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Promote healthy eating among adolescents: A Hong Kong study

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Healthy eating

**Promote healthy eating among adolescents:
A Hong Kong study**

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Structured abstract

Purpose –The objective of the study was to use the constructs in the Theory of Planned Behavior and advertising intervention to predict adolescents' intention for healthy eating.

Design/methodology/approach – A convenience sample survey of 570 secondary schools students aged 11 to 19 studying in Form 1 (equivalent to Grade 7) to Form 5 (equivalent to Grade 11) was conducted in Hong Kong.

Findings – Perceived behavior control was the most important factor in predicting behavioral intention for healthy eating, followed by attitude toward healthy eating and subjective norms. Perceived behavior control, attitude and subjective norms together explained 45 percent of the variance of behavioral intention. Respondents' attitudes towards advertisement advocating healthy eating had high positive correlation with attitudes toward healthy eating.

Research limitations – First, the sample was not a probability sample. Second, the data was collected through face-to-face interviews and respondents may tend to give socially desirable answers to the questions.

Practical implications – Hong Kong adolescents found healthy eating beneficial and desirable, but boring and not-enjoyable. Future health promotion campaign shall put emphasis on the fun and enjoyable attributes of healthy eating. As perceived norms were sourced from the government and the family, health campaign should continue to communicate the positive value of healthy eating to the family, and the society.

Originality/value – The current study is the first study to adopt the Theory of Planned Behavior and the advertising intervention to predict the effects on healthy eating in a Chinese society.

Promote healthy eating among adolescents: A Hong Kong study

1. Introduction

Over-weight and obesity pose significant health problems for adolescents. The prevalence of adolescents over-weight and obesity in developed countries had increased dramatically. Qualitative analyses revealed that early adolescents had a good understanding of what constitutes healthy eating (Power et al., 2010). However, many Australian adolescents reported food intakes that were deviated substantially from recommendations of the Australia Guide to Healthy Eating (Savidge et al., 2007).

Similar results were observed for American and Canadian adolescents. A study of American adolescents found that healthy eating messages based on Dietary Guidelines for Americans were reaching adolescents but interventions were needed to assist adolescents with the translation of this knowledge into healthy eating behaviors (Croll et al., 2001). This implied that American adolescents did receive message about dietary guidelines but were not able to practice healthy eating. A cross-sectional study on Alberta and Ontario adolescents aged 14 to 17 showed that median food group intakes were below recommendations based on Canada's Food Guide to Healthy Eating. Overall diet quality indicated that 43%, 47% and 10% of students had poor, average and superior diet quality respectively (Storey et al., 2009). All these studies indicate a gap between knowledge and practice of healthy eating among adolescents.

Over-weight and obesity pose long-term health problems. The younger the over-weight and obesity problem arises, the higher the health risk will result. The World Health Organization (WHO) recommends the use of body mass index (BMI) to define over-weight and obesity. If a person's BMI is beyond 85 percentile of those of the same age and sex in the population, he or she is defined as over-weight. Similarly, a person will be classified as obese if his or her BMI is beyond 95 percentile (So et al., 2008). It was found that 39.5% of school

students in a rural county located in southern Appalachia were over-weight or at risk for becoming over-weight (Wu et al., 2009). For the case of Hong Kong, 16.7% of children were over-weight or obese in 2005/6 while the data in 1993 was only 11.6% (So et al., 2008).

Hong Kong had a population of seven million people at the year-end of 2009. During the same time, there were 0.8 million (or 11.4% of the total population) people aged 10 to 19 (Census and Statistics Department, 2009). Similar to other developed countries, the obesity epidemic amongst adolescents and teenagers has grown to an alarming level in the past decade. It is generally believed that adolescent obesity is highly correlated to the wealth of a country or region. The per capita GDP of Hong Kong was HK\$208,263, which was a 22.5% increase since 1993. The increase in per capita GDP of Hong Kong was in line with the increase in percentage of over-weight or obese children in Hong Kong.

The Department of Health has launched several publicity campaigns to advocate healthy eating concepts such as balanced diet and increased fruit intake through public services advertisements and school-based health education programs. However, the target audience of the publicity efforts was elementary school students and their families. There is no publicity effort that put emphasis on the increasingly independent adolescents (Chan et al., 2009). A study of 152 seventh, eighth and ninth grade Hong Kong students found that respondents frequently ate out with friends and frequently consumed a range of relatively unhealthy food (candies, chips and soft drinks). They most likely ate unhealthy food at parties, when eating out or with friends. Respondents perceived that parents and government publicity asked them to eat healthy food more often than teachers or friends. In terms of alternative advertising appeals discouraging unhealthy eating, respondents considered news and fear appeals to be the most effective while popularity and achievement appeals were considered to be relatively less effective (Chan et al., 2009).

