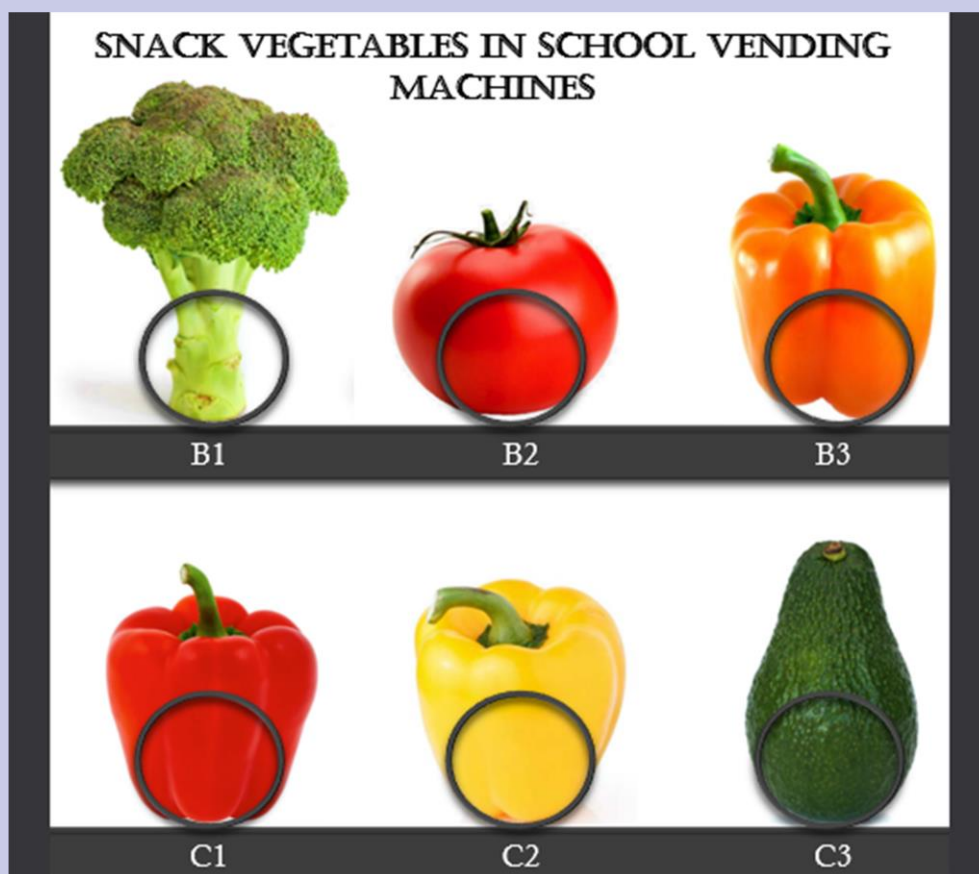


## OBESITY PREVENTION



MASTER THESIS  
KAMILARAKI, VASILIKI



Master Thesis

## OBESITY PREVENTION

---

### **Snack Vegetables in School Vending Machines: An Online Experiment on the Effect of Promotion and Healthier Assortment on Consumer Choice.**

---

*Author:*  
Vasiliki Kamilaraki

*Supervisor:*  
Ellen van Kleef  
*Second reader:*  
Victor Immink

*Student Registration Number:*  
920609417130  
*Course Code:*  
MCB-80436

Marketing and Consumer Behaviour Group  
Wageningen University and Research Centre, Wageningen, the Netherlands  
2018

## Contents

Abstract.....	4
1. Introduction .....	5
2. Theoretical Background and Conceptual Model .....	8
2.1. Introduction on Vending Machines .....	8
2.2. Interventions Focusing on Promoting Healthier Options .....	11
2.2.1. Stickers and Labels .....	12
2.2.2. Posters and other Methods .....	15
2.3. Competitive Assortment Surrounding Snack Vegetables in the Vending Machines .....	17
2.4. Conceptual Model and Hypotheses .....	18
2.4.1. Salience of snack vegetables in the vending machines .....	19
2.4.2. Preference for snack vegetables in the vending machines .....	19
2.4.3. The moderating effect of general liking of displayed vegetables in the vending machine ..	20
2.4.4. Consumer choice intention of snack vegetables from the vending machines .....	21
3. Methodology.....	22
3.1. Design.....	22
3.2. Participants .....	24
3.3. Procedure.....	24
3.4. Measures.....	24
Choice intention for snack vegetables from the vending machine .....	25
3.4.1. Control variables .....	25
4. Results.....	28
4.1. Descriptive information and randomisation check.....	28
4.2. Salience of the snack vegetables in the vending machine.....	30
4.3. Preference for snack vegetable .....	30
4.4. General liking of snack vegetables.....	31
4.5. Snack choice intention for snack vegetables .....	31
4.6. Additional exploratory descriptive .....	33
5. Discussion & Conclusion .....	35
5.1. Discussion.....	35
5.2. Limitations and future research.....	37
5.3. Implications.....	37
6. References .....	39
APPENDICES .....	45
APPENDIX A: Questionnaire instructions.....	45

APPENDIX B: Questions of the questionnaire.....	46
---	----

## Abstract

**Background:** Childhood obesity is one major problems of this era, causing several health problems. Vending machines, as part of the school nutrition environment, provide easy access to students for snack solutions. Snack vegetables are a healthy, low-caloric snack option, but consumption and purchase of vegetables in a school setting is low. In this study, it is examined whether snack vegetables selection can be encouraged by promotion interventions at vending machines to increase the salience of the snack vegetables and changes of the competitive assortment inside the vending machine.

**Methods:** An online administrated between-subjects experimental study was conducted among Dutch high-school and first-year bachelor students (N=202). There were four different conditions in which promotion (presence vs absence) and the competitive assortment size (either 25% or 75% healthy snacks) were manipulated. Participants were randomly assigned to one of the four conditions and they were asked to make a snack choice and answer a number of questions on the evaluation of the snack vegetables assortment, general liking of snack vegetables and vegetable preferences.

**Results:** It was found that there is no significant effect of the competitive healthy assortment and promotion manipulations on snack vegetable selection. Promotion or changing the competitive healthy assortment did not impact the salience of snack vegetables in the vending machine. The level of salience of snack vegetable assortment is proportional to the level of students' preference and choice intention for snack vegetables. Furthermore, general liking of snack vegetables was not a significant predictor of preference for snack vegetables.

**Conclusions:** Overall, this study suggests that promotion signs and higher availability of healthy snacks in the vending machines cannot enhance snack vegetable selection as a snack solution for young adults. Other intervention techniques could be examined in future research to better understand how to increase vegetable intake to adolescents.

**Keywords:** Snack vegetables, vending machines, promotion, assortment size, competitive assortment, salience, preference, snack choice, general liking of snack vegetables

## 1. Introduction

Childhood obesity constitutes to a major public health problem. It affects children and adolescents in many countries of the world. Recent studies have shown that the number of obese children has been increased in the last two decades from 32 to 42 million on a global scale. It is expected that the number of overweight children will be increased dramatically by 2030 (Kelly, Yang, Chen, Reynolds & He, 2008). Obesity is the abnormal or excessive fat accumulation that a person has, related proportionally with the person's height. It is associated with several illnesses such as diabetes, heart diseases, depression, stroke and several types of cancer (Calza, Decarli & Ferraroni, 2008; Berghöfer, Pischon, Reinhold, Apovian, Sharma & Willich, 2008; Rodriguez, Walker-Thurmond & Thun, 2003; Luppino, de Wit, Bouvy, Stijnen, Cuijpers, Penninx & Zitman, 2010).

School, as an aspect of the social environment, is a significant cause of obesity influencing adolescents' eating behaviour (Templeton, Marlette & Panemangalore, 2005). Students spend a lot of hours on a daily basis in school. This results in consuming around 35% to 40% of their total daily energy through basic meals such as breakfast and lunch, covering their needs for snacks (Briefel, Wilson & Gleason, 2009). Healthy food habits can be enhanced through a healthy nutrition environment. The availability and accessibility on food options that are included in the school nutrition environment affect and influence students' eating habits. By providing more available healthy food options, consumers can make a choice between different items satisfying their need for variety (Chernev, 2012). "Easy choices" are the most preferred to individuals due to the fact that they do not have to put effort to reach them (Dinner, Johnson, Goldstein & Liu, 2011). Therefore, by providing easy access to healthy food choices, consumers can reach them easily, making these choices the preferred ones (Byrd-Bredbenner, Johnson, Quick, Walsh, Greene, Hoerr, ... & Horaček, 2012). Unfortunately, the majority of these food options on snacks and meals are foods high in sugar, fat and calories (Harnack, Snyder, Story, Holliday, Lytle & Neumark-Sztainer, 2000; Wechsler, Brenner, Kuester & Miller, 2001; Wildey, Pampalona, Pelletier, Zive, Elder & Sallis, 2000). The presence of less healthy food or even fast food influences students' buying behaviour and consumption, leading to an unhealthy diet.

One of the contributors to this unhealthy diet is the vending machine. Vending machines are located into schools in order to provide snack solutions to the students. Snacks are defined as small amounts of food intake between the main meal times contributing to energy and calorie intake (Chaplin & Smith, 2011). Unfortunately, the majority of vending machines includes less-healthy snack options resulting to the creation of a more convenient environment for children to purchase high-calorie and low-nutrient foods (New & Livingstone, 2003; Templeton et al., 2005; Wiecha, Finkelstein, Troped, Fragala & Peterson, 2006). Several studies have confirmed that children tend to buy low-nutrient snacks from vending machines (Neumark-Sztainer, 2001; Kubik, Lytle, Hannan, Perry & Story, 2003; Berkey, Rockett, Field, Gillman & Colditz, 2004; Wiecha et al., 2006).

Recent studies have focused on adolescence and the significant role in shaping the nutritional consciousness of the individual. More specific, adolescence constitutes a crucial focal point for shaping individuals' eating behaviours. During puberty, eating habits and healthy behaviours change and tend to move to the consumption of high-energy foods which are characterized by high-fat level and low content in nutrients (Physicians Committee for Responsible Medicine, 2001; Birch, 1999). The intake of high amounts of sugar and fat usually comes from the consumption of fast or processed food, increasing the body weight and leading to several health problems (Nestle, 2013; Neumark-Sztainer, 2001).

The importance of fruit and vegetable consumption, in terms of the school environment, is becoming more important since the increase of children with obesity or other health problems. The adaptation of a healthier lifestyle including the fruit and vegetable consumption is recommended and promoted officially in many countries by nutritional experts (Huang, Kempf, Strother, Lee, Harris & Kaur, 2004). However, it is noticed that in Western countries, including the Netherlands, children do not take them into consideration. For instance, in Denmark, the

vegetables intake adolescents eat, on average, 84 grams of vegetables on daily basis (Yngve, Wolf, Poortvliet, ... & Perez-Rodrigo, 2005) instead of 300 grams that is the recommended amount. Children maintain a low level of fruits and vegetables intake (Tak, Velde, Singh & Brug, 2010; Yngve et al., 2005). The study of Diversi (2013) found that, although many adolescents are aware of the benefits of fruit and vegetable consumption, they continue to purchase and consume less healthy foods (Diversi, 2013).

A healthier nutrition environment, especially in schools, has been the main point of interest of several studies. These studies aimed to understand the environmental factors that can influence pupils' food choices. In the previous years, ten studies were carried out that focused on the promotion of healthy food options that are sold at schools. Eight of them focused on the impact of vending machines on purchase behaviour (Tak et al., 2010; Gebauer & Laska, 2011; Davee et al., 2005; Callaghan, Mandich & He, 2010; Fiske & Cullen, 2004; French et al., 2003; Park, Sappenfield, Huang, Sherry & Bensyl, 2010; Suarez-Balcazar, Redmond, Kouba, Hellwig, Davis, Martinez & Jones, 2007; Hua & Ickovics, 2016; Kocken, Eeuwijk, van Kesteren, Dusseldorp, Buijs, Bassa-Dafesh & Snel, 2012). Although results are mixed, promotion is generally considered as an important strategy to create awareness of healthier options.

The concept of nudging has started to be applied in order to enhance a healthier lifestyle in terms of food choices. Nudging aims to make more appealing and attractive the beneficial characteristics of the products to consumers' eyes (Van Kleef & van Trijp, 2018; Hanks, Just, Smith & Wansink, 2012). It does not "push" consumers to specific product choices, but it turns them gently to healthier food choices allowing them to maintain their liberty of choice. One way to nudge people towards healthier options is to make the healthy options look more normal and attractive to their perception. Traditionally, the assortment of a vending machines consists primarily of unhealthy, energy dense snacks and drinks. As a consequence, the few included healthier products (e.g. fruits and vegetables) are the exception and may be seen as less normal. There is initial evidence that the assortments structure of snacks has an impact on consumers' decision-making process. For instance, in a study of van Kleef, Otten and van Trijp (2012), the availability of the healthy items was manipulated, by altering the assortment structure which offered either 75% or 25% healthy snacks versus unhealthy snack options at a checkout corner. The results showed that sales of healthier snacks were higher when the assortment structure consisted of 75% healthy snack items.

The present study examines student perception, preference and choice intention of snack vegetables that are sold through vending machines. Two factors will be studied. First, I study how assortment structure (competitive assortment around the vegetable snacks includes either 75% or 25% healthy snacks) affects individual's decision-making process. We expect that customers are more likely to purchase vegetable snacks when the majority of other snack options are also healthy, creating less distinction between snack assortments. Second, I study whether promotion of vegetable snacks in vending machines will lead to higher purchase intentions and preference, as well as better perception of the snack vegetable assortment. Promotion interventions aim to inform pupils about the snack vegetable assortment and to increase their salience. No research to date has been found until the current moment which combines both promotion interventions and changes on the size of the competitive healthy assortment to enhance snack vegetable choice.

Hence, the research questions of this study are:

- *Does promoting the snack vegetable assortment that is sold through vending machines influence (a) consumer choice intentions and (b) consumer perception about snack vegetables?*
- *Does changing the competitive vending assortment around vegetables that are sold through the vending machines (either 75% or 25% of healthy alternatives), influence (a) consumer choice intention and (b) consumer perception about snack vegetables?*

For this research, an online administered experiment was developed in order to manipulate the different promotion interventions and the changes on competitive assortment in a between-

subjects design. An online questionnaire was created in order to assess consumer perception about the snack vegetables and estimate the level of salience of the snack vegetable assortment. Pictures of vending machines were created to simulate real life vending machines. A conceptual framework is presented accordingly to formulate hypotheses. The contribution of this study is to improve students' dietary habits by offering snack vegetables that are sold through vending machines.

## 2. Theoretical Background and Conceptual Model

This chapter starts with an introduction on the vending machines and on the relevant manipulations that have been examined in terms of the creation of a healthier vending environment. Promotion techniques are described in detail as well as changes on assortment structure and size. Afterwards, the effects of these two factors on consumer choice intention are explained. A conceptual model is provided at the end of the chapter in order to give an overview about the variables that are tested illustrating a number of hypotheses.

