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Chan, Kara; Prendergast, Gerard; Ng, Yu-Leung

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**Using an Expanded Theory of Planned Behavior to Predict Adolescents'  
Intention to Engage in Healthy Eating**

Kara Chan  
(Corresponding author)  
Professor  
Department of Communication Studies  
Hong Kong Baptist University  
Tel: (852) 3411 7836 Fax: (852) 3411 7890  
Email: [karachan@hkbu.edu.hk](mailto:karachan@hkbu.edu.hk)

Gerard Prendergast  
Professor and Head  
Department of Marketing  
Hong Kong Baptist University  
Tel: (852) 3411 7570 Fax: (852) 3411 5586  
Email: [gerard@hkbu.edu.hk](mailto:gerard@hkbu.edu.hk)

Yu-Leung Ng  
PhD student  
School of Communication  
Hong Kong Baptist University  
Tel: (852) 3411 8159 Fax: (852) 3411 7890  
Email: [14485028@hkbu.edu.hk](mailto:14485028@hkbu.edu.hk)

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## **Using an expanded Theory of Planned Behavior to Predict Adolescents' Intention to Engage in Healthy Eating**

### **Abstract**

A study was conducted to test an expanded Theory of Planned Behavior (TPB) in predicting healthy eating intention among adolescent boys and girls in mainland China. Two variables (perceived barriers and self-efficacy) were added in the TPB. A purposive sampling design was adopted to select schools, then students. Altogether 635 adolescents were asked to complete a structured questionnaire about healthy eating. Results of confirmatory factor analysis and structural equation modeling supported the structural validity of the proposed expanded model. Confirmatory factor analysis suggested that selected items of the perceived behavioral control and perceived barriers should be combined to form a new measure of perceived behavioral control. The new measure of perceived behavioral control and self-efficacy were found to be more influential than attitude as well as subjective norm in predicting healthy eating. Past behavior and gender were found to be significant moderating variables.

**Keywords** - Consumer psychology, Social marketing, Children and youth, Survey, Food and Nutrition

## **Using an expanded Theory of Planned Behavior to Predict Adolescents' Intention to Engage in Healthy Eating**

### **Introduction**

Obesity inflicts children as well as adults. Factors contributing to child and youth obesity include cutbacks in physical education programs, relative decline in the cost of food, rise in popularity of fast food and convenience food, more frequent eating out of home, availability of snacks and soft drinks at schools, and change in nutritional patterns (Montgomery and Chester 2007). Apart from the obese individual's health risks, obesity also puts a significant social and economic burden on society. Direct economic costs of obesity and non-communicable diseases assessed in several developed countries are in the range of 2 to 7% of total health care costs (World Health Organization 2002). In China, overweight and obesity was estimated to account for 21 billion RMB (about US\$2.7 billion), or 25.5% of the total medical costs, in 2003 (Zhao et al. 2008). Obesity, therefore, is a problem at many levels.

China has the second-largest number of obese individuals in the world (Ng et al. 2014). Childhood obesity in China is a serious issue that needs attention. The overweight and obesity rate among mainland children under the age of 20 increased from 5.7% in 1980 to 18.8% in 2013 (Ng et al. 2014). Many scholars attributed the shift toward increasing energy-dense diet to the changes in the food supply and the increasing popularity of packaged and prepared foods as well as beverages (Popkin, 2008; Popkin and Du, 2003). Rapid urbanization and the ownership of cars in the household also reinforced a sedentary lifestyle (French and Crabbe, 2010).

Healthy eating is therefore an increasingly important issue for the well-being of young consumers. Adolescents are important targets for healthy eating communication because they are susceptible to poor eating habits when they are away from home and the watchful eyes of their parents (Chan et al. 2009b). Socializing agents of healthy eating including parents,

schools, and governments often competed with the voice of food retailers in influencing children and adolescents' health perceptions and food choices (Chan et al., 2009b; Veeck et al., 2014). To facilitate effective healthy eating communication, however, requires a sound knowledge of the variables that influence young people's intention to engage (or not engage) in healthy eating. This study attempts to apply the Theory of Planned Behavior to predict the intention to eat healthily among adolescents in Mainland China. Specifically, we examine how adolescents' intentions to practice healthy eating are affected by attitudes towards healthy eating, perceived behavioral control and barriers, subjective norms, and self-efficacy. Furthermore, we investigate how the relationship between the predictors and intention are moderated by past behavior of healthy eating and gender.

Previous studies using the Theory of Planned Behavior with adolescents showed variation in the pattern of relations across genders in predicting healthy eating (Baker, Little, and Brownell 2003; Fila and Smith 2006; Chan, Ng, and Prendergast, 2014). There are differences between adolescent boys and girls in eating attitudes and behaviors (Lai-Yeung 2010; Rolls, Federoff, and Guthrie 1991). American boys' healthy eating attitude mostly influenced healthy eating intention and girls' intention was most likely affected by perceived behavioral control (Baker, Little, and Brownell 2003). Healthy eating intention was predicted by attitude, perceived behavioral control, perceived barriers, and self-efficacy among Hong Kong boys and was predicted by perceived behavioral control and self-efficacy among Hong Kong girls (Chan, Ng, and Prendergast, 2014).

