FACTORS INFLUENCING URBAN ADOLESCENTS' EATING BEHAVIOR, RATCHABURI PROVINCE, THAILAND: AN APPLICATION OF THE THEORY OF PLANNED BEHAVIOR

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ABSTRACT:

Background: Cardiovascular disease (CVD) has been the leading cause of premature death in adults in Thailand. Promoting healthy eating in adolescents is one way of helping to maintain health and lower risk of CVD in later life. This quantitative study aimed to identify the factors influencing urban adolescents' eating behavior, so that they could be used in the future to improve and promote a healthy eating intervention program.

Methods: The theory of planned behavior (TPB) was used as the theoretical framework to identify factors influencing adolescents' eating behavior and dietary intake. One hundred and eighty four urban adolescents from public high schools in Ratchaburi Province, Thailand were recruited to complete the Thai Eating Questionnaire (TEQ) developed based on the TPB. It included a brief food frequency questionnaire (FFQ). Stepwise regression analyses were undertaken with SPSS software to assess how well the variables of the TPB predicted eating intention and behavior.

Results: Urban adolescents' eating behavior was predicted by perceived behavioral control (PBC) (R^2=.050), while no association was found between eating intention and eating behavior. Urban adolescents' eating intention was together predicted by attitude toward eating behavior, and subjective norm regarding eating behavior (R^2=.274). Whereas attitude toward eating behavior predicted 24% of the variance (p<0.001), and subjective norm regarding eating behavior add another 3% (p<0.005).

Conclusions: This study supports the application of the TPB to the prediction of eating intention and eating behavior among urban adolescents. The results indicate that urban adolescents would benefit from interventions designed to increase facilitator-based and self-efficacy opportunities, as well as decreasing barriers to healthy eating.

Keywords: Eating behavior, Theory of Planned Behavior, Urban adolescents, Thailand

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BACKGROUND

Thailand is now facing a serious situation with the increase in cardiovascular disease (CVD) [1]. The incidence and prevalence rate of CVD has not been reduced. For example, the prevalence rate of heart disease has doubled over 6 years from 317.7 (x100,000) in 2001 to 690.8 (x100,000) in 2007. In addition, the mortality rates for stroke per 1,000 was 26.1for women and 23.8 for men, and the mortality rate for ischemic heart disease per 1,000 was 11.5 for women and 13.2 for men [1]. Moreover, stroke and ischemic heart disease were the first and fifth-ranked in women, while stroke and ischemic heart disease were the third and sixth-ranked in men [1]. The symptoms and complications of CVD usually appear in middle aged or elderly adults [2]. Atherosclerosis, the main pathophysiological process, that underlines the majority of coronary artery disease begins in childhood, and accelerates through adolescence and early adulthood [2, 3]. Diet is believed to be central to the etiology of CVD contributing to atherosclerosis, and hypertension [3]. Many studies have shown a strong relationship

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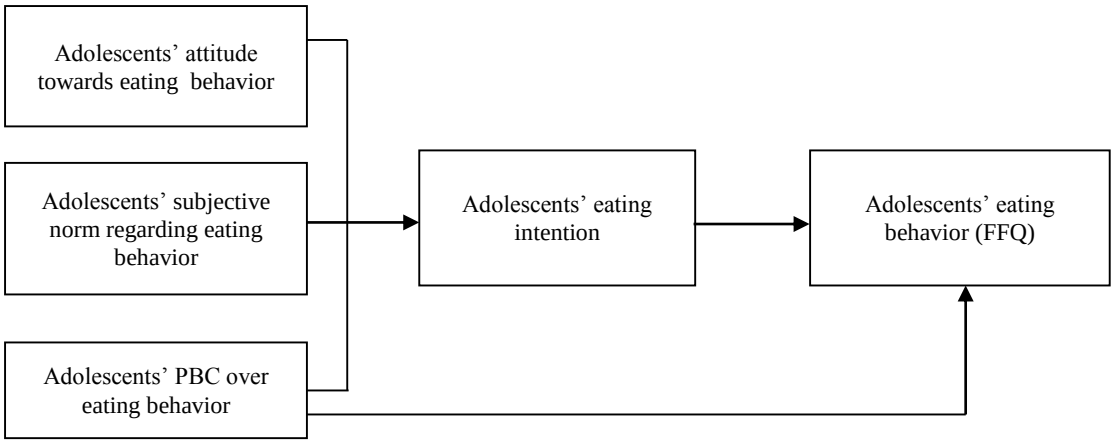