This study is a continued effort to investigate the intention of Hong Kong adolescents for health eating. The Theory of Planned Behavior is adopted as the theoretical framework to examine how

intention for healthy eating is affected by attitudes towards healthy eating, perceived behavioral control and the subjective norms related with healthy eating. Other mediating variables such as sex, age and BMI will be examined. The effects of intervention through public services advertisements will also be studied. Results of the study will benefit parents, educators and policy makers in designing health communication strategies for adolescents.

2. Theoretical framework

The relationship between attitudes and behavior has been of focal interest to social scientists. The Theory of Reasoned Action (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975) has been one of the most influential contributions on the causal link between attitudes and behavior. It has provided a condensed conceptual and empirical model for measuring the relationship between beliefs, attitudes, intentions and behavior. Basically the theory posits that, for behaviors under full volitional control, attitudes are developed from beliefs, behavioral intentions from attitudes, and behavior from behavioral intentions. The theory introduces an intermediate variable between attitudes and behavior. It narrows down the behavioral domain to single act under volitional control. The theory also adopts a highly specific attitude toward the act to predict the behavior. The Theory of Planned Behavior was introduced with the addition of a new variable of perceived behavioral control to predict behaviors that were not under full volitional control (Ajzen, 1985). The Theory of Planned Behavior suggests that when an individual has a favorable attitude toward a behavior, perceived that significant others want him to perform a behavior, and perceived that he or she has the abilities to perform a behavior, he or she will have a higher intention to adopt a given behavior.

A number of studies were conducted to investigate the efficacy of the Theory of Planned Behavior to predict healthy eating behavior. A study on Dutch high school students investigating the relative importance of personal and social environmental predictors of the consumption of fruit, high-fat snacks and breakfast indicated that for all three behaviors, higher

intention to change was associated with a more positive attitude and subjective norm. A higher intention to increase fruit intake was associated with more positive self-efficacy expectations (Martens et al., 2005).

In another survey on Native American boys and girls aged 9 -18, healthy eating behavior was positively correlated with the Theory of Planned Behavior constructs: barriers (0.46, negative scale used), attitude (0.44), perceived behavioral control (0.35) and subjective norm (0.34) (Fila and Smith, 2006). The most predictive barriers to healthy eating included the availability and taste of foods. Boys' eating behavior was most predicted by subjective norm while girls' eating behavior was most predicted by barriers. Lack of association between intention and healthy eating behavior suggests that factors other than intentions may drive healthy eating behaviors. A focus group study of American students, teachers and parents found that barriers to healthy eating include work schedule of parents, reliance on fast foods, takeout and packaged foods, difficulties in resisting eating tasty junk foods and that adolescents often ate poorly when they were hungry or bored (Power et al., 2010).

Regarding subjective norm, family members and government were among the most influential groups to adolescents for healthy eating (Chan et al., 2009). A study in Canada found that among collective factors, familial factor and the nature of foods available in the physical environment stood out as significant influences on healthy eating among children and youth (Taylor et al., 2005).

Interventions such as public service advertisements were often used by government health departments to promote healthy eating. A study of Hong Kong adolescents found that respondents perceived advertisements using fear and news appeals likable and effective (Chan et al., 2009). In view of the prevalence and the importance of these health communication campaigns, we attempt to investigate the impact of attitudes toward healthy eating advertisements on behavioral intentions for healthy eating. Scholars argued that the media, particular television, had an enormous potential influence and could overshadow familial

influences (Taylor et al., 2005). A survey on Australian children indicated that heavier television use and more frequent commercial television viewing were independently associated with more positive attitudes toward junk food; heavier television use was also independently associated with higher reported junk food consumption (Dixon et al., 2007). An experiment was conducted in which participating students were randomly allocated to four advertising viewing conditions including “junk food only”, junk food and healthy foods”, “healthy food only”, and control. Results indicated that participants exposed to ads for healthy food were more likely to develop positive attitudes and beliefs concerning these foods (Dixon et al., 2007).

3. Research objectives

This study attempts to investigate the intention of Hong Kong secondary school students for health eating by applying the Theory of Planned Behavior. Figure 1 shows a schematic based on the Theory of Planned Behavior. It illustrates how behavioral intention is predicted by attitudes, subjective norms, perceived behavioral control and attitudes toward healthy eating advertisements.

[Insert Figure 1 about here]

The following research questions were posed:

1. How adolescents' intention to adopt healthy eating is affected by their attitudes towards healthy eating, their perceived behavioral control, and the subjective norms that impose pressure on them?
2. What are the influences of sex, age and BMI on the intention to adopt healthy eating?
3. Will attitudes toward advertisements communicating healthy eating be positively associated with intention to adopt healthy eating?

