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**Using Theory of Planned Behavior to predict healthy eating among
Danish adolescents**

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Using Theory of Planned Behavior to predict healthy eating of Danish adolescents

Keywords: Adolescents, Health, Eating Diet, Social marketing, Attitudes, Behavioral change Research paper

Structured abstract

Purpose - The purpose of the study was to apply the Theory of Planned Behavior to predict Danish adolescents' behavioral intention for healthy eating.

Design/methodology/approach - A cluster sample survey of 410 students aged 11 to 16 years studying in Grade 6 to Grade 10 was conducted in Denmark.

Findings - Perceived behavioral control followed by attitudes were the most important factors in predicting behavioral intention. Females and adolescents with a higher Body Mass Index were also found to have a stronger behavioral intention. Healthy eating was perceived to be beneficial and useful, and, to a lesser extent, interesting and desirable. Family, TV programs, and teachers were influential socialization agents.

Research limitations – The survey responses may be affected by a social desirability bias. The survey includes a non-probability sample and results may not be generalized to all adolescents, even in Denmark.

Practical implications – The results may inform educators and policy makers in designing health communication interventions, particularly in making socializing agents aware of their role in fostering healthy eating behaviors in adolescents. As perceived behavioral control was the strongest predictor of behavioral intention, interventions and messages communicated to adolescents on healthy eating should aim to empower them with knowledge, ability and determination to eat healthily.

Originality/value - The study uses a predictive, theoretical framework (TPB) to investigate healthy eating, whereas previous efforts among Danish adolescents have primarily used descriptive approaches.

Using Theory of Planned Behavior to predict healthy eating of Danish adolescents

1. Introduction

According to the World Health Organization (2012), overweight and obesity pose significant health problems for people of all ages. For children, the risks include breathing difficulties, increased risk of fractures, hypertension, early markers of cardiovascular disease, insulin resistance and psychological problems. Childhood obesity also increases the risks of premature death and disability in adulthood: the earlier overweight and obesity problem arise, the higher the risk of subsequent health problems (World Health Organization, 2012). The prevalence of adolescents' overweight and obesity in the developed countries has increased dramatically and in Europe more than 30% of all European children are said to be overweight or obese (European Commission, 2007).

According to the cross-national HBSC study¹ (World Health Organization, 2008), the prevalence of overweight and obesity among 15-year olds in Denmark (9% and 13% for girls and boys respectively) is below the HBSC average, (10% and 17% for girls and boys respectively). Still, and in line with the international findings (European Commission, 2007) overweight in Danish children and adolescents has been increasing in recent years (Matthiessen *et al.*, 2008). A recent large-scale study of Danish 9th graders (approx. 15-year olds) (Søren and Jo, 2010) suggests that the prevalence of overweight amongst Danish adolescents may even be more higher than previously thought. Thus, using objective measures of height and weight, overweight and obesity in the sample was 25.2 percent, of which boys (29.3%) were more

¹ The HBSC survey includes 41 countries and regions across Europe and North America and uses self-reported (subjective) measures of height and weight, which tends to underestimate the incidence of overweight and obesity, but is suitable for measuring development over time.

severely afflicted than girls (21.1%).

Previous studies have documented the fact that adolescents have problems in understanding as well as in practicing healthy eating behaviors. For example, qualitative studies have found that early adolescents have a limited understanding of what constitutes healthy eating, whereas their understanding of what constitute *unhealthy* eating is much better (Power *et al.*, 2010; Stevenson *et al.*, 2007). With regard to behavior, several international studies attest to the fact that adolescents' diets generally do not live up to national health recommendations (e.g. Croll *et al.*, 2007; Savige *et al.*, 2007; Storey *et al.*, 2009).

In line with the international trends, Danish adolescents also generally fail to adhere to the officially recommended dietary guidelines. The average Danish teenager does not consume sufficient amounts of fruit and vegetables, and their intake of sweets and soft drinks is higher than recommended (Fagt *et al.*, 2007). The official Danish definition of healthy eating, as well as the Danish government's strategies of promoting it, have changed several times since attempts were first made in this direction in the 1930s. In its recent form, the notion of healthy eating emphasizes the combination of a balanced diet with regular physical activity (Ministry of Food, Agriculture and Fisheries, 2011). Thus, the official Danish health guidelines 'The 8 dietary recommendations' have put forward recommendations about eating sufficient amounts of fish, fiber, fruit and vegetables, about drinking water, exercising, eating a variety of foods, as well as avoiding fat and avoiding sugar (Ministry of Food, Agriculture and Fisheries, 2011).