Figure 1 The study model of eating behavior based on the TPB

between CVD and diet [4, 5]. Therefore, factors influencing healthy eating behavior need to be scientifically examined in order to best promote healthy eating behavior. Adolescence may be the most effective period for influencing lifestyle in order to successfully prevent of adult chronic diseases such as heart disease, hypertension [6]. Dietary behavior is very complex and influenced by many factors, including psychosocial factors [7, 8].

Theories have been developed to explain dietary behavior including cognitive models developed in health psychology to explain day to day decision making in relation to health behaviors, including eating behavior. One model based on cognitive decision-making is the Theory of Planned Behavior (TPB) [9]. According to the TPB, The TPB proposes that behavior is determined by the individual's intention to perform the behavior and perceptions of control over the performance of the behavior. Intention to perform behavior, in turn, is influenced by three major components which include attitude towards the behavior, subjective norm (social pressure), and perceived behavioral control (PBC). Attitudes are determined by beliefs about the likely positive or negative outcomes of the behavior and their importance (behavioral beliefs). Subjective norms are determined by the social pressure perceived by individual to perform or not perform behavior and individual's motivation to comply (normative beliefs). The PBC is determined by control beliefs that can facilitate or impede performance of behavior such as internal (e.g. skills, abilities, information) and external (e.g. obstacles, opportunities), and perception of the ease or difficulty of performing behavior. While attitude, subjective norm, and perceived behavioral control can have direct influence on behavioral intention, both behavioral intention and PBC have direct influence on behavior [9].

The TPB has been applied to a wide range of adolescents' dietary behaviors including healthy eating, food choices, fruit and vegetable intake, soft drink consumption, fish intake, and breakfast consumption. Several preliminary studies have shown that the TPB is a very useful model in predicting dietary intake with a wide range of findings [10-15].

However, there has been a lack of research on factors influencing adolescents' eating behavior based on the TPB model in Thailand. This study used the TPB model as the conceptual framework to identify factors influencing urban adolescents' eating behavior (Figure 1). Because of the high prevalence of CVD among Thai population, and associated with diet, results from this study are important for the development of intervention strategic that promote healthy eating behavior in urban adolescents.

METHODS

Participants

According to Rashidian and colleagues [16], an effective sample size for regression analyses of the TPB questionnaire part of the study is 148. That is calculated by the variance inflation factor method (α=.05; power= 80%). In this study, samples were 184 urban adolescents. Participants were recruited from 15-18 year-old male and female students, attending grades 10 to 12 in Benjamarachutit Ratchaburi School (urban), Ratchaburi Province, Thailand. The purposive sampling technique was used to select the school. There are two public high schools located in the central city of Muang Ratchaburi, and they are under the Ratchaburi Educational Service Area Office I, Ministry of Education. They were approached to take part in this

study. Finally, Benjamarachutit School was selected because it is the largest high school (1,670 pupils in grade 10-12). Therefore, it provided a variety of participants from a wide social background. The director of Benjamarachutit School also gave the researcher a permission to study in this school. It was a convenience sample because the researcher approached the students during school time and some students had only limited time for participation in the study. However, inclusion and exclusion criteria were used. The inclusion criteria were adolescents of 15-18 years who can read and write. The participants from Benjamarachutit Ratchaburi School (urban) also needed to live within Muang Ratchaburi (town boundaries). Exclusion criteria included severe mental illness and learning disability.