4. Method

Sampling and data collection

A convenience sample survey was conducted in March 2010. A structured questionnaire was designed in Chinese and was pilot-tested for understanding by personal interview of two

adolescents. Students enrolling in the integrated communication management program at a university in Hong Kong were recruited as interviewers. Interviewers were asked to recruit secondary school students in forms 1 to 5 through their social network and conducted face-to-face interview with them. Verbal consents from respondents were obtained prior to the interviews.

Questionnaire and measurements

The questionnaire consisted of two parts. The first part collected information about respondents' eating habits, attitudes toward healthy eating, subjective norms as well as perceived behavioral control of healthy eating, and intention for healthy eating. Respondents were asked about their frequency of healthy eating practices (such as eating breakfast) or unhealthy eating practices (such as consuming fast foods) on a four-point scale (1=never; 4=more than 5 times a week).

Attitudes toward healthy eating were measured by asking respondents to rate on a 5-point semantic differential scale for six evaluative adjectives that describe healthy eating, including boring-interesting, useful-useless, enjoyable-un-enjoyable, desirable-undesirable, good-bad, harmful-beneficial. In the current study, healthy eating was described as consuming three moderately balanced meals daily that consisted of sufficient fruits as well as vegetables contents, and avoiding fast foods, chips, candies, and desserts. This description was suggested from a previous study (Wu et al., 2009). The scores on these six scales were converted so that high scores would represent positive attitudes. The mean score formed the measure of attitude. The Cronbach alpha coefficient was 0.79.

Subjective norms was measured by asking respondents to rate on a 5-point scale (1=strongly agree, 5=strongly disagree) the following seven statements: "My friends think I should engage in healthy eating", "My family 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 I

read think I should engage in healthy eating”, “The government publicity thinks I should engage in healthy eating”. This scale was adopted from Chan’s (1998) study. The scores were converted so that a large number would represent positive subjective norms toward the behavior. The mean score formed the measure of subjective norms toward the behavior. The Cronbach alpha coefficient was 0.84.

Perceived behavioral control was assessed by asking respondents to rate on a 5-point scale three questions about whether they perceive that they have control on healthy eating (1=definitely yes, 5=definitely no). The three questions included “Will you try hard to eat healthily?”, “Do you have enough discipline to eat healthily?” and “Do you have enough time to eat healthily?”. These questions were from a previous study (Wu et al., 2009). The scores were converted so that a high score would represent high perceived behavioral control. The mean score formed the measure of perceived behavioral control on the behavior. The Cronbach alpha coefficient was 0.86.

Behavioral intention was measured by asking respondents to rate on a 5-point scale for one question: “Will you engage in healthy eating in the coming two weeks?” (1=definitely yes, 5=definitely no). The mean score was the measure of the intention for healthy eating.

The second part of the questionnaire collected respondents’ perceptions of five fictitious print advertisements advocating healthy eating. Each ad was based on a different appeal type: popularity, love, achievement, news, and fear. Two of these advertisements were from a previous study (Chan et al., 2009) and the remaining three advertisements were constructed by us using pictures downloaded from books and web sites. All five advertisements identified the Department of Health as the advertiser and shared the same headline “Healthy eating, you can do it”. Both authors who taught advertising copy writing selected the pictures and wrote the body copy. These advertisements were in Chinese. Respondents were asked to evaluate their liking for the ads and their perceived effectiveness using a five-point scale (1=dislike very much, 5=like very much; 1=very ineffective, 5=very effective). Averaging the mean scores for liking and

perceived effectiveness of the five advertisements formed the scale of attitudes toward healthy eating advertisements. The Cronbach alpha coefficient was 0.80.

5. Findings

Altogether 570 students studying in secondary forms 1 to 5 (equivalent to grade 7 to 11 in the U.S. education system) were surveyed. The demographic profile is summarized in Table 1. All respondents were aged between 11 and 19. The mean age was 14.5. There were roughly equal proportions of males and females. There were roughly equal numbers of respondents in each grade. Sixty-one percent of the respondents reported living in rental housing. Thirty-three percent lived in family owned housing while the remaining six percent lived in other types of housing. The Body Mass Index (BMI) of respondents ranged from 12.6 to 32.4, with a mean of 19.7. An age-sex specific BMI percentile profiles for Hong Kong adolescents classified the top 15 percentile of a specific age-sex population as over-weight (So et al., 2007). Based on the cut-off BMI indexes, 12 percent of our sample was classified as over-weight. In the academic year of 2008/09, there were 414,260 students studying in secondary forms 1 to 5 in Hong Kong (Education Bureau, 2009).

