



Consumer attitudes toward dietary supplements consumption

Implications for pharmaceutical marketing

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Abstract

Purpose – Drawing on a socio-cognitive model, the theory of planned behaviour (TPB), the aim of this paper is to investigate whether the effects of social cognition on intention to consume dietary supplements moderate by health motivation.

Design/methodology/approach – This study was carried out using a cross-sectional survey approach. Subjects comprised 438 undergraduate students from six universities in Malaysia.

Findings – Given strong support for the extended TPB's application to dietary supplements consumption provided by the study, it seems feasible that desirable changes in attitude, social norms, and perceptions of control might lead to corresponding changes in behavioural intention. The empirical findings, which are based on multi-group analysis, show that the strength of the relationships between informational influence, consumer attitude, and their intention to consume dietary supplements are strongly influenced by health motivation.

Practical implications – This research sets the ground for stakeholders in the healthcare and pharmaceutical sectors to improve their understanding of what drives dietary supplements consumption. Armed with this knowledge, marketers and health professionals could plan and execute their marketing strategies and health interventions more effectively.

Originality/value – The core contribution lies in an important extension of social cognitive model by incorporating the moderating effect of health motivation. This study demonstrates the measurement validity and predictive efficacy of the proposed integrative model which can be used as a promising framework to examine other preventive health behaviours.

Keywords Health promotion, Malaysia, Social cognition, Theory of planned behaviour, Health motivation, Preventive health

Paper type Research paper



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Introduction

There are increasing concerns in both developing and developed countries that poor dietary practices have an increased potential for causing chronic diseases and public health spending worldwide. While there is compelling evidence linking nutritional deficiency to potentially higher risks for chronic illnesses, scientists and health professionals are recognising the role of dietary supplements in disease prevention and health promotion activities (McGinnis and Ernst, 2001). Moreover, the relative ageing population worldwide is a further stimulus for the adoption of health related supplements in enhancing the health levels of the population in a country. Despite the potential problems arising from poor dietary practices, there are indications of consumers becoming more health conscious as reflected by the growth in the expenditures of health related and medical products categories. For instance, a recent report reveals that expenditure on health products and medical services has reached RM (Malaysian Ringgit) 9.6 billion in 2012, showing an increase of 45 per cent compared to 2007 (Euromonitor, 2013a). This growth in consumption of health related offerings suggests shifting trends toward healthier lifestyles which in-turn is reflected to some degree by increasing levels of disposable income, higher levels of education and improvement in the standard of living (Euromonitor, 2010). Hence, a better understanding of what drives consumers to take dietary supplements can contribute to improving value creation for both customers and marketer of health related offerings.

The theory of planned behaviour (TPB; Ajzen, 1991) is used to frame our study. TPB contains three main social cognitive predictors of intention and behaviour; these are attitude, subjective norm and perceived behavioural control (PBC). This study seeks to investigate the extent to which the effects of these social cognitive constructs on intention to consume dietary supplements are moderated by health motivation. There are several gaps in marketing knowledge that help to establish the rationale for this research. First, while previous studies have examined the link between social factors and behavioural intentions, there has not been sufficient focus on the mediating role of attitudes toward intention to consume dietary supplements. Second, the literature suggests that normative social influences in the TPB model offers a narrow perspective of social factors, hence we explain and justify why broadening the scope of social factors to include the informational influence variable in our model may provide greater clarity and precision regarding the relationships between the constructs of interest in this study. Thirdly, studies on health prevention adopting the TPB framework acknowledges that moderating factors may account for improved explanation of the variance unaccounted for by the TPB predictors; accordingly, we justify the inclusion of the health motivation construct as a moderating influence for the pathways between social cognitive and behavioural intention constructs. Finally, there is little empirical research on dietary supplements in the Malaysian context (Teng *et al.*, 2008); hence this study provides a contribution for both marketing knowledge and practice for dietary supplement marketing.

The two research questions framed for this study are:

- RQ1.* To what extent does the attitude construct contribute as a mediating influence between the social factors, PBC and the behavioural intention construct?
- RQ2.* How does the level of health motivation moderate the strength of the relationship between social cognitive and behavioural intention constructs for the dietary supplements context?



The paper is organised along the following lines. In the next section we present a review of previous research on dietary supplements and set out mapping a conceptual framework to justify the theoretical relationships between the main constructs of interest. From this discussion, specific research hypotheses are generated for the pathways between the constructs. The research design section provides a description of the sampling, data collection procedures, and a discussion of the development of the research instrument for collection of empirical data. The section on results reports on the descriptive analysis of the sample in the dataset, presents the results of the measurement model and structural model undertaken through structural equation modelling analysis. This section also reports on the results pertaining to the hypothesised mediating influence of attitude and moderating role of health motivation. The final section provides a discussion of the results in the study and sets out both marketing knowledge and managerial implications for marketing practitioners.

