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Attitudes and intentions toward purchasing novel foods enriched with omega-3 fatty acids

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Attitudes and intentions toward purchasing novel foods enriched with omega-3 fatty acids

Abstract
Objective: To identify the nature, strength and relative importance of influences on intentions to consume foods that are enriched with omega-3 fatty acids using the Theory of Planned Behavior (TPB). Design: A cross-sectional self-administered questionnaire. Setting: Community based residents living in the Illawarra region of New South Wales, Australia. Subjects: Two sub-samples were surveyed via questionnaire: Community members who responded to a local media advertisement (n=79), and subjects in a dietary intervention trial for type 2 diabetes mellitus (n=50). Variables Measures: Using the TPB variables – intention, attitude, subjective norm and perceived behavioural control - questionnaire items were constructed to measure intention to consume omega-3 enriched novel foods. Analysis: Results from sub-samples did not differ and were combined for analysis. The determinants of intention defined in the TPB were investigated using multiple linear regressions. Results: Using regression analysis we were able to show that the model was a significant determinant of intention ($R2 = 0.725$, $P < 0.001$). Attitude was a significant determinant of intention whereas subjective norms and control beliefs were not. Discussion:With attitude having the greatest influence on intentions, immediate prospects for modifying behavior are likely to come through a change in attitude and specifically to beliefs about the effectiveness of enriched products in achieving specific health benefits. Conclusions and Implications: Promoters of omega-3 enriched foods would be advised to direct their promotions towards changing attitudes of consumers about the effectiveness of the functional ingredient.

Keywords
attitudes, functional foods, omega-3 fatty acids, theory of planned behavior

Disciplines
Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

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Attitudes and intentions towards purchasing novel foods enriched with omega-3 fatty acids

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ABSTRACT

Objective: To identify the nature, strength and relative importance of influences on intentions to consume foods that are enriched with omega-3 fatty acids using the Theory of Planned Behavior (TPB).

Design: A cross-sectional self-administered questionnaire.

Setting: Community based residents living in the Illawarra region of New South Wales, Australia.

Subjects: Two sub-samples were surveyed via questionnaire: Community members who responded to a local media advertisement (n=79), and subjects in a dietary intervention trial for type 2 diabetes mellitus (n=50).

Variables Measures: Using the TPB variables – intention, attitude, subjective norm and perceived behavioural control - questionnaire items were constructed to measure intention to consume omega-3 enriched novel foods.

Analysis: Results from sub-samples did not differ and were combined for analysis. The determinants of intention defined in the TPB were investigated using multiple linear regressions.

Results: Using regression analysis we were able to show that the model was a significant determinant of intention ($R^2 = 0.725$, $P < 0.001$). Attitude was a significant determinant of intention whereas subjective norms and control beliefs were not.

Discussion:With attitude having the greatest influence on intentions, immediate prospects for modifying behavior are likely to come through a change in attitude and specifically to beliefs about the effectiveness of enriched products in achieving specific health benefits.

Conclusions and Implications: Promoters of omega-3 enriched foods would be advised to direct their promotions towards changing attitudes of consumers about the effectiveness of the functional ingredient.

Keywords: attitudes, functional foods, omega-3 fatty acids, theory of planned behavior

INTRODUCTION

Anthropological[1], epidemiological[2, 3] and intervention studies[4, 5] have demonstrated the benefits of omega-3 fatty acids from fish. Subsequent human studies have isolated the bioactive components to be eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).[6-8] With a large proportion of the population not being able to consume enough of this essential nutrient through fish alone [9], coupled with recent advances in food technology such as microencapsulated fish oil[10], we have witnessed the increasing development of foods enriched with omega-3 fatty acids from fish oil.

These novel functional food products are distributed through traditional food markets and to be effective must first be purchased, and then incorporated into an individual's eating pattern. This presents unique challenges to health educators when considering the ability and potential of functional foods to deliver population health benefits. Efforts to increase intake depend, in part, on understanding the factors determining selection and intake.

