

19th PCSF 2019
Professional Culture of the Specialist of the Future

**MEMES IN FUNCTIONAL FOOD PREDICTED BY HEALTH
ANXIETY, PERCEIVED VALUE, SUBJECTIVE NORM**

Ming-Yueh Hwang (a), Jon-Chao Hong (b), Kai-Hsin Tai (c)*

*Corresponding author

(a) National Taiwan Normal University, 162, Heping East Road Section 1, Taipei, Taiwan (R. O. C.),
t06013@ntnu.edu.tw

(b) National Taiwan Normal University, 162, Heping East Road Section 1, Taipei, Taiwan (R. O. C.),
tcdahong@gmail.com

(c) National Taiwan Normal University, 162, Heping East Road Section 1, Taipei, Taiwan (R. O. C.),
star99xin@gmail.com

Abstract

In recent years, functional food has become widespread as a meme in Taiwan. Many people purchase functional food based on someone else transferring the message regardless of the usefulness of the functional food. To examine behavioral patterns for memes with functional foods, this study used expectancy-value theory to design the research. Data was collected and validated for confirmatory factor analysis with structural equation modelling (SEM) to test research hypotheses regarding to interrelatedness of health anxiety, subjective norm, perceived behavioral control to replicate message (PBCRM) to buy and take functional foods, perceived values, and intention to transfer the message. The results indicated individuals who experienced high levels of health anxiety tended to have higher perceived behavioral control to replicate message (PBCRM) and perceived value, and reflected high levels of intention to spread the message. This result indicated that memes exist in Taiwan even when there was no benefit from functional foods.

© 2019 Published by Future Academy www.FutureAcademy.org.UK

Keywords: Functional foods, health communication, meme, social networking.



1. Introduction

A meme, initially defined by Dawkins (1976), is a mental representation that can be passed from person to person. Van den Bulte and Joshi (2007) characterized a meme according to social cognitive psychology, which focuses on individuals whose ideas appear to be influenced by others. Memes differ from dialogue in that the goal is to create additional content that others will connect with and participate to spread (Carter & Arroyo, 2011; Dawkins, 2004). However, meme promotes messages that penetrate people's lives and can change consumption styles (e.g. taking too many functional foods when people get messages from social networks). Functional food is assumed to improve overall health and prevents health-related diseases (Moller & Rowland, 2002; Gray, Armstrong, & Farley, 2003). An example is probiotics, a specific group of microflora that exerts beneficial effects to the host. It is believed that probiotics can assist weight loss without the trouble of restrictions on food and exercise. This became a widespread meme in Taiwan in 2011. In the context of meme, functional food effects can be exaggerated through message replication and transmit to influence the public. Thus, in respect of meme and functional food, people's beliefs and behavior need to be studied in order to understand why they are willing to replicate and spread online messages, which leads to an increasing number of people consuming functional foods.

Higgins and Scholer (2009) posited that the more engaged individuals repel targets (i.e., the meme); the more value is added to interact with the object to provide further impetus for exploring new objects. Because behavioral intentions (Ajzen, 1991) are conceptualized as the consequence of cognitive judgments about one's expectancies and the valences with respect to performing the potential behavior, the intentions construct provides a useful mechanism for understanding how people's experiences with a received message affect whether they will follow an action or not. However, various personality factors have been suggested as possible moderators of the behavior-intention relationship, such that certain personality traits may explain why only some individuals will act upon their intentions (Shropshire, Warkentin, & Sharma, 2015). There are currently a limited number of resources for online behavioral intentions related to meme in Taiwan. Therefore, the purpose of this paper is to provide insight into personality trait and health anxiety factors that influence users' subjective norm and perceived behavior control in relation to value perception of online functional food behavior in the meme context.

2. Problem Statement

2.1. Functional food taking in Taiwan

Chen (2011a) pointed out that total sales of functional foods in Taiwan was around NTD\$664 billion in 2008, and increased to NTD\$759 billion in 2009. In 2010 and 2011, it was expected to reach NTD\$840 billion and NTD\$900 billion respectively. Nevertheless, people have been taking functional foods and unknowingly bought fake functional foods that may cause health problems because the health information spread online may be untrue. For example, according to a report from Taiwan's Food and Drug Administration, Department of Health, among released tests on 4182 so-called functional foods, 823 contained false ingredients (a false product detection rate of 19.7%) (Lai et al., 2011). As Urala and Lähteenmäki (2007) pointed out, consumers do not consider general necessity as a reason behind their willingness to take functional food, but instead trust the suggestions of others in health-related information.

This plays an important role in functional food choices. Verbeke (2005) found that belief in the health effects of functional foods is a crucial factor that affects consumer acceptance.

Because the world population is ageing and life expectancy is increasing (National Institute on Aging, 2011), it has become increasingly relevant to improve the quality of the later years in life (van der Zanden, van Kleef, de Wijk, & van Trijp, 2014). Specialized functional foods along with word of mouth may be appropriate to explain the effects of information transmission supported by others' recommendations (Bao & Chang, 2014). Over consumption of functional foods may result in distress of kidney functions, which further leads to end stage renal dysfunction (ESRD). In Taiwan, ESRD reached 2,584 per million cases in 2010, which was the highest rate in the world. Rates of 2,260 and 1,870 cases were reported in Japan and the US (United States Renal Data System, 2012). As few studies have covered consumer behavior and psychology in relation to functional food memes in Taiwan (Chen, 2011a, 2011b), the present study explores the behavior patterns for functional foods affected by memes.