[Insert Table 1 about here]

The respondents' reported eating habits are summarized in Table 2. Respondents reported that they practiced health eating regularly. Over 60 percent of the respondents reported that ate breakfast, ate at least a portion of fruits, and ate at least half bowl of vegetables at least three times a week. However, respondents also engaged in not so healthy eating regularly. Over 40 percent of the respondents reported that they eat candies or chips, drink soft-drinks and eat fast foods at least three times a week. Consumption of snack at late night was uncommon among adolescents. About 80 percent practiced it less than three times a week.

[Insert Table 2 about here]

Table 3 summarizes the attitudes, subjective norms, perceived behavioral control, and behavioral intention relating to the healthy eating behavior. The respondents reported a

positive attitude, high subjective norms, high behavioral control and positive behavioral intention. The mean scores for these variables ranged from 3.17 for behavioral intention to 3.42 for attitudes on the 5-point scale. All four measures were significantly higher than the mid-point of three (t-values ranged from 4.5 to 16.9, significance level all <0.001). Healthy eating was evaluated by most of the respondents as beneficial, good, and useful. However, healthy eating was evaluated as uninteresting and mildly enjoyable. Respondents perceived social norms to engage in healthy eating from personal sources as well as from mediated messages in the mass media. Respondents perceived the highest norms for healthy eating from family members, followed by government publicities. Contrary to previous findings that friends and peers were influencers for unhealthy eating, the current study found that respondents perceived positive influence from friends and classmates to eat healthily. Mass media (i.e. television programs, newspapers and magazines) were perceived as equally influential sources of subjective norms as personal sources (i.e. family members, teachers, friends, and classmates). Respondents perceived a high level of behavioral control. They perceived that they had the ability to try, and they have time to engage in healthy eating. They perceived that they had enough discipline to engage in healthy eating, but to less extent. They were moderately high on behavioral intention. Among the respondents, six percent “definitely” intended to eat healthily during the coming two weeks while thirty percent “mostly” intended to eat healthily during the coming two weeks. A majority (41 percent) were not sure. Twenty-one percent “mostly not” and two percent “definitely not” intended to eat healthily in the coming two weeks.

[Insert Table 3 about here]

Respondents were asked to rate (in terms of both liking and effectiveness) five different advertising appeals designed to promote healthy eating. The score for overall attitudes toward these advertisements was 3.08 (SD=0.6), which was significantly higher than the mid-point of three ($t=3.3$, $df=569$, $p<0.001$). A one-way, repeated-measures ANOVA comparing the mean liking scores for the five ads revealed no significant difference among the appeal types. In other

words, all five ads were perceived as being equally likeable. However, there were significant differences in respondents' perceptions of the effectiveness of the five advertisements. The advertisement using the news appeals stood out to be the one with the highest perceived effectiveness while the remaining four advertisements were perceived to be equally ineffective.

Table 4 shows the Pearson correlation matrix between all variables that will be used in the prediction of intention for healthy eating. Among the demographic variables, gender and BMI showed significant correlation with behavioral intention. Female respondents had higher behavioral intention than male respondents. Respondents with higher BMI had lower behavioral intention than respondents with lower BMI. A negative correlated was recorded between gender and BMI, indicating that boys had higher BMI than girls in the sample. A high correlation coefficient of 0.64 was reported between behavioral intention and perceived behavioral control. Behavioral intention was related with all predicting variables except age.

[Insert Table 4 about here]

To examine the theoretical model, multiple regression analysis was performed. The regression was conducted in two steps. Demographic variables were introduced in the first step, followed by the other four predictors, including attitudes, subjective norms, perceived behavioral control, and attitudes toward advertisements promoting healthy eating. The results of the regression analysis are summarized in Table 5.

In the first step of multiple linear regression with the three demographic variables as predictors, a statistically significant R square value of 0.02 was obtained. This indicated that two percent of the total variation of the dependent variable of intention could be explained by the demographic variables. Age and sex was not significant predictor of behavioral intention. Respondents with higher BMI were less likely to be healthy eaters than respondents with lower BMI. In the second step of multiple linear regression when four variables were added, a statistically significant R square value of 0.45 was obtained. This indicated that 45 percent of the total variation of the dependent variable of intention could be explained by the set of seven

predictors. The increase in R square value was significant at 0.001 level. Among the seven predictors, only two were significant. These two predictors were attitudes toward healthy eating and perceived behavioral control. Respondents who had more positive attitudes toward healthy eating, and respondents who perceived they had higher control were more likely to engage in healthy eating in the coming two weeks. The relative importance of attitudes toward healthy eating and perceived control were demonstrated by the regression coefficients of 0.25 and 0.47 respectively. Attitude toward healthy eating advertisements was not significant predictor when attitude toward healthy eating was present in the regression model. However, attitude toward healthy eating advertisements had significant positive correlation with attitude toward healthy eating (0.29, $p < 0.001$), subjective norms (0.19, $p < 0.001$), as well as perceived behavioral control (0.24, $p < 0.001$). So, the attitude toward healthy eating advertisement can have an indirect influence on behavioral intention through its impact on attitude toward healthy eating, subjective norms, and perceived behavioral control.