Recent governmental campaigns have focused on increasing Danish citizens' knowledge and action regarding the recommended quantities of fruit and vegetables (e.g., 6 om dagen²). While these recommendations are well known by the majority of

² Translates to 6 (pieces of fruit/vegetables) a day.

the Danish population, such informational efforts have achieved limited success in terms of behavioral changes, especially among adolescents and young people aged 11-24 (Fagt *et al.*, 2008).

This study seeks to investigate Danish adolescents' own perceptions of healthy eating, focusing specifically on the psychological antecedents of their intention to eat healthy. The Theory of Planned Behavior (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) is selected as the theoretical framework. In terms of healthy eating this framework is used to examine the extent to which adolescents' intention for healthy eating is affected by the extent to which they have a favorable or unfavorable evaluation of engaging in healthy eating, how easy or difficult they perceive healthy eating to be, and the extent to which they think significant others want them to eat healthily. In addition, mediating variables such as gender, age and body mass index (BMI) are also examined.

2. Theoretical framework

The Theory of Reasoned Action (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) is among the most influential and widely applied theories on the link between attitudes and behavior. It provides a simple, yet logical, conceptual framework for measuring the relationship between beliefs, attitudes, subjective norms, intentions and behavior. According to this theory, attitudes and subjective norms are developed from beliefs, behavioral intentions from attitudes and subjective norms and behavior from behavioral intentions. Behavioral intentions constitute an intermediate variable between attitudes/subjective norms and behavior (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975).

As a range of behaviors (such as eating healthy or exercising) is not always perceived to be under the full volitional control of a person, Ajzen (1985) extended

the Theory of Reasoned Action with a new variable to account for factors outside of a person's full control, perceived behavioral control. Thus, The Theory of Planned Behavior suggests that when an individual has a favorable attitude towards a given behavior, perceives that significant others want him or her to perform this behavior, and, in addition, feels capable of performing the behavior he or she will have a higher intention to adopt this behavior. Hence, the overarching idea of testing the theory in the field of healthy eating is delineating the main psychological causes of these behaviors, as this knowledge will provide valuable information that can be used for predicting and influencing behavior, for instance in terms of influencing attitudes or making it easier to engage in healthy eating (e.g., by making healthy food available).

A number of studies have been conducted to investigate how well the Theory of Planned Behavior predicts healthy eating behavior among young people. Chan and Tsang (2011) found that perceived behavioral control, attitudes toward healthy eating and subjective norms predicted 45 percent of the variance in behavioral intention. In a survey including children and adolescents aged 9-18, healthy eating behavior was also predicted by the constructs included in the Theory of Planned Behavior, although gender differences in the determinants were found (Fila and Smith, 2006). For boys, subjective norms and perceived behavioral control explained 30 percent of the variance in behavior, while for girls barriers, attitudes, self-efficacy and subjective norms predicted 45 percent of the model. Overall, the most predictive barrier to healthy eating were the availability and taste of foods (Fila and Smith, 2006).

In another study including high school students, the relative importance of personal and social environmental predictors of the consumption of fruit, high-fat snacks and breakfast was investigated (Martens *et al.*, 2005). The study indicated that for all three behaviors, a more positive attitude and subjective norms were associated

with a higher intention to change. More positive self-efficacy expectations were associated with a higher intention to increase fruit intake. A study of 153 high school students in Canada found that the behavioral intention of staying in school for lunch was predicted mainly by the descriptive norm as well as by perceived behavioral control, and to a lesser extent, predicted by attitudes (Beaulieu and Godin, 2011). Descriptive norms refer to the perceived prevalence of a specific behavior in a target population (Sheeran and Orbell, 1999). These findings are in line with the commonly accepted idea that both descriptive norms ‘the norm of is’ and subjective (or injunctive) norms ‘the norm of ought’ play a role in the adoption of a range of different behaviors (Cialdini *et al.*, 1990; Grønhøj and Thøgersen, 2011; Rimal and Real, 2003). Regarding subjective norms, family members have been found to be among the most influential in terms of encouraging adolescents to eat healthily (e.g. Chan *et al.*, 2009; Chan *et al.*, 2011).