2.2. Functional foods in the meme context

There has been an explosion of consumer interest in the health enhancing role of specific foods or physiologically active food components, known as functional foods (Nakai, Nakamura, & Abe, 2011). The definition of functional foods varies tremendously in the literature and there is no agreement on a formal definition (Bech-Larsen & Grunert, 2003, p.9). In most countries, there is no legislative definition of functional foods. However, in 1991, Japan implemented a regulatory approval process for functional foods. These foods are known as foods of specified health use (FOSHU). Clearly, all foods are functional, as they provide taste, aroma, and nutritional value. However, within the last decade, the term "functional" as applied to food has adopted a different connotation. In order for food to be claimed as "functional" in the Taiwanese market, they must provide additional physiological benefits beyond meeting basic nutritional needs.

Functional foods are often considered to be healthier than conventional foods (Ares, & Gámbaro, 2007) and willingness to try them is generally high (Siegrist, Stampfli, & Kastenholz, 2008). Health claims attached to functional food are sometimes thought to lack relevance (van Kleef, van Trijp, & Luning, 2005) and are confusing to consumers (Sääksjärvi, Holmlund, & Tanskanen, 2009). This confusion may explain why people are influenced by what others say in the meme context.

2.3. Subjective norms

Taking behavioral theory to study psychosocial variables and cognitive antecedents, the Theory of Planned Behavior (TPB) derived from expectancy value theory (EVT) (Kim, Ham, Yang, & Choi, 2013), and claims that intentions are the immediate determinant of behavior, and the stronger the intention, the greater the probability that the behavior will actually be performed (Armitage & Conner, 2001). Particularly, behavioral intention can be predicted from psychosocial factors of TPB: subjective norm, and perceived behavioral control (PBC) related to that behavior (Araujo-Soares, McIntyre, & Sniehotta, 2009). Subjective norm (SN) represents an individual's beliefs about what others want him/her to do and the motivation to comply with those recommendations (Ajzen, 1991; Lautenschlager & Smith, 2007). Particularly, SN creates options to (1) strengthen a normative belief that supports the persuasive goal and

(2) increase the motivation to comply with a norm that supports persuasive goals. TPB has been used successfully with adults and study results have suggested high predictive validity of the TPB constructs to change health behaviors (Belanger-Gravel & Godin, 2010). SN has received wide attention to use as a psychological model for health behaviors such as healthy eating and physical activity (Backman, Haddad, Lee, Johnston, & Hodgkin, 2002; Belanger-Gravel & Godin, 2010; Rhodes, Macdonald, & McKay, 2006). Thus, the present study explored the correlates of SN to perceived functional food values and replicative behavior.

2.4. Replicate and transmit meme message

The important prediction factors of intention, subjective norm, and perceived behavioral control, are expected to vary across behaviors and situations. If the degree of actual control exists, the intention is expected to lead to overt behavior (Ajzen, 2001), and the variable of perceived behavioral control in TPB will be extended to perceived behavioral control to replicate message (PBCRM) to buy or take functional foods based on other's recommendation in the online context of meme. Moreover, PBCRM influences the perceived values after buying and using functional foods and how perceived values affect the behavioral intention to transmit the functional food message to others based on the assertion of TPB. As value increased the effect of value on behavioral intentions increased as well (Shah & Higgins, 1997). Thus, to address the meme issue, the adaptation of TPB presented in the present study examines functional food choice motivations from the perspective of PBCRM and perceived values to assess predictive intention of spread message (ISM).

2.5. Perceived values in having function food context

Social psychologists have developed an integrated attitude-behavior model that includes additional predictors of behavior, such as perceived values (Mouakket & Al-hawari, 2012). Perceived value, which is regarded as individual overall assessment of a product (or service) based on perceptions of what was experienced, can be used to explain why customers choose to use specific products (Zeithaml, 1988). Moreover, perceived value can be regarded as a trade-off between perceived benefits and perceived costs (Lovelock 2001). Moreover, perceived value is the utility derived from the perceived quality and expected performance of the product (Hsu & Lin, 2015). When customers perceive functional food to be useful, they are likely to be more satisfied with that food. The link between perceived values and behavioral intention have been shown in previous studies (e.g., Babin, Lee, Kim, & Griffin, 2005; Jones, Reylonds, & Arnold, 2006), thus perceived values in having function foods is examined in this study.

2.6. Health Anxiety (HA)

Some personality traits, such as neuroticism, reflect tendency to experience negative emotional responses, including symptoms such as anxiety (Costa & McCrae, 1992), and have been linked with negative physical health outcomes (Smith & MacKenzie, 2006). From a cognitive perspective, HA occurs when a particular internal stimulus (i.e. a body sensation) is misjudged to be a threat (i.e. a symptom of

illness) and the innate ability to prevent the feared illness is perceived as insufficient (Warwick, 1989). By performing healthy behaviors, consumers seek to reduce perceived health threats.

People with anxiety often present somatic rather than emotional symptoms. It can be hypothesized that individuals who have high levels of somatic symptoms will self-attribute to a high level of food hypersensitivity (Kanaan, Lepine, & Wessely, 2007). This should draw attention from the negative affective tone of the health anxiety and, hence, lower risk perceptions of being influenced by others (Sharif, 1993) in a low tendency to analytic thinking (Egloff & Schmukle, 2004). In this course, health anxiety as a trait anxiety would be strongly related to the acceptance of other's opinions.