Materials

There was no instrument currently developed based on all components of the TPB that was available for use with Thai adolescents. Therefore, the new questionnaire, namely the Thai Eating Questionnaire (TEQ) was developed by the researcher. The TEQ was developed according to the steps suggested by Ajzen who developed the TPB model [17]. The TEQ was developed from pilot work in the setting which for the large study to use specific circumstances and factors involved in behavior for the target population. Common beliefs from pilot work were elicited and frequencies counted. They were used to develop the preliminary TEQ. The TEQ composed of 112 questions, and divided into 6 parts pertaining to eating behavior and measured all constructs. It was validated by three experts. The final revision of the TEQ contained slight revision in wording based on recommendations from experts. The TEQ has very good content validity (CVI 0.980), acceptable internal consistency (Cronbach's alpha 0.870 and 0.853 with small and large group) and high test-retest reliability (0.900).

Personal information was assessed using 9 items. The items were room number, the school year, name of school, home location, age, sex, weight, height, and waist circumference**.** Eating behavior was assessed using 9 questions in relation to dietary intake of vegetables, fruit, food in protein group, rice and starchy food, milk, fast foods, snacks and sweet drink. Eating intention was assessed using 9 questions in relation to intention to eat healthily and avoid unhealthy food. They were measured on scales running from 1 (strongly agree) to 7 (strongly disagree) at the end points. Attitude towards eating behavior was measured by using the response to 25 questions in relation to beliefs about outcomes of healthy and unhealthy eating behavior and the importance of regarding eating. They were measured on a scale from 1 (e.g. healthier) to 7 (e.g. less healthy) as the end point. Subjective norm was measured by using the responses to 18 questions asking if parents, relatives, teachers, friends, health care professionals, and media told adolescents to eat healthy and unhealthy foods, and person's willingness to comply with important others' expectation. They were measured on a scale from 1 (I should not…) to 7 (I should…) as the end point. PBC was measured by using the responses to 42 questions in relation to internal and external factors or situation that may facilitate or impede healthy eating behavior, and the perceived ease and difficulty to perform healthy eating behavior. They were measured on a scale from 1 (strongly disagree) to 7 (strongly agree) at the end point.

Ethical consideration

This study has been approved by the Faculty of Health Ethics Research Committee of the University of East Anglia, United Kingdom (approval code: 2008036)**.**

Data collection

Firstly, the high school head teachers were asked for their co-operation with the study using the letter. Then, the information sheet and consent form were distributed by the researcher in the school canteen to explain the study. The students who took part in this study were asked to return the consent forms with their signatures and their parent signatures. Each student had an identification number and was given the questionnaires to complete at lunchtime for around 15-20 minutes. Their weights, heights, and waist circumferences were measured by the researcher.

Data analysis

Descriptive statistics, including percentages, mean, and standard deviation, were used to examine the demographic data and study variables. Inferential statistics, stepwise regression analyses were undertaken to predict eating intention (dependent variable) by attitude, subjective norm, and the PBC, and eating behavior (dependent variable) by PBC, and eating intention [16, 18].

RESULTS

The majority of participants in urban public high schools were female (64.4%). The mean age of urban adolescents was 16.2 years (SD=0.8). The largest number of urban adolescents attended grade 10 (40.2%). Most of the urban adolescents (69%) had a normal weight. The mean waist circumference

Table 1 Characteristics of urban adolescents

Variables	Urban adolescents (n=184)			
	n	%	Mean	SD
Sex				
Male	67	36.4		
Female	117	63.6		
Age (years)			16.2	0.8
15	41	22.3		
16	63	34.2		
17	78	42.4		
18	2	1.1		
Level				
10	42	22.8		
11	68	37.0		
12	74	40.2		
Weight status				
Underweight	6	3.3		
Pre-underweight	9	4.9		
Normal	127	69.0		
Overweight	10	5.4		
Pre-obesity	12	6.5		
Obesity	20	10.9		
Waist circumference (cm.)				
Male			80.2	11.3
Female			75.8	7.6

Table 2 Pearson correlation matrix between the TPB variables

Urban adolescents (n=184)	HEB	HEI	AT	SN	PBC
1. Eating behavior (HEB)	-				
2. Eating intention (HEI)	.151*	-			
3. Attitude toward eating behavior (AT)	.126	.491**	-		
4. Subjective norm regarding eating behavior (SN)	.080	.368**	.411**	-	
5. PBC over eating behavior	.224**	.271**	.321**	.198**	-