Although several studies attest to the powerful influence of parents for influencing offspring’s food preferences and health outcomes (e.g. Birch, 1999; Clark *et al.*, 2007; Patrick and Nicklas, 2005), scholars have argued that the media, particularly television, has an enormous potential influence that may even overshadow family influences (Taylor *et al.*, 2005). For instance, a survey on Australian children indicated that heavier television use and more frequent commercial television viewing were independently associated with more positive attitudes towards junk food, and heavier television use was independently associated with higher reported junk food consumption (Dixon *et al.*, 2007). Previous studies have suggested that peers have a negative influence on healthy eating (Kelly *et al.*, 2006). In a study on adolescents’ perception of their peers’ health norms, healthy

eating was ranked the lowest among various preventive behaviors such as to avoid drugs, cigarettes and heavy drinking (Evans *et al.*, 1995).

Recently, scholars have explored the use of the new media, such as Internet and mobile-phone games, to encourage healthy eating among children and adolescents (e.g. Maon *et al.*, 2011; Pollak, *et al.*, 2010).

The often quite modest (or, even absent, e.g. Fila and Smith, 2006) association between behavioral intentions and healthy eating behavior suggests that other factors than those commonly included in attitude models influence healthy eating behaviors. Fila and Smith (2006) identified a number of different barriers (e.g. taste and availability) usually not accounted for in attitude models, and a focus group study of students, teachers and parents (Power *et al.*, 2010) pointed to other barriers to healthy eating, such as the work schedule of parents, reliance on fast foods, and difficulties in resisting tasty junk foods. Power *et al.* (2010) also found that different moods (e.g. being hungry or bored) affected adolescents' eating choices in an unhealthy direction. Also, the nature of foods available in the physical environment has been identified as having significant influence on the nutritional quality of young people's dietary practices (Taylor *et al.*, 2005).

In sum, the reviewed studies, conducted on children and adolescents in different cultural settings support the idea of using the central constructs of Theory of Planned Behavior for predicting adolescents' behavioral intention towards healthy eating, although they reveal a complex mix of factors influencing healthy and unhealthy eating habits of children and adolescents. This implies that while useful knowledge of the social-psychological antecedents of this behavior in a Danish context is expected, this exploratory study only aims to reveal a small part of the picture.

3. Research objectives

This study attempts to predict the behavioral intention of Danish adolescents for healthy eating by applying the Theory of Planned Behavior. Based on previous research studies as outlined above, since some of the central elements of Theory of Planned Behavior have been shown to predict healthy eating behavior (i.e. perceived behavioral control and normative influence), we expected the Theory of Planned Behavior to constitute a sound theoretical background for the study. Figure 1 depicts the Theory of Planned Behavior. Although this model is general in nature, it illustrates how behavioral intentions to eat healthy are predicted by attitudes toward healthy eating, subjective norms and perceived behavioral control.

[Insert Figure 1 about here]

The following research questions were posed:

1. How are adolescents' behavioral intentions to adopt healthy eating affected by their attitudes towards healthy eating, perceived behavioral control, and subjective norms?
2. What are the influences of sex, age and BMI on the intention to adopt healthy eating?

4. Method

Sampling and data collection

A cluster sample survey was conducted in October 2010. A total of three schools from middle-income areas were selected and one class each in the sampled schools was invited to participate in the study. The questionnaires were self-administered in the classrooms. Altogether 492 questionnaires were distributed and the response rate was good at 83 percent. All aspects of the research procedure were conducted in Danish.

Questionnaire and measurements

The questionnaire was based on a similar study conducted among Hong Kong adolescents (Chan and Tsang, 2011). Information was collected 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 Likert scale (1=never to 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, and avoiding fast foods, chips, candies, and desserts. This description was suggested from a previous study (Wu *et al.*, 2009). The mean score formed the measure of attitude. The Cronbach alpha coefficient was 0.81.

Subjective norms were measured by asking respondents to rate on a 5-point Likert scale (1=strongly agree to 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 authorities think 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. The Cronbach alpha coefficient was 0.80.

Perceived behavioral control was assessed by asking respondents to rate on a 5-point Likert scale three questions about whether they perceived that they have control over healthy eating (1=definitely yes to 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 adapted 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. The Cronbach alpha coefficient was 0.64.