3. Research Questions

PB has been applied widely with findings that indicate attitudes, SN, and perceived behavioral regulators that explain much of the variance across a number of behaviors (Armitage & Conner, 2001). Bogers, Brug, van Assema, and Dagnelie (2004) suggested existing models need to be adjusted for an explanation of food choice and eating behavior; and this study attempted to validate this model in its fit for the prediction of functional food meme behavior, idea replication, and spread through health anxiety and perceived values.

3.1. Health anxiety relevant to subjective norm and PBCRM

An experience of threat and uneasiness arising from regulated expectations in a group, is the importance of normative support for the positive effects of behavior emerged (Riek, Mania, & Gaertner, 2006). However, individuals who are under pressure should have higher levels of anxiety and pressure-related intrusive thoughts that may occupy working memory resources, leading to performance decrements as a result of decreased critical thinking capacity (Byrne, Silasi-Mansat, & Worthy, 2015). Moreover, it is well established that anxious individuals commonly display an encoding advantage for threat-related information and follow a behavior relevant to that information (MacLeod & Rutherford, 1992). Accordingly, this study examined the relatedness of HA on behavioral attitude to SN and PBCRM of functional food.

- H1: Health anxiety is positively correlated to SN.
- H2: Health anxiety is positively correlated to PBCRM.

3.2. SN relevant to PBCRM

Ajzen (1991) indicated that behavior is predicted by intention and, further, that intention is jointly determined by subjective norms and perceived behavioral control (i.e., behavioral replication on meme concerns). Fishbein and Ajzen (1975) stated that SN is a function of individual beliefs that are specific to the individual or the group that should perform the behavior. As PBC reflects previous experience as well as anticipated impediments and obstacles, the more advantageous the subjective norm related to a behavior and the greater the PBC, the stronger the individual intention to perform the behavior (Ajzen, 2001). With regards to functional food, the marketing strategy relies heavily on the recommendations of celebrities,

friends or others. Accordingly, for memes, people tend to follow normative belief to comply with these referents and replicate behavior.

- H3: SN is significantly correlated to PBCRM.

3.3. SN relevant to perceived values

Consumer behavior is influenced not only by one's own makeup but also by the norms and beliefs of the cultural environment (Triandis, 1989). Consumers may believe that family, friends, and peer groups favor certain behaviors, and their beliefs influence the satisfaction of behavior (Pavlou & Chai, 2002). As SN is important to the perception of perceived values for functional food products (Urala & Lähteenmäki, 2006), the present study highlights the essentiality of SN to understand the interrelatedness of consumers' perceived values. Thus,

- H4: SN is positively correlated to perceived value.

3.4. Behavioral replication relevant to perceived values

Schwartz (2012) summarized the features of values as beliefs tied inextricably to emotion not objective ideas. Values also guide the selection or evaluation of actions, policies, people, and events. As values refer to motivation, not to action, observers must infer them indirectly (Bardi, Buchanan, Goodwin, Slabu, & Robinson, 2014). The fact that perceived value is usually under cognitive control, indicates behavioral control's relevance to perceived usefulness (Wansink & Sobal, 2007). This creates the opportunity for understanding PBCRM to infer a person's perceived values to express relevant behaviors.

- H5: PBCRM is positively correlated to perceived value.

3.5. Perceived values relevant to ISM

Previous researchers have examined consumer value as the antecedent of consumers' behavioral intention to purchase a product or use a certain service (Sweeney & Soutar, 2001; Parasuraman & Grewal, 2000). For a specific product or service, perceived value increases when users believe the benefits outweigh the costs. In many instances, perceived value has been linked to a number of positive outcomes (Minna 2005) and purchase intention (Chang & Tseng, 2013). However, the fact that intention is usually under cognitive evaluation, this study examined the correlation between perceived values and intention to spread meme messages.

- H6: Perceived value is positively correlated to ISM.

4. Purpose of the Study

Consumer influential beliefs are strong indicators of current, future, or adherence to screening behaviors, which are also critically important to understand the development of behavioral intention. This study extended TPB to predict consumers' willingness to try functional foods in terms of PBCRM, SN, perceived values and online buying intention related to their degree of health anxiety. The research model proposed is shown in Figure 1.

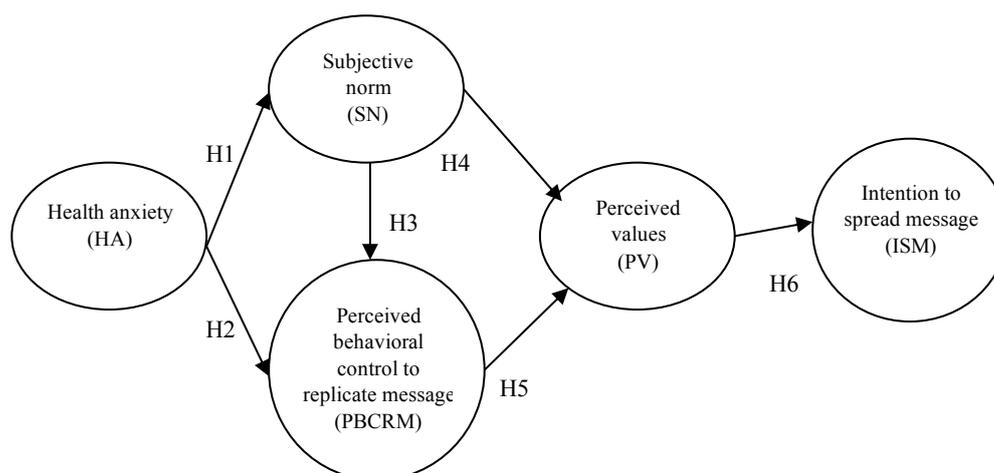


Figure 01. Research model

5. Research Methods

The present study highlights the theory of reasoned action as a model to understand the interrelatedness of health anxiety, PBCRM, and intentions to spread messages (ISM) on functional food. To study functional foods in relation to consumer attitude and intention, we began by designing the instrument to collect data for confirmatory factor analysis with structural equation modeling (SEM) to test reliability and validity of questionnaire and to verify the pathway of research model.