Literature review

The marketing of dietary supplements

The definition of dietary supplement provided by the Dietary Supplement Health and Education Act (DSHEA) of 1994 is adopted in our study. The DSHEA defines dietary supplement as a product taken by mouth that contains a dietary ingredient intended to supplement the diet which may include one or any combination of substances such as vitamins, minerals, herbs, or other botanicals, amino acids, and substances such as enzymes, organ tissues, glandulars, and metabolites (www.fda.gov). According to the DSHEA, dietary supplements are placed in a special category under the general umbrella of foods as opposed to drugs. The term “supplement” means “something that completes or makes an addition” (Merriam-Webster Online, 2013), suggesting that dietary supplement may be seen as part of a complementary food product that one consumes with an aim to maintain general good health. Therefore, we focus on the product’s intended use (e.g. as a nutrient supplement, a boost to the immune system, a weight gain or loss supplement, etc) rather than the product content (e.g. vitamin, mineral, herbs, etc) (Neuhooser, 2003).

In this research, we focus on the segment of young consumers because they represent a significant growing market for health-related products in Malaysia. Notably, consumer expenditure on health goods and medical services among young Malaysian adults aged 20 to 29 has shown an increase of 52.6 per cent from UD\$93.9 million in 2007 to US\$143.3 in 2012 (Euromonitor, 2013b). The market size of vitamins and dietary supplements for the younger segment in Malaysia has reached US\$115 million, comprising 22 per cent of the total vitamins and dietary supplements sales in 2012, and that number is expected to increase well into the future (Euromonitor, 2013c).

Young adults are a key segment for dietary supplements not just in terms of market size, but also in terms of their lifestyle and dietary habits. There is a growing consensus that health interventions are required to improve nutrition decision among young consumers (Brennan *et al.*, 2010). The health condition of young adults has become a concern for public policy in view of the importance of health as an asset in the development of human capital in the country. Furthermore, young adults are our future social opinion leaders, and hence, their beliefs and attitudes will be influential in shaping community norms and values towards preventive health behaviour among young consumers (Leslie *et al.*, 2001).



Although Malaysia has made rapid socio-economic developments in the last twenty years, the advancements in economic growth are not similarly reflected in dietary practices amongst the population. Examples of poorer dietary behaviour are reflected by levels of consumption of fatty, oily and processed foods, skipping meals, and eating out more frequently. These poorer dietary trends are particularly prevalent in younger consumers as reflected in studies of university students in Malaysia which demonstrates unhealthy meal consumption, insufficient consumption of nutrients and low levels of energy in the diets of these younger consumers (Gan *et al.*, 2011). Despite this negative perception of poor dietary behaviour, there is evidence to support that younger consumer are counteracting poorer dietary practices by taking dietary supplements to improve their health, supplement nutritional levels, lose weight and enhance their physical appearance (Al-Naggar and Chen, 2011). Studies suggest that younger consumers who take dietary supplements have been strongly influenced by their parents to do so. Other influential sources of information for the consumption of dietary supplements comes from friends, physicians, other family members and Internet sources (Al-Naggar and Chen, 2011; Gan *et al.*, 2011). Although younger consumers are aware of the benefits of dietary supplement consumption, many of these young consumers do not appear to have accurate, precise, and objective information about the choices of the appropriate supplements when choosing their dietary supplements (Al-Naggar and Chen, 2011).

Therefore, a better understanding of the younger consumer market for dietary supplements can help marketers to create value for this growing segment. To this end, this study provides empirical support to get a better understanding of how social cognitive factors may influence the younger consumer segment in making decisions for the consumption of dietary supplements.

Previous research on dietary supplement

The literature presents several threads of research relevant to the study of the dietary supplements consumption. The initial debate has primarily revolved around the economic considerations of therapeutic equivalence of generic drug or dietary supplements, that is, whether or not generic prescribing drug will lead to equivalent therapy at lower cost (see Kemp and Moyer, 1974; Horvitz *et al.*, 1975). Other studies have looked at pharmacists' and physicians' attitudes and behaviours towards generic drugs (Myers and Fink, 1971; McCormick and Hammel, 1972) as well as the factors that drive their attitude and behaviour (Bearden and Mason, 1980).

The extensive growth of the dietary supplements market has evoked concerns for consumer protection. The extensive review by Nocella and Kennedy (2012) concludes the importance of effective communication of scientific evidence to improve consumer understanding of food health claims. Another stream of research concerns how consumers process health claims and their responses to information regulation (Mason and Scammon, 2011; Crawford and Leventis, 2005; France and Bone, 2005). Along similar lines of research, Vladeck (2000) and Dodge *et al.* (2011) explored the amendment of regulation and its effect on consumer belief system.

The next stream of research which centres on dietary supplements addresses the issue of user profiling (de Jong *et al.*, 2003; Ishihara *et al.*, 2003) and socio-demographic and/or lifestyle related determinants of dietary supplements intake (Nayga and Reed, 1999; Jasti *et al.*, 2003). These latter studies attempt to generate descriptive

demographic information and do not explain why consumers do (or do not) consume dietary supplements. More recently, studies have also addressed the issue of pharmaceutical advertising (Finlayson and Mullner, 2005; Diehl *et al.*, 2007; DeLorme *et al.*, 2010, 2012; Wu *et al.*, 2012).

Several past studies have examined the antecedents of dietary supplement purchase and consumption using the TPB as theoretical framework. These studies have extended the original TPB model by introducing new variables including store type and country of origin (Jeong *et al.*, 2012) and dining-out sociability which denote how frequent consumers dine-out (Ren *et al.*, 2011). Another stream of research underpinned by TPB have integrated the theory with health belief model to explain dietary supplement consumption (Conner *et al.*, 2001; Sun *et al.*, 2006; Chung *et al.*, 2012). It is worth noting that research within these areas of inquiry assume a linear relationship between constructs, but a more complex (nonlinear) structure is worthy of exploration.