While the focus of this research was on the theoretical contribution in terms of applying an expanded version of the Theory of Planned Behavior to a new phenomenon and context, the findings also help parents, health educators, and public policy makers to more effectively develop and deliver healthy eating messages.

## **Conceptualization and Hypotheses: Theory of Planned Behavior**

The forerunner to the Theory of Planned Behavior, the Theory of Reasoned Action (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975), has been one of the most influential theories establishing a causal link between attitudes and behavior. It provides a concise conceptual and empirical framework for measuring the relationship between beliefs, attitudes, intention and behavior. According to the theory, for behaviors under full volitional control, attitudes are developed from beliefs, behavioral intention from attitudes, and behavior from behavioral intention. Extending the theory of reasoned action, the Theory of Planned Behavior was introduced with the addition of a new variable, perceived behavioral control, to predict behaviors not under full volitional control (Ajzen 1985). The Theory of Planned Behavior suggests that an individual's attitude toward a behavior, his or her perception of whether the significant others want him/her to perform the behavior, and his/her perceived ability to do so will predict his or her intention to undertake the behavior (Ajzen 1985).

By understanding these underlying drivers, therefore, the Theory of Planned Behavior facilitates prediction and understanding of the behavior. The Theory of Planned Behavior is a well-established model and a meta-analysis by Armitage and Conner (2001) found that it accounted for 39 percent of the variance in intention and 27 percent of the variance in behavior. As a result of its robustness, the theory has been used in a variety of settings by numerous researchers. Conner, Norman and Bell (2000) used the Theory of Planned Behavior to predict the long-term healthy eating intention and behavior. Albarracín, Johnson, Fishbein and Muellerleile (2001) used both the Theory of Reasoned Action and the Theory of Planned Behavior to predict condom use. Martin et al. (2010) predicted gambling behavior using the Theory of Planned Behavior. Norman, Conner and Bell (2006) predicted the success of smoking cessation by using Theory of Planned Behavior. And Zeng and Ajzen (2013) applied the Theory of Planned Behavior to the area of substance abuse.

## **Theory of Planned Behavior and Healthy Eating**

The applications of the Theory of Planned Behavior to predicting healthy eating have tended to suffer from conceptual and methodological inadequacy. The theory has been criticized that some potentially important predictors are omitted (Conner 1993; Nejad, Wertheim, and Greenwood 2004). Previous studies attempted to add variables including self-efficacy and barriers to extend the original model for predicting healthy eating (Armitage and Conner 1999; Fila and Smith 2006; Chan et al., 2014). The measurement of subjective norm in most of the studies failed to include the social influence from impersonal sources, such as the influence of the mass media, the internet, and the government publicity. A study found that subjective norm consisted of two factors: interpersonal norm and media form (Chan et al., 2014). Another problem is that although various additional variables including self-efficacy, perceived barriers, and past behavior were included in some of the studies, there was no single study that included all these three variables in addition to the conventional variables in the Theory of Planned Behavior. It was also not clear how self-efficacy as well as behavioral barriers were related to perceived behavioral control, as these three concepts seem to be similar.

Looking first at the variables that traditionally made up the Theory of Planned Behavior, subjective norm is a variable that influences intention, and refers to a person's perception of the social pressure to perform a certain behavior (Ajzen and Fishbein 1980). Subjective norms are determined by normative beliefs i.e. the extent to which a person believes that his/her important reference groups think he/she should perform the behavior (Ajzen and Fishbein 1980). Generally, a person will perform a certain behavior if he or she is motivated to comply with his important referents and perceived social pressure from them to perform the behavior (Ajzen and Fishbein 1980). In the Theory of Planned Behavior, the subjective

norm of a person is specified as the perceived expectations of important referents and that person's motivation to comply with the specific referents (Fishbein and Ajzen 1975). In the context of healthy eating, adolescents perceived that parents and government publicity encouraged them to eat healthy foods more often than teachers or friends (Chan et al., 2009). Hence, expectations of both personal sources as well as societal sources (e.g. mass media) will be considered in the current study. Based on the Theory of Planned Behavior, adolescents experiencing a higher level of social norm will have a higher intention to engage in healthy eating.

**H1.** Subjective norm supporting healthy eating is positively related with adolescents' intention to engage in healthy eating.

Turning to attitude, in the view of Fishbein and Ajzen (1975) attitude towards the behavior is an individual's belief about performing a certain act. They suggest that beliefs can be formed through life experiences in two ways, direct observation and inference processes. Usually, an individual's attitude is not determined by his/her complete set of beliefs but the salient set of beliefs. However, the salient beliefs could be strengthened, weakened or substituted by new beliefs over time (Fishbein and Ajzen 1975). To determine an individual's attitude, it is necessary to identify the salient beliefs of him/her. In the context of healthy eating, adolescents reported that healthy eating was perceived as beneficial and good, but not interesting (Chan and Tsang, 2011).

In the Theory of Planned Behavior, attitude towards the behavior implies that an individual prefers to perform a certain behavior if he/she believes that behavior brings positive consequences to him/her. In this sense it is a behavioral belief (Ajzen and Fishbein 1980). According to the Theory of Planned Behavior, adolescents who have a more positive attitude



toward healthy eating will have a higher intention to engage in healthy eating.