[Insert Table 5 about here]

6. Discussion

Before discussing the findings, four limitations need to be recognized. First, the respondents were recruited through social network which may not have been representative of adolescents in Hong Kong or elsewhere, thus limiting the generalizability of the findings. Second, the data was collected through face-to-face interviews. Respondents may tend to give socially desirable answers to the questions. Third, the advertisements used in the current study identified the Department of Health as the advertiser. It may have an impact on the perceived likability or effectiveness of the advertisements.

Despite these limitations, this exploratory study has revealed three key findings which appear to have a logical and explicable relationship:

1. Adolescents perceived social norms mainly from family members and the government to engage in healthy eating.

2. Adolescents found healthy eating beneficial and desirable, but boring and not-enjoyable.
3. Adolescents' attitudes toward healthy eating advertisements had a positive impact on intention of healthy eating through cultivating a more positive attitude toward healthy, enhancing subjective norms of healthy eating, and increasing perceived behavioral control.

In the current study, family members and government publicity played an important role in establishing subjective norms for healthy eating. Health campaigns should continue to communicate the positive value of healthy eating to the family, and the society. Teachers played a less important role in establishing subjective norms for healthy eating. The finding was consistent with a previous study that parents and government publicity often asked adolescents to eat healthy foods. Teachers on the other hand were less often cited as a source of healthy eating messages (Chan et al., 2009). Previous study found that young people demonstrated high interest and trust in government publicities (Chan, 2010). The health department should take an initiative to design healthy eating campaigns to reach out to adolescents.

Previous studies suggested that peers had negative influence on healthy eating (Kelly et al., 2006). In a study on adolescents' perception of their peers' health norms, among various preventive behaviors such as to avoid drugs, cigarettes, heavy drinking and so on, healthy eating was ranked the lowest (Evans et al. 1995). It suggested that efforts are need to bring adolescent health norms more into line with the objective risks of their health choices (Evans et al. 1995). The current study found that adolescents perceive social norms from friends and classmates to eat healthy. The result suggests a piece of good news to educators and policy makers that healthy eating has become a socially acceptable behavior among the young generation. Adolescents do not feel social pressures to eat unhealthily.

The high incidence of consumption of fast foods in the current study echoed a research finding that adolescents often eat out with friends (Chan et al., 2009). These findings together

prompt for the need to help adolescents to make healthy choices in the eating-out context. Parents, educators, and health professionals should provide concrete advices to adolescents on the selection of restaurants, dishes, as well as cooking methods that facilitates healthy eating.

Many respondents appreciated the value of healthy eating. However, they perceived that healthy eating was boring and not enjoyable. There is a need to associate fun and enjoyment with healthy eating. For example, Jamie Oliver, a renowned chef, criticized the school meals systems in the United Kingdom and advocated that “It’s all about making radical changes to the school meals system and challenging the junk food culture by showing schools they can serve fresh nutritious meals that kids enjoy eating” (www.jamieoliver.com). Further research is needed to explore what makes adolescents feel healthy eating is boring and what are the ways to make the experience more enjoyable.

Our finding indicates that adolescents did not perceive a high level of having enough disciplines to healthy eating. This may reflect the lack of persistence among adolescents and they may be easily distracted by other issues. A persistent communication effort is therefore needed to communicate constantly with adolescents about the values and importance of healthy eating.

The current study provides support for the value of advertisements advocating healthy eating. Attitudes toward healthy eating messages had positive correlation with attitudes toward healthy eating, perceived norms, as well as perceived behavioral control. The government and health professional should continue to provide resources to support health communication campaigns to adolescents.

From a theoretical point of view, the present findings provide empirical evidence of the application of Ajzen (1985)’s Theory of Planned Behavior to the prediction of healthy eating among adolescents. A relative small set of seven variables was able to predict 45 percent of the variation of intention for healthy eating. Demographic variables were not as important as the psychological variables in predicting intention. Based on the results, we modify the theory by

including a new variable of attitudes toward healthy eating advertisements. The modified theoretical model was shown in Figure 2.

[Insert Figure 2 about here]

The negative correlation between BMI and attitudes toward healthy eating, perceived behavioral control, as well as behavioral intention is worrying. This implies that those who have a more urgent need of healthy eating are less likely to practice healthy eating. Perhaps they are not equipped with the resources, or perhaps they have tried and find it too hard, or perhaps they have already given up. Further research is needed to explore the difficulties that over-weighted adolescents are facing and the ways to engaging them to seek for help.