There is little empirical evidence of research on dietary supplement usage in Malaysia despite the accelerating growth of the dietary supplements industry in the country (Teng *et al.*, 2008). Most of the dietary supplements studies are of a commercial nature and tend to focus on profiling the socio-demographics of supplements users, mapping out the lifestyle patterns of dietary supplement users and the types of supplements consumed (e.g. de Jong *et al.*, 2003; Jasti *et al.*, 2003). Therefore our study of how social cognitive constructs influence young consumers' intention to consume dietary supplements for preventative healthcare in the Malaysian context fills a gap in the literature on consumption of dietary supplements. Next, this paper provides a description of the conceptual framework and hypotheses.

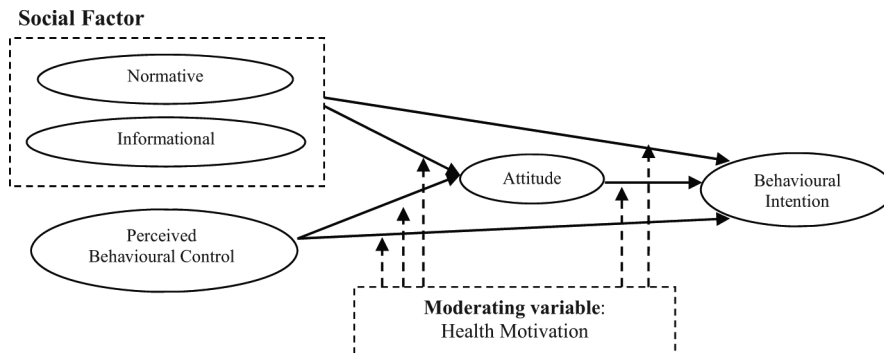
Conceptual framework and hypotheses development

To this end, we draw on Ajzen's (1991) TPB to frame our study. The TPB model posits that behavioural intention is the immediate antecedent of actual behaviour (Ajzen, 1991). Intention is determined by three conceptually independent predictors (also termed as social cognitive factors) labelled as attitude, subjective norms and PBC (Ajzen, 1991). It is postulated in the TPB that individuals are more likely to perform a given behaviour if: they believe that the behaviour will lead to beneficial or desirable outcomes (i.e. attitude); the important others in one's social environment whose views they value think they should behave in a certain way (i.e. subjective norm); and they perceive that they possess the necessary resources and opportunities to perform the behaviour (i.e. PBC) (Ajzen, 2002).

Although health motivation has been identified as an important factor in predicting health behaviour (Jayanti and Burns, 1998), the potential interaction between health motivation and social cognition has yet to receive more systematic empirical attention. We aim to provide additional insight by testing the moderating role of health motivation that accounts for the relationships between social cognitive constructs and behavioural intention in dietary supplements context. All possible moderating effects of health motivation will be considered given the exploratory nature of the current research. Figure 1 depicts the hypothesised relationships between the constructs of interest.

Subjective norm (also known as normative influence) refers to the perceived social pressure from significant others in the social environment to engage in the target behaviour (Ajzen, 1991). Social influences have long been regarded as an important

Figure 1.
Conceptual framework of
dietary supplements
consumption



factor that affects consumer behaviour (Mangleburg *et al.*, 2004). However, in some contexts, subjective norm has been shown to be a poor predictor of behavioural intention (Hausenblas *et al.*, 1997). Armitage and Conner (2001) explain that such weaker relationships may be attributed to the way subjective norm is conceptualised and measured. Hence, social influences in TPB framework may be expanded to include informational influence (Bearden *et al.*, 1989). The suggestion here is that customers who are uncertain about their choice of dietary supplements will draw information from people who possess health information (such as health professionals, doctor, physicians), and family members or people close to them whom they perceive are able to provide them with information to assist them in choosing the right dietary supplements (Park and Lessig, 1977). The social influences in the context of the information consumers receive can generate a positive effect on consumers' choices (Mcferran *et al.*, 2010). Therefore, it is posited that social influences arise from both normative influences and informational influence as presented in Figure 1. As the original TPB model captures only the normative influence, our research which includes information influence as a variable will provide a better and more precise channel to understand the relationships between social influence and behavioural intentions. We are therefore able to contribute to the dialogue both in marketing knowledge and managerial practice. Based on the above argument, the hypotheses relating to the normative and informational influence are framed as follows:

- H1(a). Higher perception of normative influence generates stronger intention to consume dietary supplements.
- H1(b). Higher perception of informational influence generates stronger intention to consume dietary supplements.

Conceptually, *PBC* refers to the individual's perception regarding the ease or difficulty of performing the target behaviour (Ajzen, 1991). The role of PBC has been explored in relation to a wide variety of health behaviours (Armitage and Conner, 2001). For instance, in examining two different health-protective behaviours (i.e. breast or testicular self-exam and dental regime), McCaul *et al.* (1993) report positive associations between PBC and health behavioural intention. Hagger and Chatzisarantis (2005) and Povey *et al.* (2000) found PBC to be positively related to exercise and dietary behavioural intention respectively. PBC is deemed relevant to the consumption of dietary supplements as control factors that can facilitate or inhibit an individual's

intention to consume dietary supplements. For example, consumers may lack sufficient money to purchase dietary supplements or the supplements may not be available in stores. Conversely, PBC may have a positive impact on behavioural intentions. On this basis, we hypothesise that:

H2. Positive perceptions of behavioural control generate stronger behavioural intention to consume dietary supplements.