5.1. Procedure

Vogt (2007) confirmed this trend of convenience sampling as the most common form of sampling is still true in contemporary social science research. Accordingly, we adopted convenience sampling methods based on the people we know, including friends and colleagues who have purchased functional foods and were willing to fill out questionnaires. The questionnaires were distributed via e-mail and were collected over a 3-week period. For ethical considerations, the research participants were informed that they had the right to end the questionnaire at any time with the insurance of anonymity for the participants.

5.2. Participants

Among the 343 surveys returned from 500 distributions, males accounted for 37% (127) and females accounted for 63% (216). Regarding age level, 51 (14.9%) participants were under the age of 20; 42 participants were aged 20–24 (12.2%); 70 (20.4%) participants were aged 25–29; and 180 (52.5%) participants were over 30. Regarding education level, there were 256 with university/college degrees (74.6%); 52 with postgraduate degrees or higher (15.2%); and 35 had senior high school certifications (10.2%).

5.3. Measuring questionnaire

The questionnaire items were adapted from previous theories or researchers and obtained by professionally translating the original items to Chinese using the forward–backward method, which allows

one to verify the accuracy, clarity, and naturalness of the translation. This research used the seven-point Likert scale to compute scores and the questionnaires elicited single responses (scored from 1 to 7) and consisted of bipolar adjective pairs (disapprove-approve).

Health anxiety: A revised version of the short health anxiety inventory (SHAI) developed by Salkovskis, Rimes, Warwick, & Clark (2002) was used to assess participant concerns for future health. The scale of HA in this study was to assess symptoms of health concerns in general.

Subjective norm: According to Fishbein and Ajzen (1975), SN refers to “perceived pressures on a person to perform a given behavior and the person’s motivation to comply with those pressures.” Thus, subjective norms reflect how the customer is affected by the perception of some significant referents (e.g., family, friends, and colleagues, among others) on his/her behavior. In the context of memes, SN reflected customers’ behavior was affected by their friends, colleagues, familiar doctors, and celebrities.

PBCRM: Sterelny, Smith, and Dickison (1996) proposed if B is a copy of A and B is produced through a process of replication, then B carries information about A by virtue of being relevantly similar to A. This definition emphasized a crucial point of causal implication that is central to most subsequent behavior of replication. Adapted from this definition, this study designed items in relation to customers’ perceived behavior control after receiving others’ recommended online message to buy and take functional foods for this construct.

Perceived value: PV refers to basic motivations such as safety needs and corresponded to products’ tangible attributes, which are primarily instrumental, functional, and cognitive to provide consumer value by offering a means to some end (Babin et al., 2005). The present study adapted this definition and designed items in this construct.

Intention to spread message: Relying on assumptions from communication theory, the proponents of media richness capacity for various processes lead to effective idea transfer (DeLuca & Valacich, 2006). As this causal relation is for the information transfer to most behavioral antecedents, thus, items of intention to spread message were adapted for the design this construct.

6. Findings

The analysis was run in two steps. Confirmatory factor analysis was applied to perform reliability analysis, validity analysis, and factor analysis of the questionnaire. LISREL 8.8 was then adopted for path modeling over covariance-based SEM.

6.1. Model fit analysis

According to Hair, Black, Babin and Anderson (2009), the fit indexes for the Absolute Fit Measures include the Chi-square, Root Mean Square Error of Approximation, Goodness of Fit Index, and Adjusted Goodness of Fit Index. The overall Absolute Fit Measures in this research were Chi-square = 3891.58, and the degrees of freedom was 1722, which indicated $\chi^2 = 718.14$, $df = 271$, $\chi^2/df = 2.65$, ratio of less than 3, is considered to be indicative of a good fit. RMSEA = 0.06, GFI = 0.85, and AGFI = 0.89. RMSEA is sensitive to model specification and is minimally influenced by sample size and not overly affected by estimation method (Fan, Thompson, & Wang, 1999). The lower the RMSEA value, the better the fit. A

commonly reported cut-off value is .08 (Hu & Bentler, 1999). The threshold value of GFI above 0.85 indicates a good fit (Kline, 2010). Regarding the value of AGFI, MacCallum and Hong (1997) suggested the threshold value above 0.8 is acceptable.

The fit indexes for Incremental Fit Measures include the Normed Fit Index, Non-Normed Fit Index, Incremental Fit Index, Comparative Fit Index, and Relative Fit Index. The Incremental Fit Measures in this research were NFI = 0.95, NNFI = 0.96, IFI = 0.96, CFI = 0.96 and RFI = 0.94. Those values are greater than 0.90 considered a good fit (Byrne, 2001). On the Parsimonious Fit Measures include Parsimonious Normed Fit Index (NFI) and Parsimonious Goodness of Fit Index (PGFI). According to Mulaik, James, Van Alstine, Bennett, Lind, & Stilwell (1989). Evaluation of goodness-of-fit indices for structural equation models. *Psychological bulletin*, 105(3), 430. (1989), PNFI and PGFI should be above 0.5 for a good model fit. The Parsimonious Fit Measures indexes of this study are as follows: PNFI = 0.69 and PGFI = 0.75. Overall, according to Hair et al. (2009), the model fit indexes above showed that the model of this research is acceptable.