Behavioral intention was measured by asking respondents to rate on a 5-point Likert scale one question: “Will you engage in healthy eating in the coming two weeks?” (1=definitely yes to 5=definitely no). The scores were reversed so that a large number represented higher behavioral intention. The mean score was the measure of the intention for healthy eating.

In order to assess the explanatory power of the Theory of Planned Behavior model and its elements, we carried out a multiple regression analysis with behavioral intention as the dependent variable and the attitudes towards healthy eating, perceived behavioral control and subjective norms as independent variables. The regression was conducted in two steps. Demographic variables were introduced in the first step, followed by the three predictors, attitudes, subjective norms, and perceived behavioral control.

5. Findings

Altogether 410 students in Grade 6 to Grade 10, aged 11 to 16 (mean age 13 years) took part in the survey. The demographic profile is summarized in Table 1. There were roughly equal proportions of males and females, and an almost equal number of respondents in each grade. Eighty-one percent (81%) of the respondents reported to be living in a house, fourteen percent (14%) lived in a rented flat while the remaining five percent (5%) lived in other types of housing. The Body Mass Index (BMI) of respondents ranged from 12.0 to 31.2, with a mean of 18.3. This is comparable to a recent Danish study that reported BMI averages in a similar age group (11-15 year olds) ranging from 17.3 (11 year-old girls) to 20.9 (15 year-old boys) (Sundhedsstyrelsen, 2008).

[Insert Table 1 about here]

Respondents reported they practiced healthy eating regularly (Table 2) and only infrequently engaged in unhealthy eating. Thus, over 60 percent of respondents claimed to eat breakfast, eat at least one portion of fruits and eat at least one portion of vegetables three or more times a week and less than 30 percent of the respondents reported that they eat candies or chips, consume soft-drinks and consume snack late at night, three or more times a week. Consumption of fast foods was uncommon among adolescents; over 95 percent consumed it less than three times a week.

[Insert Table 2 about here]

In Table 3 the attitudes, subjective norms, perceived behavioral control, and behavioral intention relating to healthy eating behavior are summarized. The respondents reported a positive attitude, high subjective norms, high behavioral control and positive behavioral intention. The mean scores for these variables ranged from 3.62 for behavioral intention to 4.22 for behavioral control on the 5-point scale.

All four measures were significantly higher than the mid-point of three (t-values ranged from 11.6 to 30.6, significance level $p < 0.001$). Healthy eating was evaluated by most of the respondents as very beneficial, good, and useful. Healthy eating was also evaluated as rather enjoyable, interesting and desirable. With respect to social norms to engage in healthy eating, these were perceived to stem from personal sources as well as from mediated messages in the mass media. The highest subjective norms for healthy eating came from family members, followed by television programs, and teachers. Friends and classmates were also perceived to have a positive influence with regard to eating healthily, although of the influence agents investigated, friends and classmates scored the lowest and therefore generally would be the least likely to exert this type of influence. Respondents perceived a high level of behavioral control. Thus they perceived that they had the ability to eat healthily, have time, as well as the discipline, to engage in healthy eating. A moderately high score was registered on behavioral intention; among respondents, twenty-two percent (22%) “definitely” intended to eat healthily during the coming two weeks while thirty-nine percent (39%) “mostly” intended to eat healthily during the coming two weeks and one-quarter of the sample was unsure. In addition, eleven percent (11%) “mostly not” and five percent (5%) “definitely not” intended to eat healthily in the coming two weeks.

[Insert Table 3 about here]

Table 4 shows the Pearson correlation matrix between all variables that are used in the prediction of behavioral intention for healthy eating. Among the demographic variables, only gender showed a significant ($p < 0.05$) correlation with behavioral intention. Female respondents had higher behavioral intention for healthy eating than male respondents. A high correlation coefficient of 0.51 was found between behavioral intention and perceived behavioral control. Behavioral intention was also related with

all predicting variables except age and BMI.