Attitude refers to an individual's overall positive or negative personal evaluations of performing the target behaviour (Ajzen, 1991). Psychologists use the term "attitude" to refer to the likes and dislikes that people hold – the relatively enduring evaluations that people hold toward thing, people and abstract ideas and images (Fishbein and Ajzen, 1975). Armitage and Conner (2001) suggest that an individual's engagement in a given health behaviour is strongly linked to attitude (Armitage and Conner, 2001). That is, positive attitudes may contribute to positive effects on behaviour whereas negative attitudes may have negative effects on behaviour. Consequently, consumers who form positive attitudes toward dietary supplements think that the consumption of dietary supplements can improve their health and may therefore have a greater intention to consume dietary supplements, while consumers who form negative attitudes may not intend to consume dietary supplements. The TPB model theorises social norms, PBC and attitude as antecedents to the behavioural intention construct; however, the attitude construct is posited as an intervening variable between the social factor, PBC and the behavioural intentions constructs in the conceptual model depicted in Figure 1.

Previous studies using the TPB framework emphasise the direct effects between the social norms, PBC antecedents and behavioural intention constructs. These studies have not given sufficient attention to the mediating influence of attitude in the link between the social norms and PBC constructs and the behavioural intentions construct. The results in some previous health studies have not been able to demonstrate strong direct influences of social norm (Rhodes *et al.*, 2006) and PBC (e.g. Rhodes and Courneya, 2003) on behavioural intention. We speculate that the effects of social factors and PBC on behavioural intention may be intervened by attitude. This line of research suggests the need to consider the potential mediating role of attitude before dismissing the value of social factors and/or PBC in predicting dietary supplement consumption decision. Our study advances marketing knowledge by testing the extent to which attitude plays a mediating role between the antecedents and young adults' intention to consume dietary supplements. Hence, it is hypothesised that:

H3. The effect of normative influence, information influence and PBC on intention to consume dietary supplements is mediated by consumer attitude.

Moderating influence of health motivation. A large number of studies have supported the validity of the TPB as a parsimonious model in various contexts; however, over half of the variance remains unexplained in health behavioural intention and behaviour (Rhodes *et al.*, 2005). In addition, the existence of a strong link between social norm and behavioural intention has been questioned by some health scholars (Armitage and Conner, 2001; Hagger *et al.*, 2002). Such belief may have risen because the moderating effects of the variables external to TPB have not been taken into account (Rhodes *et al.*, 2005). Previous TPB research has also shown a weak relationship between PBC and behavioural intention (e.g. Picazo-Vela *et al.*, 2010; Grandón *et al.*, 2011). These previous

findings imply that perception of control in itself is not sufficient to drive behavioural intention without the variable that creates a desire to perform the behaviour (Eagly and Chaiken, 1993). For instance, a person may feel that he or she has the necessary resources to purchase dietary supplements, yet that person's decision to actually purchase and consume the supplements may depend on his or her level of motivation to engage in health preventive practices.

We speculate that health motivation is one basis for why some people may be socially influenced (or susceptible to be influenced by their perception of control) while others are not. There are two main reasons why we expect the level of health motivation to affect the relationships between social cognitive and behavioural intention constructs. The first explanation deals with how health motivation influences a person's evaluation of preventive health practices. In the literature review of consumer behaviour research, health motivation is regarded to have facilitative effect on an individual's cognitive effort toward health information processing (Moorman and Matulich, 1993). This forms the basis for our presumption that health motivation tends to arouse a person's attention towards health information (and benefits) about dietary supplements he or she receives; consequently, this may influence how social influence and perception of control affect his or her attitude and intention to consume dietary supplements. This is evident in Moorman and Matulich's (1993) perspective that an individual's motivation level is regarded as an important precondition for attitudinal change.

The second reason involves the theoretical tenets of the TPB which highlight the potential for moderating effects. This means that variables external to the TPB may affect the pathways of the TPB in a moderating capacity (Hoyt *et al.*, 2009). Ajzen (1991) argues that some people form intentions based on social norm influence while others are affected by their attitude. The underlying foundation for this differential effect is, by definition, a moderator (Baron and Kenny, 1986). The concept of health motivation has been linked to various health maintenance behaviours (Moorman and Matulich, 1993; Jayanti and Burns, 1998; Petrovici and Ritson, 2006). For instance, evidence suggests that individuals who possess higher health motivation level are more likely to seek health information and engage in health preventive behaviour (Petrovici and Ritson, 2006). Therefore, health motivation may represent a moderator which may explain the heterogeneity of effect sizes found in past TPB research:

- H4.* The pathways between the antecedents (social factors and PBC), mediating (attitude) and outcome (behavioural intention) construct are stronger (weaker) for consumers with a higher (lower) levels of health motivation.

Research methods

This study was carried out using a cross-sectional survey approach. This section provides a description of the research instrument design, sampling procedure and data collection method.