The reasons for consuming functional foods are likely to be multifactorial, with a combination of social, psychological, knowledge based and economic factors. Earlier market segmentation studies in the US described the average functional food user to be female, well educated, with a higher income, aged between 35-55 years old and actively interested in health as a result of illness.[11] More recently, Bech-Larsen and Grunert (2003) examined attitudes relating to perceived healthiness of functional foods across different cultures.[12] They found that different processing methods, the use of different health claims, types of enrichments and types of products were determinants of consumers' acceptance of functional foods. Some studies have investigated demographic characteristics of users and non-users, however, they note that characteristics are specific to the functional food under study.[13] Overall, research into factors that determine choice of functional food is limited and no studies to date have investigated the specific factors

affecting the use of foods enriched with omega-3 fatty acids.

One model that has been used to explain health related behavior in the past is the Theory of Planned Behavior (TPB).[14] It has been applied to food-related behaviors such as supplement use [15], genetically modified foods [16], dairy product intake [17] and organic vegetable consumption.[18] According to the theory, behavior is directly predicated by intention to perform this behavior, as well as control factors, when behavior is not under complete volitional control. Intention in turn is determined by attitudes (A) toward the behavior, subjective norms (SN) and perceived control over the behavior (PBC). Intention can be viewed as the conscious plan to carry out a particular behavior and the motivation to perform it. Each of these determinants is formed from a set of referent beliefs. Attitudes are determined by a behavioral belief about performing a particular behavior. This is the combination of strength of the belief (BS) combined with the belief that performing a particular behavior will result in the outcome (OE). Also, Subjective Norm is determined by the social pressure and beliefs held by significant others, or normative beliefs (NB), combined with the motivation of the individual to comply with this pressure (MC). Perceived behavioral control is determined by the likelihood of various factors outside of direct control to facilitate or inhibit a certain behavior. Therefore, a person who has a positive attitude toward a behavior, perceives social pressure to perform the behavior and believes that they have control over their decision to perform the behavior is more likely to carry out that behavior. The purpose of this research was to identify the nature, strength and relative importance of influences on intention to purchase foods that are enriched with omega-3 fatty acids.

METHODS

QUESTIONNAIRE DEVELOPMENT

Survey questions were developed using results obtained from focus group interviews, as recommended by Ajzen & Fishbein (1980).[14] The details of those interviews are described elsewhere.[19] In brief, thirteen men and twenty-nine women, making a total of forty-two participants, attended six focus groups. An interview guide was prepared consisting of 10 questions which were devised using the TPB as a theoretical framework. These questions were used to generate discussion on consumer awareness, salient beliefs and attitudes and barriers toward using functional foods enriched in omega-3 fatty acids. To introduce the concept of functional food, sample products were provided as prompts for discussion - Specific omega-3 enriched food products were used as prompts for discussion - Tip Top's *Up*™ bread and Meadow Lea's *Hi Omega*® margarine (both enriched with omega-3 fatty acids). Each focus group was tape-recorded, transcribed and content analysed using Nvivo 2.0 (2002, QSR International Pty LTD). Sub-categories were developed to capture emerging themes. These formed the basis of the questions used in the questionnaire. Example foods enriched with omega-3 fatty acids were included in the instructions on filling out the questionnaire.

1. Intention (I) The dependent variable, intention, was measured by a global question using a seven point bipolar differential scale as suggested by Ajzen and Fishbein (1980).[14] Respondents could choose extremely unlikely, quite unlikely, slightly unlikely, neither, slightly likely, quite likely or extremely likely (+3 to -3) to the statement: *I intend to eat one or more foods with added omega-3 oils over the next two weeks.*

2. Attitude (A) Behavioral beliefs consist of two components: the evaluation of an outcome, or belief strength (BS) and the perceived likelihood of an outcome of the particular behavior (OE). Therefore beliefs relating to omega-3 functional foods were transformed into consequences of purchasing by multiplying the

belief strength by the outcome evaluation (BS X OE) and a mean computed (possible range +9 to –9) and reflect an overall attitude scale. The independent variable, attitude, was also measured by a global question using a seven point bipolar differential scale. Respondents could choose favourable to unfavourable (+3 to -3) to the statement: *Overall, my attitude toward my eating foods with added omega-3 oils over the next two weeks is.*

2a. Belief strength (BS) Eleven independent variable statements were used to assess belief strength towards purchasing foods enriched with omega-3 fatty acids: provide long-term health benefits, importance of obtaining the health benefits, may be at risk of inadequate intake of nutrient, may be at risk of over exposure of this nutrient, importance of scientific proof, developing new ways to make it easier to choose a diet high in omega-3, provide heart health benefits, provide brain health benefits, provide eye health benefits, improve arthritis and improve asthma. Each statement was anchored on a bipolar differential 7-point scale ranging from extremely important to extremely not important.