### 2.1. Introduction on Vending Machines

Vending machines constitute an omnipresent part of the current food industry in many developed and developing countries. They have been designed to sell products to consumers, mainly food, snack and drink options, increasing the revenues for the businesses in several locations. Food, snack and beverage vending machines (are known also as *vendors*) are located in places where it has been recognised that consumers have needs of energy intake. Significant advantage of the invention and the implication of vending machines is the fact that consumers acquire access to the food products making purchases at times that are more convenient for them. In addition, vending machine services are in an advantageous position due to the fact that there is no need for an attendant on daily basis such as in the regular retail shops. The absence of work force during working hours of the vending machines contributes to the reduction of retailer's expenses (Walker, Tedesco, van Luchene & Bemer, 2007).

The first establishment of vending machines in the marketplace used to include snack and beverage options, which were extremely ultra-processed. These options were characterised as highly contained food choices in sugar, fat and salt and low in nutrients such as chocolate bars, chips, candies and energy drinks contributing to the increase of obesity (French et al., 2003; Fairburn & Brownell, 2005; Templeton et al., 2005; Wiecha et al., 2006; Byrd-Bredbenner et al., 2012). Therefore, consumers had the chance to make a choice across different unhealthy items when there was the need for a snack.

The popularity of the vending machines has increased with the passage of the time. More vending machines placed on public locations affecting consumers' eating habits. For this reason, the vending machine industry started to introduce healthier snack options in the already existing unhealthy vending environment since the beginning of 21st century. The idea of healthy available options in the vendors aims to the improve the quality of individuals' eating habits and to face the major health problem of obesity. A mix of both healthy and less-healthy items, drinks and snacks, are available, such as candy bars, chips, crackers, cookies, nuts, granola bars, fruit juice (100% natural or with added sugar), soft drinks, diet soft drinks, energy drinks, water and ice tea (Byrd-Bredbenner et al., 2012; Park et al., 2010).

At the present time, sixteen studies have been designed which focused on the impact that vending machines have on pupils' dietary behaviour and eating habits. The high availability of unhealthy options in the vending machines, the influence of strong competitive brands and the school environmental practices and policies constitute parameters of the pupils' food choices. Three studies have been carried out on universities campus and more specific at Yale University in United States, at University of Texas and at Ohio State University examining the relation between accessibility of vending machines and consumption, or promotion on healthy products and number of purchases. Three more studies focused on healthcare facilities measuring whether consumers choose healthy items across other snack options from the vending machines. Healthy intervention on worksites and public garages have been studied as well in order to see individuals' reaction and correspondence on healthier items. The following paragraphs describe,

in detail, the studies that have been made on healthy snacking in the vending machine environment.

A significant representative review study of Hua and Ickovics (2016) gave an overview about the important factors that influence healthy items purchases that are sold through vending machines. This review paper consists of ten studies, from which eight of them include several interventions and the other two, are case studies. All of them, examine whether the creation of a healthier vending machine environment can be succeeded in several locations and what are the factors that contribute to the reinforcement and maintenance of this environment. According to these ten studies, seven of them had positive results in terms of the number of healthy item purchased and at the same time decreasing the less healthy item purchases and three of them did not achieved the desired outcomes, maintaining the sales of unhealthy items even after the implication of interventions for promoting the healthy assortment. All the studies that are presented in this review paper include interventions which manipulate the number of available healthy products (snacks or beverages) that are sold through the vendors, reduction on the price of healthy items and promotion signals in order to attract more consumers to the healthy options and by extension to make them adapt a healthier lifestyle. As a result, Hua and Ickovics (2016) concluded that healthier item purchases are possible when there is higher availability of healthier items compared to unhealthy, in combination with price reduction and messages that promote healthiness.

The factors of product availability, price reduction and promotion techniques are the main topic of interest of two intervention studies which were held really close chronically in the previous decades by French and colleagues in 1997 and 2001. The first study (French, Jeffery, Story, Hannan & Snyder, 1997) was focusing on the impact of price on low-fat snack purchases that are sold through vending machines in a University campus. It constitutes a 10-week study including nine snack vending machines in which the number of the low-fat snack items and the proportion of low-fat snack sales were counted during three different periods (baseline, low-price intervention and post-intervention). A decrease of the price by 50% on low-fat items in combination with promotional signs (stickers) which indicated the low in fat content were expected the increase of the sales. There was no promotion on the reduced prices. The results showed that there was a slight increase of 22.8% to 45.8% on the number of low-fat snack items. The next study of French, Jeffery, Story, Breitlow, Baxter, Hannan & Snyder (2001), the Chips Study, has dealt with environmental nutrition interventions on low-fat snack purchases that are sold through vendors in schools and worksites. Product availability, price levels and promotional marketing are manipulated again and resulting that the highest price reduction and the embodiment of label of low-fat items, the more sales of low-fat snacks. Promotional signs were manipulated as an additional idea of marketing, however, there were not so successful as it was expected.

After almost ten years since the two previous studies, French, Hannan, Harnack, Mitchell, Toomey & Gerlach (2010) examined again the determinants of availability, price and promotion on healthy items in an 18-month period intervention study in Minneapolis. More specific, they made interventions which included an increase of 50% on the number of healthy items that are sold in the vending machines located at four bus garages, at least 10% price reduction on healthy items and improvements on fitness room facilities in order to increase the challenges for healthier habits. After the intervention period, the number of sales on healthy items was higher from 10% to 42% when there were 50% more available healthy snacks and on average 30% discount on prices.

A more recent intervention study has developed by Hua, Kimmel, van Emmenes, Taherian, Remer, Millman & Ickovics (2017) examining whether the concept of item availability on healthy snacks that are sold via vending machines, the reduction of the prices for these and promotional signs on the vendors can affect consumers choice. More specific, a randomized factorial trial has created which include in total fifty-six snack and beverage vendors (twenty-eight with snacks and twenty-eight with beverages) in eight different conditions manipulating the changes on availability of items related to the product guidelines and/or 25% price reduction on healthy snacks and/or signals that promote the healthy snacks in the vending machines. This intervention

study was held on a University campus for a 5-month period counting the revenues and sales and compared with the outcomes from the same period on previous year. Based on the results, there was significant increase in revenue and items that were sold when there were available healthy snacks and promotion signals.

The creation of a healthier nutrition environment in public schools and universities was the main point of interest in several studies. Manipulations on availability and accessibility of healthier assortments in the vending machines have become in order to estimate consumers' buying behaviour and to make healthier choices more interesting to buying audience. In terms of a project in Maine, Davee and colleagues (2005) developed an experimental study which is associated with the creation of healthier school environment through vendors by increasing the number of the healthy items both in vendors and a la carte. Specifically, they increased the availability of healthy choices in the vendors by replacing the already existing unhealthy assortments with the low in fat and sugar options, and by excluding in general snacks that have different nutrition content than the low in sugar and fat snacks. In addition, guidelines developed in order to make nutrition changes on vending assortments based on recommendations of public health and nutrition organisations for the maximum portion sizes in each category and on the nutrition criteria for saturated fat. This research took place in total 7 high schools in Maine including 581 students. According to the results, vending machine changes were easily accepted by the students compared to the a la carte changes encouraging the changes for a healthier school nutrition environment.

Another useful pilot project in four high schools in Ontario (Callaghan, Mandich & He, 2010), focused as well in the improvement of nutrition school environment by providing healthier vending snacks. Students perception about the healthier vending environment was measured in terms of variety, availability, product placement, price and taste preference. Based on the results, students were excited with this idea, however, the purchases and vending machine revenues decreased. Price was the first important reason that students focused on and it is the cause for the low number of purchases, followed by limited variety and availability on the healthy items.

An interesting study constitutes the cross-sectional study of Caruso, Klein and Kaye (2014), which evaluates consumers' vending purchases on campus in Ohio. An attempt is also made to understand the reasons, causes and motivations of consumers' buying behaviour and their purchase frequency after implementation of healthier vending policy by promoting access to healthier snack choices. The vending assortments are separated in three different colour-based categories, red (unhealthy), yellow (moderately healthy) and green (healthier). A 2-week survey developed for the accomplishment of this purpose including 356 participants and measuring consumer choices on vending machines, the reasons of these choices such as hunger, convenience, cost and taste, and the frequency of these purchases on weekly and monthly range. The outcomes showed that red assortment was the most preferred to purchase, even after the intervention, with 59%, followed by yellow and green assortment with 27% and 8%, respectively. Distinction between the two genders was also observed, with females switched their eating habits to healthier snack options while at the same time males were not influenced by the vending changes. Hunger and convenience were the key factors for consumers' snack choices and the 1-3 times per week was the most frequent response of the vending purchase frequency, followed by 2 times per month.

As a conclusion of all the studies that are mentioned above, it has been noticed that availability, reduction of the prices and promotion are the factors that affect consumers' choices on healthy snack items that are sold through the vending machines. Most of the studies made interventions manipulating the combination of these factors (availability of healthy items, price reduction and promotion on healthy items) and not each factor separately. For instance, they increased the available healthy snacks by decreasing the number of unhealthy snacks in the vendors and at the same time, they decreased the prices on healthy snacks and put promotional signs on them. Price seems to be the determinant with the biggest impact consumers' snack decisions. However, price reduction itself cannot lead to higher sales. It is more effective when it is combined with higher availability and promotion signals. The same applies for the other two

factors. More available healthy choices or promotion techniques on the items in the vending machines cannot guarantee higher purchases.

## **2.2. Interventions Focusing on Promoting Healthier Options**

Promotion interventions in vending machines constitute a way that product manufacturers and retailers apply to encourage healthy snacking and by extension to increase the number of the sales of the healthy snack items. Promotional techniques have been applied from time to time through different sets of activities in order to link product characteristics with consumer needs and wants. These activities include a range of information about the product that addressed to several target groups of consumers.

Product advertisement is considered as a form of marketing communication which is used in order to influence consumer decisions in terms of product choices (Hills & Hultman, 2006). Several studies have focused on the importance of advertising and the significant influence on children's food choices (Probart, McDonnell, Baley-Davis & Weirich, 2006; Livingstone & Helsper, 2006; Lobstein & Dobb, 2005). Audio-visual messages are characterised as advertisement aspects which stimulate consumers' opinion creating either liking or disliking perception. Images, videos, texts, sounds are usually considered as audio-visual messages. They are characterised by a number of cues which become conceivable from the individual through the sensory receptors and are stored automatically the information of the visual field in the memory (Ryu, Lim, Tan & Han, 2007). Kamps, Tiggemann and Hollitt (2014) found that food advertisements through television commercials trigger viewers' desire for food consumption.

In terms of vending machines, consumers are influenced from several features and based on them, they make food choices. The colour, the sound, the light of the vending machines constitutes elements which can stimulate sensations (Areni & Kim, 1994; North, Hargreaves & McKendrick, 1999). According to the Vrechopoulos and Siomkos (2002), colour, music and lighting are physical internal elements that characterize a vending machine and they are known as atmospheric characteristics of the vending machine. By manipulating some of these atmospheric elements and by changing the internal environmental cues of the vending machine, consumer perception is affected in terms of the product decision. Stöckli, Stämpfli, Messner & Brunner (2016) also found that environmental cues influence consumers decision making process in terms of the product choice at vending machines.

Product exposure is another technique of promotion in order to link consumers with products. With exposure, products or product features are presented to consumers by stimulating their perception (Wardle, Herrera, Cooke & Gibson, 2003; Tak et al., 2010). Changes on product placement (usually on the shelf) and location (for instance, close to the checkout corner) can reinforce product exposure contributing to the better product perception by consumers and on item purchases. For instance, an effective way to promote a product is to put it on the consumer eye level in the shelf and to put the product assortment on a location that it will be obvious by consumers (van Kleef, Otten & van Trijp, 2012). According to the healthy snack products that are sold via the vending machines, the most common techniques for exposure include promotional signs on the vending machines (such as fancy stickers or banners) and/or on the snack items (such as colourful labels) focusing either on the product or on the vending machine exposure.

### 2.2.1. Stickers and Labels

Stickers constitute one of the most common ways to promote snack items that are sold through the vendors. It has been examined by several researchers or research teams in order to attract more consumers to healthier snack and food choices. Table 1 presents in detail the relevant studies with description on the interventions and the factors that are manipulated.

A recent factorial research of Hua et al., (2017) examined the impact of stickers on vending machines. More specific, Hua and colleagues applied one, two or three stickers based on the intervention condition. In terms of the price reduction, the promotion signals were presented as “Price Change, 25% Less, Snack Prices Reduced” and in terms of snack guidelines the sticker on the vendors illustrated “FitPick Snacks inside: calories  $\leq 250$ , saturated fat  $\leq 3$  g, sugar  $\leq 20$  g, sodium  $\leq 230$  mg” and in the case of the combination of them, price reduction and product guidelines, the sticker was “Price Change, 25% Less, Marked Snack Prices Reduced”. Regarding to the beverage vending machine, the stickers were referred to the lower prices and healthfulness with fewer words such as “1\$ Water” and “Rethink your drink”. It is important to be mentioned that the promotion techniques in this study had positive outcomes only when interventions were combined with the product guidelines enhancing consumers choices on healthier products.

The application of stickers on the healthier snack items has been studied, at first point, in the intervention study of French and colleagues (1997). A glowing orange price label located at the bottom of the package of each item in order to make the identification of the low-fat snack items. Moreover, a 5-by-7-inch shining orange sign putted on the panel glass of the vendors in order to enhance the level of attractiveness pointing out that the products with the orange label have maximum 3 grams of fat per item. Additionally, stickers with colour indicated the level of healthiness of each item. Green-coloured stickers were mentioned to the healthier choices, yellow-coloured stickers for the moderately healthy options and red-coloured stickers for the unhealthy items (Brown, Flint & Fuqua, 2014). Both promotion interventions were successful increasing the number of the sales on low-fat snacks and consumers preference on healthier snack options (almost 50%) and decreasing the purchases of unhealthy or moderately healthy products (4.84% and 15.21%, respectively).

Similar technique with colour-coded identification on vending assortments is used in a case study which built in 2014 in three Delaware state agency buildings (Lessard, Poland & Trotter, 2014). The purpose of this study was the assessment of employee buying behaviour by providing access on healthier snack and beverage options. After taste-tests on the several healthier options by employees, the most preferred items were collected and placed in the vendors in proportion 75% of healthy and moderately healthy, and maximum 25% of unhealthy snack and beverage assortments. Nutrition guidelines were characterizing the vending assortments. More specific, “Go” for healthy, “Slow” for moderately healthy and “Whoa” for unhealthy items. To encourage vending purchases, promotional signage (special symbols) marked the items and put around the vending machines and in order to inform employees about the changes of vending assortments, they shared the information sending emails to employees and put announcement to the relevant newspaper. The results were not so positive despite all the changes and the revenues were low. The “slow” items were the most preferred assortment compared to the other two with a small increase on the proportion of purchases in some locations.