Research instrument

All measurements were adapted from previously published work and have proven satisfactory psychometric quality. Each construct was assessed using a seven-point Likert-type scale. The Appendix shows the number of items for each construct and the relevant sources where construct items were adopted. We adopted the broadened conceptualisation of social influence that incorporates the normative and information

influence. Items measuring the normative and information influence were adapted from Bearden *et al.* (1989) and Ajzen (2002). Next, the measurement scale for PBC was derived from Hagger and Chatzisarantis (2005) and Ajzen (2002). The instrumental aspect of attitude (i.e. perceived costs and benefits associated with dietary supplements consumption) is deemed to be more relevant in our study context as opposed to the affective aspect (i.e. enjoyment or pleasure of consuming dietary supplements). Therefore, attitude was assessed using measurements obtained from Conner *et al.* (2001) and Hagger and Chatzisarantis (2005) which capture the instrumental component of attitude. The ultimate dependent variable, behavioural intention, was operationalised as one's conscious plan, or effort, and the likelihood to consume dietary supplements (Ajzen, 1991). The behavioural intention measure was adapted from the work of Ajzen (2002). Last, health motivation was used to assess the degree to which people say they are concerned about health hazards and their level of interest or willingness to engage in health behaviours that leads to preventive health care behaviours (Moorman and Matulich, 1993). Health motivation was assessed using a six-item scale borrowed from Jayanti and Burns (1998).

The questionnaire was pre-tested on a convenience sample of 50 undergraduate students from a Malaysian university. Several minor modifications were made to the wording, presentation and structure of the questionnaire in response to the pre-test feedback and opinions of three experts in the marketing discipline. Respondents who had participated in the pre-tests were not included in the main study.

Sampling procedures and data collection

As this study investigates the attitude and behavioural intention of young consumers, the participants comprised of undergraduate students from six universities in Malaysia. Indeed, choosing a homogeneous sample such as undergraduate students reduces random error that might occur when a heterogeneous sample is used (Calder *et al.*, 1981). Data gathering was carried out using personally administered survey. Lecturer-facilitator from each participating university was recruited (through connection of acquaintances) to facilitate the data collection. Prior to the field work, all lecturer-facilitators were briefed on the research purposes, objectives, procedures, the meaning of each question, and the terms used. As a token of appreciation for their assistance, a small gift in the form of a decorative item was given to each lecturer-facilitator. The questionnaires were personally distributed to the subjects during the lecture break time. The subjects were given clear definition of dietary supplements (both written and verbal format) and were reminded to refer to the definition provided when attempting each question throughout the whole questionnaire. The whole data collection process took approximately four weeks.

Common method bias

We acknowledge the potential common method bias when both exogenous and endogenous measures were obtained using a cross-sectional design, which may have inflated the relationships observed between the pair of constructs (Whitman and Woszczyński, 2004). In addition to the precautions in terms of measurement items selection and questionnaire design, common method variance was tested using Harman's single-factor test (Podsakoff *et al.*, 2003). A principal components factor analysis with varimax rotation demonstrated that all self-report items revealed a



six-factor structure, with each factor accounting for less than 50 per cent of the covariation, indicating that no general factor was observed. Therefore, we conclude that bias due to common method variance was unlikely to pose an issue in our study.

Results

A total of 438 completed questionnaires were usable. Since this study relied on voluntarily participation, respondents and non-respondents may differ on their demographic characteristics. Based on Armstrong and Overton's (1977) procedures, the Chi-square tests showed an absence of significant differences between early and late respondents in terms of gender, ethnicity, religion and parental income. We therefore conclude that non-response bias was unlikely to be an issue in our study. The demographic characteristics of the overall sample were well spread over gender groups. The majority of respondents (61 per cent) were aged between 18 to 20 years old. Approximately 45 per cent of the respondents were Chinese, reflecting the main target segment for dietary supplements. Among the 56 per cent of the respondents who indicated that they consumed dietary supplements in the last six months, 38.4 per cent and 21 per cent of these users purchase supplement products from chemists/pharmacies/drug stores and direct selling sources, respectively.

Measurement validation

A two-step approach using structural equation modelling (Anderson and Gerbing, 1988) was adopted. First, confirmatory factor analysis was performed to evaluate the psychometric properties of the scales. Upon establishing the model fit, the significance, direction, and size of each structural parameter for the specified model were estimated. An analysis of the priori measurement model resulted in good model fit ($\chi^2 = 429.31$, $\chi^2/df = 1.651$, GFI = 0.927, TLI = 0.967, CFI = 0.971, RMSEA = 0.039) after several modifications based on standardised residuals, modification indices and standardised loading estimates (Hair *et al.*, 2010). The measurement model was improved using a conservative strategy, that is, only those paths that made theoretical sense were considered and freeing of cross-loadings was not allowed in the model refinement process (Byrne, 2001).

Convergent validity. Evidence of convergent validity was demonstrated (see Table I). That is, each factor loading of the reflective indicators was significant with loading greater than 0.50 (Hair *et al.*, 2010). Furthermore, all individual scales exceeded the acceptable composite reliability and the average variance extracted (AVE) of 0.60 (Bagozzi and Yi, 1988) and 0.50 (Fornell and Larcker, 1981), respectively.