6.2. Path Analysis

SEM has evolved into a mature and popular methodology to investigate model-derived structural hypotheses (Hershberger, 2003). Figure 2 shows the results of the path relationship among the hypotheses and hypotheses 1 through 5 were validated. Figure 2 indicated that health anxiety was positively relevant to SN ($\beta = 0.34, t = 5.12^{***}$), and to PBCRM ($\beta = 0.38, t = 4.05^{***}$); SN was negatively relevant to perceived values ($\beta = -0.14, t = 2.58^{**}$), and PBCRM was also negatively relevant to perceived values ($\beta = -0.64, t = 5.71^{***}$); finally, perceived value was positively correlated to ISM ($\beta = 0.56, t = 5.10^{***}$). The values of SRC were above 0.1 significant levels and indicated the six hypotheses were positively supported. In addition, the explanation power of health anxiety on SN was 58.1%, on PBCRM was 49.1%; the explanation power of SN and PBCRM on perceived values was 33.2%; the explanation power of perceived values on ISM was 35.7% These values were more than the recommended threshold value of 10% proposed by Falk and Miller (1992). Therefore, all variables of this research had good predicting power (Hair et al., 2009).

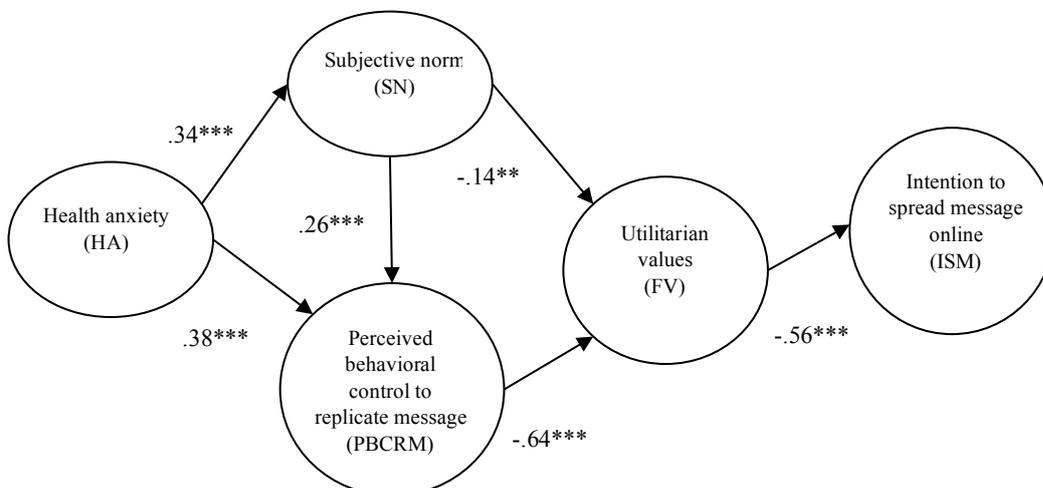


Figure 02. Verification of research model

7. Conclusion

This study decomposed TPB to examine meme behavior for functional foods online. The results indicated that all hypotheses were supported. This indicates participants with high levels of health anxiety, in general, are more willing to duplicate and transfer memes in relation to functional foods. Participants are more easily influenced by people in duplicating suggestions to purchase and consume functional foods. The interrelatedness among those constructs is elaborated as follows.

7.1. Health anxiety as an antecedent of SN:

In general, ruminating on health provides a sense of anxious apprehension that could motivate self-protective behavior towards purchasing food (Chapman & Coups, 2006). This study found that most samples have high levels of health anxiety that can predict high levels of SN on functional foods. This result is supported by the study of Kaplan and Baron-Epel (2003) which indicated respondents' ratings of their health status expressed by normative beliefs. Information and knowledge that others have can influence to consumers' perceptions, evaluations, and judgments together with health sensations.

7.2. Health anxiety as the antecedents of PBCRM:

Personal vulnerability leads individuals to experience higher levels of anxiety due a persistent sense of personal behavior. The present findings indicate health anxiety has a consistent positive relationship with PBCRM to suggest that consumers who were more uneasy, apprehensive, or anxious about health regarding purchases and consumption of functional foods. This finding is supported in previous research (De Maya, López-López, & Munuera, 2011), but is inconsistent with Naylor, Droms and Haws (2009), which found that consumers with higher health consciousness were not affected by health anxiety when purchasing functional foods.

7.3. SN as the antecedent of PBCRM:

It is assumed that if consumers have faith in a doctor or a celebrity's opinion about functional foods, they would follow this example in purchasing and consuming. This result revealed that SN can positively influence PBCRM and highlighted a lack of scientific validity about functional foods is not an obstacle for their consumption. This is supported by the study of van Kleef et al. (2005) who argued that scientific validity underpinning of decisions regarding functional foods show a significant influence of the perception of others' suggestions, but ignores the scientific validity linked to the purchase and consumption of functional foods.

7.4. SN as the antecedent of perceived values:

Due to the sense of belonging and enjoyment of helping others, people tend to disclose their actions to influence others (e.g., friends, family, and neighbors) (e.g., Cheung & Lee, 2012). The result of this study showed that there was a negative relationship between SN and perceived values, indicating participants easily accepted others' opinions regarding buying functional foods, even if they did not get a sense of

benefit from taking the functional foods. This result was supported by Pavlou and Chai (2002), who argued that consumers believe that family, friends, and peer groups favor certain behaviors, and their beliefs influence the behavior without concerning real effect of consumption.

