

Using knowledge, attitudes, social norms, past behaviour and perceptions of control to predict undergraduates' intention to incorporate glycaemic index into dietary behaviour.

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Abstract

Aim:

The present study utilised an extension of the theory of planned behaviour to analyse intention to perform behaviour related to the glycaemic index of food. The extended model incorporated measures of past behaviour, pre-existing knowledge about glycaemic index and attitudes towards restrained eating.

Methods:

Seventy-two participants read an academic journal article about glycaemic index and completed questionnaires measuring predictor components of the theory of planned behaviour model.

Results:

Subjective norm and attitude were generally observed to be the best predictors of intention. Pre-existing knowledge about glycaemic index and attitude toward restrained eating were generally found to be poor predictors of intention. Past behaviour exhibited a positive relationship with intention.

Conclusions:

Interventions that focus on dietary behaviour related to the glycaemic index of food should involve individuals who have relationships of influence with the target demographic, such as friends and family, and will need to address modifying ingrained patterns of behaviour.

Keywords: *glycaemic index (GI); theory of planned behaviour; diet; behavioural intention*

INTRODUCTION

A recently popularised avenue of dietary research investigates the glycaemic index (GI) of food. GI is a property of carbohydrates that pertains to its digestive properties and effect on blood-sugar levels¹. In the past, GI has been investigated in terms of possible implications for diabetes sufferers. However, the extent to which everyday consumers consider the GI properties of food when forming their behavioural intentions has not been investigated. Diabetes is a lifestyle disease – the fastest growing chronic disease in Australia – and an estimated one in four adults has diabetes or an impaired glucose metabolism². The majority of research and interventions focus on ‘at risk’ categories of people; however diabetes is a symptom of pervasive lifestyle factors that result from industrialisation and modernisation of society. Replacing a high with a low GI diet can reduce the risk of diabetes³. In the interests of preventive nutrition, it is imperative that the determinants of desirable dietary behaviour are studied within the general public, and specifically amongst younger adults whose eating habits are a lifetime investment.

In an overview of global trends in lifestyle, science and technology, Aranceta⁴ investigated key themes and strategies for future community nutrition. In terms of preventive nutrition, GI is highlighted as central to reforming popular understanding of what constitutes a healthy diet. In addition, dietary approaches to preventing diabetes that utilise the GI concept have been strongly recommended⁵. In order to comprehensively implement GI as a key dietary consideration within society, younger people’s dietary patterns must be investigated as an imperative concern in order to effect long-term and widespread change.

Several social cognition models are available for studying health behaviour. The most widely implemented of these is the Theory of Planned Behaviour (TPB)^{6,7}, which is an extension of the Theory of Reasoned Action (TRA). Fishbein⁸ developed the TRA on the premise that attitudes serve to guide behaviour⁹ and suggested that the main cause of volitional behaviour is an individual's intention to perform the behaviour.

Ajzen and Fishbein¹⁰ posit two determinants of these behavioural intentions. The first is the individual's attitude that is shaped by the collection of beliefs held by him or her, toward performing the behaviour. The second determinant of behavioural intention is that of subjective norm, which is concerned with the various social pressures that an individual feels in relation to performing a particular behaviour.

The TPB uses the TRA components but acknowledges that not all behaviours are caused by purely volitional factors. It postulates an additional category of influence on an individual's enactment of health behaviours, known as perceived behavioural control (PBC)^{11,12}. PBC takes account of considerations about people's perceptions of control over a particular behaviour. Actual control over performance of any particular behaviour is difficult to define and measure, therefore perceptions of control are favoured in measurement situations¹³.

The TPB has been widely used to investigate a variety of dietary behaviours¹⁴⁻¹⁶ as well as health-related decision-making behaviours¹⁷. In one such case, Conner, Kirk, Cade and Barrett¹⁸ used the TPB to investigate women's use of dietary supplements and found that attitude, subjective norm and PBC were all significant predictors of supplement-taking intention in a sample of 179 women in the UK. In a study on healthy eating behaviour in native American youth, Fila and Smith¹⁷ analysed self-report

measures of healthy eating and found that subjective norm and PBC accounted for 30% of the variance in boys' behaviour, whereas for girls, attitude and subjective norm, together with additional measures of self efficacy and barriers being investigated, accounted for 45% of the variation in healthy eating.