**H2.** Attitude toward healthy eating is positively related with adolescents' intention to engage in healthy eating.

For the third predictor, perceived behavioral control, there may be external factors that facilitate or interfere with how a person acts (Ajzen 2005). In short, opportunity can affect the success of the intended behavior. For example, a person who intends to see a play may not do so because of tickets being sold-out or bad weather (Ajzen 2005). Dependence on others is another external factor. If the behavior requires the participation of others, the person will have less control over the performance of the behavior. The case of cooperation is a good example (Ajzen 2005). Based on the Theory of Planned Behavior, the higher control one perceives he or she has of the healthy eating behavior, the higher intention he or she will engage in healthy eating.

**H3.** Perceived behavioral control is positively related with adolescents' intention to engage in healthy eating.

In this study, we propose an expanded Theory of Planned Behavior by including the two variables of self-efficacy and perceived barriers to predict behavioral intention. Self-efficacy is defined as confidence in an individual's own ability to accomplish a behavior that relates to internal resources (Bandura 1986; Armitage and Conner 1999). Ajzen (1991) argued that perceived behavioral control is synonymous with self-efficacy. Scholars argued that there is a difference between the two concepts (Armitage and Conner 1999; Terry and O' Leary 1995). Armitage and Conner (1999) conceptualized perceptions of control over the behavior as the

extent to which individuals perceive control over external factors. Empirical evidence showed that perceived control and self-efficacy predicted intention of low-fat diet consumption in different patterns (Armitage and Conner 1999). Other studies found that self-efficacy significantly influenced adolescents' healthy eating intention (Chan et al., 2014) and behavior (Fila and Smith, 2006). We therefore propose:

**H4.** Self-efficacy is positively related with adolescents' intention to engage in healthy eating.

While adolescents are recommended to eat healthily, they find it difficult to do so because of many perceived barriers to healthy eating (Croll, Neumark-Sztainer, and Story 2001; Shepherd et al. 2006). Becker (1974)'s health belief model states that perceived barriers are one's own opinion of visible costs of behavior. Glasgow (2008) defined perceived barriers as a person's estimation of the obstacles that will hinder his or her achievement of a specific behavior. Shepherd et al. (2006) conducted a systematic review to investigate the barriers to healthy eating among young people aged 11 to 16 years and found that barriers to healthy eating included poor availability of healthy foods at school and in their social spaces, teachers and peers not being informative and supportive for healthy eating, higher preferences for unhealthy foods because of taste, and healthy foods being expensive generally. It is expected that if adolescents think they are not able to overcome the barriers to eat healthily, they will be unlikely to engage in healthy eating.

**H5.** Perceived barriers are negatively related with adolescents' intention to engage in healthy eating.

Figure 1 summarizes our proposed theoretical model.

[Insert Figure 1 about here]

Moderating variables, including past behavior and gender, have been used to predict the change in direction and strength of the relationship between attitudes and behavioral intention. This is because repeatedly performing a behavior leads to a reduction in the amount of deliberative processing (Verplanken et al. 1997). As a consequence, there ought to be a reduction in the strength of the attitudes - intention link. There is empirical evidence to support this argument (e.g. Trafimow, 2000).

It can be seen from the face value that perceived behavioral control and perceived barriers are closely related. For example, poor availability of healthy food can be an external factor that restricts a person's food consumption behavior. In this study, we attempt to clarify the difference between these two concepts based on empirical evidence.

Subjective norm was found to be the most influencing factor in predicting healthy eating among boys while perceived barriers was the most influencing factor in predicting healthy eating among girls (Fila and Smith, 2006). Another study found that healthy eating among boys was influenced by attitudes while healthy eating among girls was influenced by self-efficacy (Chan et al., 2014). We argue that past behavior and gender can exert influence on all the key variables of the Theory of Planned Behavior, as well as on perceived barriers and self-efficacy. We therefore propose the following two research questions:

RQ1: How does past behavior play a moderating role in the expanded Theory of Planned Behavior?

RQ2: How does gender play a moderating role in the expanded Theory of Planned Behavior?

## **Method**

### *Participants and Procedure*

A purposive non-probability sampling design first selecting a type of school, then schools, then classes was conducted. Five schools in Shanghai and seven schools in Jilin, Shenyang

were selected. To ensure social and economic diversity, both traditional and vocational schools at different districts were selected. For each selected school, one to two classes from the chosen grades were sampled. A retired secondary school principal and a graduate student were appointed as researchers to assist with the sampling and the data collection. They contacted the sampled schools and invited their participation. The survey was conducted at the schools during normal class sessions by the appointed researchers in person. Students were informed that their participation was voluntary and that all responses would be confidential. Data collection was conducted from December 2013 to February 2014.

Altogether 635 students completed the questionnaire. There were 343 males and 288 females (4 of them did not report their gender). The mean age of the respondents was 15.58 and the standard deviation was 1.57. The body mass index (BMI) of participants was calculated by using the formula  $BMI = (\text{weight in kg}) / (\text{height in meters})^2$ . Based on the BMI-for-age from 5 to 19 years for boys and girls (World Health Organization, 2007), all BMIs over and below three standard deviations for each age were removed. The final BMI ranged from 13.27 to 34.45, with a mean of 20.52 and standard deviation of 3.92. According to the BMI classification of The World Health Organization (2014), BMI greater than 25 is classified as overweight and BMI greater than 30 is classified as obese. Based on this classification, 8% of the sample was classified as overweight and 3.1% of the sample was classified as obese.