7.5. PBCRM as the antecedent of perceived values:

TPB postulates that behavioral engagement is primarily determined by the socio-cognitive concepts in which people exercise behavioral pattern that influences the evaluations of the outcomes of behavioral performance. This result revealed that PBCRM is negatively related to perceived values of taking functional foods. The result was supported by Chen (2011b), who indicated that health concerns have a direct predictive control on taking functional foods and reflect the degree of willingness to consume functional foods.

7.6. Perceived values related to ISM:

Food choice involves a “dynamic phenomena full of changing psychological, social, and economic meanings” (Loumala, Laaksonen, & Leipamaa, 2004, p. 567). Overby and Lee (2006) found that consumer’s perceived values influenced their preference for online food purchasing behavior. This study indicated that functional values served the role of predicting ISM behavior and the correlation was positively high. This implied that people would be willing to pass functional food messages to others if they perceived values (Mustonen, Hissa, Huutilainen, Miettinen, & Tuorila, 2007).

Due to the complexity of decision making, consumers are susceptible to a wide range of social, cognitive, and affective factors determined by memes for functional foods. The present study used TPB to predict replication related to meme. This indicated that health anxiety can positively predict participants SN and PBCRM; where SN and PBCRM were negatively correlated to ISM mediated by perceived values. Taken together, this study contributes a novel perspective to explain meme behavior relevant to replication and intention to spread message. The results of this study advance our understanding of relational dynamics based on the decomposition of TPB by showing how health anxiety promotes or inhibits the relationship between SN, PBCRM, perceived values and ISM.

This study underscores the importance of relational dynamics in meme research relevant to functional food. The results discussed here show that when people with strong meme also have a high degree of relational SN and PBCRM reflecting a strong sense of health anxiety, they are more willing to spread functional food message to others. Based on the interrelatedness among constructs, the present study noticed that memes for functional foods would continue to appeal to people with high health anxiety to replicate the using and buying of functional foods. However, this study provides valuable information for understanding memes for functional foods as the high levels of ESRD in Taiwan suggests consumers need to be cautious about false messages and functional foods in the online market in Taiwan.

Acknowledgments

This work was financially supported by the “Institute for Research Excellence in Learning Sciences” and “Chinese Language and Technology Center” of National Taiwan Normal University (NTNU) from The

Featured Areas Research Center Program within the framework of the Higher Education Sprout Project by the Ministry of Education (MOE) in Taiwan.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211.
- Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology*, 52, 27–58.
- Araujo-Soares, V., McIntyre, T., & Sniehotta, F. F. (2009). Predicting changes in physical activity among adolescents. The role of self-efficacy, intention, action planning, and coping planning. *Health Education Research*, 24(1), 128–139.
- Ares, G., & Gámbaro, A. (2007). Influence of gender, age and motives underlying food choice on perceived healthiness and willingness to try functional foods. *Appetite*, 49, 148–158.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behavior: A meta-analytic review. *British Journal of social psychology*, 40(4), 471–499.
- Babin, B. J., Lee, Y. K., Kim, E. J., & Griffin, M. (2005). Modeling consumer satisfaction and word-of-mouth: Restaurant patronage in Korea. *Journal of Services Marketing*, 19(3), 133–139.
- Backman, D. R., Haddad, E. H., Lee, J. W., Johnston, P. K., & Hodgkin, G. E. (2002). Psychosocial predictors of healthful dietary behavior in adolescents. *Journal of Nutrition Education and Behavior*, 34(4), 184–193.
- Bao, T., & Chang, T. L. S. (2014). Finding disseminators via electronic word of mouth message for effective marketing communications. *Decision Support Systems*, 67, 21–29.
- Bardi, A., Buchanan, K. E., Goodwin, R., Slabu, L., & Robinson, M. (2014). Value stability and change during self-chosen life transitions: Self-selection versus socialization effects. *Journal of Personality and Social Psychology*, 106(1), 131–147.
- Bech-Larsen, T., & Grunert, K. G. (2003). The perceived healthiness of functional foods A conjoint study of Danish, Finnish and American consumers' perception of functional foods. *Appetite*, 40, 9–14.
- Belanger-Gravel, A. B., & Godin, G. (2010). Key beliefs for targeted interventions to increase physical activity in children. Analyzing data from an extended version of the Theory of Planned Behavior. *International Journal of Pediatrics*. <https://doi.org/10.1155/2010/893854>
- Bogers, R. P., Brug, J., van Assema, P., & Dagnelie, P. C. (2004). Explaining fruit and vegetable consumption: The theory of planned behavior and misconception of personal intake levels. *Appetite*, 42, 157–166.
- Byrne, B. M. (2001). *Structural equation modeling with AMOS: Basic concepts, applications and programming*. London, England: Lawrence Erlbaum Associates, Inc.
- Byrne, K. A., Silasi-Mansat, C. D., & Worthy, D. A. (2015). Who chokes under pressure? The Big Five personality traits and decision-making under pressure. *Personality and Individual Differences*, 74, 22–28.
- Carter, G. V., & Arroyo, S. J. (2011). Tubing the future: Participatory pedagogy and YouTube U in 2020. *Computers and Composition*, 28(4), 292–302.
- Chang, E. C., & Tseng, Y. F. (2013). Research note: e-store image, perceived value and perceived risk. *Journal of Business Research*, 66(7), 864–870.
- Chapman, G. B., & Coups, E. J. (2006). Emotions and preventive health behavior: Worry, regret, and influenza. *Health Psychology*, 25(1), 82–90.
- Chen, M. F. (2011a). The joint moderating effect of health consciousness and healthy lifestyle on consumers' willingness to use functional foods in Taiwan. *Appetite*, 57(1), 253–262.
- Chen, M. F. (2011b). The mediating role of subjective health complaints on willingness to use selected functional foods. *Food Quality and Preference*, 22(1), 110–118
- Cheung, C. M. K., & Lee, M. K. O. (2012). What drives consumers to spread electronic word of mouth in online consumer-opinion platforms. *Decision Support Systems*, 53(1), 218–225.
- Costa, P. T., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Difference*, 13, 653–65.

