THE MODERATION EFFECT ON THE RELATIONSHIP BETWEEN THE TPB-BASED PREDICTOR VARIABLES AND INTENTION FOR HEALTHY EATING AMONG THAI UNIVERSITY STUDENTS IN BANGKOK

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Abstract The present study was conducted to explore the moderation effect of health science education, internal health locus of control, and gender on the relationship between theory of planned behavior (TPB)-based variables and intention for healthy eating among Thai university students in Bangkok. There are 199 participants in this study whom were recruited from two universities via convenience sampling. Questionnaire about TPB-based variables from previous research and Multidimensional health locus of control scale were utilized to access participants' attitude towards healthy eating, subjective norms, perceived behavioral control, and intention for healthy eating, and internal health locus of control. The results from this study show that TPB is applicable with Thai university students in Bangkok. Furthermore, the results showed three moderation effects. The first two moderations are the moderation effect of internal health locus of control on the relationship between two TPB-based predictors variables (attitude towards healthy eating, subjective norm) and intention for healthy eating. Meanwhile, gender also moderate the relationship
between subjective norm and intention for healthy eating. Hence, considering client's level of internal health locus of control and gender are necessary because those moderator variables will promote the efficacy of healthy eating strategy for Thai university students in Bangkok.

Keywords: Theory of planned behavior (TPB), healthy eating, moderation effect, health science education, internal health locus of control, gender

Introduction

Healthy diet not only affect only physiological health but also affect psychological well-being (Stevenson, 2017).

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However, statistics have established that a large percentage of the population eat unbalanced nutrients (e.g., too much meat and other foods high in fat) such that many institutions have attempted to promote the consumption of more vegetables and wholegrain to gain more fiber and vitamins (Waratornpibul, 2014). The TPB model has been widely used in research involving eating-related behavior and it effective enough to predict healthy eating behavior after 6 years (Conner, Norman, & Bell, 2002). Utilizing the theory of planned behavior (TPB) to investigate its association with health-related behavior has long been accomplished (Steinmetz, Knappstein, Ajzen, Schmidt, & Kabst, 2016). However, in this era when people can access health information easily and have less personal interaction, there may be some changes in which factors influence the intention for healthy eating. Using the TPB model alone might not be comprehensive enough to understand university students' intention towards healthy eating. Therefore, the current study introduces the inclusion of health science education, Internal health locus of control, and gender as moderator variables to investigate if these moderators have enough power to influence the relationship between the TPB-based predictor variables and intention for healthy eating among Thai university students in Bangkok.

Research Objectives

This purpose of the present study is to investigate the factors that influence healthy eating intention in Thai university students. The main aim of the current study was to investigate the moderating effect of health science education, internal health locus of control, and gender on the relationship between TPB-based predictor variables and intention for healthy eating among Thai university students in Bangkok.

Literature Review

The following shortened review of literature contains theoretical perspectives and empirical findings about the TPB model, TPB-based predictor variables and moderator variables that were employed in this study. The Theory of Planned Behavior (TPB) was originally developed from the theory of reasoned action by adding perceived behavioral control in to the model (Ajzen, 1991). TPB was defined as the most well-known theoretical framework that used for predicting human behavior in numerous ranges of behavior (Åstr∅sm & Rise, 2001).

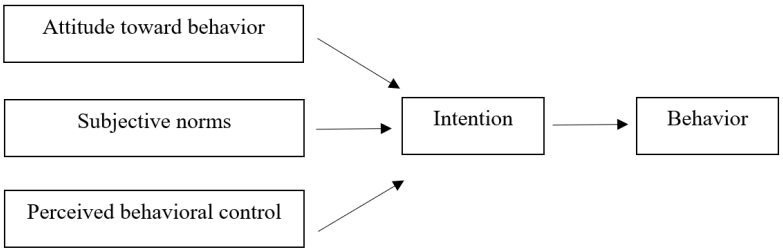

Figure 1. Theory of planned behavior (Ajzen, 1991).

Attitude is derived from beliefs related to features such as events and characteristics (Ajzen, 1985). Those features will determine the attitude in the same direction such that if that feature leads to a positive consequence

Subjective norm is a kind of social pressure that influences an individual to approve or disapprove one's performance of a behavior (Ajzen, 1985, 1991).