[Insert Table 4 about here]

The results of the regression analysis are summarized in Table 5. In the first step of the multiple linear regression with the three demographic variables as predictors, a statistically significant R^2 value of 0.04 was obtained, indicating that four percent of the total variation of the dependent variable of intention could be explained by the demographic variables. Age and BMI were not significant predictors of behavioral intention. However, girls were more likely to be healthy eaters than boys. In the second step of multiple linear regression a statistically significant R^2 value of 0.37 was obtained, when the three TPB variables were added (i.e. attitudes, subjective norms, perceived behavioral control). In total, 37 percent of the total variation of the dependent variable of intention could be explained by the set of six predictors. The increase of 0.33 in R^2 value was significant at 0.001 level.

Among the six predictors, four were significant, namely gender, BMI, attitudes toward healthy eating and perceived behavioral control. Respondents who were female had higher BMIs, more positive attitudes toward healthy eating, and perceived higher control, were more likely to engage in healthy eating in the coming two weeks. The relative importance of gender, BMI, attitudes toward healthy eating and perceived behavioral control were demonstrated by the regression coefficients of 0.09, 0.10, 0.30 and 0.37, respectively.

[Insert Table 5 about here]

6. Discussion

This study has tested a theoretically and empirically acknowledged model for predicting healthy eating intentions of adolescents amongst Danish adolescents. We found that perceived behavioral control and adolescents' own attitudes toward healthy eating had a positive impact on behavioral intention to eat healthily. Thus, the

perceived ease of engaging in healthy eating and having favorable attitudes towards healthy eating were the most important factors in predicting adolescents' intentions for healthy eating. The findings partly confirm previous studies with regard to the importance of personal, favorable attitudes to healthy eating (Chan and Tsang, 2011; Fila and Smith, 2006; Martens *et al.*, 2005) and with regard to the importance of perceived behavioral control (Chan and Tsang, 2011; Beaulieu and Godin, 2011; Fila and Smith, 2006). The adolescents reported that they frequently consume healthy foods, and they perceived healthy eating beneficial, good and useful, but to a lesser extent, enjoyable and interesting.

For adolescents, the social influence for healthy eating could mainly be attributed to family members, television programs, and teachers. Government authorities promoting healthy eating did not appear to play a role in establishing subjective norms for healthy eating among Danish adolescents.

Furthermore, results indicated that girls and those adolescents with higher BMI have a stronger behavioral intention to eat healthily. When other factors were controlled, subjective norms did not contribute to the prediction of behavioral intention of healthy eating, contrasting the findings of similar, recent studies (e.g. Fila and Smith, 2006). Hence, Danish adolescents do not appear to display a strong motivation to comply with their social norms. As a result, peer acceptance appeal may not be a good choice in communicating healthy eating to adolescents.

From a theoretical point of view, the present findings provide empirical evidence of the application of the Theory of Planned Behavior in predicting healthy eating among adolescents in the Danish context. A relative small set of six variables was able to predict 37 percent of the variation of intention for healthy eating, with psychological variables being more important than demographic variables in predicting behavioral intention.

In the current study, family members, television programs and teachers all played an important role in establishing subjective norms for healthy eating. This supports the common finding that family is a very important unit of (dietary) socialization (e.g. Birch, 1999) also when this concerns older children. But it also lends support to the notion that media has a growing role to play in establishing social norms for eating (e.g. Taylor *et al.*, 2005). The lack of perceived influence from public authorities in communicating healthy eating with adolescents among Danish adolescents is consistent with previous findings (Chan *et al.*, 2011). Similar to Beaulieu and Godin's (2011) study, behavioral control was identified as the major factor influencing intentions of healthy eating. Our finding indicates that adolescents perceive a high level of behavioral control. That is, Danish adolescents are generally empowered to engage in healthy eating.

It is interesting to find that television programs exerted a positive social influence on healthy eating among adolescents. Content analysis studies are suggested to identify particular programs and messages on television that encourage adolescents to engage in healthy eating. Previous studies have produced mixed results as regards the significance of teachers for encouraging healthy eating amongst adolescents (Chan *et al.*, 2009; Chan and Tsang, 2011). In this study, teachers played an important role in establishing subjective norms for healthy eating.

Although previous studies have suggested that peer influences discourage healthy eating (e.g. Kelly *et al.*, 2006), the current study found that adolescents perceive social norms from friends and classmates as influencing them to eat healthily. To the extent that this can be taken as evidence that healthy eating has become a socially acceptable behavior among the young generation, this is a piece of good news to educators and policy makers. Adolescents, as found in this study, do not feel social pressures to eat unhealthily.

