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Danish and Chinese adolescents' perceptions of healthy eating and attitudes toward regulatory measures

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Keywords: health promotion – intervention – survey – individualism – collectivism

Abstract

Research paper

Purpose

This article aims to examine young consumers' perceptions of healthy eating, contexts where healthy or unhealthy eating are practiced, and their evaluation of regulatory measures that discourage the consumption of unhealthy foods in two different markets.

Design/methodology/approach

A convenient sampled survey was conducted of 386 Danish and Chinese adolescents using a structured questionnaire.

Findings

Results showed that perceptions of healthy eating were generally based on concepts such as balance and moderation. Unhealthy eating was most frequently practiced at parties and in festive periods. Hong Kong respondents were more likely to associate eating habits with healthy eating than Danish respondents. Danish respondents were more likely to practice healthy eating at schools than Hong Kong respondents. Making tanks of cold water freely available everywhere was perceived to be most effective in discouraging the consumption of soft drink. There were age, gender and market differences in attitudes toward selected

regulatory measures that discourage the consumption of soft drinks.

Originality/value

The study is an innovative attempt to examine adolescents' perception of healthy eating and attitudes toward food regulatory measures in more than one consumer market.

Research implications

Health educators and public health campaign designers should design health communication messages that target at different perceptions of unhealthy eating, as well as different unhealthy eating contexts. Policy makers should be aware of the difference in local environmental conditions when designing regulations to encourage healthy eating.

(230 words)

Danish and Chinese adolescents' perceptions of healthy eating and attitudes toward regulatory measures

Introduction

Obesity is a global problem afflicting all age groups, bringing social and economic burdens. The direct economic costs of obesity have been assessed in several developed countries as being 2 to 7 percent of total health care costs (World Health Organization, 2002). Overweight and obesity bring about physical problems, and are associated with a number of psycho-social problems including body shape dissatisfaction and eating disorders. People with obesity are often confronted with social bias, prejudice and discrimination (Chan *et al.*, 2009). A survey among adolescents in Hong Kong found that respondents associated a young person with above average body size with lack of self-control, lazy, and low self-esteem (Tsang and Chan, 2010).

Studies indicate the importance of developing healthy eating habits among people at a young age. Yet, obesity is steadily increasing among young people. It is estimated that at the turn of the 21st century there were over 155 million overweight children and youth in the world (Lobstein *et al.*, 2004).

As obesity has become an increasingly serious problem globally, there has in recent times been an increase in research studying how to encourage the adoption of a healthy eating lifestyle. Marketing of unhealthy foods to children and youth was identified as the major source of impact on consumers' choice of unhealthy foods (Kline, 2011). Some

countries explored various policies and action strategies to discourage the consumption of unhealthy foods. For instance, restricting food advertising to children was debated in United Kingdom and Australia although any direct causal link between food advertising and food eating behaviors is contested in the literature (Young, 2003).

Effective health communication to young people should be based on a sound understanding of their perceptions of healthy eating, the contexts where healthy or unhealthy eating are practiced, and their perceptions of different regulatory measures regarding healthy eating. While some of these issues have been researched in the context of younger children, similar studies on adolescents have not been explored (Chan *et al.*, 2009). This would seem to be an important area for research, since adolescents are more often away from home and the watchful eyes of their parents. They are also in the process of forming lifelong food consumption habits. What constitutes healthy or unhealthy eating among the adolescents? Under what situations do adolescents engaged in healthy or unhealthy eating? If certain regulatory measures are used to promote a healthy diet among adolescents, what are their attitudes toward these measures? How can regulatory measures be more responsive to adolescents in different cultures? A previous study found that uncertainty avoidance, a cultural dimension in Hofstede's (1983) frame work, help explain the differences in skepticism toward pharmaceutical advertising among U.S. and German consumers (Diehl *et al.*, 2007). It indicates that cultural dimensions may have an impact on consumers' attitudes

toward food regulatory measures. The current study explores if young consumers from different cultures may demonstrate differences in their attitudes toward different food regulatory measures. The current study will advance our knowledge of how to promote healthy eating among adolescents in different cultural settings.