Perceived behavioral control refers to how individuals perceive performing a specific behavior in terms of whether it is difficult or easy for them (Wu, 2009). If they perceive that it is easy, they will feel that they have more control over the performance of the behavior. The theory of planned behavior was designed to be able to explain and predict human behavior in many situations, including health-related behavior. TPB was used with several eating-related behaviors such as decreasing fat intake, increasing fruit and vegetable intake, other health-related eating behavior, and healthy eating (Conner et al., 2002; Steinmetz et al., 2016; Povey, Conner, Sparks, James, & Shepherd, 2000). Moderator variable often be employed to make a hypothesis in psychological research. Moderator variable referred to a third variable that affect the relationship between two variables (Cohen, Cohen, West & Aiken, 2003). This study included three moderator variables which are health science education, internal health locus of control, and gender. For the first moderator, health science education, students with more knowledge about healthy eating from formal education or from recreational readings were more likely to develop healthy eating behaviors than their counterparts with less knowledge about healthy eating (Mii, 2007). In addition, a study revealed that exercise science students are under pressure to succeed in their future career as they are expected to lead and be a role model for their future clients to live healthily which includes eating healthy food (Malmborg, Bremander, Olsson, & Bergman, 2017) Exposing to a specific situation will influence individuals to develop a sense of expectancy which would, subsequently, influence the individual's prospective behavior in that situation. Expectancies can be distinguished into internal and external locus of control (Wallston, Wallston, Kaplan, & Maides, 1976). *Internal locus of control* applies when people believe that they, themselves, are the cause of a particular situation. On the other hand, *external locus of control* applies when people think that the situation was caused by something or someone beyond their control (Moshki, Ghofranipour, Hajizadeh, & Azadfallah, 2007). People who score high on internal locus of control are more likely to continue with health-related activities such as eating fiber, avoiding fat, exercising, and regular tooth-brushing (Steptoe & Wardle, 2001). Further, Bennett, Moore, Smith, Murphy, & Smith (1994) examined health locus of control and value for health as predictors of dietary behavior found that individuals with high scores on internal locus of control tend to consume healthy diets more frequently. There appears to be no conclusive evidence on the moderating role of gender. Emanuel, McCully, Gallagher, and Updegraff (2012) noted that the effect of gender differences in determining eating

behavior is still unclear. For example, Fila & Smith (2006) established that gender is a significant factor that made a difference in the study's results. It was found that females tend to eat healthier than males because females tend to appreciate more how important it is to eat healthy than males (Emanuel et al., 2012). Interestingly, another study reported that males are more likely to engage in healthy eating than females (Chansukree & Rungjindarat, 2017). By the same token, it would be interesting to investigate if gender difference will moderate the relationship between TPB-related variables and intention for healthy eating among Thai university students in Bangkok. The theory of planned behavior is one of the most powerful theories about human behavior (Ajzen, 2002; Chan et al., 2015; Wu, 2009). However, it would be interesting to include health science education, internal health locus of control, and gender as moderator variables in the current study's conceptual model. These moderators will enhance our understanding about the attitude and intention toward healthy eating behavior among Thai university students in Bangkok, with a view to promoting permanent healthy eating habits in the greater population.

