. *** p < 0.001.

PBC = Perceived Behavioural Control