A low incidence of consumption of fast foods was found. This may be attributed to the higher cost of eating out in Denmark and the different demographics of this study population. This suggests that there is no urgent need to assist adolescents to make healthy choices in the eating-out context. We expect that with increasing allowance and intensity of social interaction, adolescents will more often eat out with friends. Parents, educators, and health professionals should provide advice to older adolescents on the selection of restaurants, dishes, as well as cooking methods that facilitate healthy eating.

Many respondents appreciated the functional value of healthy eating. However, they perceived to a less extent that healthy eating was enjoyable and interesting. There is an urgent need of finding creative ways of associating healthy eating with fun and enjoyment. Thus, further research is needed to explore ways to make an experience of healthy eating more enjoyable.

The positive correlation between BMI and behavioral intention when other predictors are controlled for implies that those who have a more urgent need of healthy eating are more likely to practice healthy eating.

7. Implications for promoting healthy eating to adolescents

Taken together, based on our theoretical outset, the findings of the current study lead us to highlight the following implications when promoting healthy eating to adolescents:

First of all, adolescents' own attitudes towards engaging in healthy eating have direct consequences for their intention to eat healthily. Therefore, efforts to influence these attitudes, for instance through school interventions, hold much relevance. In particular, it is important to reposition healthy eating as fun and interesting because of the 'image problem' this dietary practice holds according to this study.

Furthermore, the study reinforces the role of parents in socializing children *and* adolescents to eat healthily. Therefore, besides targeting health communication to the adolescents themselves, messages could also be framed in a household setting. In addition, there may be a need to make parents more aware of the important role they assume as socialization agents, including for their older children, despite of these adolescents being in a period when they start to claim independence – including in terms of food choice.

Finally, perceived behavioral control was shown to be the strongest predictor of intention for healthy eating. Therefore, when promoting healthy eating to adolescents, an important goal should be to enhance their perceived behavioral control. Thus, communication and intervention strategies should empower adolescents to have the knowledge, ability, and motivation to eat healthily. This can be done by providing education on how to eat healthily, and by providing more hands-on experience, for instance by engaging children and adolescents in cooking experiences that allow them to attain more control of their diet and get experience with a wider variety of food (e.g. Stevenson *et al.*, 2007). Importantly, the social and physical environment must encourage healthy eating by making healthy options widely available and affordable in the settings where adolescents are exercising their independent choices.

8. Limitations of the study

Two limitations to the study should be noted. First, the respondents were recruited through schools which may not have been representative of adolescents in Denmark or elsewhere, thus limiting the generalizability of the findings, even in the Danish context. Second, respondents may have tended to give socially desirable answers to the questions as healthy eating increasingly is put forward as a socially desirable mode of conduct.

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Figure 1 Theoretical model of Theory of Planned Behavior

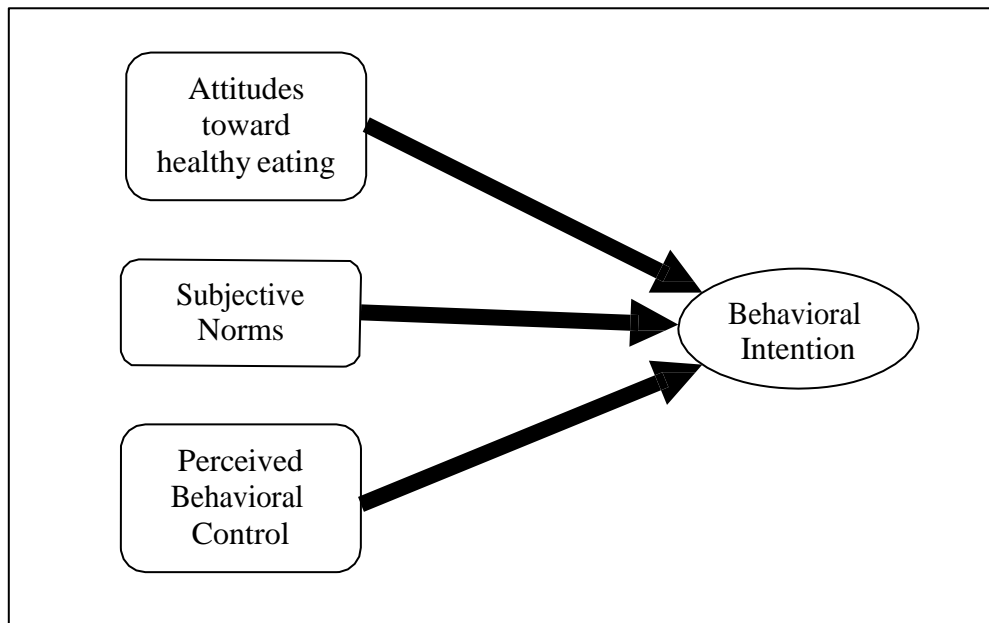


Table 1 Demographic profile of respondents (N=410)