Conceptual Framework

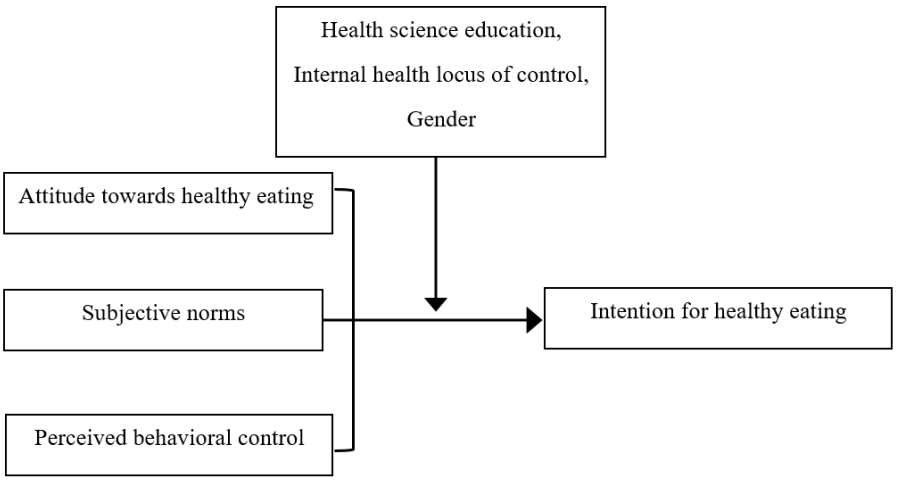

Figure 2. Conceptual framework of the study.

Method

Participants

The participants of this study consisted of 199 participants from two universities in Bangkok, Thailand: 71.9% (n=143) were female and 28.1% (n=56) were male, 49.7% (n=99) were from health science faculty and 50.3% (n=100) were from non-health science faculties. Participants' ages ranged from 17 years to 25 years and the average age is 21 years old.

Instrumentation

This study utilized a six-part self-administered questionnaire in English. The questionnaire was made up with the following descriptions:

Demographic information: Participants were asked to answer a set of researcher-constructed questions designed to tap their age, gender, nationality, and faculty

Multidimentional Health Locus of Control: Participants were asked to rate six item statements using a five-point Likert scale. The items were adapted from the *Multidimensional Health Locus of Control scale* (MHLC) that was employed to measure respondents' internal health locus of control (Wallston et al., 1978).

Attitude Towards Healthy Eating: participants were asked to rate six pairs of attitudes using a five-point semantic differential scale on their attitude towards 'healthy eating' (Wu, 2009).

Subjective norms: participants were asked to rate seven factors using a five-point Likert scale (1 = *Absolutely false* to 5 = *Absolutely true*) in terms of how the factor or social reference affects their willingness to eat healthy (Chan, 1998).

Perceived Behavioral Control: participants were asked to rate four item statements using a five-point Likert scale (1 = *Strongly disagree* to 5 = *Strongly agree*) aimed at measuring how much control have they got in themselves to eat healthily (Wu, 2009).

Intention for healthy eating: participants were asked to rate two item statements designed to measure intention for healthy eating using a five-point Likert scale ranging from 1 = *Strongly disagree* to 5 = *Strongly agree* (Chan et al., 2015).

Data Collection Procedure

The questionnaires were distributed to Thai university students who met the criteria and willing to participate in the study. Two reputable universities in Bangkok was involved in this study which were Assumption University and Mahidol university. Upon collection of the completed questionnaires, the researcher inspected each and every questionnaire and screen out those that were deemed not valid. Only valid completed questionnaires were subjected to data analysis.

Data Analysis

Frequency and percentage distributions, means and standard deviations were used to analyze the demographic data. Hierarchical regression analysis was conducted to test the hypothesized moderating effect (interaction effect) of health science education, internal health locus of control, and gender on the relationship between the TPB-based predictor variables of attitude towards healthy eating, subjective norms, and perceived behavior control, and the intention for healthy eating.

Results

Reliability analysis of the scales was conducted on the five scales that were utilized in the questionnaire to measure internal health locus of control, attitude toward healthy eating, subjective norm for healthy eating, perceived behavioral control, and intention for healthy eating. The computed Cronbach's alpha coefficients for overall five scales were moderate and ranged from .66 to .81 as follows: .66 for "Multidimensional Health Locus of Control scale", "Subjective norm", "Perceived Behavioral control", .74 for "Attitude toward healthy eating", and .81 for "Intention for healthy eating". Moreover, moderation analysis via multiple regression was employed to test the hypotheses of the moderating effect of health science education, internal health locus of control, and gender on the TPB-based predictor variables (attitude toward healthy eating, subjective norm for healthy eating, perceived behavioral control) and intention for healthy eating. The results of an applicability of TPB and moderated regression analysis are presented in the following Table1 and 2 respectively.