Stickers were the main promotion technique on healthy vending snack and beverage items in the recent intervention study of Pharis, Colby, Wagner & Mallya (2018). The assessment of promotion interventions on the healthy items in the vending machines contributed to the improvement of vending standards in order to create a healthy nutrition environment. More specific, the combination of slogan (“Here’s to your health”) on the vending machines as well as green stickers or green-coloured prongs aimed to make healthy snack items more obvious making consumers purchase them. Instead of the stickers, energy labelling was used for the promotion of healthy drinks in the vending machines. A sample of 250 vending machines were measured in terms of number of purchased items in the City of Philadelphia for a four-years period. Regarding to the results, consumer purchases of healthy items were increased after the promotion interventions for both snack and beverages. It is important to noticed that healthy

beverage purchases were significantly higher than snack purchases. As a conclusion, they found that promotional signs on the vending machines and the application of stickers/labels had a positive effect on consumers purchase behaviour.

The intervention of adopting “healthier” labels on snack items constitutes an ordinary promotion technique combined with the presence of promotional signs which are usually mentioned to price offers, price reductions, nutritional values and product size. Labels on healthy snack items have been examined in two intervention studies (French et al., 2001; Dingman, Schulz, Wyrick, Bibeau & Gupta, 2015; Callaghan, Mandich & He, 2010). The adaptation of labels that are present the high level of healthiness of the items such as “low-fat snacks”, “Better Choice” or “Healthier Choice” contributes to identify the nutrition information of the proposed healthy snacks to the consumers. However, not all of these interventions were successful in order to attract more consumers, based on the number of the sales which remained to be in the same level even after the changes.

Friske and Cullen (2014) examined the impact of promotion intervention by providing low-fat snack solution that are sold via vending machines. In this intervention study, Friske and Kullen applied promotion interventions not only on the low-fat items but also on the vending machines. More detailed, two interventions were included either with the addition of yellow price labels and or with the addition of yellow price labels in combination with promotional signs on the top of vending machines. In both cases, yellow signs are placed and decorate the front glass of the vending machines. A small increase on the healthy (low-fat) snack purchases has noticed across the two interventions and greater efficiency observed at the combination of labels and promotional signs.

Table 1. Description of studies (methods-results) which applied stickers and labels on vending machines enhancing healthy consumption.

Study	Study Purpose	Study Design	Time Frame /Duration	Location - Country	Sample Size	Manipulations on promotion effect	Relevant Findings on promotion effects
<b>Stickers</b>							
French, S. A., Jeffery, R. W., Story, M., Hannan, P., & Snyder, M. P., 1997	Examine the impact of price on purchases of low-fat snacks sold through vending machines	Intervention study: 50% price reduction, implementation of low-fat stickers on items	10 weeks	University campus	9 snack vending machines	Glowing orange labels at the bottom of each package, 5-by-7-inch glowing orange sign on vending machine panel glass	Higher sales on low-fat snacks after the price reductions and implementation of stickers
Hua, S. V., Kimmel, L., Van Emmenes, M., Taherian, R., Remer, G., Millman, A., & Ickovics, J. R., 2017	Examine the impact of availability, price reduction and promotional signs of healthier items on sales and revenue of snack and beverage vending machines	Intervention study: Implication of 25% price reduction, higher availability, product guidelines on healthy items and use of stickers on them	February to June 2015 /5-month intervention	University campus	56 vending machines (28 with snacks and 28 with beverage)	Stickers on the vending machines	Higher revenues when there are promotional signs and available healthy choices
Brown, M. V., Flint, M., & Fuqua, J., 2014	Examine the effects of nutrition information on vending machine purchases	Intervention study: Identification of product healthiness with colour-coded stickers	Fall 2011 / 4 weeks	University campus	5 vending machines	Implication of colour-coded stickers on items. Colours: Red (unhealthy), yellow (moderately healthy), green (healthier)	Higher sales by 50.76% on healthier items (green), lower sales by 4.84% on unhealthy items (red), lower sales by 15.21% on moderately healthy items (yellow)
Pharis, M. L., Colby, L., Wagner, A., & Mallya, G., 2018	Examine the ratio of sales of healthy and unhealthy items and evaluate the sales of snacks and beverages before, during and after the policy interventions	Intervention study: two-third of products meet healthy nutrition standards, portion size of sweet beverages decreased	4 years (2010-2013)	City of Philadelphia, USA	250 vending machines	Slogan on vending machines ("Here's to your health") promoting the healthy snack items and green stickers/green-coloured prongs	Higher sales on healthy snacks after promotion interventions
<b>Labels</b>							
Lessard, L., Poland, M., & Trotter, M., 2014	Estimation of consumers' purchasing responses to an increased proportion of healthier vending machine products	Intervention study: Providing 75% of healthy items in the vending machines and three nutrition guidelines ("Go", "Slow", "Whoa")	October 2011 to April 2012 - 28 weeks	3 state agency buildings - Delaware	9 vending machines	Product guidelines on healthy ("Go"), moderately healthy ("Slow") and unhealthy ("Whoa")	The sales varied in different locations. The combination of healthy item availability and product guidelines was effective only for moderately healthy assortment ("Slow") which was the most preferred
French, S. A., Jeffery, R. W., Story, M., Breitlow, K. K., Baxter, J. S., Hannan, P., & Snyder, M. P., 2001	Examine the impact of environmental interventions on food choices among adolescents and adults	Intervention study: Low-fat snack included in vending machines in 4 different price levels and 3 promotional conditions	12-month intervention	Secondary schools (12) and worksites (12) - Minneapolis	55 vending machines	Three promotional conditions: Low-fat label, low-fat label plus promotional signage, none	Price reductions (10%, 25%, 50%) contributed to higher sales (9%, 39%, 93% respectively). Promotion interventions weakly contributed to higher sales
Dingman, D. A., Schulz, M. R., Wyrick, D. L., Bibeau, D. L., & Gupta, S. N., 2015	Examine the effect of providing nutrition information and designation on healthy items sold in vending machines	Intervention study: Nutrient information placed next to the vendors and labels on the healthy items	16 weeks	University campus - southeast United States	18 vending machines - 3850 students	Promotion interventions such as nutrition information, interpretative signage and promotional email to residents	Nutrition information on items and promotion signals ("Better Choice ") did not increase the sales of healthy items
Fiske & Cullen, 2004	Examine the impact of environmental promotion intervention making available low-fat vending items	Intervention study: More available low-fat items and 2 promotion levels. Labels (intervention I), labels +signs (Intervention II)	6 weeks	Elementary and middle school	10 snack vending machines	Labels with yellow price strips on the price sticker of each low-fat item and small yellow sign on the front glass of vending machine (Intervention I), signs on the top of vending machines (Intervention II)	Labels plus signs (Intervention II) were more effective on consumer choices increasing slightly the sales
Callaghan, C., Mandich, G., & He, M., 2010	Creation of healthier school vending machine environment by increasing the availability of healthy snacks	Intervention study: creation of a healthier vending machine environment at 50:50 ratio of healthy-unhealthy items	February to May 2007	Secondary schools - Ontario, Middlesex-London, Elgin, Oxford	No information	Promotional materials and information on the package of each healthy item such as "Healthier Choice"	Promotion interventions ("Healthier choice") did not increase the healthy item purchases

### **2.2.2. Posters and other Methods**

Posters have been created in favour of promotion marketing practices in order to exposure products or product assortments in order to stimulate and affect consumers choices. Sometimes, the creation of a healthier nutrition environment through filling the vending assortments with healthy snack options is not enough to encourage consumers to buy them. Posters contribute to the involvement of environmental cues that consumers are exposed on, affecting their decisions and choices (Bargh, 2006). According to an intervention study of Stöckli and colleagues (2016) has found that posters which present healthiness, skinny sculptures or skinny body figures can remind to consumers to make healthier food decision and by extension increase the healthy item purchases. It has been also concluded that even there are available healthy snack choices but no poster intervention or poster which illustrates pleasure consumption, consumers are not sensitized, and the sales do not show any increase.

Creative, innovative and more complex ideas have been applied in favour of promotion on healthy snacks that are sold in vending machines. In the case of Hua and Ickovics (2016), a stoplight system was used, as a way of promotional sign, which indicate the healthfulness of the products reminding to consumers the beneficial attributes and consequences about the healthy choices. This promotional technique was effective because in combination with the price reduction and the higher availability of healthy items, increased the number of sales and revenues of healthy foods in vending machines. Another example of promotion on healthy snacks was the experimental study of Davee and colleagues (2014), which focused on the creation of a healthier environment, examined the possibility of replacing the unhealthy options on school vending machines with items low in sugar and fat. In order to make more obvious these changes, a banner and tasty-testing of healthy snack items tried to encourage fruit and vegetable consumption and in combination with a visual demonstration which presents the amounts of sugar and fat in food options. Table 2 illustrates all information about the relevant studies.

Table 2. Description of studies (methods-results) which applied posters and other methods as promotion interventions on vending machines enhancing healthy consumption.

Study	Study Purpose	Study Design	Time Frame /Duration	Location - Country	Sample Size	Manipulations on promotion effect	Relevant Findings on promotion effects
<b>Posters</b>							
Stöckli, S., Stämpfli, A. E., Messner, C., & Brunner, T. A., 2016	Examine the influence of environmental cues on consumption choice (healthy vs unhealthy)	Intervention study: Two field experiments focusing on presence of 3 different posters and consumers' stimulation in terms of healthy choices	28 April to 25 May, 2014	European University of Applied Sciences	30 individuals	Health-evoking nature poster, pleasure-evoking fun poster, poster with skinny Giacometti sculptures	Health-related images contributed to higher sales instead of pleasure-related images
<b>Stoplight system</b>							
Hua, S. V., & Ickovics, J. R., 2016	Description and identification of the most effective promotion interventions for healthier vending purchases	Review Article: Lower prices, higher availability of healthy snacks, vending machine advertisement, implementation of promotional signals	1994 to 2015	Secondary schools, college or university campus, worksite, other (parks and state buildings) - United States	10 articles	Stoplight system on vending machines	Stoplight system in combination with price reduction and availability on healthy items were effective for sales
<b>Other</b>							
Davee, A. M., Blum, J. E. W., Devore, R. L., Beaudoin, C. M., Kaley, L. A., Leiter, J. L., & Wigand, D. A., 2005	Improve the nutrition environment by making available healthier snacks and beverages in vending machines and a la carte programs	Intervention study: Replacement of unhealthy items in vending machines with low in fat and sugar snacks, based on healthy product guidelines	Spring semester of 2004	Public high schools – Maine	7 public high schools, 581 students	Taste-testing of healthy items, banners that encourage fruit and vegetable consumption, visual demonstration of the accumulated fat and sugar in food	The available healthy snacks in combination with promotion interventions have positive results on students' snack decisions

### **2.3. Competitive Assortment Surrounding Snack Vegetables in the Vending Machines**

Consumers make product choices based on both their needs and the product options that are available. During the decision-making process, consumers make comparisons across different product assortments and across different items within assortments in order to find the choice that can satisfy them the most. Product selection is triggered by consumers' overall perception about the assortment variety which is influenced by the assortment size and assortment structure (Chernev, 2012).

Assortment size is referred to the number of items that are included in single assortment. These items can be either similar or dissimilar within the assortment. Large assortments tend to be perceived as assortments with greater variety than small assortments (Van Herpen & Pieters, 2002). For instance, by enlarging the size of a healthy assortment in the vending machines, more available healthy snack options are provided to consumers, raising their expectations. This is due to the fact that consumers can satisfy their need for variety as long as there are several available options and at the same time they maintain the feeling of freedom in their choices (Brehm, 1972). Therefore, in case that the competitive assortment is larger, then it is automatically more attractive to consumers.

In the study of Sela, Berger and Liu (2008), the influence of assortment size was examined in terms of the impact on consumers decisions. It supported that consumers' choices vary between vice or virtue and the assortment size influences their option choices. Regarding the results, large-sized assortments are more attractive to consumer than small-sized assortments because of the perceived variety. However, the more the assortment size increases, the more difficult the option choice is. In this point, it is important to mention that the type of product choice is not dependent on the assortment size but on the justification of item choice (hedonic or utilitarian choice).

On the other hand, assortment structure refers to the degree of organisation of items within the assortment (Chernev, 2012). For instance, snack vegetables seem more as normal snack options in the vending machine when they are part of a larger healthy assortment with more available healthy options. This is because the distinction between snack vegetables and healthy snack products is less than the distinction between snack vegetables and unhealthy snack products. The degree of distinctiveness of snack options describes the differences between individual items on attribute-level (Van Herpen & Pieters, 2002; Van Herpen & Pieters, 2007). The more available healthy snack options are added in the vending machine, the larger assortment size of the healthy snack choices. Therefore, consumers have greater perceived variety (Chernev, 2012) about the healthy vending options and may be more likely to choose one of these options. The intervention study of van Kleef, Otten and van Trijp (2012) confirms that there is a higher probability of a healthier snack choice when there are more available healthy snacks in the relative food environment.

In order to have a clear overview on how promotion and changes in the competitive healthy assortment influence consumers' choice, a conceptual framework is presented in Figure 1. Promotion of snack vegetables on the outside of vending machines and changes of the assortment structure of competitive options affect the degree of salience of snack vegetables (i.e. it will make the vegetables stand out in a positive way). This in turn will lead to a higher preference of the snack vegetables, particularly for consumers who generally like snack vegetables, and a higher likelihood that they will be chosen.

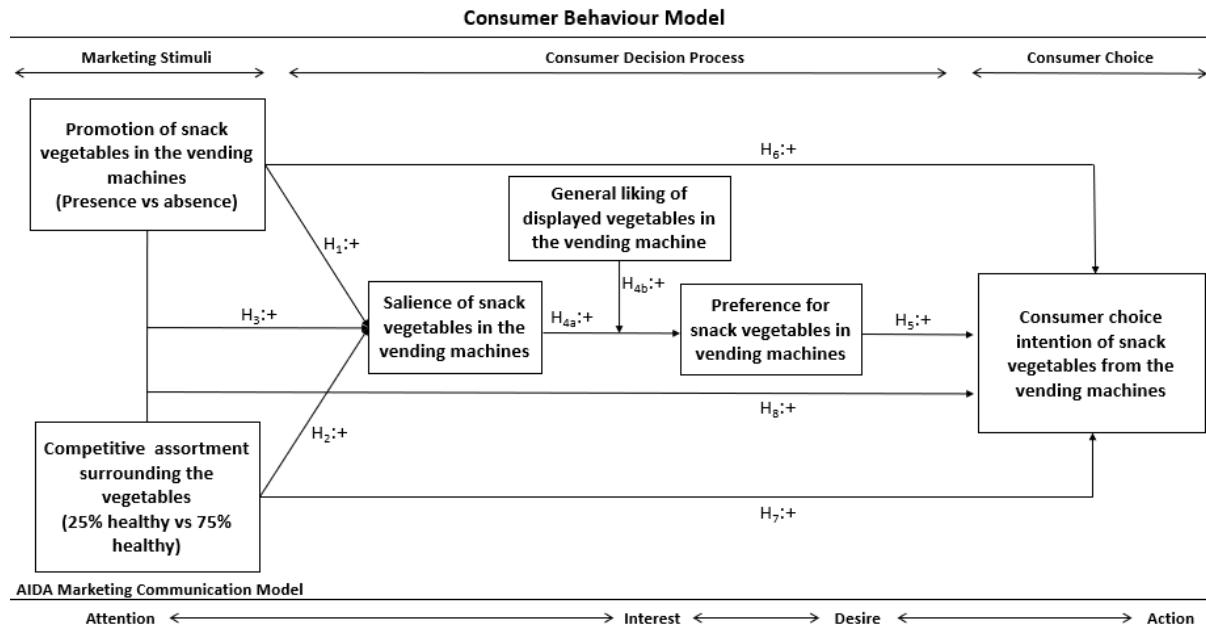


Figure 1. Conceptual model showing effects on consumer snack vegetable choice intention by manipulating the factors of promotion and competitive assortment size.