- Dawkins, R. (1976). *The selfish gene* (p. 192). Oxford: Oxford University Press.
- Dawkins, R. (2004). Extended phenotype: But not too extended. A reply to Laland, Turner and Jablonka. *Biology and Philosophy*, 19(3), 377-396.
- DeLuca, D., & Valacich, J. S. (2006). Virtual teams in and out of synchronicity. *Information Technology and People*, 19(4), 323.
- De Maya, S. R., López-López, I., & Munuera, J. L. (2011). Organic food consumption in Europe: International segmentation based on value system differences. *Ecological Economics*, 70(10), 1767-1775.
- Egloff, B., & Schmukle, S. C. (2004). Gender differences in implicit and explicit anxiety measures. *Personality and Individual Differences*, 36, 1807-1813.
- Falk, R. F., & Miller, N. B. (1992). *A primer for soft modelling*. OH: University of Akron Press.
- Fan, X., Thompson, B., & Wang, L. (1999). Effects of sample size, estimation methods, and model specification on structural equation. *Structural Equation Modeling*, 6(1), 56-83.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior*. Reading, MA: Addison-Wesley.
- Gray, J., Armstrong, G., & Farley, H. (2003). Opportunities and constraints in the functional food market. *Nutrition & Food Science*, 33(5), 213-218.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate data analysis (7th ed.)*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Hershberger, S. (2003). The Growth of Structural Equation Modeling: 1994-2001. *Structural Equation Modeling*, 10(1), 35-46. https://doi.org/10.1207/S15328007SEM1001_2
- Higgins, E. T., & Scholer, A. A (2009). Engaging the consumer: The science and art of the value creation process. *Journal of Consumer Psychology*, 19(2), 100-114.
- Hsu, C. L., & Lin, J. C. C. (2015). What drives purchase intention for paid mobile apps? – An expectation confirmation model with perceived value. *Electronic Commerce Research and Applications*, 14(1), 46-57.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55.
- Jones, M. A., Reylonds, K. E., & Arnold, M. J. (2006). Hedonic and utilitarian shopping value: Investigating differential effects on retail outcomes. *Journal of Business Research*, 59(6), 974-981.
- Kanaan, R. A. A., Lepine, J. P., & Wessely, S. C. (2007). The association or otherwise of the functional somatic syndromes. *Psychosomatic Medicine*, 69(9), 855-859.
- Kaplan, G., & Baron-Epel, O. (2003). What lies behind the subjective evaluation of health status? *Social Science & Medicine*, 56, 1669-1676.
- Kim, E., Ham, S., Yang, S., & Choi, J. G. (2013). The roles of attitude, subjective norm, and perceived behavioral control in the formation of consumers' behavioral intentions to read menu labels in the restaurant industry. *International Journal of Hospitality Management*, 35, 203-213.
- Kline, R. (2010). *Principles and practice of structural equation modeling*. New York, NY: The Guilford Press.
- Lai, K. C., Liao, Y. C., Lin, M. C., Ku, Y. R., Tsai, L. Y., Lee, F. C.... Low, J. F. (2011). The 100 year report: Extracted components of western medicine from functional foods. *Annual Report of Food and Drug Research*, 1, 212-223.
- Lautenschlager, L., & Smith, C. (2007). Understanding gardening and dietary habits among youth garden program participants using the Theory of Planned Behavior. *Appetite*, 49, 122-130.
- Loumala, H. T., Laaksonen, P., & Leipamaa, H. (2004). How do consumers solve value conflicts in food choice: An empirical description and points for theory-building. *Advances in Consumer Research*, 31, 564-570.
- Lovelock, C. H. (2001). *Service marketing: People, technology, strategy (4th ed.)*. New York: Prentice-Hall.
- MacCallum, R. C., & Hong, S. (1997). Power analysis in covariance structure modeling using GFI and AGFI. *Multivariate Behavioral Research*, 32(2), 193-210.
- MacLeod, C., & Rutherford, E. M. (1992). Anxiety and the selective processing of emotional information: Mediating roles of awareness, trait and state variables, and personal relevance of stimulus materials. *Behaviour Research and Therapy*, 30, 479-491