2b. Outcome evaluation (OE) The TPB assumes that having a positive attitude towards a behavior is based on believing that the behavior will be likely to lead to positively evaluated outcomes, or will be unlikely to lead to negatively evaluated outcomes. Therefore for each of the BS there was an equivalent outcome evaluation statement. Each statement was anchored on a bipolar differential 7-point scale ranging from extremely likely to extremely unlikely.

3. Subjective Norm (SN) The TPB assumes that normative factors are based on perceptions of whether specific significant others believe you should perform the behavior or not (Normative Belief), and the motivation to comply with the wishes of these significant others. Therefore beliefs relating to omega-3 functional foods were transformed into consequences of purchasing by multiplying the normative belief by the motivation to comply and a mean was computed (possible range +9 to –9). This reflects an overall subjective norm scale (SN). The independent variable, subjective norm, was also measured by a global question using a seven point bipolar differential scale. Respondents could choose extremely likely to extremely unlikely (+3 to -3) to the statement: *most people who are important to me think I should eat*

foods with added omega-3 fats.

3a. Normative beliefs (NB) Groups or individuals whose views might influence functional food use were also explored. Seven normative beliefs (NB) were assessed: family, friends, medical practitioners, nutritionists, scientists and food industry. For example one statement is *"most members of my family think that I should eat foods with added omega-3 oils"* (extremely likely – extremely unlikely). Normative belief statements were scored from +3 to –3.

3b. Motivation to comply (MC) Motivation to comply with the beliefs of significant others was also determined. For each of the NB there was a question relating to the motivation to comply. For example one statement is *"Generally speaking, I want to do what my family thinks I should do.*" Motivations to comply statements were scored from +3 to –3. Each statement was anchored on a bipolar differential 7-point scale ranging from extremely likely to extremely unlikely.

4. Perceived Behavioral Control (PBC) Factors, which might facilitate or inhibit functional food use, are termed control beliefs (CB). Included in our questionnaire were availability at the supermarket, control over shopping, cost, taste, time, and suitability for the family. In addition a global question of control was included: *" how much control do you have over whether you do or do not eat foods with added omega-3 oils"* (seven point scale: complete control - very little control). Unlike other determinants of intention, CB does not correspond with measures of intention. The TPB assumes that the higher CB would be found in those intending to purchase functional foods. In this case it was expected that a high CB would result in both intention to purchase or not to purchase functional foods, whereas a lower CB would result in no intention to purchase. For this reason CB was transformed into a binomial scale. The transformation involved estimating whether motivation was either positive or negative from the determinant variables,

therefore placing PBC as either, (a) having control over purchasing or not purchasing, or (b) no control.

DATA ANALYSIS

Internal consistency reliability of the scales used to measure the variables was determined by calculating the Chronbach's alpha. Chronbach's alpha of the three main variables of the TPB model, deleting questions with an alpha < 0.3. All variables that constituted Attitude were included in the analysis, and the alpha value was 0.89. The questions relating to the influence of friends and food companies were deleted as they showed a low level of internal reliability (0.222 and 0204 respectively). Chronbach's alpha for SN in the final analysis was 0.77. Control over food choice also showed a low level of internal reliability and once deleted the Chronbach's alpha value for PBC increased from 0.71 to 0.74.