## 2.4. Conceptual Model and Hypotheses

Consumer behaviour constitutes a major area of interest of marketing. Several studies have focused on many different potential drivers of consumer behaviour as well as environmental, societal and psychological factors, which have an effect on consumer behaviour. The importance of understanding consumer behaviour gives the chance to marketers to predict consumers buying decisions. Significant theories have been built for this purpose. The conceptual framework of this experimental study has built based on two basic models of marketing theory. Both studies link product with consumers by explaining and analysing consumers' mental processes of product choice when they are exposed to advertisements.

The first theory is the *Consumer Behaviour Model* that aims to understand consumer behaviour and buying decisions (Kotler & Armstrong, 2010). This model explains how promotion stimuli which is one of the 4P's of marketing (Goi, 2009) affects consumer decision-making process and influences the final choice. More specific, by making promotion interventions on snack vegetables in the vending machines, relevant information is provided to consumers about the snack vegetables or snack vegetable assortment. As a result, the exposure of snack vegetables becomes more intense to consumers especially by enlarging the competitive healthy assortment (Chernev, 2011; Van Kleef et al., 2012) and the snack vegetables may be more salient. Higher level of salience on product or product assortment usually increases the probability of product selection (Chernev, 2006) due to the fact that these products are more preferred to consumers.

The second relevant theory that supports the conceptual framework of this study is the *AIDA Marketing Communication Model*. AIDA is mentioned as an acronym which explains, in a four-step mental process, customer's reactions on advertisement for the sale to happen (Rawal, 2013). More specific, these four steps of AIDA are referred to *Attention*, *Interest*, *Desire* and *Action* of consumers to choose or purchase a certain product (Rawal, 2013). The *Attention* to a product, specifically snack vegetables, is achieved with the promotion interventions on the outside of the vending machines and the changes on the competitive healthy assortment in order to make snack vegetables more salient to consumers. *Interest* and *Desire*, which are the second and the third step, are expressed by consumer preference for snack vegetables that are sold in the vending machines. Afterwards, *Action*, which is the last step of the AIDA model, is combined with the dependent variable which is consumers' choice intention for snack vegetables. The following sections explain more detail the relation between the variables.

#### **2.4.1. Salience of snack vegetables in the vending machines**

Salience of a certain product or brand constitutes important determinant of advertising because it expresses whether customers are willing to buy a product. Salience is defined as the level that product attributes are being easily reflected in consumers' mind during the buying situation (Van Ittersum, Pennings, Wansink & van Trijp, 2007). It is a psychological phenomenon that contributes to the decision-making process based on the perception that consumers have in their memory (known as top-in-mind).

Salience is usually anchored on two product features, which are quality and quantity (Romaniuk & Sharp, 2003), focusing on the ratio quality/quantity and making comparisons with the rest products. When consumers are called to choose between several products, they choose the one that it is closer to their consideration set. The power that force consumers to select a product is characterized by higher product salience (Olsen, 2002; Bordalo, Gennaioli & Shleifer, 2013). Salient assortments increase the probabilities for consumers to observe the assortment options. This is the reason that products with strong brand name in the marketplace have high product salience and products with small brand name have small product salience.

The degree of product salience derives from the degree of product attribute salience. The level of salience of product attributes is associated with whether consumers have access to information about the product attributes (Lynch, 1991). Promotion interventions on the vending machines is a way to expose products or product assortments to consumers' field of view. Product characteristics and attributes are presented to consumers in order to inform them about the functional utilities that these products can provide. In other words, promotion can inform consumers about the products.

Furthermore, an assortment which includes snack vegetables and more healthy options increase the probabilities to make snack vegetables more salient than an assortment with snack vegetable surrounded by mainly unhealthy snack options. Snack vegetables are considered as primarily healthy items. Therefore, by adding more primarily or mainly healthy snack options in the vending environment, the product attributes are more relevant between them resulting to more salient healthy items and by extension more salient snack vegetables (Van Ittersum et al., 2007).

In summary, the following propositions are formulated:

*Hypothesis 1: Compared to a vending machine without promotion interventions to encourage the snack vegetable choices, a vending machine with promotion interventions will make snack vegetables more salient.*

*Hypothesis 2: Compared to a vending machine with a small 25% healthy competitive assortment, a vending machine with a high 75% healthy competitive assortment, will make snack vegetables more salient.*

*Hypothesis 3: Snack vegetables will be most salient in the condition where these snacks are being promoted and a high 75% of the competitive assortment is healthy.*

#### **2.4.2. Preference for snack vegetables in the vending machines**

Food acceptance and selection on different types of food is anchored to food patterns that every individual has (Cashdan, 1994). These patterns are usually influenced mainly by the family environment since young ages and are reflected in later life through food choices (Skinner, Carruth, Bounds & Ziegler, 2002). Food habits that are usually followed by individuals are determined as food preferences. Preference is defined as a higher-order desire of an object that consumers distinguish between a number of objects. It is based on the comparison between products with similar characteristics or products that are used for the same purpose and fulfil the

same needs. In terms of marketing and consumer behaviour theories, consumer preference constitutes an important determinant of consumer food decisions (Capaldi, 1996).

Children preference on vegetable intake is significantly low compared to other food choices. Because of this problem, researchers found that exposure on vegetables is a possible way to increase children preference for vegetable consumption (Wardle, Cooke, Gibson, Sapochnik, Sheiham & Lawson, 2003). By making snack vegetables in the vending machines more obvious to students through promotion interventions, then snack vegetable assortment may be more salient increasing students preference for them.

Hence, the following proposition is formulated:

*Hypothesis 4a: The more salient snack vegetables are in the vending machine, the more preferred they are as a snack solution.*

#### **2.4.3. The moderating effect of general liking of displayed vegetables in the vending machine**

Children eat only food that they like (Birch & Fisher, 1998). Liking constitutes an important determinant of consumers choice and decision-making (Capaldi, 1996). It is expressed as an effective response to a food choice and describes the degree of pleasure that has been experienced (Zandstra, Weegels, Van Spronsen & Klerk, 2004). Many studies have focused on taste and/or flavour liking of certain products in terms of preference and product selection (Brug, Tak, Velde, Bere & De Bourdeaudhuij, 2008). The study of Brug and colleagues (2008) supported that liking and taste preference for certain food products constitute drivers for food choices. In addition, it is mentioned that taste preferences are different between individuals and can be influenced by learning strategic processes.

More specific, there are four different learning techniques that taste preference can be learned to individuals. The first technique is known as "Taste-nutrient learning". It describes the experience of a flavour stimulus (for instance sweet, salty, fatty, bitter) which is evaluated positively by the feeling of satiety. This technique is considered as operant or instrumental conditioning. Classical conditioning is another way of learning which is described by "Taste-taste learning" and "Taste-environment learning". A new taste can be learned easier if it is combined with a taste preference that already exists. In addition, food that was tried for the first time in a friendly and pleasant environment is more favourable and liked than food which was eaten under pressure or on hurry. Therefore, physical and social environment contributes to liking of several food tastes. "Observational learning or modelling" is the last taste learning technique which is referred to preference of food tastes that are preferred from other people.

In terms of snack vegetables in the vending machines, children, who like the taste of vegetables, may be more attracted to snack vegetables as a snack solution. The study of Brug and colleagues (2008) found that positive liking for vegetables increases consumers' willingness for vegetable consumption. However, it is possible to have a preference for a choice, such as snack vegetables, even the item is not attractive or liked (Zandstra & El-Dereby, 2011). Therefore, the following proposition is formulated:

*Hypothesis 4b: The more salient snack vegetables are in the vending machine, the preferred they are as a snack solution, particularly for customers with a high general liking of snack vegetables.*

#### **2.4.4. Consumer choice intention of snack vegetables from the vending machines**

Choice is the outcome of an overall decision-making process and it is affected by personal, situational and environmental factors (Furst, Connor, Bisogni & Sobal, 1996). Food choices are determined by preferences that individual have between food options reflecting individuals' lifestyle (Lindeman & Sirelius, 2001; Brunsø, Scholderer & Grunert, 2004). It is important to understand consumers' preferences in order to predict their food decisions.

Food industries started to use advertisements and other promotion techniques in order to increase consumer preferences and by extension choices for certain products (Livingstone & Helsper, 2006). In terms of snack vegetables in the vending machines, promotion interventions may enhance consumer preferences and by extension choice intention for selection of snack vegetables as a snack solution.

Hence, the following proposition is formulated:

*Hypothesis 5: The more preferred the snack vegetables are in the vending machine, the more likely they are to be selected.*

*Hypothesis 6: Compared to a vending machine without promotion interventions to encourage the snack vegetable selection, a vending machine with promotion interventions will increase students' intention for snack vegetables.*

*Hypothesis 7: Compared to a vending machine with a small 25% healthy competitive assortment, a vending machine with a high 75% healthy competitive assortment, will increase students' intention for snack vegetables.*

*Hypothesis 8: Snack vegetables will be most selected in the condition where these snacks are being promoted and a high 75% of the competitive assortment is healthy.*

### 3. Methodology

The following sections include the research design and the description of the data collection. An online questionnaire has developed in order to estimate whether changes on competitive healthy vending assortment and promotion interventions on the outside of the vendors have an effect on the consumers' preference and choice intention for snack vegetables from the vending machines. The statistical analysis and the procedure of data that has been collected are also parts of this chapter.

#### 3.1. Design

This research constituted a 2 (promotion: presence, absence) by 2 (assortment size: 75% healthy snacks, 25% healthy snacks) between-subjects administrated online experimental study using Qualtrics software. There were four different conditions in which participants were exposed randomly to one of them (see Figure 2 and Figure 3). The questions were the same for the participants in all the four conditions.

A number of sixteen snack items are included, in total, in each vending machine equally distributed in four different shelves. The factors of promotion on the vending machines (promotion interventions versus no promotion interventions on snack vegetables that are sold through vendors) and the competitive assortment structure (either 75% healthy snacks in vending machines versus 25% healthy snacks) were studied.

Snack vegetables which were the main point of interest, were located in the middle of vending machine, taking place between the second and the third vending shelf in all the four conditions. This position was chosen because product placement on consumer's eye level is characterised by higher visibility than other placements. In addition, snack vegetables assortment consisted of four different kind of products such as mix of red and yellow cherry tomatoes, red cherry tomatoes, yellow peppers and carrots (e.g. Tommies snack raw tomatoes and peppers). By providing different item options in a specific assortment, the distinctiveness between options is higher increasing the likelihood of selection (Chernev, 2012).

In terms of promotion interventions, which included changes on the outfit of vending machines, aimed to make snack vegetables in the vending machines more salient through the manipulations as an assortment and not as product itself. More specific, vending machines with promotion actions were covered by a green-coloured outfit compared with the non-promotion vending machines which had black-coloured outfit. Green colour was chosen due to the fact that is usually related with nature (green colour of the trees, grass) on consumer perception. In addition, it evokes positive emotions (NAZ, K.A.Y.A & Epps, 2004). Therefore, it could be accepted by consumers as a representative for the vegetables colour. Afterwards, the presence of a cartoon figure which represents snack vegetables as human entities on the right bottom of the vending machine and their expression of "We are COOL" trying to attract students' attention combined with a slogan on the top of the vendor promoting healthiness ("Better CHOICES for Better LIFE").

Each vending machine included totally sixteen snack products. The rest of the snack items in the vending machine, were healthy and unhealthy snacks which were manipulated either including 75% or 25% of healthy snacks. The selection of the snacks was based on the nutrition guidelines that is suggested by the Netherlands Nutrition Centre (2012). The healthy snack products are contained by maximum 110 calories per portion.

The competitive assortment includes a variety of savoury, sweet and fresh snacks have been chosen to fill the vending shelves. Chips (e.g. Doritos, Pringles), chocolate bars (e.g. Mars, Snickers, Milka) and candies (e.g. Stroopwafels, Maltesers) are examples of the unhealthy assortment. The healthy assortment includes fresh fruits (e.g. banana, apple, pear), grain bars (e.g. Balisto in three different flavours, Fitness) and rice waffles with cheese flavour (e.g. Snack A Jacks).

The first condition (Condition 1) represents a vending machine without promotion interventions and with 25% of competitive healthy snacks surrounding the snack vegetables. The second condition (Condition 2) illustrates a vending machine with promotion interventions on the snack vegetables and 25% of the competitive healthy assortment. Both of these conditions are included in Figure 2. Furthermore, Figure 3 illustrates the other two conditions, Condition 3 and Condition 4, which include snack vegetables surrounded by 75% of the competitive healthy assortment and either without or with promotion interventions.

**Condition 1**



**Condition 2**



Figure 2. Screenshots of the two conditions with 25% of competitive healthy assortment and either without or with promotion interventions.

**Condition 3**



**Condition 4**

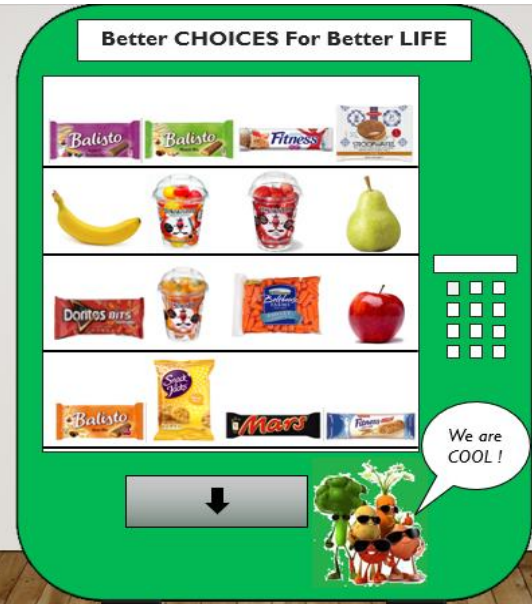


Figure 3. Screenshots of the two conditions with 75% of competitive healthy assortment and either without or with promotion interventions.