Demographic	No. ^a	Percentage
<i>Sex</i>		
Female	206	52.4
Male	187	47.6
<i>Age (years)</i>		
11	23	5.8
12	120	30.2
13	132	33.2
14	93	23.4
15	28	7.1
16	1	0.3
<i>Grade (level)</i>		
6	127	31.8
7	149	37.2
8	100	25.0
9	23	5.8
10	1	0.2
<i>Housing type</i>		
One family house	316	81.0
Rented apartment	54	13.8
Other	20	5.2
<i>Body Mass Index (BMI)</i>		
BMI less than 14	7	2.0
$14 \leq \text{BMI} < 17$	104	29.2
$17 \leq \text{BMI} < 20$	171	48.0
$20 \leq \text{BMI} < 23$	54	15.2
$23 \leq \text{BMI} < 26$	15	4.2
BMI 26 or above	5	1.4

^aMay not add up to total sample size due to non-response to specific questions

Table 2 Eating habits (N = 410)

	Never Freq. (% ^a)	1-2 days a week Freq. (%)	3-4 days a week Freq. (%)	> 5 days a week Freq. (%)
Eat breakfast	13(3)	32(8)	43(11)	317(78)
Eat at least a portion of fruits	13(3)	69(17)	155(39)	163(41)
Eat at least a portion of vegetables	36(9)	125(31)	127(32)	112(28)
Consume snack at late night	49(12)	243(61)	81(20)	26(7)
Consume candies or chips	27(7)	284(71)	70(18)	17(4)
Consume soft drinks	44(11)	235(59)	84(21)	35(9)
Eat fast foods	166(47)	177(50)	5(2)	5(1)

^a 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 (N = 410)

	Mean^a	SD
Overall attitudes toward healthy eating	3.96	0.62
beneficial	4.35	0.82
useful	4.32	0.72
good	4.29	0.77
enjoyable	3.88	0.80
interesting	3.46	0.88
desirable	3.41	0.83
Overall subjective norms	3.68	0.66
family members	4.14	0.83
TV programs	4.03	0.94
teachers	3.81	1.10
Newspapers and magazines	3.72	0.91
government publicity	3.67	1.06
friends	3.20	0.97
classmates	3.15	0.96
Overall perceived behavioral control	4.22	0.65
Can you try hard?	4.49	0.71
Do you have enough discipline?	4.10	0.87
Do you have enough time?	4.07	0.93
Behavioral intention	3.62	1.07

^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 = 410)

	Sex	Age	BMI	Attitudes towards healthy eating	Subjective norms	Perceived behavioral control	Behavioral intention
Sex (0= M, 1= F)		-0.13*	-0.09	0.26***	0.18***	0.03	0.20***
Age			0.21***	-0.11*	-0.15**	0.07	-0.05
BMI				-0.08	0.08	-0.06	0.02
Attitudes towards healthy eating					0.33***	0.45***	0.54***
Subjective norms						0.16***	0.26***
Perceived behavioral control							0.51***

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

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

*** Correlation is significant at the 0.001 level (2-tailed).

Table 5 Summary of results of multiple linear regression for predicting behavioral intention (N = 410)

variables	Standardized		Standardized	
	coefficient beta	t-value	coefficient beta	t-value
Step 1: Demographics				
Sex (0=M,1=F)	0.20	3.7***	0.09	2.0*
Age	-0.04	-0.8	-0.05	-1.1
BMI	0.05	0.9	0.10	2.3*
Adjusted R square = 0.04**				
Step 2				
Attitudes toward healthy eating			0.30	5.8***
Subjective norms			0.06	1.2
Perceived behavioral control			0.37	7.5***
Increase in adjusted R square = 0.33***				

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