There were no significant differences between the two sub-samples in both demographic parameters and measured variables (apart from the proportion reporting a chronic illness); therefore the results were combined for analysis. Respondents were dichotomized into intenders and non-intenders and independent t-tests where used to compare mean scores of TPB components and other continuous variables. Non-parametric data were compared using Mann Whitney *U*-tests. Correlations between the variables were measured using both Pearson's and Spearman's correlation coefficients. The determinants of intention as per TPB were investigated using multiple linear regressions. According to the TPB, Attitude, Subjective Norm and Perceived Behavioral Control are direct determinants of intention. The first step involved entering global measures of attitude, subjective norm and perceived behavioral control into the model. The second step involved the addition of the attitudinal beliefs, normative beliefs and control beliefs. This allows us to determine if beliefs are mediated through attitude. Additional demographic variables (age, income and education) were added to the model to investigate any associations. Estimates were computed at the overall means for the data set. All analyses were carried out using SPSS for Windows version 7.0

(SPSS Inc.)

SAMPLE

Two sub-samples were surveyed via questionnaire: general consumers who responded to media advertisement and subjects with Type 2 diabetes participating in an intervention trial. These sub-samples were selected as we wanted to investigate if there were differences in intention and attitude between those with an existing disease (in this case type 2 diabetes mellitus) and those without, as suggested by Childs (1997).[11] General consumers were recruited from advertisements in the local media. Potential participants phoned in their contact details to a study-specific answering service and these calls were returned and a brief outline of the study was explained. They were screened and excluded if they were undergoing treatment for chronic illness. Those expressing interest were sent an information sheet and consent form to sign and return. Once consent was obtained a questionnaire was sent via post. Questionnaires not returned after 2 weeks were followed up via telephone communication.

Subjects with type 2 diabetes mellitus were recruited from advertisements in the local media and on local institutional email networks (University and Technical College). Potential participants phoned in their contact details to a study specific answering service and these calls were returned with a screening questionnaire. Inclusion criteria were: aged 35-75yrs, diagnosed with type 2 diabetes mellitus for at least one year and generally well. Exclusion criteria were: on insulin therapy (or with HbA1c >9%), BMI > 35kg/m^2, with major debilitating illness, food allergies or food habits inhibiting their participation in the study, illiteracy and inadequate conversational English. Subjects at the first clinic appointment of this 6-month trial completed the questionnaire. Approval for the conduct of the study was provided by the University of Wollongong / Illawarra Area Health Service Human Research Ethics Committee.

Using the database of eligible consumers responding to the local media advertisement, 134 questionnaires

were sent out. After 3 weeks (including a reminder call after 2 weeks) 79 were returned representing a response rate of 61%. Fifty-five adults with type-2 diabetes who had volunteered separately for participation in a dietary intervention trial were asked to fill out the questionnaire and five declined to participate. The final sample size of the two sub-samples was 129.

RESULTS

The mean age of the participant sample was 53 (± 12.8) years (range 17 – 80 years) and the mean body mass index (BMI) 28.6 (±6.6) kg/m^2. Two thirds of the participants were female (66.7%) and the majority of subjects were currently in a relationship with no children under the age of 18 living at home (75.2%). Ninety four percent of participants were the main shopper in the household, or shared the shopping in the household. Income range was relatively evenly distributed between the five income brackets – 22.6% earned < $20K per year, 19% earned between $20K-$40K per year, 13.9% earned between $41K-$60K per year, 16.1% earned between $61K-$80K per year and 12.4% earned between $81K-$100K per year. The smallest number (7.3%) earned greater than $101K per year. The highest level of education of participants was 0.8% finished primary school, 31% finished high school, 24.8% finished technical college and 38.8% graduated from University.

Spearman's or Pearson's correlation between the various TPB components, along with measures of age, income and education were conducted and those above 0.3 reported. Attitude (r = 0.56; p=0.01) and Subjective Norm (r = 0.41; p=0.01) were correlated to Intention. In turn, each set of beliefs was correlated with the corresponding global measure. For example BB X OE correlated strongly with attitude (r = 0.75; p=0.01) and NB X MC correlated strongly with Subjective Norm (r = 0.48; p=0.01). Perceived behavioural control beliefs did to correlate with any of the variables under investigation. Demographic variables (age, income and eduction) did not show a relationship with any of the TPB variables.

There were no differences between the two sub-samples in intention to use functional foods or any of the determinant variables. Table 1 summarises the differences between intenders and non-intenders of omega-3 enriched functional foods. Perceived behavioral control and control beliefs were not different between intenders and non-intenders. Those who intended to use these products had a more positive attitude toward them and perceived normative pressure to use them. Similarly scores on belief items also showed the same trend. There were no difference in age, income or education between the intenders and non-intenders.