### **3.2. Participants**

The participants of this study were male and female students of Dutch high schools and first-year bachelor students (9 VMBO; 120 VWO; 37 HAVO; 36 other). The targeted age group was adolescents ranged from 16 to 19 years old. A number of 202 participants (89 males; 113 females) was required in order to give valid and reliable results on the research. They were invited by email in order to fill in the questionnaire including questions about their snack choices. This online questionnaire gave the chance to the respondents to answer the questions on the time that was the most preferable for them and from the location that was most convenient giving them relative freedom.

### **3.3. Procedure**

The questionnaire started with some instructions about the research content and the consent. Information about the duration of the questionnaire were provided as well (see Appendix A). After the instructions, the participants were introduced to the first question by thinking that they want to buy a snack in order to satisfy their hunger. Subsequently, participants were exposed randomly in one of the four conditions and were called to make a snack choice between the different assortments of the vending machine. They clicked on their most preferable option by making it green. The questionnaire was designed properly to accept only a single answer as snack choice and after the selection of snack, participants could not change their choice.

The following part included the same questions across the four conditions. After the selection of the snack, participants were asked to evaluate snack vegetables in terms of the degree that they are obvious in the vending machine and in comparison, with the competitive snack items. Subsequently, statements were provided as well, in order to estimate participants' preference and liking on snack vegetables (see Appendix B).

At the last part of the questionnaire, there are some control variables in order to create an overview about participants' profile. More specific, participants are called to answer whether they were feeling hungry the moment that they answered the questionnaire and whether they follow a healthy lifestyle. Age and gender were important background characteristics to classify participants. In addition, there are some explanatory variables which were mentioned to the level of education of participants and to what extent they filled the questionnaire seriously. Space for comments or suggestions as well as optional choice was provided in order to receive more information about the results or invitation for further online studies. The last part consisted of a thank you message for filling this research questionnaire (see Appendix B).

### **3.4. Measures**

In this study, promotion interventions on snack vegetables and changes on the competitive healthy assortment constitute the two independent variables. The effects of these two variables were measured in order to understand student choice intention for snack vegetables from the vending machines. Salience of snack vegetables, as well as preference and liking of the displayed vegetables are the key dependent variables that help this process. Some control variables were used in order to check the randomisation of this study and to give an overview about participants' profile. These were hunger, health-consciousness, age and gender. In addition, explanatory variables about the participants' education level and the mode of questionnaire administration are included. Open-ended questions were provided as well at the end of the questionnaire giving space for comments or suggestions.

### **Choice intention for snack vegetables from the vending machine**

Participants were asked to make a snack choice across the snack items in the vending machine. The available snack choices differed across the four conditions. However, snack vegetables were always placed in the middle of the vending machines and they were always available. By clicking on the most preferable choice, the snack item was included in a green frame. In case that the participant selected more than one snack options then it was not allowed to continue to the next question.

### **Salience of snack vegetables in the vending machine**

After the snack choice from the vending machine, participants were called to evaluate a two-item scale and five-point scale statements about snack vegetables even if they have chosen another kind of snack. Salient is important determinant for consumer choice and decision-making process. More specific, there are two-item scale statements ("The snack vegetables are easily observed in the vending machine"; "The snack vegetables stand out of the other snacks in the vending machine") are evaluated on a five-point Likert scale (from "strongly disagree" to "strongly agree"). The reliability of this scale was  $\alpha=0.651$ .

### **Preference for snack vegetables in the vending**

Participants asked to indicate in what extent agree with the three statements (five-point scale items) that are referred to preference for snack vegetables. These statements were built in terms of health consciousness and freshness of snack vegetables in order to create an overview about respondents' profile. Preference is an important determinant triggering consumer's choice intention. More specific, the three statements were "I like the displayed snack vegetables in the vending machine", "The snack vegetables in the vending machine looked attractive" and "The snack vegetables in the vending machine looked appealing" and they are answered on a five-point Likert scale (from "strongly disagree" to "strongly agree"). The reliability of this scale was  $\alpha=0.834$ .

#### **3.4.1. Control variables**

##### **General liking of snack vegetables**

Participants were called to choose the level which they were agreed regarding to general liking of snack vegetables. Liking is important factor of consumers' choice. It motivates consumer preference for certain product choices. The questions were three-item scale statements about liking ("In general, I like the taste of snack vegetables"; "I appreciate vegetables as a snack"; "Snack vegetables are attractive") and they are evaluated on a five-point Likert scale (from "strongly disagree" to "strongly agree"). The reliability of this scale was  $\alpha=0.875$ .

##### **Hunger**

Almost at the end of the questionnaire, participants were asked whether they were hungry. Hunger is mentioned as a feeling and a primarily need that people have. The moment that hunger is really intense, it triggers impulsive reactions that probably leads to food choices that are different from consistent behaviour. This is due to the fact that individuals are affected by a primarily need which requires immediate satisfaction in order to keep the balance (McLeod, 2007). The question was "How hungry are you at this moment?" and was measured with a five-point Bipolar scale with anchors from "Not at all hungry" to "Very hungry".

## **Health consciousness**

Participants were asked to evaluate statements which were related with health consciousness. Health consciousness characterises individuals who make healthy lifestyle choices. Healthy food habits constitute one aspect of healthy lifestyle. Health-conscious consumers aim to improve their quality of life by adapting healthier behaviours which combine physical fitness and nutrition (Kaynak & Eksi, 2014; Newsom, McFarland, Kaplan, Huguet & Zani, 2005). They are more likely to choose snack vegetables as a snack solution because they are more beneficial for their health and well-being. The study of Dutta-Bergman (2004), found that health consciousness is important factor in order to be part of the community. Being a member of community, individuals have access to resources and social support which contributes to individual's health. Therefore, health-conscious consumers are more likely to be involved in it. In this study, it is important to observe whether snack vegetable selection is related with health consciousness. There were two-item statements ("It is important for me to snack healthy"; "I try to avoid unhealthy snacks from vending machines") which were answered with a five-point Likert scale with anchors from "Strongly disagree" to "Strongly agree". The reliability of this scale was  $\alpha=0.710$ .

## **Demographic characteristics**

At the end of the questionnaire, the participants were called to give personal information about their age and gender. Gender and age seem to be significant determinants on children food choices and dietary behaviour (Cooke & Wardle, 2005). It has noticed that females tend to have healthier dietary habits than males (Wardle et al., 2004) or females are more willing than males to change their dietary based on recommendations of a healthy lifestyle. The study of Brug and colleagues (2008) found significant differences between the two genders on the taste preference and liking of vegetables. Regarding to age, it was noticed that younger ages, especially children, have low preference and intention to consume vegetables (Yngve et al., 2005; Tak et al., 2010).

## **Level of education of participants**

Participants were asked about their level of education. It has found that the education level is associated with the vegetable intake. In particular, the study of De Irala-Estevez, Groth, Johansson, Oltersdorf, Prättälä & Martínez-González (2000) found that the more high-educated individuals the more likely to vegetable intake. Therefore, the relevant question was "What is your level of education?", and it was answered by a single answer across four multiple options (VMBO, VMO, HAVO and Other).

## **Mode of questionnaire administration**

Participants were called to answer in which extent they answered the questions seriously. It is important to assess whether the answers are reliable in order to have reliable data analysis. The question was a single item ("How seriously did you fill the questionnaire?") was measured with a five-point Bipolar scale with anchors from "Not seriously at all" to "Very seriously".

### **3.4.2. Data analysis**

The dependent variable of this research study was students' snack choice intention with promotion and assortment size as independent variables. Snack choices were divided in three groups, coded as 1 for snack vegetable selection, 2 for healthy and 3 for the selection of unhealthy snacks in order to give an overview about students' snack choices. Binary logistic regression analysis was used to estimate the relationships between the main effects of promotion and assortment size and their interaction effect with snack vegetable choice. For the purpose of this

analysis, a new variable, coded as 0 (non-selection of snack vegetables as a snack solution) and 1 (selection of snack vegetables as a snack solution), has created. Ratings of salience of snack vegetable display, preference, general liking of snack vegetables and health consciousness were analysed with factorial (two-way) ANOVA. The differences of the randomization variables across conditions were checked using ANOVA and  $\chi^2$  analysis. Bivariate Pearson correlation tested the relationship between salience and preference and the moderator effect was estimated with Multiple regression analysis. The randomization variables of this study were gender, age, education level, hunger, health consciousness and mode of questionnaire administration. All the data analyses were supported by using SPSS statistical software IBM SPSS Statistics 23.00. A significant level of  $P < 0.05$  was used.

## 4. Results

This chapter includes the outcomes of the data analysis of the questionnaire and their interpretation. Descriptive information and randomization checks were described in the first part of this chapter followed by the data analysis of the key dependent variable (snack choice) and the analysis of the mediator (salience of snack vegetables in the vending machine and preference on snack vegetables) and moderator (general liking of snack vegetables) variables. Additional exploratory descriptive information is provided as well.

### 4.1. Descriptive information and randomisation check

In total, 89 males and 113 females ( $n=202$ ) participated in this research study, by filling the online questionnaire. Snack vegetables were selected by 33 participants, healthy snacks by 62 participants and unhealthy snacks were selected by 107 participants (see Table 3). The average age of participants was 18.6 ( $SD=1.5$ ) and ranged from 16 to 27. The majority of the students across the conditions studied at VWO (120 students), followed by students from HAVO and university/MBO (37 and 36 students, respectively). VMBO students were part of this research as well, however, in a smaller percentage (9 students). More than half of the students were characterized by health consciousness (62% of participants) and they were not hungry (66% of participants). Chi-square analysis and ANOVA found no differences across conditions in age (promotion:  $F(1,198)=0.005$ ,  $P=0.943$ ,  $\eta^2_p=0.000$ ; assortment size:  $F(1,198)=0.823$ ,  $P=0.365$ ,  $\eta^2_p=0.004$ ; interaction:  $F(1,198)=0.090$ ,  $P=0.764$ ,  $\eta^2_p=0.000$ ), in gender ( $\chi^2(3, 202) = 1.121$ ,  $P=0.772$ ), in hunger (promotion:  $F(1,198)=0.036$ ,  $P=0.849$ ,  $\eta^2_p=0.000$ ; assortment size:  $F(1,198)=0.042$ ,  $P=0.837$ ,  $\eta^2_p=0.000$ ; interaction:  $F(1,198)=0.031$ ,  $P=0.861$ ,  $\eta^2_p=0.000$ ), in health consciousness (promotion:  $F(1,198)=3.475$ ,  $P=0.064$ ,  $\eta^2_p=0.017$ ; assortment size:  $F(1,198)=0.322$ ,  $P=0.571$ ,  $\eta^2_p=0.002$ ; interaction:  $F(1,198)=0.090$ ,  $P=0.765$ ,  $\eta^2_p=0.000$ ) or in mode of questionnaire administration (promotion:  $F(1,198)=1.777$ ,  $P=0.184$ ,  $\eta^2_p=0.009$ ; assortment size:  $F(1,198)=2.804$ ,  $P=0.096$ ,  $\eta^2_p=0.014$ ; interaction:  $F(1,198)=0.005$ ,  $P=0.946$ ,  $\eta^2_p=0.000$ ). Table 4 illustrates the relevant results from the data analysis.

Table 3. Frequencies of gender, snack choice and education per condition.

Conditions Variables	25% Healthy snacks		75% Healthy snacks		Total (N=202)
	Without Promotion (Condition 1) (N=50)	With Promotion (Condition 2) (N=49)	Without Promotion (Condition 3) (N=52)	With Promotion (Condition 4) (N=51)	
Gender*					
Males	24	19	22	24	89
Females	26	30	30	27	113
Snack choice*					
Snack Vegetables	9	8	6	10	33
Healthy	7	9	26	20	62
Unhealthy	34	32	20	21	107
Education level*					
VMBO	3	2	1	3	9
VWO	29	27	34	30	120
HAVO	12	7	10	8	37
Other Education* (University; MBO)	6	13	7	10	36

Table 4. Ratings of salience, preference and general liking and randomization checks as a function of promotion and assortment size across the four conditions among Dutch students aged 16-27, April 2018.

Conditions Variables	25% Healthy snacks (N=99)		75% Healthy snacks (N=103)		ANOVA (F)		
	Without Promotion (Condition 1) Mean (SD)	With Promotion (Condition 2) Mean (SD)	Without Promotion (Condition 3) Mean (SD)	With Promotion (Condition 4) Mean (SD)	P value for Main Effect Promotion	P value for Main Effect Assortment Size	P value for interaction Effect
Randomization Checks							
Age	18.5 (1.5)	18.5 (1.3)	18.7 (1.2)	18.6 (2.0)	0.94	0.36	0.76
Health consciousness*	3.1 (1.1)	3.4 (1.0)	3.3 (1.0)	3.5 (0.9)	0.06	0.57	0.76
Hunger*	2.8 (1.0)	2.8 (1.3)	2.8 (1.1)	2.8 (1.3)	0.84	0.83	0.86
Mode of administration*	4.4 (0.6)	4.3 (0.7)	4.6 (0.7)	4.4 (0.6)	0.18	0.09	0.84
Process Variables							
Salience*	3.1 (1.0)	3.2 (0.9)	3.4 (1.0)	3.4 (0.9)	0.09	0.09	0.68
Preference*	3.2 (1.0)	3.4 (0.8)	3.5 (0.9)	3.2 (0.8)	0.66	0.54	0.02
General liking*	3.6 (1.1)	3.5 (1.1)	3.8 (0.8)	3.6 (0.9)	0.25	0.25	0.91

\*These variables were measured with a 5-point scale each one.

#### 4.2. Salience of the snack vegetables in the vending machine

Promotion and assortment size, as independent variables, and the ratings of salience, as dependent variable, were tested with factorial (two-way) ANOVA. According to the hypotheses, snack vegetables are more salient when there are promotion interventions on the vending machines (hypothesis 1), or when the competitive assortment is characterized by 75% of healthy snacks instead of 25% (hypothesis 2). It was expected that the combination of promotion interventions on the vending machines and the competitive assortment consists of 75% healthy snacks can make snack vegetables more salient (hypothesis 3). The results showed there was a marginal effect for the snack vegetable assortment for both conditions that the availability of competitive healthy assortment was 75% (Condition 3: mean=3.4, SD=1.0; Condition 4: mean=3.4, SD=0.9) compared to conditions with 25% healthy snack options (Condition 1: mean=3.1, SD=1.0; Condition 2: mean=3.2, SD=0.9). However, there were no main or interaction effects (promotion:  $F(1,198)=0.003$ ,  $P=0.959$ ,  $\eta^2_p=0.000$ ; assortment size:  $F(1,198)=2.810$ ,  $P=0.095$ ,  $\eta^2_p=0.014$ ; interaction:  $F(1,198)=0.167$ ,  $P=0.683$ ,  $\eta^2_p=0.001$ ). Therefore, these predictions (hypothesis 1, hypothesis 2 and hypothesis 3) could not be confirmed.