While all five appeals examined in this research were perceived as being equally likeable, the news appeals were perceived as being the most effective in encouraging healthy eating. The study showed some similarities with previous results that news as well as fear appeals were most effective in discouraging the consumption of soft drinks (Chan et al., 2009). Since the respondents were Chinese, this was assumed to be a collectivist context in which popularity appeals (reflecting peer acceptance of healthy eating) should be the most effective. Yet this was not the case. The subjective norm was found to have insignificant standardized coefficient beta in the prediction of behavioral intention. These two findings together indicate that adolescents in Hong Kong do not demonstrate a strong motivation to comply with the social norms. Unlike in the previous study, adolescents did not perceive the fear appeal effective. Health communicators should therefore explore the use of news appeal in communicating healthy eating to adolescents.

6. Conclusion

To conclude, the present study found that perceived behavior control and attitudes toward healthy eating were most important factors in predicting adolescents' intention for healthy eating. Respondents reported that they frequently consume healthy as well as unhealthy foods. Our sample perceived family members and government publicities the major source of social

influence regarding healthy eating. Respondents perceived healthy eating beneficial, good and useful. However, healthy eating was perceived to be marginally enjoyable and somewhat boring. Intention for healthy eating was moderately high, indicating a need for improvement. Advertisements using news appeals seem to be promising to communicate to adolescents.

The current study provides solid foundation for the development of effective communication programs that targeted toward adolescents. Continued research efforts should build on these findings and explore new grounds.

7. Management implications

The findings of the current study would lead to the following suggestions for managers responsible for marketing of healthy eating to adolescents:

1. The government should design a targeted communication campaign that directly at the increasingly independent adolescents.
2. Communicating healthy eating messages should target adolescents via parents, friends, and teachers. In other words, healthy eating messages should be frame in a household setting, a social setting or a school setting.
3. Healthy eating should be repositioned as fun and interesting.
4. Communicating healthy eating to adolescents must enhance their ability and their behavioral control.
5. News appeal should be considered in an advertising intervention campaign for communicating healthy eating to adolescents.

As perceived behavioral control demonstrated to be the strongest predictor of intention for healthy eating, health communicators should empower adolescents with the ability and resources to engage in healthy eating. This can be done by providing education on how to eat healthy. The government and non-profit organizations should set up web sites to disseminate healthy eating tips. In view of the high incidence of unhealthy eating in social gatherings (Chan et al., 2009), there is a need to help adolescents to understand the basics of cooking and nutrition for social functions and

parties. Adolescents seek for role models. Health communicators, educators and policy makers can encourage the sharing of positive experience on healthy eating in the mass media or through the new media such as blogs and Facebook websites. Seeing how other people of similar age and background engage in healthy eating will enhance the perception of behavior control that will eventually lead to higher intention for healthy eating.