[Insert Table 1]

At step 1 in the development of the linear regression model of intention, attitude was significantly positively associated with intention, whereas SN and PBC were not significant (Table 2). Thus stronger intentions to use omega 3 enriched foods were associated with having positive attitudes toward the use of these foods. Overall the equation accounted for 72.4% of the variance of intentions ($p<0.001$). Assumptions of multiple regression were validated using residual plots. At step 2, the belief variables explained a marginal amount of variation in intentions 72.5% ($p<0.001$). Thus as predicted by TBP, the effect of belief components have no unmediated effects. Therefore, the next phase was to examine how beliefs about the consequences of using omega 3 enriched foods were associated with intention to use.

[Insert Table 2]

Based on the dichotomised categorisation of self-reported intention to use, differences in responses to each belief question between intenders and non-intenders were examined using independent *t*-tests. Table 3 provides the mean results of each question and are considered for each set of beliefs in turn.

[Insert Table 3]

Behavioral beliefs Intenders differed from non-intenders in 3 behavioral beliefs; *"importance of the health benefits of omega-3 fats", "that foods enriched with omega-3 contain enough of this nutrient to be of benefit" and "how important is it that we make new ways to make omega-3 intake easy"*. When we considered how each group evaluated these outcomes on omega-3 enriched food intake, intenders differed

significantly in 9 of the 11 beliefs. With the multiplicative measure of belief strength and outcome evaluation (BS X OE) there was a significant difference between intenders and non-intenders for the 9 beliefs. These results suggest that intenders are more likely to believe that eating omega-3 enriched products specifically will provide a variety of health benefits despite the fact there was little difference between how intenders and non-intenders rated the overall importance of these effects.

Normative beliefs Normative beliefs differed between intenders and non-intenders for 5 of the 6 variables. Differences were observed for *family members, friends, dietitians, doctors and scientists* with more positive ratings for intenders. This was consistent when considering motivations to comply as well as the multiplicative value of NB X MC, with all variables except for family members (MC) differing. There were no differences between the groups in the normative belief relating to food companies, with both groups responding negatively when rating motivation to comply with their recommendations.

Control beliefs Only 2 out of the 6 control beliefs differed significantly between intenders and non-intenders: *availability in the supermarket* and *control over purchasing*. Interestingly, intenders' did not perceive availability as being a barrier to purchase (indicated by the negative response), whereas non-intenders believed that this was a barrier. Non-intenders were more likely to believe that a lack of control over purchasing was a significant reason for not purchasing these products.

DISCUSSION

Using a questionnaire based on the TPB, the model explained 72.5% of the variance of intention to use omega 3 enriched foods. This result is comparable with other studies investigating intentions to use genetically modified foods and supplements, using the TPB, which have reported $R^2 = 0.35$ and 0.75 respectively.[15, 16] Our results in light of this earlier work highlight the importance of studying specific food

products, processing techniques and health effects in order to understand the complex nature of food selection. For example whilst our results are valid in understanding consumer behavior in selecting omega-3 enriched foods, they do not translate to an understanding of the use of fish oil supplements, nor omega-3 enriched products enriched using GM technology.

Our findings into the determinants of intention extend on previous work using the TPB. In relation to omega-3 enriched foods, attitude was found to be the sole determinant of intention to eat these products and was the sole significant predictor. We found that both normative beliefs and control were not significant determinants of intention to eat these products in this study. It is apparent from the literature that the relative importance of these factors is variable and is dependent on the behavior, demographic and particular food under investigation. For example, dairy product use by the elderly is predicted by both attitudes and control beliefs, whereas the use of genetically modified foods is predicted by attitude, control beliefs as well as subjective norms.[16, 17] This adds weight to the importance of investigating single action, specific behaviors as suggested by Azjen and Fishbein.[14]

It appears that selection of omega-3 enriched foods remains largely a personal choice. Although marketers, health professionals and family members may suggest the use of these novel products, ultimately use is an individual decision having minimal influence from normative factors. Similarly as perceived behavioral control was not predictive of intention to eat omega-3 functional foods in our sample, we can speculate that selection of these products is under volitional control, although control factors may act directly on behavior. In summary, the selection of omega-3 functional foods appears to be a cognitive process based on underlying beliefs, leading to overall attitudes which in turn have a significant impact on food choice.