#### 4.3. Preference for snack vegetable

According to the hypothesis, the more salient snack vegetables are, in the vending machines, the more preferred they are as a snack solution (*hypothesis 4a*). A bivariate Pearson Correlation tested the hypothesis in order to estimate the correlation between salience and preference for snack vegetables. The results showed that there is a statistically significant linear association between salience and preference ( $P<0.001$ ). Pearson's correlation revealed that salience and preference for snack vegetables are positively correlated ( $r=0.245$ ) which means that when salience increases then preference increases as well. However, the strength of correlation is small ( $0.1<|r|/0.3$ ). Therefore, the *hypothesis 4a* can be confirmed.

As an additional analysis, promotion and assortment size, as independent variables, and the ratings of preference, as dependent variable, were tested with factorial (two-way) ANOVA. The purpose of this analysis was to estimate whether promotion, assortment size and their interaction influence participants' preference for snack vegetables from the vending machines directly. The results showed that there was an interaction effect between promotion and assortment size in terms of preference for snack vegetables ( $F(1,198)=4.813$ ,  $P=0.029$ ). It revealed that participants had stronger preference to select snack vegetables from a vending machine which includes 75% of healthy snacks and no promotion interventions (mean=3.5, SD=0.9). Table 4 includes all the relevant results. Figure 4 illustrates the mean preferences that participants had for snack vegetables across the four conditions. It can clearly be seen that participants scored higher on the condition with 75% of healthy competitive snacks and without promotion signs on the vending machines (Condition 3).

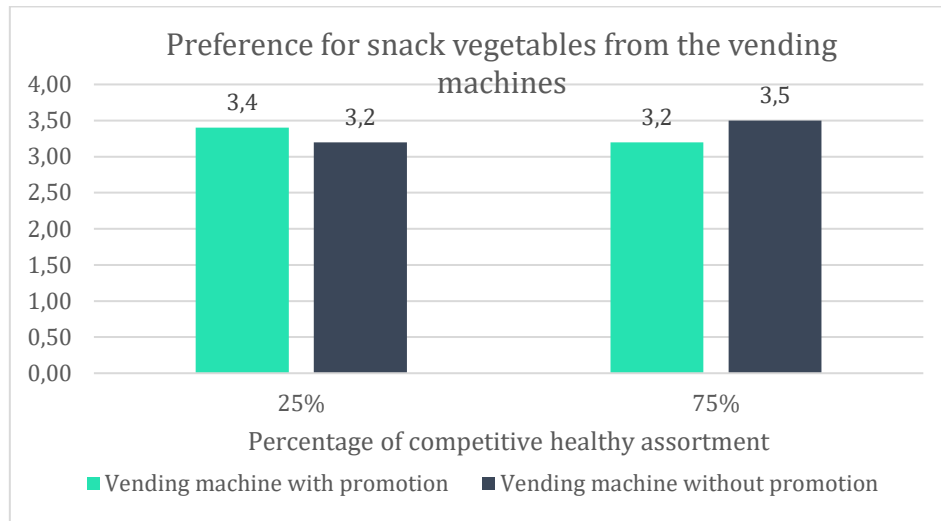


Figure 4. Mean scores in participants' preference for snack vegetables from the vending machines across conditions.

#### 4.4. General liking of snack vegetables

According to the hypothesis, the more salient snack vegetables are, the more preferred are by consumers, especially when consumers have a high general liking for snack vegetables (*hypothesis 4b*). A Linear Regression analysis tested the hypothesis in order to estimate if general liking of snack vegetables statistically predicted students' rating of preference. The results showed that the two predictors, salience and general liking of snack vegetables, explained 8% of the variance ( $R^2=0.08$ ,  $F(2,199)=9.749$ ,  $P<0.001$ ). It found that salience of snack vegetables is a significant predictor of preference for snack vegetables ( $\beta=0.283$ ,  $P<0.001$ ), but general liking of snack vegetables does not significantly predict the preference for snack vegetables from the vending machines ( $\beta=-0.077$ ,  $P=0.260$ ). Therefore, the *hypothesis 4b* cannot be confirmed.

As an additional analysis, promotion and assortment size, as independent variables, and the rating of general liking, as dependent variable, were tested with factorial (two-way) ANOVA. The purpose of this analysis was to estimate whether general liking that participants have for snack vegetables is influenced by promotion, assortment size and their interaction. No significant effect has found (promotion:  $F(1,198)=1.290$ ,  $P=0.257$ ,  $\eta^2_p=0.006$ ; assortment size:  $F(1,198)=1.288$ ,  $P=0.258$ ,  $\eta^2_p=0.006$ ; interaction:  $F(1,198)=0.011$ ,  $P=0.918$ ,  $\eta^2_p=0.000$ ) (see Table 4).

#### 4.5. Snack choice intention for snack vegetables

There were 16 snacks (vegetables, healthy, unhealthy) were available in each vending machine for selection. In total, there were 33 cases on snack vegetables selection and 169 cases in which participants selected snacks from the competitive assortments (107 unhealthy; 62 healthy). All the participants made a snack choice. A scatterplot confirmed the goodness-of-fit of the model. Chi-square test gave a clear overview about the snack choices that were selected by participants across the four conditions (Figure 5). Figure 6 presents the percentages of snack vegetables that selected from the vending machines across the different conditions. It is noticed that snack vegetables were mostly selected in Condition 4 (75% healthy competitive assortment, without promotion) with 4.95% of the total snack choices.

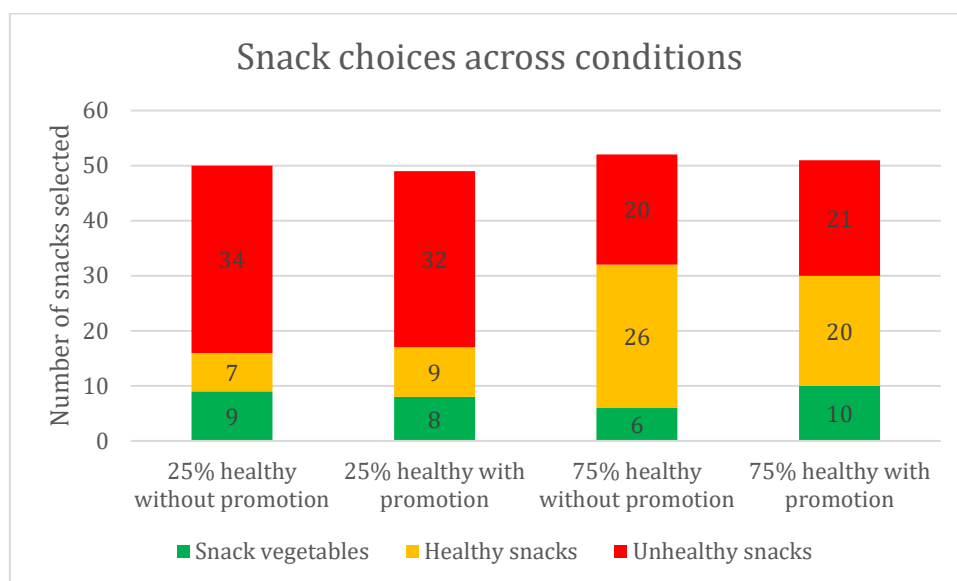


Figure 5. Representation of snack choices that selected across the four conditions.

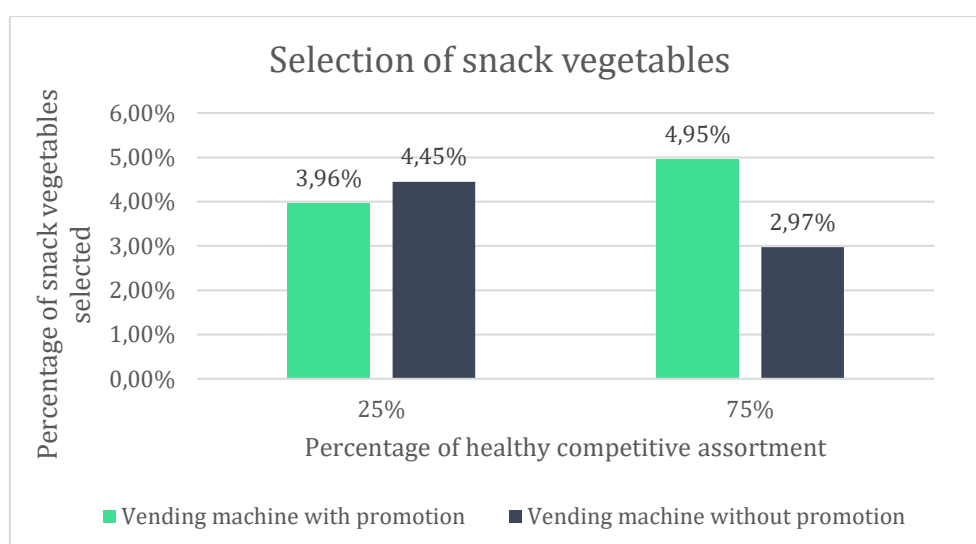


Figure 6. Representation of total number of students' snack selection from the vending machines across conditions.

According to the *hypothesis 5*, the more preferred the snack vegetables from the vending machines are, the more likely they are to be selected by the students. A Point-Biserial Correlation tested the hypothesis in order to estimate the association between preference for snack vegetables and the selection of snack vegetables as a snack choice. For the analysis, snack vegetable selection was coded with 0 for the non-selection and 1 for the selection of snack vegetables. The results showed that there is a statistically significant association between preference and snack vegetable selection ( $P < 0.001$ ). Pearson Correlation revealed a positive value ( $\chi^2(1, 202) = 0.245$ ) meaning that the higher preference that students have for snack vegetables, the more likely to select as a snack solution from the vending machine. Therefore, the *hypothesis 5* can be confirmed.

Binary Logistic Regression selected as a data analysis method for the estimation of the main effects of promotion and assortment size, as well as the promotion by assortment size interaction effect. According to the hypotheses, students are more willing to select snack vegetables from the vending machines when these vending machines characterized by promotion interventions (*hypothesis 6*) or surrounded by 75% competitive healthy snacks (*hypothesis 7*) or characterized by promotion interventions and surrounded by 75% of competitive healthy snack options

(*hypothesis 8*). Scatterplot indicated the normality of distributions of snack choices. The assumptions of linearity have been met for the independent variables. The main effects of promotion, assortment size and their interaction effect has met the assumptions of linearity. The results of the logistic regression revealed that both of the independent variables, promotion and competitive healthy assortment, had no statistically significant impact on snack vegetable choice (promotion:  $t^2(1,198)=1.252$ ,  $P=0.263$ ; competitive assortment size:  $t^2(1,198)=0.182$ ,  $P=0.670$ ). The odd ratio for promotion was 0.535 with 95% CI between 0.179 and 1.600, while the odds ratio for competitive healthy assortment was 0.800 with 95% CI between 0.287 and 2.231. No significance found also on promotion by assortment size interaction effect on snack vegetable selection ( $t^2(1,198)=0.925$ ,  $P=0.336$ ). The odds ratio was 2.104 with 95% CI between 0.462 and 9.573. The model had percentage of accuracy 83.7% and the variance in the snack vegetable selection is explained by the model between 7% and 12%. To summarize, promotion interventions, changes on the competitive healthy assortment size or combination of them, are not predictors of snack vegetable choice from the vending machines. Therefore, *hypothesis 6*, *hypothesis 7* and *hypothesis 8* cannot be confirmed.

#### 4.6. Additional exploratory descriptive information

Besides the variables that are presented in the conceptual framework, other exploratory variables have analysed as well, to better explain the research findings.

##### Gender

In terms of snack selection between genders, it is important to be mentioned that female participants scored higher (11,88%) on snack vegetable selection than male participants (4,45%) having a tendency for healthy snacking (18,31%) of females selected healthy snacks and 12,37% of males). On the other hand, the majority of males scored higher on unhealthy snacking (27,22%). Figure 7 includes all the relevant information.

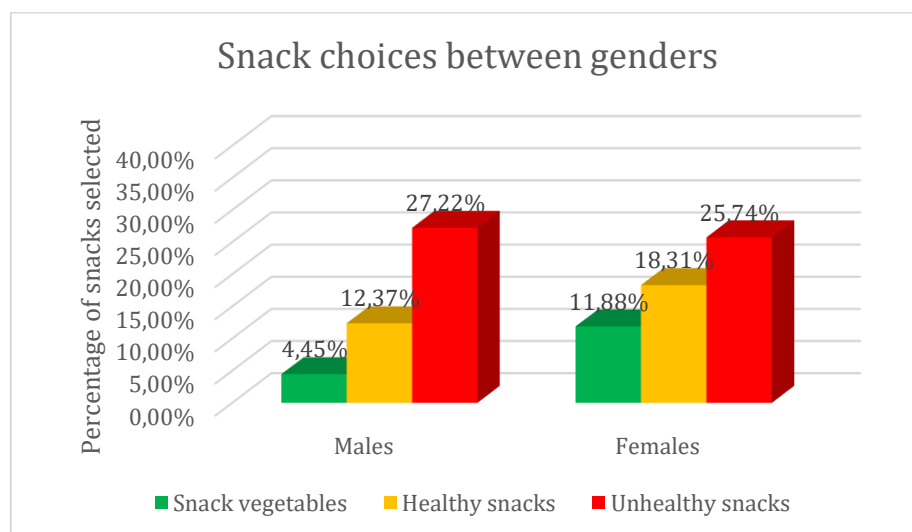


Figure 7. Snack choices between males and females regardless of conditions.

## Age

In order to have a better overview about the adolescents' snack choices, participants were divided in two age groups, Group 1 (16-19 years old) and Group 2 (20 years and older). In both groups, unhealthy snacks were the most selected (42,07% and 10,89%, respectively) and snack vegetables the least selected across conditions. Snack vegetables were chosen by 27 (13,4%) and 13 (6,43%) students belonging to the first and second group, respectively.

## 5. Discussion & Conclusion

### 5.1. Discussion

Childhood obesity constitutes a major health problem of our era. On the occasion of this problem, this study has been conducted in order to turn students to a healthier nutrition lifestyle. In particular, this study aims to create alternative ideas to increase the vegetable intake to adolescents in the school environment. Changes on the availability of competitive healthy assortment size (either 25% or 75% healthy snacks surrounding snack vegetables) and promotion interventions on the outside of the vending machines were manipulated. These two factors (availability and promotion on the vending machines) have been tested by several researchers (French et al, 2001; Fiske & Cullen, 2004; Callaghan, Mandich & He, 2010) in order to enhance healthy snacking (basically products low in fat and calories) on students' food decisions. Although, none of these studies had ever focused exclusively on snack vegetables until the present time. For this reason, this research study explored the possibilities of snack vegetable selection as a snack solution from school vending machines.