### *Measures*

In the questionnaire, healthy eating was defined as consuming three balanced meals every day that had sufficient fruits as well as vegetables, and consuming fast foods, chips, candies, and desserts sparingly (Baker, Little, and Brownell 2003). Established scales had been used for the three main constructs of the Theory of Planned Behavior as well as the additional

constructs of self-efficacy, perceived barriers, and past behavior. The scales were translated into Chinese, and back-translated into English before fieldwork. The study was conducted in Chinese. The questions asked are shown in the Appendix.

*Attitude.* Attitude toward healthy eating was measured by asking participants to rate on a 5-point semantic differential scale for six pairs of evaluative adjectives that describe healthy eating, for example, boring-interesting, or worthy-unworthy (Gronhoj et al. 2012). The Cronbach's alpha coefficients were .84 for boys and .76 for girls.

*Subjective norm.* Subjective norm was measured by asking participants eight statements using a 5-point scale rated between strongly disagree and strongly agree. Sample statements were: "My friends think I should engage in healthy eating." and "Newspapers and magazines I read think I should engage in healthy eating." These statements came from a previous study (Gronhoj et al. 2012). One more statement "The internet information thinks I should engage in healthy eating" was added to reflect the increasing importance of the new media in influencing behavior among adolescents. The Cronbach's alpha coefficients of subjective norm were .92 for boys and .92 for girls.

*Perceived behavioral control.* Participants were asked to what extent they perceived that they had control on healthy eating by rating on a 5-point scale (1 = definitely no, 5 = definitely yes) three questions. For example, "Do you have enough discipline to eat healthily?" These questions were adopted from Gronhoj et al.'s (2012) study. Alpha coefficients were .75 for boys and .81 for girls.

*Self-efficacy.* Self-efficacy was measured by asking participants to rate four statements on a five-point scale, such as "How certain/confident are you that you could engage in healthy eating over the next two weeks?" These items were selected and modified from Norman and Conner's (2006) study. Alpha coefficients were .90 for boys and .90 for girls.

*Perceived barriers.* Perceived barriers were rated on a 5-point scale between strongly disagree and strongly agree for six statements. For example, “I don’t always eat healthily because not enough healthy options available.” and “I don’t always eat healthily because healthy foods are expensive”. The barriers to healthy eating scale was reliable and valid (Fowles and Feucht 2004). The Cronbach’s alpha coefficients were .84 and .79 for boys and girls respectively.

*Past behavior.* Past healthy eating behavior were measured by asking the participants to indicate how often they engaged in healthy eating in the past month on a 5-point scale (1 = never, 5 = very often). This item was taken from Norman and Conner’s (2006) study.

*Intention.* Healthy eating intention was measured by asking participants to rate on two five-point scale questions: “Do you intend to engage in healthy eating over the next week?” and “How likely is it that you will engage in healthy eating over the next week?” (1 = definitely no, 5 = definitely yes). The Cronbach’s alpha coefficients were .87 and .85 for boys and girls respectively.

### *Data analysis*

Confirmatory factor analysis was conducted to test the construct validity of the proposed measures. Then structural equation modeling was used to evaluate the extent to which the proposed causal structure was able to explain the observed associations between variables, and to estimate the magnitude of the postulated effects. To minimize the bias due to measurement error, all the factors supported by the confirmatory factor analysis were introduced as latent variables, with past behavior and gender as moderators.

## **Results**

The age, BMI, and obesity classification by gender are shown in Table 1. Independent *t*-test

results showed that girls ( $M = 15.74$ ) are slightly older than boys ( $M = 15.46$ ),  $t(609) = -2.18$ ,  $p < .05$ . Boys ( $M = 21.06$ ) had higher BMI than girls ( $M = 19.90$ ),  $t(562) = 3.54$ ,  $p < .001$ . The Pearson chi-square test revealed that more boys (13.3%) were classified as overweight than girls (4.2%),  $\chi^2 = 19.51$ ,  $p < .001$ .

[Insert Table 1 about here]

Table 2 displays the mean and standard deviation among of the key variables for boys and girls. Independent  $t$ -test results showed that boys ( $M = 2.75$ ) scored significantly higher for perceived barriers than girls ( $M = 2.56$ ),  $t(606) = 2.68$ ,  $p < .01$ . There were no significant differences between boys and girls for all other variables.

[Insert Table 2 about here]

### *Quality of Constructs*

The composite reliability of each variable was calculated in the first place. We conducted exploratory factor analysis (EFA) with Maximum-likelihood method and Promax rotation. Items that were cross-loaded on more than one factor and items loaded higher on an unintended construct than on the intended construct were dropped. Based on the results of EFA and the subsequent CFA results to achieve an adequate fit, we arrived at the following changes:

- Two items of attitude were removed because CFA results did not achieve adequate fit.
- Four items of interpersonal subjective norm were removed because CFA results did not achieve adequate fit. All the remaining four items of subjective media norm were retained in the scale.
- Two items of perceived behavioral control were removed because of their cross-loading on behavioral intention.
- Two items of perceived barriers that did not fit the CFA model were removed.