Literature review

In this paper, healthy eating is defined by the eating behaviors that can enable the person to achieve “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (World Health Organization, 2007). Understanding adolescents’ perception of healthy eating and the contexts of unhealthy eating are important to assess how healthy promotion messages and intervention campaigns should be designed. Understanding their attitudes toward regulatory measures with an impact on food choice will help health policy makers to estimate the young people’s responses to different intervention policies.

Healthy eating is constructed within many realities, to have different meanings in different cultures, and to be dynamic and changing over time (Paquette, 2005). A review of empirical studies of perceptions of healthy eating found that perceptions of healthy eating were generally based on food choice, characteristics of food, and healthy concepts held by the public. Fruits and vegetables were consistently perceived as part of healthy eating. Naturalness and freshness, low fat, sugar, as well as salt contents were important in the

perceptions of healthy eating. The role of meat in healthy eating was ambiguous. Some studies reported that people perceived eating more meat was healthy (Pirouznia, 2001) while other studies reported that people perceived avoiding or limiting meat consumption was healthy (Troiano and Flegal, 1998). Concepts such as balance, variety and moderation were often identified to be related with healthy eating. However, these health concepts were complicated and often convey different meanings to different demographic groups (Paquette, 2005).

A focus group study of 203 adolescents reported that healthy eating was related with moderation, balance, and variety. Barriers to healthy eating include a lack of time, limited availability of healthy foods in schools, and a general lack of concern regarding healthy eating recommendations (Croll *et al.*, 2001). A survey of 416 adolescents aged 14 to 16 found that perceived behavioral control and attitudes toward healthy eating were positively associated with the intention for healthy eating (Wu *et al.*, 2009). A review of studies on determinants of healthy eating in children and youth found that individual factors influencing healthy eating identified include knowledge, attitudes and food preference. However, among collective factors, familial factors such as family food practices and the nature of foods available at homes, schools, and in fast-food establishments were major influences on healthy eating. The media, particularly television, had an enormous potential influence on healthy eating (Taylor *et al.*, 2005). Raine (2005) argued that healthy eating is highly contextual.

Environmental factors such as interpersonal environment created by family and peers, the physical environment about food availability and accessibility, the economic environment, as well as the social environment involving social status and cultural milieu are making a combined impact on healthy or unhealthy eating (Raine, 2005).

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 of eating behavior 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 youth aged 9 to 18, healthy eating behavior was positively correlated with barriers (negative scale used), attitude, perceived behavioral control, and subjective norm (Fila and Smith, 2006).

In view of the increasing prevalence of global obesity problems, many societies are exploring public healthy policy and regulatory measures to solve it. These efforts include a wide range of actions such as taxation, moderation of food pricing, integration of healthy and trade policy, restricting the marketing and advertising of food and beverage advertising that would have an impact on childhood and youth obesity, mandatory disclosure of nutrition information, community health educational campaigns, restricting the selling of unhealthy food in schools, and increased physical activities in schools (Clarke *et al.*, 2007). A review of

the literature indicates that there is a lack of research examining food and food regulation from the young audience's perspective. This information is important in the understanding of the multiple contexts influencing healthy eating and the formulation of health policy and action strategies. Although adolescents have presumably very little say in whether these regulations are enacted, asking them their responses to different regulatory measures can help policy makers to estimate public response from this group of stakeholders. With this in mind, the following research questions were posed:

RQ1. How do Danish and Hong Kong adolescents differ in their perceptions of healthy and unhealthy eating?

RQ2. How do Danish and Hong Kong adolescents differ in the contexts of healthy and unhealthy eating?

RQ3. How do Danish and Hong Kong adolescents differ in their responses to regulatory measures that discourage the consumption of unhealthy food?