According to the theory, students should have higher choice intention for snack vegetables and perceive them as more salient, after promotion interventions on the vending machines or after increasing the availability of healthy competitive snacks (75% instead of 25%). It was also expected that the combination of promotion interventions and higher availability of competitive healthy snacks (75% instead of 25%) would increase the snack vegetable selection and make them more salient to student perception. Students who perceive snack vegetables as salient products in the vending machines, they should have preference for them, especially if they have a general liking for snack vegetables. Preference for snack vegetables should also leads to the snack vegetable selection as a snack choice.

Although the concept of nudging has been applied in this research study in order to turn students, in a gentle way, to vegetable snacking, results showed that snack vegetables were the least preferable and selected vending assortment options compared to other healthy or unhealthy snack options. On average, snack vegetable selection was only 4% across the conditions, ranging from about 3% to 5%. Previous studies supported the low preference that children have for vegetables and by extension the low level of vegetable intake (Tak et al., 2010; Yngve et al., 2005).

The results indicated that promotion signs on the outside of the vending machines did not impact neither students' choice intention nor their perception for snack vegetables. In other words, promotion interventions did not influence students to choose snack vegetables as a snack solution, despite of the fact that promotion has been proven as a good predictor to enhance healthier snack choices in the vending machines (Brown, Flint & Fuqua, 2014; Pharis et al., 2018). This is because promotion signs could not make snack vegetables salient to student perception and in this way to enhance their preference for them. The studies of Olsen (2002) and Bordalo, Gennaioli & Shleifer (2013) found that the higher degree of salience of a product, the more preferred and selectable is. Therefore, the low degree of salience of snack vegetables in the vending machines is explainable by their results.

A possible explanation of the low level of salience of snack vegetable assortment could be the fact that snack vegetables, as a primarily healthy snack option, are perceived as not so tasty snack choice as the moderately healthy or unhealthy snacking. In the study of Raghunathan, Naylor & Hoyer (2006), it found that consumers perceive healthy food options as not tasty as unhealthy, and taste is an important determinant of food decisions (Brug et al., 2008). Consequently, the results of this research study are not in line with the results of the recent study of Pharis and colleagues (2018), in which slogan on the vending machines and the use of green

colour to enhance healthy food choices. This is probably because children perception of snack vegetables differs from their perception of other healthy choices.

Regarding to the competitive healthy assortment, the results showed that students' choice intention and perception for snack vegetables from the vending machines were not being influenced by the changes on its size (either 25% or 75% of healthy alternatives). In both cases, 25% and 75%, only 9% and 8% of snack vegetables selected, respectively. It found that by adding more healthy snacks in the vending machines (75% of healthy alternatives), participants were more willing to select a snack from the healthy assortment and not from the unhealthy. This is because large assortments tend to be perceived as assortments with greater variety than small assortments (Van Herpen & Pieters, 2002), raising consumer expectations. Therefore, consumers are more likely to select a snack from a large assortment. However, the larger the assortment is, the more difficult to make a choice (Sela, Berger & Liu, 2008). As it was explained earlier, snack vegetables are considered as primarily healthy options, which may be perceived as not so tasty as other moderately healthy snack options in the vending machine. This is the reason that students did not perceive snack vegetable assortment as salient after the manipulations of the competitive healthy assortment and in this way, they did not show preference for them. Similar studies have come up to the same conclusion (Callaghan, Mandich & He, 2010; Hua et al., 2017).

The interaction term of the two independent factors was not a predictor for the reinforcement of snack vegetable choice or it could not make snack vegetable salient to student perception. It has to be mentioned, again, that product salience is influenced by the quality and quantity of the specific product (Romaniuk & Sharp, 2003). Students may have had doubts about the quality (such as freshness) of snack vegetable assortment. This might be the reason that snack vegetable assortment was not salient in the vending machine and by extension, not preferable and selected as a snack solution. These findings are in line with the study of Lessard, Poland and Trotter (2014), who examined the consumers' snack purchases after increasing the number of available healthy products in the vending machines and using labels as nutrition guidelines on healthy and unhealthy snack assortments. They found that higher availability of healthy products in combination with promotion interventions on the assortments, influence slightly only moderately healthy snacks.

This research study examined also whether general liking of snack vegetables, students' health consciousness, the feeling of hunger and the level of education have an influence on the selection of snack vegetables in the vending machines. According to the results, none of these variables were predictors of snack vegetable selection. Students, who expressed a general liking for snack vegetables, chose mainly unhealthy and healthy snacking. This result indicates that students may be more attractive than healthy and unhealthy snack choices when there are available in the vending machines. Previous studies found that health-conscious consumers have the tendency for nutritious food (Newsom et al., 2005; Kaynak & Eksi, 2014). Although snack vegetables are presented as a good option for health-conscious students, they preferred mainly healthy snacking and not snack vegetables. The possible explanation might be that students expressed doubts about the quality of snack vegetable assortment. In addition, hunger did not influence differently students on the selection of snack. Either hungry or satisfied students selected different from snack vegetables options. Furthermore, both high-educated and low-educated students had preferences and choice intention for snack options different from snack vegetables, despite the fact that De Irala-Estevez and colleagues (2000) found in their research study that high-educated consumers are more likely to vegetable intake.

Differences across the two genders were estimated, presenting that females had higher preference for both, snack vegetable and healthy snacks. In contrast, males selected mainly unhealthy snacking. These findings were confirmed also by the study of Wardle and colleagues (2004) in which females were more willing to change their dietary habits and to follow a healthy lifestyle. Participants' age was not a predictor in this research study. No differences have found on the participants' choice intention for snack vegetables. In contrast, participants expressed their intention for unhealthy snacking, which confirms the study of Tak and colleagues (2010) for the low level of students' preference and by extension the low intake of snack vegetables.

## 5.2. Limitations and future research

Despite the results of this study, there are some limitations which have to be mentioned. First of all, snack vegetables were presented to the participants as pictures and not as real products. In a real school environment and real vending machine conditions, student perception about the snack vegetable assortment may be different. It is important to mention that the majority of participants filled the questionnaire during the evening which indicates that they were not at school. It is possible that this timing influenced snack preferences. Therefore, a natural and realistic environment can be a driver for future research influencing differently the results.

A second limitation constitutes the fact that the promotion was applied only on the outside of the vending machines. Green colour, slogan and cartoon logo were selected for the promotion of snack vegetables. However, other promotion techniques may have a different influence on students' snack choices. Taste-related messages in order to reinforce snack vegetable salience and selection could be an effective promotion technique according to Davee and colleagues (2005). In their study, the use of taste-testing technique to promote healthy (low in fat and sugar) snacks in combination with higher availability of healthy snacks in the vending machine, increased purchases on the healthy items.

Additionally, the number of snack vegetables was small compared to other assortments. Changes on the size of snack vegetable assortment may have a different effect on student perception and choice intention. It would be interesting to estimate students' evaluations on the snack vegetable assortment, their preferences and snack choice intentions for snack vegetables when the vending machine includes only healthy and snack vegetable assortments.

In terms of the questionnaire construct, there were also some limitations that have to be noticed. The English language of the questionnaire seemed to be a problem for Dutch students. Using a questionnaire in Dutch language may be better when a study is conducted in the Netherlands to make the task more understandable. In addition, the questions (statements) about the salience of snack vegetables in the vending machines, that participants had to answer, had a relevant low score of reliability ( $\alpha=0.651$ ). This score indicated that the statements were acceptable for the research, however, in a future research need to be improved.

According to participants, freshness seems a determinant driver of their snack decisions. Students were not sure about the freshness and by extension the quality of snack vegetables in the vending machines. Taste observations by giving free samples of snack vegetables can give make them sure about the quality and the taste of snack vegetables. The idea of free sampling had positive results on the study of Davee and colleagues (2005).

In the present study, the snack vegetable assortment consisted of red and mix cherry tomatoes, carrots and peppers. A vending machine including exclusively a variety of snack vegetables and placed in the school environment would be an interesting idea to test in a future research, in order to check if students choose snack vegetables as a snack solution. Promotion interventions can be applied as well on the outside, inside or both of vending machines, in combination with free samples of the relevant vegetables serviced to the students for a taste observation.

Furthermore, this study conducted on adolescent students who were 16 years or older. It would be interesting to examine, in future research, the snack choice intentions of adolescent students aged from 12 to 15, or to extend the target group including more countries and higher number of participants.

## 5.3. Implications

The purpose of this study was to examine whether snack vegetables selection and salience of the snack vegetable assortment can be encouraged by promotion interventions at vending machines and changes of the competitive healthy assortment inside the vending machine. As it was explained earlier, promotion or changing the competitive healthy assortment did not impact the salience of snack vegetable assortment, students' preference or student's choice intention for

snack vegetables from the vending machine. In particular, by using a green vending machine with cartoon figure and slogan (“Better CHOICES for Better LIFE”) and either having 25% or 75% of healthy snacks, did not influence students to select snack vegetables as a snack solution. These findings are useful for marketers, companies or consultants that are involved in the food vending machines industry.

## 6. References

- Areni, C. S., & Kim, D. (1994). The influence of in-store lighting on consumers' examination of merchandise in a wine store. *International journal of research in marketing*, 11(2), 117-125.
- Bargh, J. A. (2006). What have we been priming all these years? On the development, mechanisms, and ecology of nonconscious social behaviour. *European journal of social psychology*, 36(2), 147-168.
- Berghöfer, A., Pischon, T., Reinhold, T., Apovian, C. M., Sharma, A. M., & Willich, S. N. (2008). Obesity prevalence from a European perspective: a systematic review. *BMC public health*, 8(1), 200.
- Berkey, C. S., Rockett, H. R., Field, A. E., Gillman, M. W., & Colditz, G. A. (2004). Sugar-added beverages and adolescent weight change. *Obesity*, 12(5), 778-788.
- Birch, L. L. (1999). Development of food preferences. *Annual review of nutrition*, 19(1), 41-62.
- Birch, L. L., & Fisher, J. O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics*, 101(Supplement 2), 539-549.
- Bordalo, P., Gennaioli, N., & Shleifer, A. (2013). Salience and consumer choice. *Journal of Political Economy*, 121(5), 803-843.
- Brehm, J. W. (1972). *Responses to the loss of freedom: A theory of psychological reactance*. General Learning Press.
- Briefel, R. R., Wilson, A., & Gleason, P. M. (2009). Consumption of low-nutrient, energy-dense foods and beverages at school, home, and other locations among school lunch participants and nonparticipants. *Journal of the American Dietetic Association*, 109(2), S79-S90.
- Brown, M. V., Flint, M., & Fuqua, J. (2014). The effects of a nutrition education intervention on vending machine sales on a university campus. *Journal of American College Health*, 62(7), 512-516.
- Brug, J., Tak, N. I., te Velde, S. J., Bere, E., & De Bourdeaudhuij, I. (2008). Taste preferences, liking and other factors related to fruit and vegetable intakes among schoolchildren: results from observational studies. *British Journal of Nutrition*, 99(S1), S7-S14.
- Brunsø, K., Scholderer, J., & Grunert, K. G. (2004). Closing the gap between values and behavior—a means–end theory of lifestyle. *Journal of business research*, 57(6), 665-670.
- Byrd-Bredbenner, C., Johnson, M., Quick, V. M., Walsh, J., Greene, G. W., Hoerr, S., ... & Horacek, T. M. (2012). Sweet and salty. An assessment of the snacks and beverages sold in vending machines on US post-secondary institution campuses. *Appetite*, 58(3), 1143-1151.
- Callaghan, C., Mandich, G., & He, M. (2010). Healthier snacks in school vending machines: a pilot project in four Ontario high schools. *Canadian Journal of Dietetic Practice and Research*, 71(4), 186-186.

- Calle, E. E., Rodriguez, C., Walker-Thurmond, K., & Thun, M. J. (2003). Overweight, obesity, and mortality from cancer in a prospectively studied cohort of US adults. *N Engl J Med*, 2003(348), 1625-1638.
- Calza, S., Decarli, A., & Ferraroni, M. (2008). Obesity and prevalence of chronic diseases in the 1999–2000 Italian National Health Survey. *BMC Public Health*, 8(1), 140.
- Capaldi, E. D. (1996). *Why we eat what we eat: The psychology of eating*. American Psychological Association.
- Caruso, M. L., Klein, E. G., & Kaye, G. (2014). Campus-based snack food vending consumption. *Journal of nutrition education and behaviour*, 46(5), 401-405.
- Cashdan, E. (1994). A sensitive period for learning about food. *Human Nature*, 5(3), 279-291.
- Chaplin, K., & Smith, A. P. (2011). Definitions and perceptions of snacking. *Current Topics in Nutraceuticals Research*, 9(1/2), 53.
- Chernev, A. (2006). Decision focus and consumer choice among assortments. *Journal of Consumer Research*, 33(1), 50-59.
- Chernev, A. (2012). Product assortment and consumer choice: An interdisciplinary review. *Foundations and Trends® in Marketing*, 6(1), 1-61.
- Chernev, A., & Hamilton, R. (2009). Assortment size and option attractiveness in consumer choice among retailers. *Journal of Marketing Research*, 46(3), 410-420.
- Cooke, L. J., & Wardle, J. (2005). Age and gender differences in children's food preferences. *British Journal of Nutrition*, 93(5), 741-746.
- Davee, A. M., Blum, J. E. W., Devore, R. L., Beaudoin, C. M., Kaley, L. A., Leiter, J. L., & Wigand, D. A. (2005). PEER REVIEWED: The Vending and à la Carte Policy Intervention in Maine Public High Schools. *Preventing chronic disease*, 2(Spec No).
- De Irala-Estevez, J., Groth, M., Johansson, L., Oltersdorf, U., Prättälä, R., & Martínez-González, M. A. (2000). A systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables. *European journal of clinical nutrition*, 54(9), 706.
- Dingman, D. A., Schulz, M. R., Wyrick, D. L., Bibeau, D. L., & Gupta, S. N. (2015). Does providing nutrition information at vending machines reduce calories per item sold?. *Journal of public health policy*, 36(1), 110-122.
- Dinner, I., Johnson, E. J., Goldstein, D. G., & Liu, K. (2011). Partitioning default effects: Why people choose not to choose. *Journal of Experimental Psychology: Applied*, 17(4), 332.
- Dutta-Bergman, M. J. (2004). An alternative approach to social capital: Exploring the linkage between health consciousness and community participation. *Health Communication*, 16(4), 393-409.
- Fairburn, C. G., & Brownell, K. D. (Eds.). (2005). *Eating disorders and obesity: A comprehensive handbook*. Guilford Press.
- Fiske, A., & Cullen, K. W. (2004). Effects of promotional materials on vending sales of low-fat items in teachers' lounges. *Journal of the American Dietetic Association*, 104(1), 90-93.

French, S. A., Hannan, P. J., Harnack, L. J., Mitchell, N. R., Toomey, T. L., & Gerlach, A. (2010). Pricing and availability intervention in vending machines at four bus garages. *Journal of occupational and environmental medicine/American College of Occupational and Environmental Medicine*, 52(Suppl 1), S29.