Construct	No. of items	Items loadings	AVE	Construct reliability
Normative influence	3	0.788 – 0.841*	0.658	0.852
Information influence	3	0.819 – 0.837*	0.684	0.867
PBC	5	0.553 – 0.800*	0.551	0.858
Attitude	5	0.651 – 0.799*	0.567	0.867
Intention	5	0.672 – 0.834*	0.595	0.880
Health motivation	4	0.650 – 0.782*	0.558	0.834

Note: * $p < 0.001$

Table I.
Reliability and validity of
measures

Discriminant validity. Discriminant validity was first assessed using a procedure advocated by Gaski and Nevin (1985) in which a correlation between two scales that is lower than the reliability of each of those scales, is taken as proof of good discriminant validity. The results (see Table II) revealed that all scales for the specified model had reliabilities in excess of the correlations between them, indicating that each pair of construct was distinct. Next, discriminant validity was determined by the variance extracted value, namely whether or not it exceeds the squared inter-construct correlations associated with that construct (Fornell and Larcker, 1981). As shown in Table II, the variance extracted of each construct was well above its squared correlation with other constructs. These results lent adequate evidence for discriminant validity of the present measurement model.

Structural model

Having established the fitting measurement model with adequate evidence of reliability and validity, the structural model with all the seven main effects was then tested. The specified structural model (Figure 2) demonstrated a satisfactory model fit to the empirical data ($\chi^2 = 284.42$, $\chi^2/df = 1.589$, GFI = 0.942, TLI = 0.975, CFI =

Factor	AVE	NI	II	PBC	ATT	INT	HM
NI	0.658	0.852					
II	0.684	0.463*	0.867				
		(0.21)					
PBC	0.551	0.354*	0.514*	0.858			
		(0.13)	(0.26)				
ATT	0.567	0.353*	0.415*	0.633*	0.867		
		(0.12)	(0.17)	(0.40)			
INT	0.595	0.438*	0.527*	0.603*	0.704*	0.880	
		(0.19)	(0.28)	(0.36)	(0.50)		
HM	0.558	0.243*	0.422*	0.617*	0.726*	0.622*	0.834
		(0.06)	(0.18)	(0.38)	(0.53)	(0.39)	

Table II. Factor correlations and squared correlation between the study constructs

Notes: NI = Normative Influence; II = Information Influence; PBC = Perceived Behavioural Control; ATT = Attitude; INT = Intention; HM = Health Motivation. * $p < 0.001$

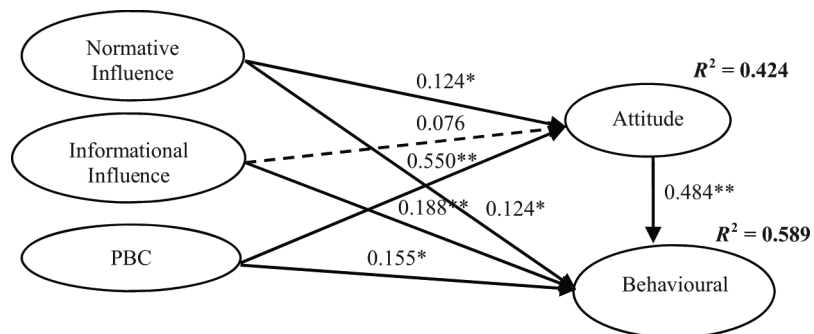


Figure 2. Parameter estimates for the hypothesised structural

Notes: PBC = Perceived Behavioural Control. * $p < 0.05$; ** $p < 0.001$

0.978, RMSEA = 0.037). 42.4 per cent of the total variance in consumer attitude was explained by the specified predictors. Overall, normative influence and PBC had significant positive effect on consumer attitude. Therefore, *H1(a)* and *H2* are supported. It is observed that PBC had particularly strong effect on consumer attitude towards dietary supplements consumption. The specified structural model explained a total variance of 58.9 per cent in behavioural intention. Our findings revealed that consumer attitude, normative influence, informational influence and PBC have positive effects on behavioural intention. Consumer attitude emerged to be the most salient factor in influencing the subjects' intention to consume dietary supplements.

The insignificant path between information influence and attitude towards dietary supplements consumption lead to the speculation that the relationship could be more complex in this setting compared to past literature that used a different sample within the western culture. There might well be other possible moderating variable or some other condition that the current literature has neglected when examining the relationship between social influence and consumer attitude. Such finding further justifies the need to investigate the proposed moderating role of health motivation in our study.

Mediating effects. The hypothesised model suggests three possible indirect (mediating) paths. In order to test for mediation, the hypothesised partial mediation model was compared against both full mediation and direct effect model (i.e. all predicting variables including attitude were allowed to affect behavioural intention directly without specifying any mediating effects) using competing model strategy (Baron and Kenny, 1986). Chi-square difference test showed that the partial mediation model was more superior compared to the full mediation ($\Delta\chi^2 = 51.416, p < 0.001, df = 3$) and direct effect model ($\Delta\chi^2 = 176.4, p < 0.001, df = 3$). Consequently, the mediating effects can be interpreted with confidence using our specified model. Hair *et al.* (2010) suggest that a path with a coefficient value greater than 0.09 represents a sizable indirect effect. An indirect path (through attitude) was observed for the effect of PBC on intention ($\beta = 0.266$). Hence, *H3* is partially supported.