Background of Denmark and Hong Kong

The youth market is often considered as an example of a global market segment because of its similarity in consumption habits such as clothing style, music tastes, and media usage (De Mooij, 2010). The transnational market ideology is manifested in the globalization of youth's identity, center-periphery, as well as reference to youth cultural consumption styles (Kjeldgaard and Askegaard, 2006).

Adolescents in Denmark and Hong Kong were studied because of their distinctive historical, cultural and social settings. Denmark and Hong Kong are both rather small and homogeneous areas at an advanced stage of technological development. The two cultures can be used to represent western and traditional-transitional cultures respectively. The following paragraphs attempt to outline the social economic background as well as the degree of obesity problems of the two cultures.

The Danish family in general is called “a family of negotiation” (Gram, 2006). Accordingly, the modern culture of individualism is moderated in Danish families where the adolescent is viewed very much as an individual to treat with respect, a natural partner in family decisions and a social being in its own right (Andersen *et al.*, 2008). Danish public school covers the whole period of compulsory education. The Danish education system is not examination-driven as public schools provide basic education free of charge (Andersen *et al.*, 2007). Almost all Danish children participate in different sports activities. The most popular sports are football and swimming. More than 80 percent engage in regular leisure activities such as sports, scouting, drama, film, dance, and horseback riding (Hansen *et al.*, 2002). The education system in Hong Kong is examination-oriented (Children’s Council Working Committee, 2005). Hong Kong children enjoy very little leisure time, get relatively little exercise, and are considered to be extremely inactive (Hui, 2001). Most elementary schools offer only two physical education classes a week. The lack of physical exercise has been

proposed as a factor contributing to the prevalence of obese children in the society (Hui, 2001).

Schools in Denmark are active in promoting healthy eating. A significant number of public primary schools adopted Public Organic Food Procurement Policy. A survey found that schools adopting Organic Food Procurement Policy reported more active integration of Food and Nutrition Policy in their curriculum than schools not adopting the Organic Food Procurement Policy (He *et al.*, 2010). Among the some 2,500 kindergarten, elementary and secondary schools in Hong Kong, only 100 (i.e. less than 4 percent) participated in the Healthy School Award Scheme (The Chinese University of Hong Kong, 2006). Evidence was found that students attending schools that reached level of Healthy Schools Award were found to demonstrate healthier lifestyle than students attending schools that not yet reached level of Healthy Schools Award (Lee *et al.*, 2006).

Both societies are subjected to marketing efforts of global food advertisers including soft drinks and fast food restaurants. Advertising to children and youth is allowed in both Denmark and Hong Kong. A pan-European project examining food marketing found that food advertisements during children's watching hours overwhelmingly promoted unhealthy foods that are high in fat, sugar or salt. The extent of unhealthy television food advertisements ranged from 49 percent in Italy to nearly 100 percent in Denmark and the UK. Creative advertising strategies used by food advertisers often involve popular characters in the youth's

media culture, as well as adopting child and youth-related appeals, such as play, fun, adventure, humor, or fantasy (Matthews, 2007).

Children and youth in Hong Kong are exposed to a large amount of advertising, especially through television advertising. The average rating of TVB-Jade, the dominant free Chinese channel, during the evening prime time from 7 to 11 pm on a weekday for youth 15 to 24 was 24 rating points and was equivalent to an audience size of 204,000 (CSM Media Research, 2010). Food and beverages market actively to the youth segment in Hong Kong. A content analysis found that food and beverage television commercials often carry information about availability, contents, and special offers. Celebrity endorsement was the most frequently used advertising appeals in television commercials that target the youth (Chan, 2010).