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Figure 1 Theoretical model

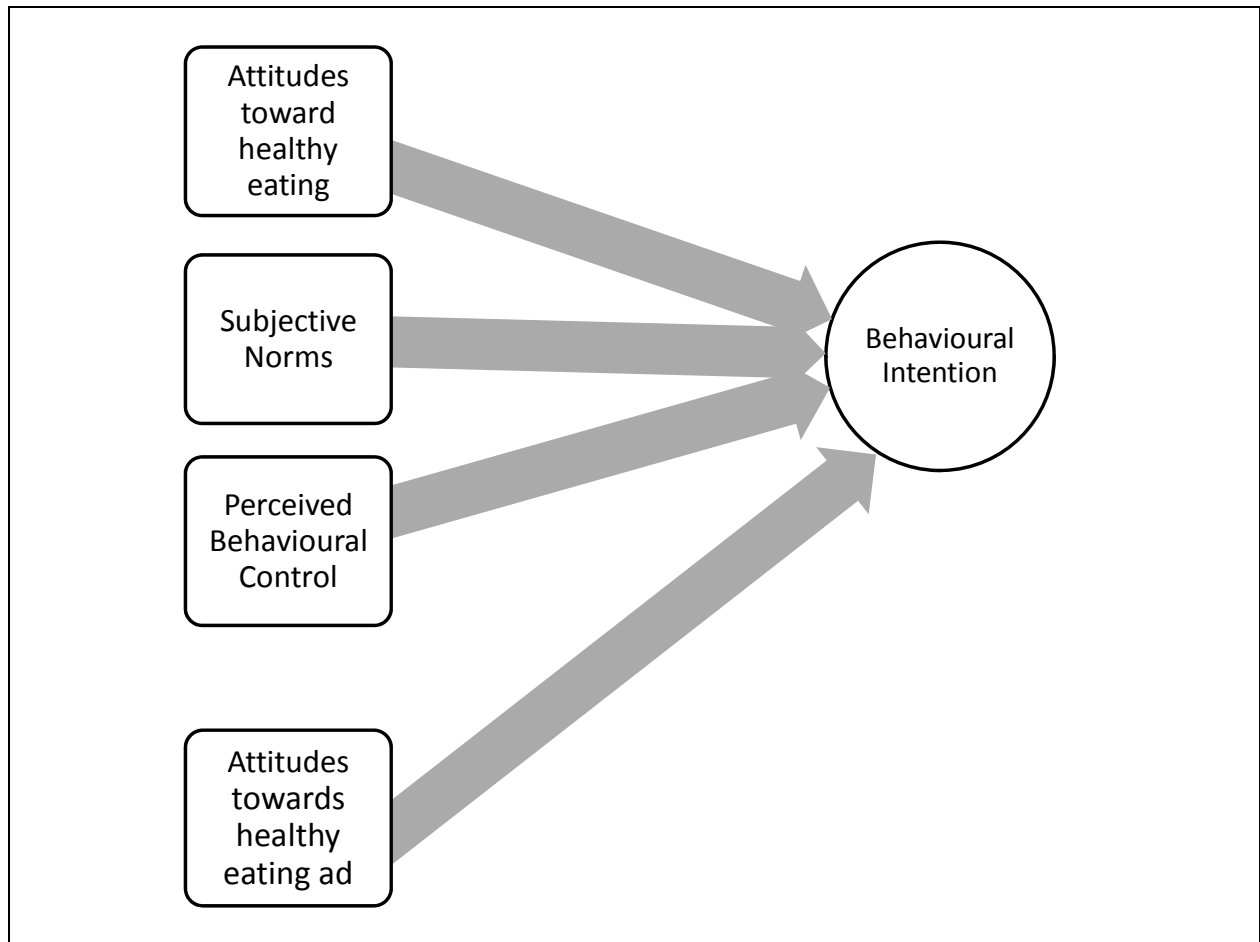


Figure 2 A proposed theoretical model

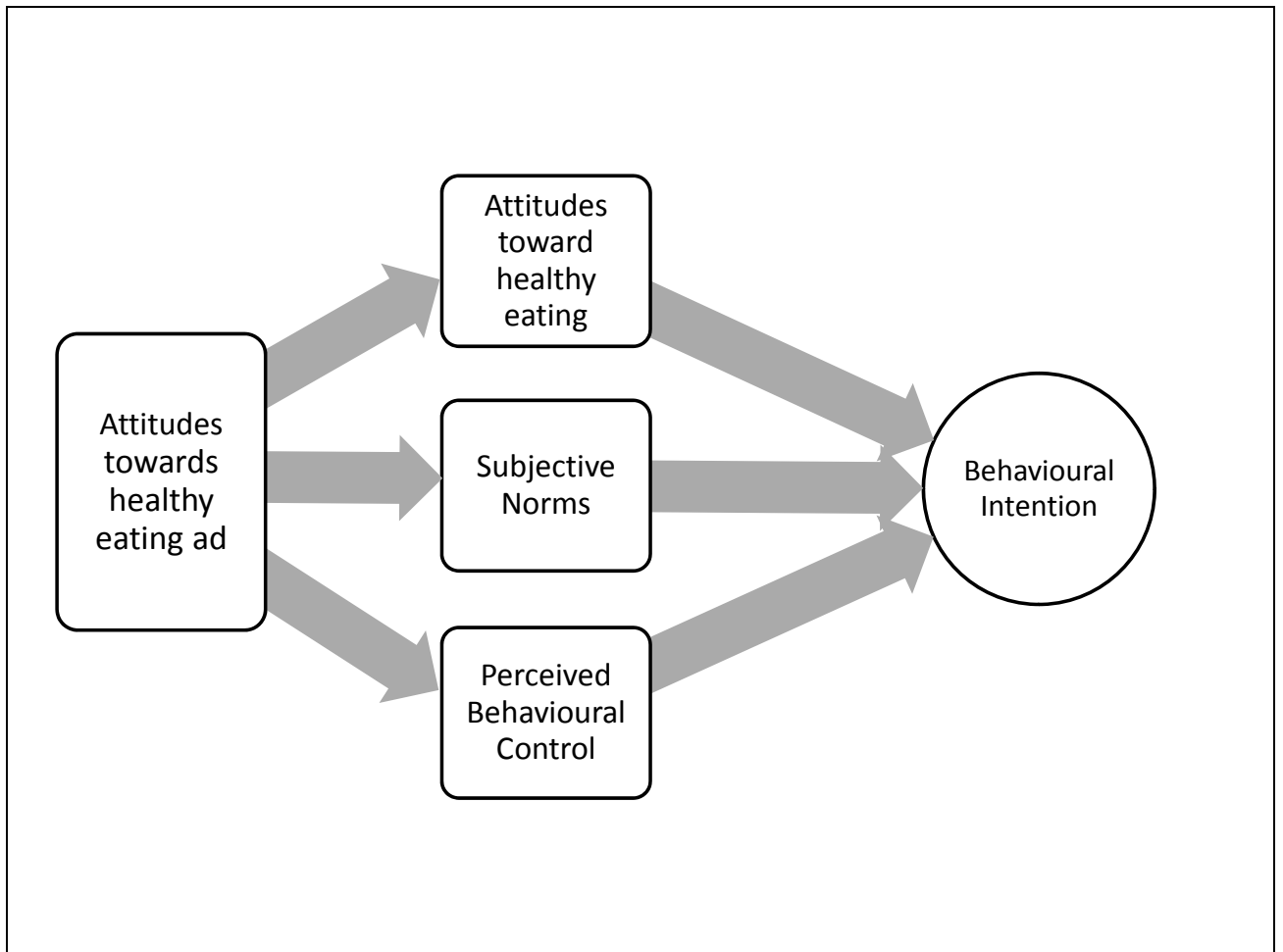


Table 1 Demographic profile of respondents (N=570)

Demographic	No.	Percentage
Female	283	49.6
Male	287	50.4
Aged 11 - 13	167	29.3
Aged 14 - 16	238	62.1
Aged 17 - 19	164	8.6
Secondary Form 1	121	21.2
Secondary Form 2	131	23.0
Secondary Form 3	137	24.0
Secondary Form 4	109	19.1
Secondary Form 5	72	12.6
public rental housing	242	42.5
private rental housing	104	18.2
self-owned flat	189	33.2
other types of housing	35	6.1
BMI less than 17	82	14.2
$17 \leq \text{BMI} < 20$	259	45.4
$20 \leq \text{BMI} < 23$	159	27.9
$23 \leq \text{BMI} < 26$	57	10.0
BMI 26 or above	14	2.5
Normal weight*	502	88.1
Over-weight	68	11.9

*based on age-sex specific body mass index percentile for Hong Kong 2005/6 (So, 2008)

Table 2 Eating habits

	Never (%)	1-2 days a week (%)	3-4 days a week (%)	> 5 days a week (%)
Eat breakfast	13	23	22	43
Eat at least a portion of fruits	3	37	36	24
Eat at least half bowl of vegetables	2	28	38	32
Consume snack at late night	37	42	17	4
Consume candies or chips	6	45	36	13
Consume soft drinks	9	48	31	12
Eat fast foods	4	55	32	9

Row percentages do not add to 100% due to rounding

Table 3 Intention, attitudes, subjective norms and perceived behavioral control relating to healthy eating behavior

	Mean^a	SD
Overall attitudes toward healthy eating	3.42	0.60
beneficial	3.83	0.77
good	3.64	0.87
useful	3.60	0.93
worthy	3.51	0.88
enjoyable	3.08	0.83
interesting	2.88	0.86
Overall subjective norms	3.35	0.67