Sutton¹⁹ argues that future behaviour is determined by past behaviour, in addition to the cognitions posited by the TPB. This is evidenced by the many studies that include past behaviour as an additional variable in the TPB framework and find that it explains a significant amount of the variance in measures of behaviour and behavioural intention²⁰. Conner and Sparks¹⁵ suggest that well-formed intentions integrate the effect of past behaviour, and recommend including measures of past behaviour to ascertain how much variance it accounts for in intentions in addition to the other variables.

Meta-analytic research conducted by Glasman and Albarracín²¹ on the relationship between attitude and behaviour has suggested that attitude confidence can mediate attitude stability. That is, weaker attitudes are more pliable than strong ones, and therefore may be more influenced by new information. GI is not a widely known dietary consideration amongst the general public, thus it is highly probable that people with more knowledge have stronger views on the subject, because they have had previous exposure to it. With this in mind, consideration must be given to the prior expertise of participants when they are being presented with information designed to influence their beliefs. However, it cannot be assumed that the target population will necessarily have any pre-existing knowledge about GI (thus they will have no basis for making judgments that pertain to GI). This issue must be addressed by research that investigates GI-related behaviour.

The overarching aim of the present study is to investigate the utility of the TPB in analysing health behaviours related to the GI of food, and to investigate the predictive strength of possibly relevant additional variables. It was hypothesised that attitude, subjective norm and perceived behavioural control would predict intention to engage in GI-related behaviours. It was also hypothesised that past behaviour **and** pre-existing knowledge about GI would increase the predictive utility of the TPB model in relation to GI behaviour.

METHODS

Participants

Participants were 72 Australian undergraduate Psychology students whose English language skills were deemed to be proficient and who participated in return for course credit. An online appointment system was used for recruitment. The experiment was advertised as an investigation into attitudes toward eating and was approved by the University Human Ethics Committee.

Measures

A questionnaire was constructed according to the guidelines and procedures defined by Ajzen and Fishbein¹⁰ and Ajzen²² to measure components of the TPB. Elicitation interviews were conducted with a convenience sample of 8 undergraduates, and two pilot studies were conducted with a total of 24 participants in order to develop reliable and valid measures.

Three behaviours of interest were selected as suitable for the study, each with a particular target, action, context and time. These were “Buying foods with a low GI the

next time I shop for food” (*shopping*), “Recommending food that has a low GI to someone I know within the next month” (*recommending*) and “Eating a meal that has a low GI, next time I prepare my own dinner at home” (*cooking/eating*). The diverse aspects involved with performing each of these behaviours may be susceptible to different influences on behavioural intention. All measures in the questionnaire were rated on seven-point Likert scales.

Attitude

Two indirect measures for each behaviour of interest were used. These were multiplicative composites of four belief strength and outcome evaluation measures, for example:

1. *A meal that has a low GI will taste nice. (extremely unlikely/ extremely likely)*
2. *To me, food tasting nice is... (extremely bad/ extremely good).*

Subjective Norm

Three indirect measures for each behaviour of interest were used. These were multiplicative composites of six measures of normative belief strength and motivation to comply, for example:

1. *My friends think that I... (definitely should/ definitely should not) ...eat a meal that has a low GI, next time I prepare my own dinner at home.*
2. *When it comes to preparing and eating food, how much do you want to do what the following group of people think you should do? family; friends; (not at all/ very much).*

PBC

Two indirect measures for each behaviour of interest were used (except shopping, for which there was one measure due to problems developing an appropriate item from the elicitation interview information). These were multiplicative composites of four control belief strength and control belief power, for example:

1. *Preparing a meal with a low GI is labour-intensive. (strongly disagree/ strongly agree).*
2. *A labour-intensive preparation process would make it... (extremely difficult/ extremely easy)... for me to eat a meal with a low GI, next time I prepare my own dinner at home.*

Past Behaviour

Past behaviour was a dichotomous measure assessed for each of the behaviours of interest. Participants were required to indicate whether they had engaged in the behaviour at all in the last month.