- The remaining item of the perceived behavioral control was combined with four items of perceived barriers (reversed in direction) to form a new measure of perceived behavior control.
- Two self-efficacy items were removed because of the inadequate fit of the CFA results.

Then we re-ran the confirmatory factor analysis to further confirm the structural validity. This time, the analysis revealed an adequate fit,  $\chi^2(139)=257.03$ ,  $p<.001$ ,  $\chi^2/df=1.85$ , CFI=.98, GFI=.96, root mean square error of approximation (RMSEA)=.04. All factor loadings were above .80. Scales for the subjective norm measure (Cronbach's  $\alpha=.93$ ), self-efficacy measure (Cronbach's  $\alpha=.90$ ), attitude towards healthy eating behavior measure (Cronbach's  $\alpha=.82$ ), healthy eating intention measure (Cronbach's  $\alpha=.87$ ), and perceived behavioral control measure (Cronbach's  $\alpha=.79$ ) showed good reliability. Furthermore, the convergent and discriminant validity of the scales were examined by computing the average variance extracted (AVE), the maximum shared squared variance (MSV) and the average shared square variance (ASV). The results are illustrated in Table 3. The discriminant validity is supported, with MSVs less than AVEs which were greater than ASVs, meeting the criterion suggested by Fornell and Larcker (1981). The convergent validity, however, is roughly satisfactory, with the AVE of barrier-and-control (.43) slightly lower than .50, indicating that the measures share less than half of their variation with the latent variable.

[Insert Table 3 about here]

### *Hypotheses testing*

The structural models showed an excellent fit with the data, supporting our hypothesis that the proposed causal structure is a valid explanation of the observed associations between variables. The  $\chi^2(725)=1549.75$ ,  $p<.001$ ,  $\chi^2/df=2.14$ , CFI=.95, GFI=.92, root mean square error of approximation (RMSEA)=.03. The estimated values of the model coefficients are



listed in Table 4 and Figure 2.

[Insert Table 4 about here]

[Insert Figure 2 about here]

The estimated total effects indicated that the four latent predictors, i.e. subjective norm from the media, self-efficacy, attitude toward healthy eating, and perceived behavioral control, were all positively related to healthy eating intention. All the associations were statistically significant at  $p < .05$ . Thus, H1 to H4 were all supported. Because the measures of perceived barriers and the measures of perceived behavioral control had been combined into a new measure of perceived behavioral control, there was no need to test H5.

To analyze the moderating effect, the critical ratio differences test was employed. According to Byrne (2010), critical ratio consists of z-test or z-score. This test has been provided when dividing the regression weight estimate of its standard error. The findings revealed that the effect of subjective norm on behavioral intention was stronger among the participants who scored high in past behavior. Furthermore, the effect of self-efficacy on behavioral intention was stronger among the participants who scored low in past behavior (see Table 5).

Regarding the moderating effect of gender, the results showed that subjective norm was positively related to behavioral intention among males but not females (Table 6). Moreover, the attitude toward healthy eating was found to be positively related with behavioral intention among the females, but not males.

[Insert Table 5 about here]

[Insert Table 6 about here]

## **Discussion**

The present study sought to apply an expanded version of the Theory of Planned Behavior to the prediction of healthy eating intention among a sample of Mainland Chinese adolescents. First of all, the EFA results found that two items of an established measurement of perceived behavioral control were loaded on the behavioral intention measure. It indicated that asking participants whether they would try hard to eat healthily and whether they had enough discipline to eat healthily was similar to ask about their intention to eat healthily. Only the item “Do you have enough time to eat healthily” was not loaded on the behavioral intention measure. Furthermore, it was found that this item loaded on the perceived barriers measure. So, there is empirical evidence that the perceived barriers, when reversed, were a better measure of perceived behavioral control. This is what we adopted in the subsequent analysis for the expanded TPB model. With the addition of the self-efficacy variable, the expanded version of the TPB was found to be a valid model using SEM analysis. Perceived behavioral control ( $b=.35, p<.001$ ) and self-efficacy ( $b=.44, p<.001$ ) emerged as significant predictors among the four predictors. Subjective norm ( $b=.14, p<.001$ ) and attitude toward healthy eating ( $b=.10, p<.05$ ), though statistically significant, were not as important as the influence of perceived behavioral control and self-efficacy.

The importance of perceived behavior control in predicting healthy eating intention among adolescents was consistent with the findings in previous studies among Hong Kong as well as Danish adolescents (Chan et al., 2014; Gronhoj et al., 2012). The relatively lower level of influence of subjective norm in predicting healthy intention was also consistent with previous findings (Chan et al., 2014; Gronhj et al., 2012). This can be attributed to the absence of interpersonal source of subjective norm in the measurement. In order to achieve an adequate fit in the SEM model, the subjective norm in the final model did not capture the normative influence of interpersonal sources. Veeck (2014) found that the influence of peers on food

choice were strong because of the tradition of communal eating in China. The normative influence from the media may not be strong enough to drive intention.