family members	3.69	0.98
government publicities	3.60	0.94
teachers	3.44	0.88
TV programs	3.21	0.97
Newspapers and magazines	3.19	0.97
friends	3.17	0.93
classmates	3.15	0.87
Overall perceived behavioral control	3.21	0.88
Can you try hard?	3.38	0.99
Do you have enough time?	3.17	0.96
Do you have enough discipline?	3.08	1.02
Behavioral intention	3.17	0.91

^a All variables are measured on a 5-point scale with 5 indicating positive direction and 1 indicating negative direction

Table 4 Pearson correlations among various measures (N=570)

	Gender	Age	BMI	Attitudes towards healthy eating	Subjective norms	Perceived behavioral control	Attitudes towards ads	Behavioral intention
Gender (0= M, 1= F)		-0.05	-0.23**	0.07	0.04	0.07	-0.05	0.09*
Age			0.06	-0.04	-0.00	-0.04	-0.01	-0.05
BMI				-0.13**	0.01	-0.08*	-0.03	-0.13**
Attitudes towards healthy eating					0.39**	0.59**	0.29**	0.54**
Subjective norms						0.45**	0.19**	0.35**
Perceived behavioral control							0.24**	0.64**
Attitudes towards ad								0.17**
Behavioral intention								

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 5 Summary of results of multiple linear regression for predicting behavioral intention

variables	Standardized coefficient beta	t-value	Standardized coefficient beta	t-value
Step 1: demographics				
Gender (0=M,1=F)	0.06	1.5	0.03	0.8
Age	-0.04	-0.9	-0.01	-0.5
BMI	-0.12	-2.7**	-0.06	-1.8
Adjusted R square = 0.02**				
Step 2				
Attitudes toward healthy eating			0.25	6.2***
Subject norms			0.04	1.2
Behavioral control			0.47	11.7***
Attitudes toward advertisements			-0.03	-0.9
Increase in adjusted R square = 0.43***				

** p<0.01; *** p<0.001