Moderating effects. Once support for the main effects was found, the potential moderating role of health motivation on the postulated relationships specified in the structural model was analysed in order to gain further understanding into the relationships. Although moderated regression analysis is a commonly used method in marketing research, multi-group analysis was employed since it is a powerful and versatile approach in testing structural invariance (Steenkamp and Baumgartner, 1998). Median split was computed in this study based upon the values of the moderating variable. That is, multi-group analysis comparing two sub-samples, one with high versus one with low value of health motivation was performed.

Prior to the multi-group analysis, cross validation of the specified model as recommended by Hair *et al.* (2010) was performed. The loose cross-validation results showed acceptable model fit when the measurement models for both groups were estimated separately, indicating multi-group analysis could be performed with confidence (Hair *et al.*, 2010). In the next step, an overall χ^2 difference test was assessed for the moderating variable. That is, model comparisons were conducted between a general two-group model whereby the structural paths specified were freed across both groups, and a model whereby the specified paths were systematically constrained to be equal across the two groups (Byrne, 2001). The results revealed a χ^2 difference ($\Delta\chi^2 =$

19.76, $df = 7$) between the constrained ($\chi^2 = 556.47$, $df = 365$) and unconstrained ($\chi^2 = 536.71$, $df = 358$) model which was larger than the threshold value of 14.067 at 5 per cent significance level, indicating a potential moderation effect of health motivation (Hair *et al.*, 2010).

Consequently, each link was separately constrained to be equal across the two sub-groups and χ^2 differences were calculated with respect to the general model in order to test the moderating effect of health motivation on each link. The χ^2 difference that is significantly higher than the critical value of 3.84 indicated moderating effect. The results (Table III) showed a significant moderating effect of health motivation on the informational influence-attitude and informational influence-intention paths. Therefore, *H4* is partially supported. Particularly, the positive moderating effect of health motivation on the relationship between informational influence and intention suggested that individual who are more motivated to perform preventive health behaviour (the extent to which the likelihood of the individual to accept information from significant other in ambiguous situations) had a stronger impact on their intention to consume dietary supplements. Surprisingly, the empirical results demonstrated that health motivation weakens the effect of information influence on the subjects' attitudes towards dietary supplements consumption.

Discussion

The empirical results show that social norms, perceptions of control and attitudes have corresponding influences on behavioural intention for dietary supplement consumption. Our findings present empirical support to show that normative influence has positive effects on both attitudes and behavioural intention. This finding is interesting as some scholars have downplayed the role of social norms in the TPB research (Armitage and Conner, 2001). Thus, the findings in this study draws support from Childers and Rao's (1992) view that consumption decisions are influenced by their reference groups. As our target group of consumers comprises of younger consumers, we suggest that the significant others, for example, parents of younger consumers may play an important role in shaping their attitudes towards dietary supplements.

While informational influence is reported to predict behavioural intention positively, its influence on attitude is not significant. This lack of support for the effect of informational influence for attitude suggests that consumers may have reservations with regard to the trustworthiness of information on health supplements.

Hypothesised paths	Low health motivation ($n = 149$)		High health motivation ($n = 289$)		χ^2 difference ($\Delta df = 1$)
	Estimate	t -value	Estimate	t -value	
NI \rightarrow ATT	-0.121	-0.891	0.072	0.966	$\Delta\chi^2 = 1.538$
II \rightarrow ATT	0.440	3.228**	0.060	0.846	$\Delta\chi^2 = 5.917^*$
PBC \rightarrow ATT	0.358	3.150**	0.365	4.354***	$\Delta\chi^2 = 0.154$
ATT \rightarrow INT	0.555	4.136***	0.409	5.102***	$\Delta\chi^2 = 0.412$
NI \rightarrow INT	0.023	0.176	0.196	3.060**	$\Delta\chi^2 = 1.889$
II \rightarrow INT	-0.016	-0.132	0.294	4.205***	$\Delta\chi^2 = 4.852^*$
PBC \rightarrow INT	0.240	2.207*	0.069	0.985	$\Delta\chi^2 = 1.166$

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table III.
Structural parameter
estimates for health
motivation as moderator
model



This is especially true when the consumers are unsure if the regulations controlling manufacturer claims or whether manufacturers' business activities are monitored effectively in the market. Another possible explanation could be that the effect of informational influence on consumer attitude, such as medical care services, may be a stronger influence in a more serious health context.

While at first glance, it appears that the impact of information influence on consumer attitude and behavioural intention is straightforward, a more in-depth examination suggests that the issue is more complex, whereby the relationship between informational influence and consumer attitude is strengthened for the low health motivation group rather than as a direct influence on behavioural intentions. One possible explanation for such a moderating effect is that the exposure to health information for the low motivation health group increases their awareness and expectations about dietary supplements to a greater extent than the high motivated group. In contrast, informational influence directly influences the path to behavioural intentions for the high motivation group to consume dietary supplements, as compared to low health motivation individuals. Thus, it is noted that the inclusion of the health motivation as a moderating variable provides a more accurate perspective of the relationships between information influence, consumer attitude and behavioural intention. Thus, an added contribution of this study is that it shows how health motivation acts as a moderating influence for the relationships in the social cognitive model set out in the context of the theory of planned behaviour framework. Furthermore, the study shows that the value of information influence should not be disregarded for the consumption of dietary health offerings. The availability of timely and accurate information regarding the usage and instructions of dietary products is crucial in consumers' decision making process.