The current study also examined the moderating effects of past behavior and gender within the expanded version of the TPB. Past behavior moderates the relationship between subjective norm and behavioral intention, as well as the relationship between self-efficacy and behavioral intention. When the frequency of past behavior increased, the strength of the subjective norm-intention relationship increased. A similar finding was reported by Trafimow (2000) who found that habit moderated the correlations between subjective norm and condom use intentions. Furthermore, participants who more often eat healthily in the past had weaker self-efficacy-intention than those who less often eat healthily in the past. This indicates that among those who did eat healthily in the past, they had internalized the healthy eating behavior. As a result, a higher level of self-efficacy does not lead to higher behavioral intention. On the other hand, those who have not practiced healthy eating in the past may treat health eating as a new and unfamiliar experience. As a result, higher self-efficacy leads to higher behavioral intention among them. However, as the measure used in this study for past behavior simply related to frequency of healthy eating, Triandis (1977) suggested that using frequency of past behavior as a measure of habit strength fails to capture all of the defining features of a habitual response.

Gender moderates the relationship between subjective norm and behavioral intention, as well as the relationship between attitude and behavioral intention. Male participants' healthy eating intention was more likely to be affected by subjective norm than among female participants. This is consistent with a previous study that subjective norm was the most influencing factor in predicting boys' healthy eating (Fila and Smith, 2006). In contrast, Mainland Chinese adolescent girls' healthy eating intention was more likely to be influenced by attitude toward healthy eating than adolescent boys. The result is contradictory to a

previous study that healthy eating intention among boys was affected by attitude (Chan et al., 2014). This result indicates that the patterns of gender difference in healthy eating intention between Mainland Chinese and Hong Kong Chinese are different.

Overall, the current results provide a unique contribution and extend previous applications of the Theory of Planned Behavior in predicting healthy eating among Hong Kong adolescents (Chan and Tsang 2011; Chan et al., 2014). Specifically, in the Mainland Chinese setting, we uncovered the moderating predictors of past behavior and gender in addition to the expanded Theory of Planned Behavior. The present study provides a theoretical basis for future research to expand the application of the Theory of Planned Behavior (as it applies to healthy eating) across a broader range of age groups and geographical locations, as well as extending the model to include the relationship between healthy eating intention and actual behavior.

## **Implications**

This is the first study to apply an expanded Theory of Planned Behavior to predict healthy eating intentions amongst Mainland Chinese adolescents. Understanding what drives healthy eating is of considerable importance. The TPB predicts deliberate behavior, and is of use in understanding the factors which influence behavior and therefore facilitates prediction and understanding of healthy eating. Support for the hypotheses varied between boys and girls.

Veeck (2004) suggested that advocating healthy eating could be achieved through informational or educational means by changing the attitudes and beliefs of individuals, or through environmental means by making the environment more facilitating toward healthy eating. As perceived behavioral control and self-efficacy were found to be major influencing factors in predicting healthy eating reported in this study as well as previous studies (Chan et

al., 2014; Gronhoj et al, 2012), there is a need to enhance the perceived ability of eating healthily among adolescents.

Ajzen (2002b) argues that PBC is the overarching, superordinate construct that is comprised of two lower-level components: self-efficacy and controllability. So it is no coincidence that when one is a significant predictor, so too is the other. It is necessary to facilitate ease of behavioral control and self-efficacy through fostering an environment where adolescents can make healthy food choices. Facilitating greater behavioral control and self-efficacy could be accomplished through various channels (parents, teachers, Government bodies) by teaching adolescents cooking skills in making time-saving healthy snacks/meals, giving them a means to identify healthier food choices, providing positive support at home and school to reward healthy eating practices, and ensuring healthy food choices are available. When adolescents feel they are involved in the food selection process, have a means of accessing healthy food, and have confidence in their ability to choose healthy food, healthier eating behavior will presumably follow.

Parents and public policy makers would be wise to encourage a more positive attitude toward healthy eating, particularly for girls, where there is a strong link between attitude and intention. Fostering a more positive consumer attitude towards healthy eating would presumably take time, as attitudes do not change easily. In line with Ajzen's (2005) rationale, public policy makers would need to foster the belief amongst adolescents that engaging in healthy eating will have a positive outcome (Ajzen 2005). Parents should praise children when they make healthy food choices, and alert them to the positive consequences of healthy food choices (such as, for example, giving them strength for sports, increasing their focus in class, and enhancing their overall physical outlook). The results also indicated that boys, more so than girls, are also influenced by their reference group. Peers would therefore be a productive channel through which is communicate the healthy eating message to boys.

## **Conclusion**

The negative consequences (at both the individual level and the society level) of adolescents engaging in unhealthy eating are significant. There are psychological and physical health risks for the individual, and a major social and economic burden for society. This is particularly the case in Mainland China, where overweight and obesity rates among children are soaring to unprecedented levels. Any attempt to encourage healthy eating amongst adolescents, however, must be grounded in a full understanding of the factors that lead to adolescents making healthy food choices. The research report in this paper has uncovered those factors, and in doing so has provided a platform for marketers, parents, and Government bodies to develop strategies that will foster healthy eating decisions amongst these adolescents.