Table 1: Relationship between Attitude toward healthy eating, Subjective norm and Perceived behavioral control with Intention for healthy eating

Variables	B	SE	β
Attitude toward healthy eating	.091	.032	.181**
Subjective norm	.085	.025	.214*
Perceived behavioral control	.213	.040	.344*

*$p < 0.01$ **$p < 0.05$

The results showed that attitude toward healthy eating ($\beta = .181$, $p < 0.05$), subjective norm for healthy eating ($\beta = .214$, $p < 0.01$) and perceived behavioral control ($\beta = .344$, $p < 0.01$) were significant predictors of intention for healthy eating. Thus, the model of the Theory of planed behavior is applicable with Thai university student in Bangkok.

Table 2: The moderation effect of health science education (1), internal health locus of control (2), and gender (3) on the TPB-based predictor variables (attitude toward healthy eating, subjective norm for healthy eating, perceived behavioral control) and intention for healthy eating.

	Variables	B	SE	β	R^2	R^2 change
1	ATT	.161	.034	.320*	.103*	
	Health science education	.073	.207	.024		
	ATT X Health science education	-.031	.068	-.030	.104	.001
	SN	.144	.027	.362*	.131*	
	Health science education	.130	.204	.042		
	SN X Health science education	.008	.053	.010	.131	.000
	PBC	.308	.042	.476*	.221*	
	Health Science Education	-.199	.196	-.065		
	PBC X Health Science Education	.054	.083	.041	.222	.002
2	ATT	.152	.035	.302*	.103*	
	IHLOC	.005	.035	.009		
	ATT X IHLOC	.024	.011	.142**	.123**	.020**
	SN	.133	.027	.336*	.130*	
	IHLOC	-.002	.034	-.005		
	SN X IHLOC	.017	.009	.133**	.147**	.017**
	PBC	.284	.043	.439*	.216*	
	IHLOC	.002	.032	.004		
	PBC X IHLOC	.018	.013	.091	.224	.008
3	ATT	.159	.035	.316*	.103*	
	Gender	.092	.236	.027		
	ATT X Gender	.007	.081	.006	.103	.000
	SN	.153	.026	.384*	.135*	
	Gender	.242	.223	.071		
	SN X Gender	-.145	.064	-.151**	.157**	.022**
	PBC	.306	.041	.473*	.227*	
	Gender	.361	.215	.106		
	PBC X Gender	-.057	.092	-.039	.229	.002

*$p < 0.01$ **$p < 0.05$

Note: There are some abbreviations in this table. Attitude toward healthy eating (ATT), subjective norm for healthy eating (SN), perceived behavioral control (PBC), and internal health locus of control (IHLOC)

Moderated multiple regression showed that there were three significant moderating effects out of nine moderation interactions which were (1) internal health locus of control on the relationship between attitude towards healthy eating and intention for healthy eating

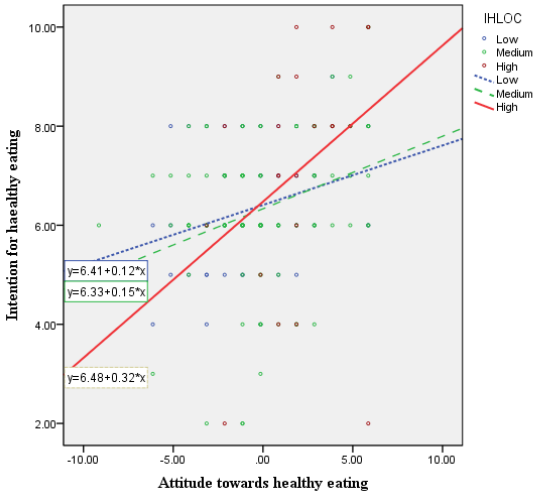

Figure 3. Plot of significant internal health locus of control X attitude toward healthy eating interaction for the intention for healthy eating.

People who possess high level of internal health locus of control with low levels of subjective norm for healthy eating have the lowest levels of intention for healthy eating. In contrast, when level of subjective norm is high, people who have high level of internal health locus of control will show higher intention for healthy eating than people who have medium and low level of internal health locus of control.