Existing Knowledge

A test for knowledge about GI was developed through research of the subject and feedback from piloting and elicitation interviews. The test contained thirteen items and was designed in a true-false response format, with a “don’t know” option to reduce the possibility of guessing. For example, “G.I. is a measure of how fast carbohydrates hit the blood system” and “the cooking process can alter a food’s G.I.”.

Reliability

To test the internal reliability for each of the TPB constructs, the cronbachs alpha was assessed for each of the direct measures. Scales were observed to have acceptable internal consistency, except for PBC, as seen in table 1.

INSERT HERE : Table 1

Procedure

Participants completed the GI knowledge test and demographic items. To ensure that participants were aware of low-GI diets and their implication for health, they were given a journal article that reviewed GI research – edited for length – to read²³. Participants completed the questionnaire that contained measures of the TPB. Time taken for each participant to undertake the tasks was approximately one hour. Participants received a debriefing upon completion.

Analyses

Data was analysed using SPSS version 15.0 for windows. Stepwise hierarchical regression analyses were run for each behaviour of interest. The first step looked at attitude, subjective norm and perceived behavioural control as predictors of intention, the second included GI knowledge and past behaviour as additional predictors of intention. In this way it was possible to consider the additional predictive power of the non TPB components.

RESULTS

Participant Information

Female $n = 49$, mean age = 20.8 years.

Multivariate Analyses

All overall regression models analysed were statistically significant at the $p < .05$ level. GI knowledge score and past behaviour contributed significantly to the variance explained by the TPB variables, for shopping behaviour and for all behaviours combined. However, these additional predictors did not contribute significantly to the TPB models for recommending and cooking behaviours and therefore did not warrant inclusion in the accepted model. Particular results of each model are shown in tables 2a and 2b.

INSERT HERE : Table 2a and 2b

DISCUSSION

In general, subjective norm was observed to be the most consistent predictor of variance in behavioural intention for health behaviours related to the GI of food. It significantly predicted the variance in behavioural intention for *recommending*, *cooking* and the overall measure of GI-related behaviour, whilst holding the effects of all other variables in the model constant. Intuitively this is not surprising, because subjective norm is a variable that captures notions of social influence, particularly from friends and family within this sample. It might be argued that the age group of the sample is one that is particularly vulnerable to social pressures. First year Psychology students often live with other people, whether with their parents, in share houses or in a college. Recommending food, as well as cooking and eating food, is usually done with possible judgements from

other people in mind. The case of recommending food can be considered as particularly important, since it is very much a socially embedded behaviour, connected with notions of persuasion and influence.

Attitude was a statistically significant predictor of intention in cooking/eating and generally across all behaviours combined, attitude was observed to be a statistically significant predictor of the variance in intention for *cooking/eating* and all behaviours combined, holding the effects of other variables constant.

Past behaviour was the only significant predictor of intention to perform *shopping* behaviour, controlling for the effects of attitude, subjective norm, PBC and pre-existing GI knowledge. This would suggest that intention to perform *shopping* behaviour is dictated and legitimated largely by habit. This priority in intervention is also generally applicable to all behaviours related to GI, since the model that incorporated all behaviours of interest also highlighted past behaviour as a significant contributor to the variation in intention, controlling for all other variables in the model.

The amount of variance in intention explained in the present study (average 30%) shows the extended TPB to be comparable with other studies which have used the model. For example, in a meta-analysis of 185 studies, the TPB on average accounted for 39 percent of variance in behavioural intention²⁴. This provides compelling evidence to suggest that the TPB has considerable utility in analysing health behaviours related to the GI of food.

According to analyses performed by Rashidian, Miles, Russell and Russell²⁵, the sample size for a TPB regression analysis which uses behavioural intention as a dependent variable and uses simple random sampling should be at least 148. Due to

practical constraints in the present study, the sample size used was only 72. Considering that this sample size is less than ideal for the regression analyses in the present study, the significant results obtained can be described as very convincing.

Implications

These results have several implications for interventions that seek to encourage health behaviour related to the GI of food in an undergraduate population. First, the importance of subjective norm as a predictor means that interventions should not solely target individuals, but attempt to include people around them, such as friends and family. For example, education about the importance of GI in long-term preventative nutrition for young adults, with particular reference to the health of their friend/sibling/child might be provided to them by their GP or local health organisation.