If we are to use this information in a practical sense it is important to investigate the upstream determinants of attitude, namely belief strength and outcome evaluation. Intenders had a greater belief in the importance

of omega-3 fats and their associated health benefit and a belief that it is important to provide these novel foods on the market, but insisted it was important that they contain enough of the active ingredient to be useful. Most significant was the belief that eating foods enriched with omega-3 fats specifically would lead to a number of health benefits. Subjects believed in a wide range of health benefits attributed to omega-3 enriched foods despite varying degrees of empirical scientific evidence to support of these claims. However, both intenders and non-intenders alike rated the importance of these health parameters similarly. This would suggest that changing individual beliefs about the importance in health issues alone will not translate into the use of these foods. Efforts to influence consumers may best be channeled into demonstrating and communicating a cause and effect relationship between a specific product and a health parameter or benefit. Therefore, the role of health claims might be important in promoting these foods. However, more research is required to determine the effectiveness of this approach in increasing the use of omega-3 functional foods.

There are a number of limitations to this study. Despite the lack of differences between our two sub-samples, the combined sample was not representative of the general population and was both time and context specific. In addition, our study participants were more likely to be interested in nutrition than the general population. Intention to use omega-3 functional food was high (54%) and may have been a result of the recent product launches which coincided with the study. Also, this study provides a static view of attitudes towards omega-3 enriched foods and follow-up over time, as more of these foods enter the market, would be useful. Another limitation was that our questionnaire did not account for more general beliefs to do with healthfulness, naturalness and altruism, which previous studies have been shown to be significant determinants of GMO food selection.[16] However, these issues did not emerge as salient beliefs from our earlier focus group work.[19] This implies a more general limitation to the TPB.

In summary, to be initially effective in maintaining and encouraging positive intentions, a likely strategy

for promoters of omega-3 enriched functional foods would be to direct their promotions towards changing of attitude, and specifically belief in the effectiveness of enriched products in achieving specific health benefits. This would suggest that the effects of policy initiatives such as health claims might be important to support the greater use of these products.

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1 **Table 1** Comparison of variable rating scores between those intending or not intending to use omega-3

2 enriched products in the following two weeks [mean (SD)][a]

	Intenders (n = 61 [47.7%])	Non Intenders (n= 67 [52.3%])	Significance (p- value)
Attitude[b]	2.2 (0.6)	-0.5 (1.5)	0.00
Behavioral beliefs (BS x OE) [c]	4.2 (1.9)	1.6 (2.5)	0.00
Subjective Norm [b]	0.8 (1.4)	-0.2 (1.5)	0.00
Normative beliefs (NB x MC) [c]	1.9 (2.0)	0.7 (1.6)	0.00
Perceived behavioral control [b]	2.2 (1.1)	1.9 (1.4)	0.13
Control Beliefs (CB)[b]	0.5 (1.1)	0.4 (1.2)	0.95

3 [a]Student's t- test between users and non-users.

4 [b]Scores are from +3 to –3

5 [c]Scores are from +9 to –9

6

7

1 **Table 2** Linear regression of intentions onto TPB components[a]

Variable	*B*	Beta	SE	Significance
Step 1				
Attitude	1.01	0.85	0.07	p<0.001
Subjective Norm	0.02	0.01	0.07	p=0.82
Perceived behavioral control (PBC)	0.02	0.01	0.08	p=0.87
Step 2				
Attitude	0.97	0.81	0.07	p<0.001
Subjective Norm	-0.05	-0.04	0.09	p=0.57
Perceived behavioral control (PBC)	-0.01	-0.01	0.09	p=0.88
Behavioral beliefs (BS X OE)	0.06	0.07	0.06	p=0.32
Normative beliefs (NB X OE)	0.08	0.07	0.06	p=0.22
Control beliefs (CB)	0.00	0.00	0.09	p=1.00

2 **[a] *B* = regression coefficient; SE = standard error; R^2 = 0.724 (p<0.0001) for Step 1, R^2 = 0.725 (p<0.0001) for Step 2.**