(2) internal health locus of control on the relationship between subjective norm and intention for healthy eating

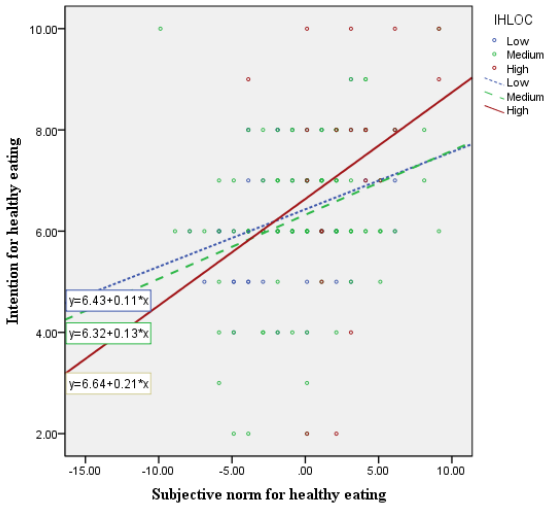

Figure 4. Plot of significant internal health locus of control X Subjective norm interaction for the intention for healthy eating.

The group that has the lowest level of intention for healthy eating are people who have high level of internal health locus of control with low level of subjective norm for healthy eating. On the other hand, when people who have high level of internal health locus of control have high level of subjective norm for healthy eating, their intention also becomes higher than people who have medium and low level of internal health locus of control.

(3) gender on the relationship between subjective norm and intention for healthy eating

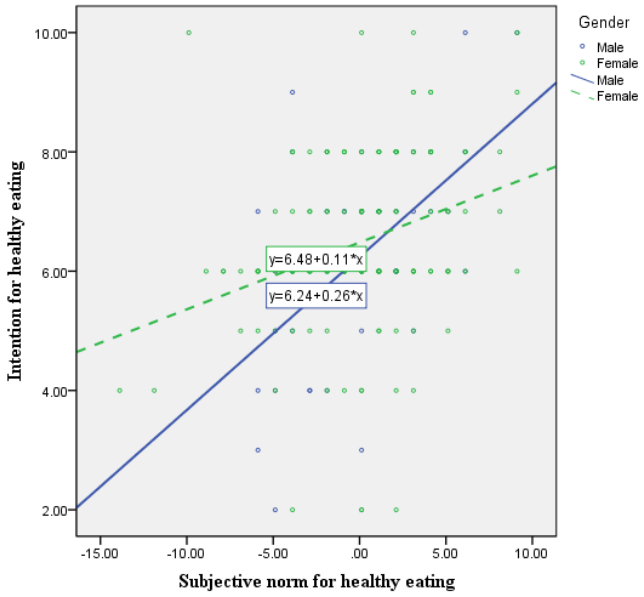

Figure 5. Plot of significant Gender X Subjective norm interaction for the intention for healthy eating.

Compared to lowercase participants, when subjective norm for healthy eating is low, the male group tends to have the lowest level of intention for healthy eating. However, when the level of subjective norm for healthy eating become high, male's intention for healthy eating become higher than the female group.

Discussion and Suggestions

The results from this study confirmed that TPB-based predictor variables (attitude towards healthy eating, subjective norm, and perceived behavioral control) were significant predictor variables of intention for healthy eating. The results were congruent with several researches such as Chan et al. (2015). Then, the results of this study demonstrated the applicability of the TPB model in the area of healthy eating with Thai university students in Bangkok. Furthermore, for Thai university students

in Bangkok perceived behavioral control seems to be the most powerful factor out of the three predictor variables from the theory of planned behavior which influence intention for healthy eating, followed by subjective norm and attitude toward healthy eating respectively.

For the three moderation variables, this study revealed three moderation effects between internal health locus of control and gender on the relationship between TPB-based variables and intention for healthy eating in Thai university students in Bangkok. The first two moderation effects were the moderation effect of internal health locus of control on the relationship between attitude towards healthy eating and subjective norm with intention for healthy eating. The last moderation effect was the moderation effect of gender on the relationship between subjective norm and intention for healthy eating.

Lacking of moderation effect of health science education on the relationship between the TPB-based predictor variables and the intention for healthy eating may occur because most of the participants have a great assessible to the information about healthy eating from the internet. Moreover, 'trust' could be one of the factors needed to work with attitude and knowledge to transform attitude into intention (Teng & Wang, 2015). However, there were an evidence that exercise-science students tend to be healthier than business student. The reason for the inconsistency between the results from this study and the result from previous study may be the difference in faculties of the participants as current study's participants were from health-science faculty which probably have less pressure to be a role model.