The recent official Danish definition of healthy eating emphasizes the combination of a balanced diet with physical activity. Recent governmental campaigns have focused on increasing Danish citizens' knowledge and action regarding the recommended quantities of fruit and vegetables (e.g., 6 om dagen, 2008). While these recommendations are well known by the majority of the Danish population, such informational efforts have been met with limited success when it comes to behavioural changes, especially among younger people. Promotional messages of healthy eating targeted at young citizens was criticized to be too abstract and ineffective (Holm, 2003). The Hong Kong Government took an active role in promoting healthy eating since 2005. Several campaigns using television commercials and

outdoor posters were launched about healthy eating and balanced diet in 2005, as well as healthy lunches and snacks in 2006. In 2007, a publicity campaign was launched to encourage Hong Kong people to consume two portions of fruits and three portions of vegetables a day. Survey results found that 72 percent of Hong Kong residents were aware of this publicity campaign. Female respondents and younger respondents were more likely to be aware of the campaign (Department of Health, 2007). Yet analyses of all these government publicity materials reveals that the government's healthy eating campaign were targeted at younger children or the general public. There is no publicity campaign targeted specifically at adolescents in secondary schools and higher education institutes.

Although the prevalence of overweight among adolescents in Denmark is below the European average (World Health Organization, 2008), overweight Danish children and adolescents aged 4 to 18 increased significantly from 11 percent in 1995 to 14 percent in 2000-2002 (Matthiessen *et al.*, 2008). Amongst 11-15 year-olds, 12 percent of the youngsters were overweight in 2006 (Sundhedsstyrelsen, 2008). Obesity problems among Hong Kong elementary school students aged 6 to 13 increased from 16 percent in 1997/98 to 21 percent in 2007/08. It has been projected that by 2013, one in every four Hong Kong teenagers aged between 6 and 18 will be obese (Information Services Department, 2008).

Methods

Questionnaire development

A draft questionnaire addressing the research questions was formulated in Chinese based on a pilot focus group study conducted in Hong Kong and in Denmark. The results were used to guide the design of a structured questionnaire. The questionnaire was tested by personally interviewing seven young persons aged 12 to 14. The questionnaire was translated into English, and then translated into Danish. A graduate student fluent in Danish and English back-translated the Danish questionnaire to English while another graduate student fluent in English and Chinese back-translated the English questionnaire to Chinese. The process ensured both questionnaires were comparable in wordings and meanings.

The final questionnaire had two parts. The first part collected information about perceptions of healthy and unhealthy eating as well as the contexts in which healthy and unhealthy eating were practiced. All the questions were close-ended. Respondents were asked to check from a list of six dieting practices (such as eat according the food pyramid) that they found healthy. They could choose none or choose all six practices. Respondents were then asked to check from a list of six dieting practices (such as eat too fast) that they found unhealthy. A similar procedure was designed for the contexts of healthy and unhealthy eating. The set of answers were generated from the focus group study. The second part of the questionnaire collected respondents' attitudes toward four measures that discouraged the consumption of soft drink. These measures were again generated from the focus group study. Respondents were asked to evaluate their perceived effectiveness using a five-point scale (1=very ineffective, 5=very effective). Soft drink was

selected as the focus of the de-marketing campaign because young consumers are familiar with soft drinks, according to our focus group interviewees. Sweets and soft drinks were identified as unhealthy eating (World Health Organization, 2004). Also, soft drinks are supported by aggressive advertising campaigns targeted toward young consumers, often employing media celebrities such as popular singers as spokespersons. Finally, demographic information including age and sex was collected.

Data collection

The respondents in Denmark were 234 students in grades 7 to 8, aged 12 to 15 years.

The response rate was 98 percent. The questionnaires were self-administered in the classrooms of five secondary schools. All the schools were in low to middle income residential neighborhoods. All aspects of the research procedure were conducted in Danish.

The respondents in Hong Kong were 152 students in grades 7 to 9, aged 12 to 16 years.

Altogether 160 questionnaires were distributed and 152 were collected. The response rate was 95 percent. The questionnaires were self-administered in the classrooms of three secondary schools (two co-educational and one school for boys). All the schools were in low to middle income residential neighborhoods. All aspects of the research procedure were conducted in Chinese.