A second implication is concerned with attitude toward health behaviours related to the GI of food.. Interventions should aim at forming and strengthening attitudes toward GI, especially with regard to choices about cooking and eating. These could include advertising campaigns directed at young adults that shape a long-term perspective of their eating habits, as well as fun or unusual educational experiences, such as an on-campus promotion with a cooking demonstration that prepares a low-GI meal. Student accommodation such as university colleges would be an ideal place for intervention-related promotional materials and activities to be provided and held.

The issue of past behaviour is more difficult to address. Interventions with this emphasis – especially those focussed on shopping behaviour – must primarily focus on modifying ingrained patterns of behaviour. One suggestion is that environmental

changes, such as having low-GI food options conveniently located on campus, may assist in achieving this goal.

Limitations

None of the models showed PBC to be an individually significant contributor to the variance in behavioural intention. Sparks, Hedderley and Shepherd²⁶ note that control contributes relatively little toward predicting intentions to consume common foods. It may simply be that PBC is inapplicable in this context, and it might be argued that the behaviours analysed in the present study are under volitional control to a large degree. However, the unacceptably low internal consistencies observed in the direct measures of PBC suggest that something else may be happening.

The internal consistency of PBC items has frequently been shown to be low^{27,28}. One explanation given for this is that lay people may interpret the terms 'control' and 'difficulty' differently²⁹. This will need further investigation in order to appropriately inform the use of the PBC variable, and its measurement. However, the most commonly held explanation for the problems encountered by the PBC variable is that the construct itself may not be unitary²⁷. Other constructs that are potentially captured by measures of PBC have been suggested, including self-efficacy and actual, rather than perceived, controllability²⁷. In order to remedy this problem, further theoretical and empirical research must be conducted to inform the appropriate definition and measurement of these variables.

Measures of past behaviour used in the present study were dichotomous and can only be interpreted loosely. In order to inform interventions more specifically, further research that investigates different levels of past behaviour is required. It must also be

noted that the GI knowledge test used to measure this component needs further validation and any inferences made from the results can only be made tentatively.

The sample used in the present investigation were undergraduate psychology students. Replication of this study within different samples will be needed in order to determine the generalisability of results. However, considering that psychology students might be considered as 'lay' to specific dietary knowledge, they can be considered as somewhat representative of their age group and thus, there is no reason to doubt that the results of this study are likely to generalise.

Conclusions

French, Cooke, McLean, Williams, and Sutton⁶ point out that TPB measurement tools are different for every study and are therefore not adequately evaluated for reliability and validity like other psychological assessment tools. However, the point of analyses that utilise the TPB is to identify factors that affect intentions and behaviour in a specific context. The present study has provided a very useful application of the TPB in a sample of undergraduates, the results of which offer some helpful insights for informing future policy and interventions surrounding undergraduates' dietary behavioural intentions in the context of GI.

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TABLE 1
Internal Consistency (cronbach's alpha) of Direct Measures of Theory of Planned Behaviour
Components for Individual and Combined Behaviours of Interest.

Variable	Shopping	Recommending	Cooking/Eating	All Behaviours
Behavioural Intention	.93	.93	.93	.96
Attitude	.82	.85	.80	.91
Subjective Norm	.66	.75	.70	.89
Perceived Behavioural Control	.41	.49	.66	.78

Acceptable values are $\alpha > .70$

TABLE 2
Hierarchical Regression Summary for Model Variables on Intention for Shopping and Recommending Behaviour.

	Shopping					Recommending				
	R ²	ΔR ²	B	SE B	β	R ²	ΔR ²	B	SE B	β
<u>Step 1: TPB Variables</u>	.12*					.18**				
Attitude			.08	.13	.07			.14	.09	.17
Subjective Norm			.07	.05	.19			.14	.05	.35**
Perceived Behavioural Control			.02	.14	.02			.09	.11	.09
<u>Step 2: Additional Variables</u>	.24**	.11*				.21	.03			
GI Knowledge			.00	.20	.00			-	-	-
Past Behaviour			3.79	1.24	.38**			-	-	-

Note: N = 72. *p<.05, **p<0.01, ***p<.001. Where Step 2 variables are significant. All coefficients are reported for the accepted model. Note: N = 317. All coefficients are reported for the final step. * p < 0.05. **p < 0.01. ***p < .01.