The results indicated that intervention for healthy eating based on TPB, attitude toward healthy eating and subjective norm may serve as a stronger influence on intention for healthy eating when participants have high internal health locus of control. However, the moderation effect of internal health locus of control was not present in the relationship between perceived behavior control and intention for healthy eating in Thai university students. A reason that could help to explain an absent of moderation effect in this case was the concept of trait and state. Trait was defined as a stable characteristic of personality. On the other hand, state was based on a current situation of individual which could shift overtime (Spielberger, 1996). This different concept could intervene the moderation effect of internal health locus of control on the relationship between perceived behavior control and intention for healthy eating.

The results from this study showed that there was no moderation effect of gender on the relationship between attitude toward healthy eating and perceived behavioral control with the intention for healthy eating. These results were congruent with the finding from Emanuel et at., (2012) that gender did not have moderation effect on TPB construct with a sample of American adults. Nevertheless, for the participants in this study, there was a moderation effect of gender on the relationship

between subjective norm and the intention for healthy eating, which was congruent with previous research Chan et al. (2015) found the relationship between subjective norm and the intention for healthy eating was moderated by gender in Chinese population.

The results from this study could fill the knowledge gab about the theory of planned behavior and healthy eating in both practice area and research area. For example, the results showed that the TPB model is appropriate to use as a fundamental theory to design intervention to promote healthy eating intention for Thai university student in Bangkok. Furthermore, the results of moderator variables could emphasize an importance of internal health locus of control and gender in the TPB model.

Internal health locus of control was confirmed that it significantly moderated the relationship between attitude toward healthy eating and subjective norm with intention for healthy eating. Hence, internal health locus of control seems to have an essential role in influencing attitude towards healthy eating and subjective norm in influencing intention for healthy eating in Thai university student in Bangkok.

The moderating effects of gender contributes to the literature on the TPB model which an information for this issue was quite limited. According to the result, subjective norm may have more power for influence intention for healthy eating in male compared to women for Thai university student in Bangkok. So, clinician could use all of these results to design a more effective intervention to promote healthy eating intention for Thai university student in Bangkok.

Limitations

While many issues have been explored in this study, still, a number of limitations need to be noted and considered when interpreting the results. First, there was a limited number of male participants. Imbalance in the proportion of participants in each group could decrease ability in detecting a difference in a correlation between two groups (Frazier, Tix & Barron, 2004).

Second, the researcher collected data during student's examination period for several students at Mahidol University. Therefore, participants may have felt exhausted from their exam and might not be able to fully express their opinions during response the questionnaire.

Third, the data was collected only from two universities in Bangkok. Therefore, generalizing the results for the population of university students in Bangkok should be done carefully and it may not be generalizable to other populations.

Fourth, the questions about TPB based variables such as attitude toward healthy eating were indirect measure or belief-based measure. Some participants may have been influenced by their friend's questionnaire responses or they preferred not

to share their honest opinion about healthy eating when researcher gave the questionnaire to them in group.

Lastly, the internet has increased the ease of access to information, which also includes to healthy eating. Therefore, we could not avoid that even though participants in non-health science group could gain knowledge about nutrition and healthy eating through the Internet. Consequently, this overlap of knowledge may affect the moderation results in the health science education variable.

Conclusion

The results from this study showed that for Thai university students in Bangkok, internal health locus of control moderate the relationship between two predictors variables (attitude towards healthy eating, subjective norm) and intention for healthy eating. Furthermore, gender also moderated the relationship between subjective norm and intention for healthy eating. Two specific observations are noteworthy. First, internal health locus of control was one of the factors which clinician should consider when doing counseling to build intention for healthy eating. Especially for clients who have high internal locus of control, emphasizing their attitude toward healthy eating and subjective norm could possibly stimulate their intention for eating healthy more than emphasizing at perceived behavioral control. Second, if consider the gender of the client, male client's intention tends to increase significantly when they have high scores of subjective norms, which their healthy eating intention were more influenced by media and their significant others. Nonetheless, the results of this study should be considered carefully under the limitations.

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