Data analysis

Frequency distribution of perception as well as context of healthy and unhealthy eating

was tabulated. Chi-square tests were conducted to examine if Danish and Hong Kong respondents differed in their perceptions. Mean scores of perceived effectiveness of four regulatory measures were presented for Danish and Hong Kong respondents. Since the perceived effectiveness of four regulatory measures was collected for each respondent, one-way repeated-measures analysis of variance (ANOVA) was performed to identify any significant differences within the sub-sample. To examine differences between Danish and Hong Kong respondents, independent sample t-tests were conducted. The findings section presents the one-way repeated-measures ANOVA results for each sub-sample, followed by the independent sample t-test results between the Danish and the Hong Kong sub-samples.

Results

Fifty-one percent of the respondents were male and 49 percent were female. The mean age of the respondents was 13.4 years. There was no significant difference between the two sub-samples in terms of age profile. However, the Hong Kong sub-sample had a higher proportion of boys (57 percent of boys in the Hong Kong sub-sample and 44 percent of boys in the Danish sub-sample).

The respondents' perceptions of healthy and unhealthy eating are summarized in Table 1. Among the Danish respondents, the percentages revealed that eating according to the food pyramid was most likely to be perceived as healthy eating, followed by having a balanced diet. Having three meals a day, eating natural food, as well as eating at regular time intervals

were perceived by about 40 percent of Danish respondents as healthy eating. Consuming similar amount of food each meal was least likely to be perceived as healthy eating by Danish respondents.

Among Hong Kong respondents, having a balanced diet was perceived as healthy eating by over 90 percent of the sample. Eating at regular time intervals, eating according to the food pyramid, as well as consuming three meals a day were considered as healthy eating by over 60 percent of Hong Kong respondents. Eating natural food and consuming similar amount of food each meal was least likely to be perceived as healthy eating by Hong Kong respondents.

Among the Danish respondents, consuming fast food was perceived as unhealthy eating by over 90 percent of Danish respondents. Eating too fast was perceived as unhealthy eating by nearly 60 percent of Danish respondents. Eating too much or too little sometimes as well as eating food with preservatives/additives was considered as unhealthy eating by over 40 percent of Danish respondents. Eating at irregular time intervals and eating a narrow range of food were least likely to be perceived as unhealthy eating by Danish respondents.

Among Hong Kong respondents, eating a narrow range of food was most likely to be perceived as unhealthy eating by Hong Kong respondents. Eating at irregular time intervals, eating food with preservatives/additives, and eating fast food were considered as unhealthy eating by over two-thirds of Hong Kong respondents. Eating too fast was considered as

unhealthy eating by over half of Hong Kong respondents. Eating too much or too little sometimes was least likely to be perceived as unhealthy eating by Hong Kong respondents.

There were more differences than similarities among Danish and Hong Kong adolescents in their perceptions of healthy and unhealthy eating. Seven out of twelve chi-square values demonstrated significant differences. Hong Kong respondents were more likely to perceive having a balanced diet as healthy eating than Danish respondents. On the other hand, Danish respondents were more likely to perceive eating fast food as unhealthy eating than Hong Kong respondents.

[Insert Table 1 about here]

Respondents were asked to report in what contexts they consume healthy or unhealthy foods. Table 2 summarizes the results. Nearly 90 percent of Danish respondents reported that they eat healthy foods at home and over half of them eat healthy foods at school. Over 40 percent of Danish respondents reported that they eat healthy foods when they were sick, when parents were around, and when they were in good mood. They were least likely to eat healthy foods during holidays. On the other hand, over 70 percent of Hong Kong respondents reported that they eat healthy foods at home and only 21 percent of them eat healthy foods at school. Over 40 percent of Hong Kong respondents reported that they eat healthy foods when they were sick and when parents were around. They were least likely to eat healthy foods during holidays, and when they were in a good mood.