- Minna, P. (2005). Linking perceived value and loyalty in location-based mobile services. *Managing Service Quality, 15*(6), 509–538.
- Moller, B., & Rowland, I. (2002). Functional foods: At the frontier between food and pharma. *Current Opinion in Biotechnology, 13*, 483-485.
- Mouakket, S., & Al-hawari, M. A. (2012). Examining the antecedents of e-loyalty intention in an online reservation environment. *The Journal of High Technology Management Research, 23*(1), 46-57.
- Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of goodness-of-fit indices for structural equation models. *Psychological bulletin, 105*(3), 430.
- Mustonen, S., Hissa, I., Huotilainen, A., Miettinen, S. M., & Tuorila, H. (2007). Hedonic responses as predictors of food choice: Flexibility and self-prediction. *Appetite, 49*(1), 159-168.
- Nakai, Y., Nakamura, A., & Abe, K. (2011). Functional food genomics in Japan e-State of the art. *Trends in Food Science & Technology, 22*(12), 641-645.
- National Institute on Aging (2011). *Global health and ageing (NIH Publication No. 11-7737)*. Washington, DC: U.S. Department of Health and Human Services.
- Naylor, W. R., Droms, C. M., & Haws, K. L. (2009). Eating with a purpose: Consumer response to functional food health claims in conflicting versus complementary information environments. *Journal of Public & Marketing, 28*(2), 221-233.
- Overby, J. W., & Lee, E. J. (2006). The effects of utilitarian and hedonic online shopping value on consumer preference and intentions. *Journal of Business Research, 59*, 1160-1166.
- Parasuraman, A., & Grewal, D. (2000). Serving customers and consumers effectively in the twenty-first century: A conceptual framework and overview. *Journal of the Academy of Marketing Science, 28*(1), 9–16.
- Pavlou, P. A., & Chai, L. (2002). What drives electronic commerce across cultures? A cross-cultural empirical investigation of the theory of planned behavior. *Journal of Electronic Commerce Research, 3*(4), 240–253.
- Rhodes, R. E., Macdonald, H. M., & McKay, H. A. (2006). Predicting physical activity intention and behavior among children in a longitudinal sample. *Social Science & Medicine, 62*, 3146–3156.
- Riek, B. M., Mania, E. W., & Gaertner, S. L. (2006). Intergroup threat and outgroup attitudes: A meta-analytic review. *Personality and Social Psychology Review, 10*, 336–353.
- Sääksjärvi, M., Holmlund, M., & Tanskanen, N. (2009). Consumer knowledge of functional foods. *The International Review of Retail, Distribution and Consumer Research, 19*, 135–156.
- Salkovskis, P. M., Rimes, K. A., Warwick, H. M. C., & Clark, D. M. (2002). The health anxiety inventory: development and validation of scales for the measurement of health anxiety and hypochondriasis. *Psychological Medicine, 32*, 843–853.
- Schwartz, S. H. (2012). An overview of the Schwartz theory of basic values. *Online Readings in Psychology and Culture, 2* (1). <http://doi.org/10.9707/2307-0919.1116>
- Shah, J., & Higgins, E. T. (1997). Expectancy- value effects: regulatory focus as determinant of magnitude and direction. *Journal of Personality and Social Psychology, 73*(3), 447-458.
- Sharif, E. (1993). Choosing versus rejecting: Why some options are both better and worse than others. *Memory and Cognition, 21*, 546–556.
- Shropshire, J., Warkentin, M., & Sharma, S. (2015). Personality, attitudes, and intentions: Predicting initial adoption of information security behavior. *Computers & Security, 49*, 177-191.
- Siegrist, M., Stampfli, N., & Kastenholtz, H. (2008). Consumers' willingness to buy functional foods. The influence of carrier, benefit and trust. *Appetite, 51*, 526–529.
- Smith, T. W., & MacKenzie, J. (2006). Personality and risk of physical illness. *Annual Review Clinic Psychology, 2*, 435–467.
- Sterelny, K., Smith, K. C., & Dickison, M. (1996). The extended replicator. *Biology and Philosophy, 11*, 377-403.
- Sweeney, J. C., & Soutar, G. N. (2001). Consumers perceived value: the development of a multiple item scale. *Journal of Retailing, 77*, 203–220.
- Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review, 96*(3), 506–520.

- United States Renal Data System (2012). 2012 Atlas of CKD & ESRD-- international comparisons. Retrieved from http://www.usrds.org/2012/pdf/v2_ch12_12.pdf
- Urala, N., & Lähteenmäki, L. (2006). Hedonic ratings and perceived healthiness in experimental functional food choices. *Appetite*, 47 (3), 302-314.
- Urala, N., & Lähteenmäki, L. (2007). Consumers' changing attitudes towards functional foods. *Food Quality and Preference*, 18(1), 1-12.
- Van den Bulte, C., & Joshi, Y. V. (2007). New product diffusion with influentials and imitators. *Marketing science*, 26(3), 400-421.
- van der Zanden, L. D. T., van Kleef, E., de Wijk, R. A., & van Trijp, H. C. M. (2014). Knowledge, perceptions and preferences of elderly regarding protein-enriched functional food. *Appetite*, 80, 16-22.
- van Kleef, E., van Trijp, H. C. M., & Luning, P. (2005). Functional foods: Health claim-food product compatibility and the impact of health claim framing on consumer evaluation. *Appetite*, 44(3), 299-308.
- Verbeke, W. (2005). Consumer acceptance of functional foods: Socio-demographic, cognitive and attitudinal determinants. *Food Quality and Preference*, 16, 45-57.
- Vogt, W. P. (2007). Quantitative research methods for professionals. Boston: Pearson Education, Inc.
- Wansink, B., & Sobal, J. (2007). Mindless eating the 200 daily food decisions we overlook. *Environmental Behavior*, 39(1), 106-123.
- Warwick, H. M. (1989). A cognitive-behavioural approach to hypochondriasis and health anxiety. *Journal of Psychosomatic Research*, 33(6), 705-711.
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality and value: A means-end model and synthesis of evidence. *Journal of Marketing*, 52, 2-22.