**p<.01

Table 3 Stepwise multiple regression analyses of the TPB variables on eating intention, and eating behavior

Predictors	**B**	**Beta**	**Estimate**	**R square**	***P-value***
Dependent variable:					
Eating intention					
Independent variables:					
Attitude toward eating behavior	0.025	0.408	0.300	0.241	0.000
Subjective norm regarding eating behavior	0.109	0.200	0.109	0.274	0.005
Constant = 3.826					
Dependent variable:					
Eating behavior					
Independent variables:					
PBC over eating behavior	0.059	0.224	0.059	0.050	0.002
Constant = 32.907					

of male and female adolescents were 80.2 cm. (SD=11.3) and 75.8 cm. (SD=7.6), respectively (Table 1).

Pearson's correlation coefficient showed that urban adolescents' eating behavior had a very low correlation with eating intention (*r*=.151), and was weakly associated with PBC over eating behavior (*r*=.224). Eating intention was reasonably correlated with attitude towards eating behavior (*r*=.491), but had a low correlation with subjective norm regarding eating behavior (*r*=.368), and PBC over eating behavior (*r*=.271). Attitude towards eating behavior was reasonably associated with subjective norm regarding eating behavior (*r*=.411), and it had a weak correlation with PBC over eating behavior (*r*=.321). Subjective norm had a very weak

association with PBC over eating behavior (r=.198).The results indicated that as there were no high correlations between each components of the TPB, and the data were sufficiently reliable for regression analysis (Table 2).

The stepwise regression analyses of eating intention of urban adolescents on three constructs of the TPB (attitude, subjective norm, and PBC) showed that attitude toward eating behavior, and subjective norm regarding eating behavior together predicted 27% of variance (R^2=.274). Whereas attitude towards eating behavior predicted 24% of variance (p=.000), and subjective norm regarding eating behavior added just another 3% (p=.005). The results of stepwise regression analyses of eating behavior of urban adolescents are on two components of the TPB (eating intention, and PBC) and showed that only PBC over eating behavior predicted 5.0% of variance (R^2=.050, p=.002) (Table 3).

DISCUSSION

The results of this study generally supported the constructs of the TPB which were found to be predictive of factors influencing eating behavior. These findings are consistent with the predictive pattern demonstrated in some studies that have used surveys based on the TPB to identify its effect on dietary consumption in adolescents. They will be discussed as follows.

Predicting eating intention by attitude, subjective norm, and the PBC

In this investigation of the eating intention of urban adolescents, attitude was the strongest predictor (24.1%) of eating intention in urban adolescents, and subjective norm regarding healthy eating added another 3% (p=.005). However, PBC did not contribute directly to the prediction of eating intention of urban adolescents.

This was consistent with the results from numerous dietary studies using the TPB with adolescents. For example, a survey of college baseball players in USA showed that attitude was the strongest predictor of intention to eat a healthy diet, and explained 38% of the variance [19]. According to some studies of the TPB's application to dietary behavior in adolescents, the attitude construct was found to be one of the predictors of intention, but the percentage of prediction was less than the subjective norm, and PBC [11, 19, 20]. Overall, across studies attitude predicted approximately 25 - 40% of dietary consumption. Attitude towards eating behavior was described as the urban adolescents' beliefs or feeling about positive and negative outcomes of their own performance eating behavior and the evaluation of the importance of these outcomes. Therefore, one possible explanation for the effect of attitude towards eating behavior on eating intention was that urban adolescents are likely to be concerned about positive outcomes of healthy eating behavior and negative outcomes of unhealthy eating behavior or the behavioral beliefs.

Urban adolescents' eating intention in this study was predicted by their subjective norm, and explained 3.3 %. This is similar to the findings from other studies for example, Pawlak and colleagues [19] results from their study of factors influencing intention to eat a healthy diet in college baseball players found that the subjective norm influenced intention to eat a healthy diet, and explained 29% of the variance. In contrast, other studies found that there was no association between subjective norm and dietary intention. For example, the study by Blanchard and colleague [10] showed that intention to eat fruit and vegetables in college students was not affected by subjective norm. The results of the above studies are contradictory and as most of them have a similar cross-sectional design; their results may reflect the differences in the studies populations, including the age of the participants. However, the studies conducted with younger children and adolescents, compared to older adolescents are more likely to show that subjective norm was a predictor of their dietary consumption. In addition, many studies also indicated that older children or adolescents compared to younger children are increasingly able to decide their food choices using cognitive motivational factors such as thinking about the advantages of eating healthy foods rather than being affected by social influences [12, 21]. Therefore, subjective norm may not affect older adolescent's choice.