3

1 **Table 3** Mean scores for belief items: comparison of intenders and non intenders [mean (SD)] (n=126)

Variable	Intenders	Non-intenders	Intenders	Non-Intenders	Intenders	Non-intenders
	Belief strength (BS)[a]		***Outcome evaluation(OE)[a]***		***BS X OE[b]***	
Importance of general health	2.85 (0.40)	2.74 (0.82)	2.1 0(0.65) †††	0.92 (1.32)	6.08 (2.15) †††	2.48 (3.9)
Importance of health benefits n3	2.48 (0.57) †††	1.43 (1.33)	2.15 (0.64) †††	0.92 (1.41)	5.49 (2.40) †††	2.05(3.19)
Contain enough n3 to be useful	2.41 (0.70) †††	1.28(1.46)	1.7 (0.10) ††	0.48 (1.45)	4.42 (2.99) †††	1.35 (2.94)
Little risk of over exposure	1.32 (1.81)	1.16 (1.69)	0.98 (1.72)	0.42 (1.60)	1.21 (4.45)	-0.09 (3.58)
Food development based on science	2.82 (0.50)	2.52 (1.19)	1.80 (1.14) ††	1.05 (1.44)	5.14 (3.37) †††	2.43 (4.41)
New ways to make n3 intake easy	2.43 (0.62) †††	1.51 (1.20)	1.69 (1.09) †††	0.45 (1.6)	4.34 (3.03) †††	1.59 (3.12)
Improving heart health	2.85 (0.36)	2.76 (0.46)	1.97 (0.62) †††	0.86 (1.40)	5.64 (2.02) †††	1.97 (4.10)
Brain health	2.82 (0.39)	2.69 (0.55)	1.32(1.32) ††	0.63 (1.39)	3.73 (3.95) ††	1.78 (4.01)
Eye health	2.79 (0.45)	2.68 (0.58)	0.98 (1.32)	0.55 (1.36)	2.81 (3.77)	1.54 (3.90)
Improving Arthritis	2.74 (0/48)	2.68 (0.53)	1.39 (1.10) ††	0.63 (1.39)	3.98 (3.09) ††	1.86 (3.88)
Asthma	2.83 (0.38)	2.69 (0.50)	0.91 (1.26) ††	0.23 (1.40)	2.67 (3.58) ††	0.85 (3.67)
	Normative beliefs(NB)[a]		***Motivation to comply(MC)[a]***		***NB X MC[b]***	
Family	0.75 (1.41) †††	-0.56 (1.60)	0.56 (1.76)	0.18 (1.70)	1.88 (2.89) †	0.51 (3.20)
Friends	0.53 (1.39) †††	-0.52 (1.51)	-0.03 (1.68)	-0.38 (1.52)	1.05 (2.92)	0.97 (3.01)
Dietitians	1.47 (1.24) †	0.92 (1.52)	1.80 (0.93) †††	0.98 (1.57)	3.14 (3.05) †	1.83 (2.90)
Doctors	1.26 (1.36) †	0.69 (1.44)	1.80 (1.01) †	1.34 (1.36)	3.12(2.91) ††	1.33 (2.90)
Scientists	1.43 (1.33) ††	0.78 (1.39)	1.30 (1.13) ††	0.63 (1.41)	2.43 (2.91) ††	0.88 (2.50)
Food companies	1.14 (1.60)	1.20 (1.40)	-0.72 (1.64)	-1.09 (1.63)	-0.47 (4.10)	-1.42 (3.92)
	Control beliefs(CB)[a]					
Availability at the supermarket	-0.25 (1.77) †	0.19 (1.5)				
Control over purchase	1.16 (2.25) ††	1.51 (1.68)				
Cost	0.28 (1.93)	0.06 (1.87)				
Taste/texture	0.49 (1.76)	0.52 (1.66)				
Time required to find	0.64 (1.85)	0.22 (1.73)				
Suitability for family	0.38 (1.88)	0.04 (1.91)				

2 † $p<0.05$; †† $p<0.01$; ††† $p<0.001$ equal variances not assumed

3 [a]Items scored betweem +3 to -3

4 [b] Items scored between +9 to –9

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