Lastly, this study advances the literature related to the effect of PBC on behavioural intentions by showing that perceptions of control can influence individuals' intention to consume dietary supplements indirectly by positively affecting attitude. That is, interventions aimed at increasing the inclination to consume dietary supplements can be enhanced by strengthening the ties between perception of control and attitude. In turn, these favourable attitudes drive the likelihood to consume such health products. The findings in the study suggest that by improving the facilitation or decreasing the barriers to a consumer's perception of control towards dietary has a positive influence on attitudes. For example, lack of time could be one of the factors that inhibit the consumption of dietary supplements. In this context, offering dietary supplement that minimises or overcomes this impediment to the consumption of health supplements is one strategy to overcome this barrier in the context of product strategy.

Managerial implications

The present research adds to the existing literature on health and pharmaceutical marketing, which is of considerable interest to stakeholders in the healthcare and pharmaceutical industry such as marketing practitioners, health professionals, public policy agencies, consumer welfare advocates and academicians. Our study presents several managerial implications. First, the young segment market represents an important segment in the health supplements category. The results show that young consumers "positive health motivation and attitudes influence behavioural intention to consume health supplements. Second, the ever increasing costs of public health means



those younger consumers who look after their health and well-being may contribute to reducing public health costs as well as increasing productivity in the workforce. Third, younger consumers take dietary supplements for a variety of reasons, and hence, marketers must make specific information available so as to ensure the target group of younger consumers are able to discern the benefits and value for the consumption of health supplements. Marketers must also ensure that sales staff has good product knowledge on health supplements in-store to ensure younger consumers get relevant and accurate information on health supplement offerings that offer younger consumers solution for improving health and well-being. Last, parents and family members are an important reference category for younger consumers in Malaysia who wish to take health supplements. Marketing messages in the form of health supplement advertising framed in the context of close family members as a reference category may create positive influences and attitudes on the benefits of consumption of health supplements for younger consumers.

Concluding remarks

Gaining long-term, effective and consistent behavioural change aimed at increasing young adults' dietary supplement use can be a challenging task. To this effect, our study provides empirical validation through the TPB framework. In conclusion, the current study offers an initial starting point for future research for dietary supplement use, and can be extended to other health behaviours such as smoking, sunscreen use, dietary behaviour, and stress management. This study acknowledges the limitations of using a student sample which limits the generalizability of the results to the larger population. However, the sample limitation presents an opportunity for further studies in this area; for example, future research can replicate the study using non-student consumer groups and perhaps extend the study in a different cultural setting. Finally, additional research is also needed to incorporate other potential moderators or antecedents of dietary supplement use.

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Further reading

United States Food and Drug Administration (1994), *Dietary Supplement Health and Education Act of 1994*, available at: www.fda.gov/AboutFDA/Transparency/Basics/ucm195635.htm (accessed April 13, 2010).



Appendix. Measurement scales information

Construct	Items statement	Reference
Normative influence	When buying dietary supplements, I generally purchase those brands that I think others will approve of Most people who are important to me would support me to take dietary supplements It is expected of me that I take dietary supplements People who are important to me would think I should take dietary supplements People who are important to me would approve of my taking dietary supplements	Bearden <i>et al.</i> (1989); Ajzen (2002)
Informational influence	When buying dietary supplements, I often consult other people to help choose the best alternative available To make sure I purchase the right dietary supplements products or brands, I often observe what others are buying and consuming If I have little experience with a particular dietary supplement, I often ask others before consuming it I frequently gather information from others about dietary supplements	Bearden <i>et al.</i> (1989)
Perceived behavioural control	There are factors outside my control that could prevent me from taking dietary supplements I have complete control over whether or not I take dietary supplements from now on There is a lot I can do to make sure I take dietary supplements Overall, I have high control over taking dietary supplements Whether or not I take dietary supplements is entirely up to me	Ajzen (2002); Hagger and Chatzisarantis (2005)
Attitude	I think that the money I spend taking dietary supplements is worthwhile It is important for me to take dietary supplements It is valuable for me to take dietary supplements It is useful to take dietary supplements Overall, I think that my taking dietary supplements would be beneficial	Conner <i>et al.</i> (2001); Hagger and Chatzisarantis (2005)
Behavioral intention	I intend to take dietary supplements I plan to take dietary supplements I will try to take dietary supplements from now on It is likely that I will take dietary supplements I want to take dietary supplements	Ajzen (2002)

(continued)

Table AI.



Construct	Items statement	Reference
Health motivation	<p>I try to prevent common health problems before I feel any symptoms</p> <p>I am concerned about common health hazards and try to take action to prevent them</p> <p>I don't worry about common health hazards until they become a problem for me or someone close to me*</p> <p>Because there are so many illness that can hurt me these days, I am not going to worry about them*</p> <p>I try to take action against common health hazards I hear about</p> <p>I would rather enjoy life than try to make sure I am not exposing myself to a health hazard*</p>	Jayanti and Burns (1998)

Table AI.

Note: *Denotes reversed scored items

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