In this study, PBC did not contribute directly to the prediction of eating intention of urban adolescents. This is inconsistent with the findings of major studies regarding dietary behaviors, as PBC is considered an important variable that is significantly associated with intention. For example, Pawlak and Malinauskas [11] conducted a study to identify beliefs about eating 2.5 cups of vegetables a day and assessed how well these beliefs predict the intention to eat them. The findings illustrated that PBC was one of the predictors of intention, and explained 15.9% of the variance. According to the TPB, behavioral intention is influenced by attitude towards behavior and subjective norm regarding behavior. In order to account for behaviors not under complete volitional control, the behavioral intention

is assumed to be affected by external factors that are perceived to facilitate or impede the performance of behavior and this factor is named the PBC [9]. In contrast, urban adolescents' eating intention was not influenced by the PBC construct. It seems to be that the eating intention of urban adolescents is independent of the PBC or external control factors. Urban adolescents' perception of eating behavior may be that it is completely under their own control, and they can eat what they want to eat, and so it was not influenced by environment factors.

Predicting eating behavior by eating intention and the PBC

In this study, the urban adolescents' eating behavior was predicted by the PBC, and explained 5.0% of the variance, while eating intention was not the predictor of eating behavior.

Although there is strong evidence of a significant relationship between intention and dietary behavior, it was quite surprising that this relationship was not significant in urban adolescents in this study. However, this finding is consistent with some other studies. For example, in a cross-sectional study by Fila and Smith [12] the TPB was used to predict healthy eating behavior in urban Native American adolescents aged 9-18 years and there was no relationship between healthy eating intention and healthy eating behavior. This is consistent with the study by Sangperm and colleague [22], where the results showed that there was no association between intention and healthy eating behavior in urban Thai adolescents. In addition, a similar study among New Zealand adolescents [23] reported that the PBC was an important determinant of children's healthy eating.

In comparing the different results, it seems reasonable to suggest that some eating behaviors are under complete volitional control and that some behaviors can be influenced by a single internal factor or intention, and that some dietary behaviors are not under volitional control and are influenced by external control factors, and not only personal motivation. This is consistent with the general rule of the TPB that when behaviors pose no problems to volitional control, they can be predicted by intention with considerable accuracy [9]. Therefore, it might be explained that urban adolescents' eating behavior could be driven by external factors, and that eating behavior is not under complete volitional control behavior in urban adolescents. In addition, the samples of this study included more female than male approximately twice times. This may have affected the results of this study as the study by Fila and Smith that examined the predictors of urban American adolescents' healthy eating [12] showed that different genders were influenced by different predictors of their healthy eating behavior. Specifically female urban adolescents' healthy eating behavior was mostly predicted by barriers.

In conclusion, overall, the study supports the application of the TPB to the prediction of eating intention and eating behavior among urban adolescents. The TPB not only provided a framework for understanding urban adolescents' eating behavior but also could be used to design interventions for promoting healthy eating behavior. The results of this study suggest that PBC was a predictor of urban adolescents' eating behaviors, while eating intention of urban adolescents was predicted by attitude and subjective norm. Therefore, urban adolescents who were affected by PBC or control belief towards eating behavior would benefit more from programs designed to increase the availability and accessibility of healthy food and that promote self-efficacy about undertaking healthy eating behavior.

There were several limitations to the study. One urban public high school was selected by purposive sampling. The sample was also a convenience sample and included more females than males. This may have affected the results of this study [12]. Therefore, future research could use a more systematic sampling procedure to control both the gender and other demographics such as weight which may influence dietary intake.

CONFLICT OF INTEREST

The author declares that there are no conflicts of interest.

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