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**Table 1.** Age, BMI, and BMI Classification for Boys and Girls

Variable	Boys	Girls	
Age (Years)			<i>t</i>
M	15.46	15.74	-2.18*
SD	1.52	1.60	
BMI (kg/m <sup>2</sup> )			<i>t</i>
M	21.06	19.90	3.54***
SD	3.91	3.85	
Obesity classification (%) †			$\chi^2$
Thinness	31.2	43.3	19.51***
Normal	52.5	48.3	
Overweight	13.3	4.2	
Obese	3.0	4.2	

Note. † Based on the BMI classification of the World Health Organization (2014).

**Table 2.** Mean, Standard Deviation, and Pearson Correlations among Various Measures for Boys and Girls

	Boys		Girls	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Attitude	3.80	0.67	3.83	0.55
Subjective norm	3.90	0.81	3.93	0.73
Perceived behavioral control	3.69	0.83	3.68	0.83
Self-efficacy	3.27	1.02	3.24	1.01
Perceived barriers	2.75	0.90	2.56	0.81
Past behavior	3.69	1.06	3.76	1.02
Healthy eating intention	3.81	0.87	3.89	0.79

**Table 3.** Convergent validity and discriminant validity

	CR	AVE	MSV	ASV
Attitude	.831	.556	.139	.102
Subjective norm (media)	.923	.751	.076	.037
Perceived behavioral control	.790	.434	.262	.134
Self-efficacy	.899	.693	.287	.124
Behavioral intention	.870	.769	.287	.178

**Table 4.** Regression weights onto the behavioral intention

	Estimate	S.E.	C.R.	P
Attitude	.11	.04	2.45	.014
Subjective norm	.11	.03	3.52	***
Perceived behavioral control	.34	.05	7.48	***
Self-efficacy	.31	.03	10.19	***

Notes: \*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$

**Table 5.** Moderating effects of past behavior

	Low in past behavior		High in past behavior		z-score
	Estimate	P	Estimate	P	
Attitude	.08	.236	.12	.019	.379
Subjective norm	-.03	.513	.16	.000	3.324***
Perceived behavioral control	.20	.005	.21	.000	.038
Self-efficacy	.31	.000	.19	.000	-1.788*

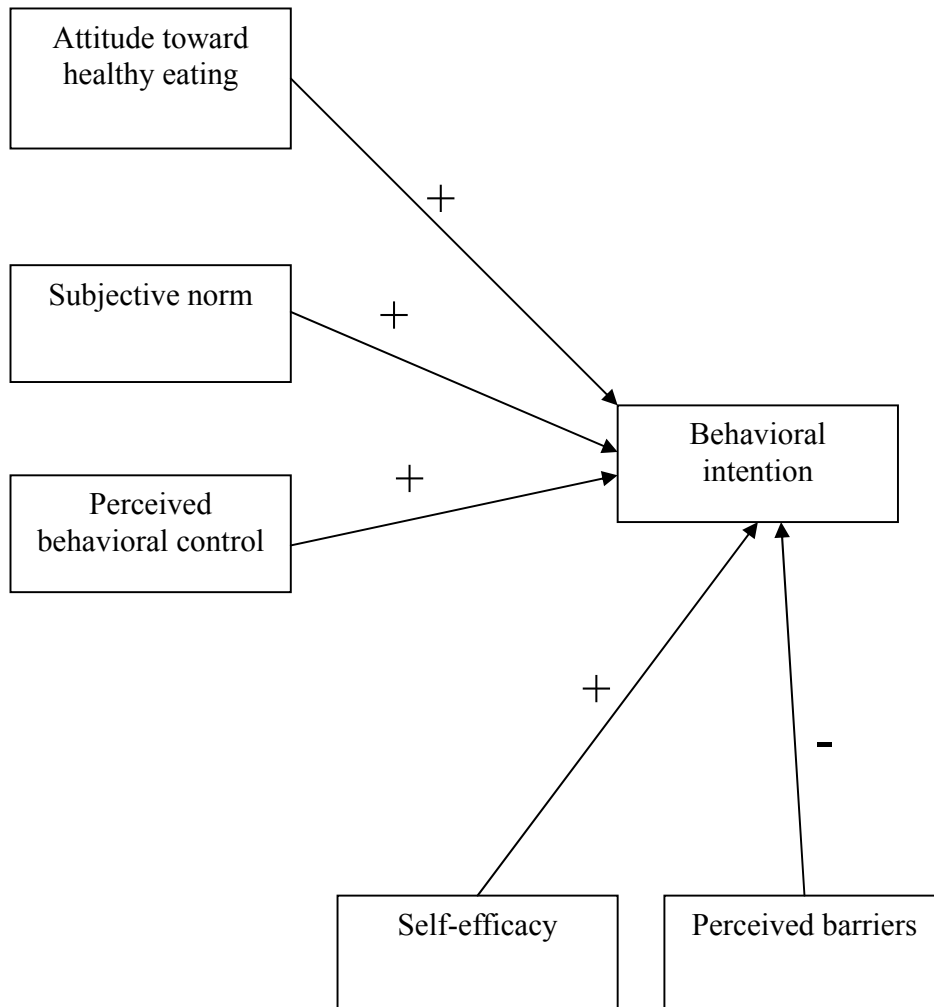
Notes: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$