Over 75 percent of Danish respondents reported that they eat unhealthy foods in parties and in festive periods. Social gathering and eating out were contexts of unhealthy eating reported by over half of the Danish respondents. They were least likely to eat unhealthy foods when in hurry and when they were in a bad mood. Over 70 percent of Hong Kong respondents reported that they eat unhealthy foods in parties and eating-out. Social gathering, festive periods, and when in hurry were contexts of unhealthy eating reported by half of the Hong Kong respondents. They were least likely to eat unhealthy foods when they were in a bad mood.

There were more differences than similarities among Danish and Hong Kong adolescents in the contexts of healthy and unhealthy eating. Nine out of twelve chi-square values demonstrated significant differences. Danish respondents were more likely to eat healthy foods in school and at home than Hong Kong respondents. On the other hand, Hong Kong respondents were more likely to eat healthy foods when they are sick. Danish respondents were more likely to eat unhealthy foods in festive periods as well as when in bad mood than Hong Kong respondents. Hong Kong respondents were more likely to eat unhealthy foods in parties, when eat-out, and when they were in a hurry.

[Insert Table 2 about here]

Respondents were asked to rate the perceived effectiveness of four different regulatory measures that discourage soft drink consumption. Table 3 summarizes the results. Among the

Danish respondents, there was a significant effect for perceived effectiveness of the four different regulatory measures [Wilks' Lambda = 0.513, $F(3, 222) = 70.2$, $p \leq 0.001$]. LSD pairwise comparisons of the means revealed that providing free cold water everywhere was perceived as most effective. On the other hand, imposing a ban on advertisements for soft drinks was perceived to be least effective. Perceived effectiveness of imposing a ban on the sale of soft drinks in schools/sports centers and increasing the price of soft drinks had no difference. Among the Hong Kong respondents, there was also a significant effect for perceived effectiveness of four different regulatory measures [Wilks' Lambda = 0.670, $F(3, 149) = 24.5$, $p \leq 0.001$]. LSD pairwise comparisons of the means revealed that imposing a ban on advertisements for soft drinks was perceived to be least effective. Perceived effectiveness of the other three regulatory measures had no difference among Hong Kong respondents. All these three measures were perceived as more effective than imposing a ban on advertisements for soft drinks.

Independent sample t-test results indicated that significant differences in perceived effectiveness were found for two of the four regulatory measures between the Danish and Hong Kong sub-samples (see Table 3). Danish respondents perceived that providing free cold water everywhere would be very effective in discouraging the consumption of soft drinks while Hong Kong respondents were lukewarm about the measure. Danish respondents perceived that increasing the price of soft drink would be effective in discouraging its

consumption while Hong Kong respondents considered it ineffective.

[Insert Table 3 about here]

Do Danish and Hong Kong adolescents differ in their attitude toward regulatory measures? Multiple linear regressions were conducted using sex, age, market to predict the perceived effectiveness of the four selected regulatory measures. Results are summarized in Table 4.

Perceived effectiveness of two of the four regulatory measures showed gender and age differences among the respondents. Girls perceived imposing a ban on the sale of soft drinks or imposing a ban on ads for soft drinks more effective than boys. Younger respondents perceived that imposing a ban on ads for soft drinks more effective than older respondents. Danish respondents perceived that increasing the price of soft drinks or making tank of cold water freely available everywhere more effective than Hong Kong adolescents.

[Insert Table 4 about here]

The adjusted R squares for the regression analysis were less than 0.10 for all four regulatory measures, indicating that demographic characteristics and market variables accounted for a small percentage of the variance of attitudes toward regulatory measures.