French, S. A., Jeffery, R. W., Story, M., Breitlow, K. K., Baxter, J. S., Hannan, P., & Snyder, M. P. (2001). Pricing and promotion effects on low-fat vending snack purchases: the CHIPS Study. *American journal of public health*, 91(1), 112.

French, S. A., Jeffery, R. W., Story, M., Hannan, P., & Snyder, M. P. (1997). A pricing strategy to promote low-fat snack choices through vending machines. *American journal of public health*, 87(5), 849-851.

French, S. A., Story, M., Fulkerson, J. A., & Gerlach, A. F. (2003). Food environment in secondary schools: a la carte, vending machines, and food policies and practices. *American Journal of Public Health*, 93(7), 1161-1168.

Furst, T., Connor, M., Bisogni, C. A., & Sobal, F. J. (8). Falk, LW (1996). Food choice. A conceptual model of the process. *Appetite*, 26, 247-266.

Gebauer, H., & Laska, M. N. (2011). Convenience stores surrounding urban schools: an assessment of healthy food availability, advertising, and product placement. *Journal of Urban Health*, 88(4), 616-622.

Goi, C. L. (2009). A review of marketing mix: 4Ps or more?. *International journal of marketing studies*, 1(1), 2.

Hanks, A. S., Just, D. R., Smith, L. E., & Wansink, B. (2012). Healthy convenience: nudging students toward healthier choices in the lunchroom. *Journal of Public Health*, 34(3), 370-376.

Harnack, L., Snyder, P., Story, M., Holliday, R., Lytle, L., & Neumark-Sztainer, D. (2000). Availability of a la carte food items in junior and senior high schools: a needs assessment. *Journal of the American Dietetic Association*, 100(6), 701-703.

Hills, G. E., & Hultman, C. (2006). Promotion and advertising.

Hua, S. V., & Ickovics, J. R. (2016). Vending machines: A narrative review of factors influencing items purchased. *Journal of the Academy of Nutrition and Dietetics*, 116(10), 1578-1588.

Hua, S. V., Kimmel, L., Van Emmenes, M., Taherian, R., Remer, G., Millman, A., & Ickovics, J. R. (2017). Health Promotion and Healthier Products Increase Vending Purchases: A Randomized Factorial Trial. *Journal of the Academy of Nutrition and Dietetics*.

Huang, T. T., Kempf, A. M., Strother, M. L., Li, C., Lee, R. E., Harris, K. J., & Kaur, H. (2004). Overweight and components of the metabolic syndrome in college students. *Diabetes Care*, 27(12), 3000-3001.

Kelly, T., Yang, W., Chen, C. S., Reynolds, K., & He, J. (2008). Global burden of obesity in 2005 and projections to 2030. *International journal of obesity*, 32(9), 1431-1437.

Kemps, E., Tiggemann, M., & Hollitt, S. (2014). Exposure to television food advertising primes food-related cognitions and triggers motivation to eat. *Psychology & health*, 29(10), 1192-1205.

Kocken, P. L., Eeuwijk, J., Van Kesteren, N., Dusseldorp, E., Buijs, G., Bassa-Dafesh, Z., & Snel, J. (2012). Promoting the purchase of low-calorie foods from school vending machines: a cluster-randomized controlled study. *Journal of School Health*, 82(3), 115-122.

Kotler, P., & Armstrong, G. (2010). *Principles of marketing*. Pearson education.

Kubik, M. Y., Lytle, L. A., Hannan, P. J., Perry, C. L., & Story, M. (2003). The association of the school food environment with dietary behaviours of young adolescents. *American journal of public health*, 93(7), 1168-1173.

Lessard, L., Poland, M., & Trotter, M. (2014). Peer Reviewed: Lessons Learned From a Healthful Vending Pilot Program in Delaware State Agency Buildings, 2011–2012. *Preventing chronic disease*, 11.

Lindeman, M., & Sirelius, M. (2001). Food choice ideologies: the modern manifestations of normative and humanist views of the world. *Appetite*, 37(3), 175-184.

Livingstone, S., & Helsper, E. J. (2006). Does advertising literacy mediate the effects of advertising on children? A critical examination of two linked research literatures in relation to obesity and food choice. *Journal of communication*, 56(3), 560-584.

Lobstein, T., & Dobb, S. (2005). Evidence of a possible link between obesogenic food advertising and child overweight. *Obesity reviews*, 6(3), 203-208.

Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, B. W., & Zitman, F. G. (2010). Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. *Archives of general psychiatry*, 67(3), 220-229.

Lynch, J. G. (1991). Memory and decision making. *Handbook of consumer behavior*, 1-9.

McLeod, S. (2007). Maslow's hierarchy of needs. *Simply Psychology*, 1.

NAz, K. A. Y. A., & Epps, H. (2004). Relationship between color and emotion: A study of college students. *College Student J*, 38(3), 396.

Nestle, M. (2013). *Food politics: How the food industry influences nutrition and health* (Vol. 3). Univ of California Press.

Netherlands Nutrition Centre: Richtlijnen voedselkeuze 2011 (nutrition guidelines). 2011, Accessed at February 3, 2012 at [http://www.voedingscentrum.nl/Assets/Uploads/Documents/Voedingscentrum/Actueel/00\\_Richtlijnen%20voedselkeuze%202011.pdf](http://www.voedingscentrum.nl/Assets/Uploads/Documents/Voedingscentrum/Actueel/00_Richtlijnen%20voedselkeuze%202011.pdf). 2011., (nutrition guidelines)

Neumark-Sztainer, D. (2001). Factors Associated with Nutritional Intake in Adolescents. *National Technical Information Service, Springfield, VA*.

New, S. A., & Livingstone, M. B. E. (2003). An investigation of the association between vending machine confectionery purchase frequency by schoolchildren in the UK and other dietary and lifestyle factors. *Public health nutrition*, 6(5), 497-504.

North, A. C., Hargreaves, D. J., & McKendrick, J. (1999). The influence of in-store music on wine selections. *Journal of Applied psychology*, 84(2), 271.

Olsen, G. D. (2002). Salient stimuli in advertising: The effect of contrast interval length and type on recall. *Journal of Experimental Psychology: Applied*, 8(3), 168.

Park, S., Sappenfield, W. M., Huang, Y., Sherry, B., & Bensyl, D. M. (2010). The impact of the availability of school vending machines on eating behaviour during lunch: The Youth Physical Activity and Nutrition Survey. *Journal of the American dietetic association*, 110(10), 1532-1536.

Pharis, M. L., Colby, L., Wagner, A., & Mallya, G. (2017). Sales of healthy snacks and beverages following the implementation of healthy vending standards in City of Philadelphia vending machines. *Public Health Nutrition*, 1-7.

Physicians Committee for Responsible Medicine. 2001 School Lunch Report: School lunch program fails to make the grade. Available at: [http://www.healthyschoollunches.org/reports/report2001\\_intro.html](http://www.healthyschoollunches.org/reports/report2001_intro.html). Accessed December 15, 2004.

Probart, C., McDonnell, E., Bailey-Davis, L., & Weirich, J. E. (2006). Existence and predictors of soft drink advertisements in Pennsylvania high schools. *Journal of the American Dietetic Association*, 106(12), 2052-2056.

Raghunathan, R., Naylor, R. W., & Hoyer, W. D. (2006). The unhealthy= tasty intuition and its effects on taste inferences, enjoyment, and choice of food products. *Journal of Marketing*, 70(4), 170-184.

Rawal, P. (2013). AIDA Marketing Communication Model: Stimulating a purchase decision in the minds of the consumers through a linear progression of steps. *International Journal of Multidisciplinary research in social & management sciences*, 1(1), 37-44.

Ryu, G., Lim, E. A. C., Tan, L. T. L., & Han, Y. J. (2007). Preattentive processing of banner advertisements: The role of modality, location, and interference. *Electronic Commerce Research and Applications*, 6(1), 6-18.

Sela, A., Berger, J., & Liu, W. (2008). Variety, vice, and virtue: How assortment size influences option choice. *Journal of Consumer Research*, 35(6), 941-951.

Skinner JD, Carruth BR, Wendy B, Ziegler PJ: Children's food preferences: A longitudinal analysis. *J Am Diet Assoc* 102 :1638– 1647, 2002 .

Spear, B. A. (2002). Adolescent growth and development. *Journal of the Academy of Nutrition and Dietetics*, S23.

Stöckli, S., Stämpfli, A. E., Messner, C., & Brunner, T. A. (2016). An (un) healthy poster: When environmental cues affect consumers' food choices at vending machines. *Appetite*, 96, 368-374.

Suarez-Balcazar, Y., Redmond, L., Kouba, J., Hellwig, M., Davis, R., Martinez, L. I., & Jones, L. (2007). Introducing systems change in the schools: the case of school luncheons and vending machines. *American Journal of Community Psychology*, 39(3-4), 335-345.

Tak, N. I., Te Velde, S. J., Singh, A. S., & Brug, J. (2010). The effects of a fruit and vegetable promotion intervention on unhealthy snacks during mid-morning school breaks: results of the Dutch Schoolgruiten Project. *Journal of human nutrition and dietetics*, 23(6), 609-615.

- Templeton, S. B., Marlette, M. A., & Panemangalore, M. (2005). Competitive foods increase the intake of energy and decrease the intake of certain nutrients by adolescents consuming school lunch. *Journal of the American Dietetic Association*, 105(2), 215-220.
- Van Herpen, E., & Pieters, R. (2002). The variety of an assortment: An extension to the attribute-based approach. *Marketing Science*, 21(3), 331-341.
- Van Herpen, E., & Pieters, R. (2007). Anticipated identification costs: Improving assortment evaluation by diagnostic attributes. *International Journal of Research in Marketing*, 24(1), 77-88.
- Van Ittersum, K., Pennings, J. M., Wansink, B., & Van Trijp, H. C. (2007). The validity of attribute-importance measurement: A review. *Journal of Business Research*, 60(11), 1177-1190.
- Van Kleef, E., Otten, K., & van Trijp, H. C. (2012). Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices. *BMC public health*, 12(1), 1072.
- Van Kleef, E., & van Trijp, H. C. (2018). Methodological Challenges of Research in Nudging. In *Methods in Consumer Research, Volume 1* (pp. 329-349).
- Vrechopoulos, A. P., & Siomkos, G. J. (2002). Virtual store atmosphere in non-store retailing. *Journal of Internet Marketing*, 3(1), 22-38.
- Walker, J. S., Tedesco, D. E., Van Luchene, A. S., & Bemmer, K. (2007). *U.S. Patent No. 7,249,050*. Washington, DC: U.S. Patent and Trademark Office.
- Wardle, J., Haase, A. M., Steptoe, A., Nillapun, M., Jonwutiwes, K., & Bellis, F. (2004). Gender differences in food choice: the contribution of health beliefs and dieting. *Annals of Behavioral Medicine*, 27(2), 107-116.
- Wardle, J., Herrera, M.L., Cooke, L. & Gibson, E.L. (2003) Modifying children's food preferences: the effects of exposure and reward on acceptance of an unfamiliar vegetable. *Eur. J. Clin. Nutr.* 57, 341-348.
- Wechsler, H., Brener, N. D., Kuester, S., & Miller, C. (2001). Food service and foods and beverages available at school: results from the School Health Policies and Programs Study 2000. *Journal of School Health*, 71(7), 313-324.
- Wiecha, J. L., Finkelstein, D., Troped, P. J., Fragala, M., & Peterson, K. E. (2006). School vending machine use and fast-food restaurant use are associated with sugar-sweetened beverage intake in youth. *Journal of the American Dietetic Association*, 106(10), 1624-1630.
- Wildev, M. B., Pampalone, S. Z., Pelletier, R. L., Zive, M. M., Elder, J. P., & Sallis, J. F. (2000). Fat and sugar levels are high in snacks purchased from student stores in middle schools. *Journal of the American Dietetic Association*, 100(3), 319-322.
- Yngve, A., Wolf, A., Poortvliet, E., Elmadfa, I., Brug, J., Ehrenblad, B., ... & Pérez-Rodrigo, C. (2005). Fruit and vegetable intake in a sample of 11-year-old children in 9 European countries: The Pro Children Cross-sectional Survey. *Annals of Nutrition and Metabolism*, 49(4), 236-245.
- Zandstra, E. H., Weegels, M. F., Van Spronsen, A. A., & Klerk, M. (2004). Scoring or boring? Predicting boredom through repeated in-home consumption. *Food Quality and Preference*, 15(6), 549-557.

## APPENDICES

### APPENDIX A: Questionnaire instructions



#### Welcome!

Dear student,

This study is organised by the Marketing and Consumer Behavior group of Wageningen University and is part of my MSc project on the consumption of snack vegetables. In this study, we look into peoples' preference on snacks that are available in the vending machines.

This questionnaire will take about 5 minutes. More information can be obtained by sending an e-mail to [vasiliki.kamilaraki@wur.nl](mailto:vasiliki.kamilaraki@wur.nl). You have to be 16 years or older to participate.

By clicking on the highlighted text below you give your consent to participate in this research and you acknowledge the following:

- I have read and understood the information above and have been given a full explanation of my duties as participant and the likely duration of this study.
- I understand that participation in this study involves filling in an online questionnaire.
- I understand that all personal data relating to my participation in this study is held and processed in the strictest confidence.
- I understand that I am free to withdraw from this study at any time without the need to justify my decision and without prejudice. I can do this by simply closing my browser.

Thank you in advance!

Kind regards,  
Vasiliki Kamilaraki

I herewith confirm that I have read and understood the above information and voluntarily agree to take part in this research



## APPENDIX B: Questions of the questionnaire



Please indicate to what extent you agree with the following statements about snack vegetables.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
The snack vegetables are easily observed in the vending machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The snack vegetables stand out of the other snacks in the vending machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Please indicate to what extent you agree with the following statements about snack vegetables.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I liked the displayed snack vegetables in the vending machine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The snack vegetables in the vending machine looked attractive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The snack vegetables in the vending machine looked appealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Please indicate to what extent agree with the following statements about snack vegetables.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
In general, I like the taste of snack vegetables	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I appreciate vegetables as a snack	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Snack vegetables are attractive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



How hungry are you at this moment?

Not at all hungry | ☐ ☐ ☐ ☐ ☐ | Very hungry



Please indicate to what extent agree with the following statements about health consciousness.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
It is important for me to snack healthy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to avoid unhealthy snacks from vending machines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



What is your age (in years)?



What is your gender?

- ☐ Male
- ☐ Female



What is your level of education?

- ☐ VMBO  
☐ VWO  
☐ HAVO  
☐ Other



How seriously did you fill this questionnaire?

Not seriously at all | ☐ ☐ ☐ ☐ ☐ | Very seriously



In case you have any comments or suggestions, please write them down in the field below.



If you are interested in this research and like to receive more information about the results, please leave your email address so i can send you more information afterwards (Optional).

Would you like to receive invitations for our coming online studies?

If so, please fill in your email below.

Email



Thank you for filling in this questionnaire. You can now click on the arrow to submit the answers.