**Table 6.** Moderating effects of gender

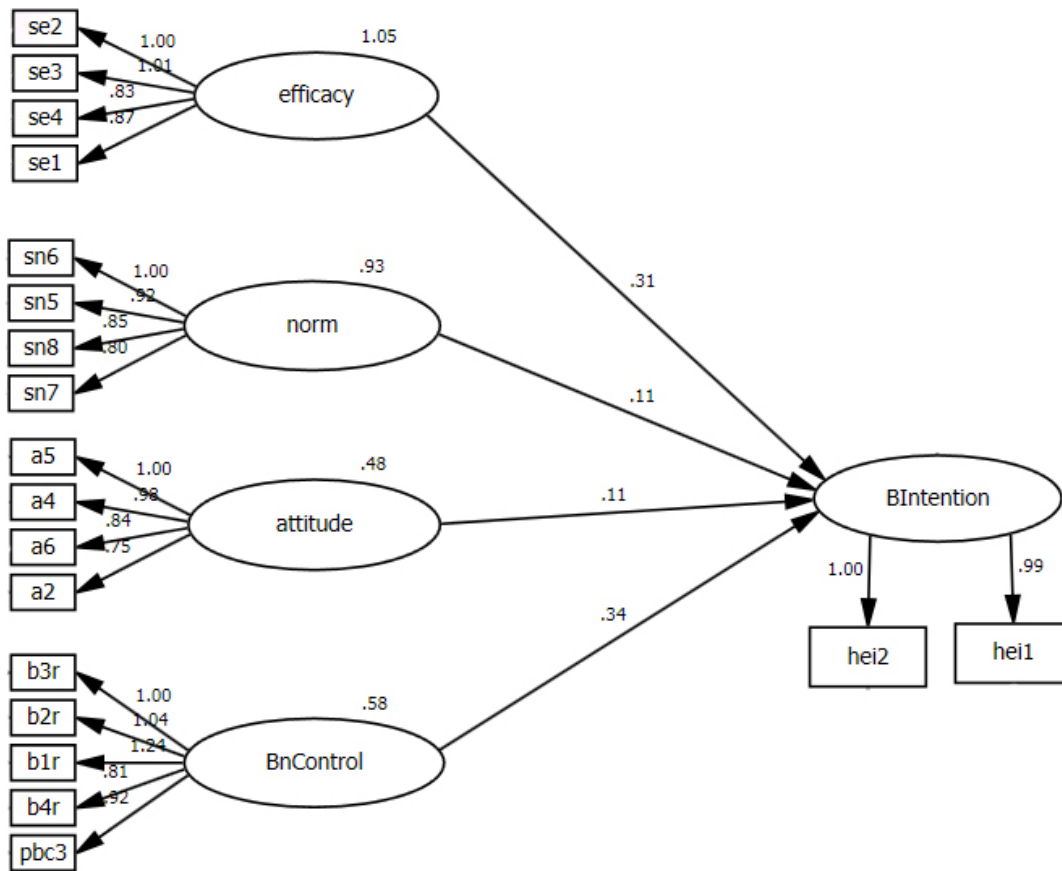
	Male		Female		z-score
	Estimate	P	Estimate	P	
Attitude	.02	.715	.22	.000	2.304**
Subjective norm	.15	.000	.03	.486	-1.967**
Perceived behavioral control	.30	.000	.41	.000	1.148
Self-efficacy	.35	.000	.26	.000	-1.598

Notes: \*\*\*  $p < 0.01$ ; \*\*  $p < 0.05$ ; \*  $p < 0.10$





**Figure 1.** An expanded Theory of Planned Behavior



**Figure 2.** Regression weights of the proposed model

## Appendix. Questions asked

### *Attitude toward healthy eating*

- Very interesting --- Very boring\*
- Very useful --- Very useless
- Very enjoyable --- Very un-enjoyable\*
- Very worthy --- Very unworthy
- Very good --- Very bad
- Very beneficial --- very harmful

### *Subjective norm*

- My friends think I should engage in healthy eating\*
- My family members think I should engage in healthy eating\*
- My classmates think I should engage in healthy eating\*
- My teachers think I should engage in healthy eating\*
- TV programs I watch think I should engage in healthy eating
- Newspapers and magazines I read think I should engage in healthy eating
- The government publicities think I should engage in healthy eating
- The internet information think I should engage in healthy eating

### *Perceived behavioral control*

- Will you try hard to eat healthily?\*
- Do you have enough discipline to eat healthily?\*
- Do you have enough time to eat healthily?+

### *Perceived barriers*

I don't always eat healthily because ...

- I like to treat myself+
- healthy food doesn't taste as good+
- not enough healthy options available+
- confused about what's healthy and what's not+
- haven't got time\*
- healthy foods are expensive\*

### *Self-efficacy*

- How certain are you that you could engage in healthy eating over the next two weeks?
- How confident are you that you could engage in healthy eating over the next two weeks?
- For me, engaging in healthy eating over the next two weeks would be easy\*

- If I wanted to, I could easily engage in healthy eating over the next two weeks\*

*Past healthy eating behavior*

- How often did you engage in healthy eating in the past month?

*Healthy eating intention*

- Do you intend to engage in healthy eating over the next week?
- How likely is it that you will engage in healthy eating over the next week?

\* dropped in SEM

+ combined to form a new measure of perceived behavioral control