Discussion

Before discussing the findings, three limitations need to be recognized. First, the respondents were chosen from a non-probability sample of secondary schools which may not

have been representative of all schools in Denmark, Hong Kong or elsewhere, thus limiting the generalizability of the findings. The observed differences in two markets may be due to sampling error. Further study using representative random samples will be desirable. Second, this study relied on self-reporting. As with all self-report studies, whether the reporting is consistent with actual behavior might be questioned. Future researchers might overcome both of these problems by using more representative samples, and by actually observing eating behavior. Third, adolescents' opinion about regulatory measures may not reflect their behaviors when the regulatory measure is enacted. Future study may consider asking specific behavioral intention for the individuals. For example, a question "would you consume fewer soft drinks if they were not sold at schools or sporting events?" may be asked.

Despite these limitations, this exploratory study has revealed four key findings which appear to have a logical and explicable relationship. First, perceptions of healthy eating among adolescents were generally based on concepts such as balance and moderation. Healthy eating messages based on the food pyramid are reaching adolescents. Adolescents generally considered fast foods and food with preservatives/additives unhealthy. Healthy eating is perceived to have a stronger link with the contents of the diet than the contexts of the diet. The perceptions with high percentages regarding healthy or unhealthy eating were about food contents, rather than eating habits. Second, unhealthy eating was usually practiced in social settings and during festive periods while healthy eating was usually practiced at

homes and in schools. Third, providing cold water freely was considered effective measures that discourage consumption of soft drinks. Other measures, such as imposing a ban on the sale of the soft drinks in schools and sports centers, increasing the price of soft drinks, and imposing a ban on the advertisements for soft drinks were all considered as ineffective among adolescents. It suggests that convenience and accessibility of healthy drink is considered important among respondents of both markets. These three findings, in tandem, would seem to reinforce the importance of this study focusing on adolescents. Unlike younger children, adolescents may not always be under the supervision of their parents, and therefore they may be making more independent eating decisions when they are outside the home. Fourth, there are gender, age and market difference in attitudes toward regulatory food measures among adolescents.

Results showed that adolescents have a significant amount of knowledge regarding healthy foods and believe that healthy eating involves moderation and balance. These findings suggest that healthy eating messages based on the food pyramids are reaching adolescents, but interventions are needed that assist adolescents with the translation of this knowledge into healthy behaviors. Our study showed that respondents frequently consume unhealthy foods in social contexts. Barriers to healthy eating may include a lack of knowledge in preparing healthy foods in social gatherings, lack of time, limited availability of healthy foods in schools, and yielding to peer pressure in social contexts.

Danish respondents were more likely to perceive providing free cold water everywhere effective in discouraging soft drink consumption than Hong Kong respondents. Focus group study of Hong Kong adolescents found that interviewees worry that free water provided on the street is not hygienic. Hong Kong is a densely populated city and it is difficult to keep the water feeder clean from environmental pollution or human intervention. The concern about local supply condition may be true in many other transitional economies. The results suggest that adolescents in both Denmark and Hong Kong respond differently to food regulatory measures. The study indicates that there are legislative, policies, regulatory, and supply conditions that differ in each national context. Further study on how these conditions impact consumers' adoption of healthy eating lifestyles will assist policy makers and health educators in designing health interventions and health related messages.

Conclusion

To conclude, the current study found that respondents frequently consume unhealthy foods in social contexts, namely parties, social gatherings, eating-out with friends, as well as during festive periods. Danish schools were found to be facilitating healthy eating while Hong Kong schools were not. It was encouraging to find out that healthy eating was most often practiced at home in both societies. Two of the four regulatory measures were perceived differently in effectiveness among Danish and Hong Kong respondents. The result suggests that young consumers in different market environments hold different attitudes toward food

regulatory measures.

The overall low (less than 10 percent) adjusted R square values indicated that there are other important context variables which need to be included in future studies. For example, attitudes toward healthy eating in general as well as perceived control of healthy eating should be considered for inclusion in future research.

Public policy implications

Obesity brings many problems, both social and economic. Despite the severity of the problems obesity causes and the growing incidence of obesity, little is known about adolescents' perceptions of communication about healthy eating. By identifying their perceptions of healthy and unhealthy, the contexts that they consume healthy or unhealthy foods, and their perceptions of the various regulatory measures concerning unhealthy foods, this study has provided useful information for public health officials and health educators to consider when developing communications and action strategies targeted towards adolescents. Specifically, communicating healthy eating messages should target the increasingly independent adolescent directly, as well as through their parents. Also, there is an urgent need to encourage adolescents to engage in healthy eating in social contexts. As Hong Kong secondary schools were not perceived as facilitating healthy eating, public health officials should step up the actions to encourage secondary school administrators to implement healthy eating practices in schools. Government officials may need to rethink how they communicate

with adolescents, and ensure they use the appropriate media and message contexts to influence adolescents' attitudes and behavior. For example, the government may consider distributing leaflets about values of healthy eating in restaurants. As adolescents in different markets respond to regulatory measures in a significantly different way, health educators and public health campaign designers should test and adopt regulatory measures that are most promising to their target audience in that particular market.

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Table 1 Perceptions of healthy and unhealthy eating (N=384)

	Total (%)	Denmark (n=232) (%)	Hong Kong (n=152) (%)	Chi-square values
<i>Perceived as healthy eating</i>				
Have a balanced diet	73	60	93	49.5***
Eat according to the food pyramid	70	69	71	0.2
Eat at regular time intervals	54	39	78	56.1***
Have three meals a day	51	44	61	9.2**
Eat natural food	45	44	46	0.1
Eat almost the same amount each meal	23	22	26	0.6
<i>Perceived as unhealthy eating</i>				
Eat fast foods	80	91	65	38.4***
Eat too fast	58	59	55	0.4
Eat food with preservatives or additive	56	46	72	23.0***
Eat a narrow range of food	56	35	88	99.8***
Eat at irregular time intervals	51	36	74	52.4***
Sometimes eat too much and sometimes eat too little	44	47	38	2.6

* p<0.05; **p<0.01;***p<0.001

Table 2 Contexts of healthy and unhealthy eating

	Total (%)	Denmark (%)	Hong Kong (%)	Chi-square value
<i>Context of healthy eating</i>				
At home	82	89	72	16.5***
When I am sick	52	44	65	16.0***
In school	42	55	21	42.1***
When parents are around	41	42	41	0.0
When I am in good mood	34	40	24	10.4***
During holidays	23	24	22	0.0
<i>Context of unhealthy eating</i>				
In parties	80	77	86	4.9*
In festive periods such as Christmas	70	78	57	19.2***
Gathering with friends	61	62	61	0.0
Eat outside	52	41	70	29.8***
When I am in hurry	32	22	49	29.2***
When I am in bad mood	21	27	13	10.6***

* p<0.05; **p<0.01;***p<0.001

Table 3 Perceived effectiveness of four selected regulatory measures

Regulatory measures	Mean score	Denmark	Hong Kong	t-value
Make tanks of cold water freely available everywhere	3.3	3.7	2.8	6.7***
Impose a ban on the sale of soft drinks in schools and sports centers	2.8	2.8	2.8	0.3
Make the purchase of soft drinks more expensive	2.8	3.0	2.7	2.3*
Impose a ban on advertisements for soft drinks	2.1	2.1	2.2	-0.5

* p<0.05; ***p<0.001

Table 4. Summary of regression analysis predicting attitudes toward selected regulatory measures

	Standardized beta			Adj. R square
	sex (0=F; 1=M)	age	market (0=Demark; 1=HK)	
Impose a ban on the sale of soft drinks in schools/sports centers	-0.14**	-0.07	0.01	0.02*
Impose a ban on ads for soft drinks	-0.18***	-0.13**	0.06	0.04***
Make the purchase of soft drinks more expensive	-0.03	-0.02	-0.10*	0.01
Make tanks of cold water freely available everywhere	-0.03	-0.02	-0.32***	0.10***

Hong Kong

* p<0.05; **p<0.01;***p<0.001