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MSc. THESIS REPORT

EFFECT OF SATIETY CLAIM AND EXTERNAL CUES ON EXPECTED AND EXPERIENCED SATIETY

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EFFECT OF SATIETY CLAIM AND EXTERNAL CUES ON EXPECTED AND EXPERIENCED SATIETY

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ABSTRACT

The prevalence of obesity has been attributed to over-consumption of food. In addition to its medical consequences, various economic consequences of obesity have been identified. Satiety enhancing foods have the tendency to prevent over-consumption of food as they keep consumers full for long thereby curbing the obesity epidemics on the long-run. To this effect, satiety claims on food products are used to 'prepare' the mind of consumers as to what to expect after consuming such food products which then influence the amount of the food consumed. However, satiety claims alone are not sufficient to influence the satiety expectations and food intake of consumers as there are external cues such as the framing of the food as meal or snack as well as shape, height, colour, etc. of the food package which influence satiety expectations of the consumers. This study is thus aimed at investigating how external cues can enlarge the effect of satiety claim on expected and experienced satiety thereby making satiety claims more credible. An online pre-test was first carried out using pictures of yoghurt drink presented in various dinnerware; manipulating the colour, size, shape of the dinnerware in which the yoghurt drink was presented together with the presence or absence of satiety claim. This was done in order to decide the most salient external cue that will moderate the relationship between satiety claim and satiety expectations of the consumers in the food consumption experiment and also to investigate the influence of external cues and satiety claim on expected satiety without actual food consumption. Result of the online pre-test shows that the height of the package and satiety claim had significant influence on the satiety expectations of the consumers as they expected yoghurt drink presented in tall glass with satiety claim to be more satiating. A food consumption experiment was later carried out manipulating the presence and absence of claim with the height of the dinnerware. Result shows significant influence of satiety claim and height of the container in which the yoghurt was presented on the satiety expectation of the consumers as they expected yoghurt drink presented in a tall glass with satiety claim to be more satiating. However, no significant influence of satiety claim and height of dinnerware on experienced satiety were reported. Although participants presented with yoghurt drink in a tall glass estimated drinking more than those presented with the same quantity of yoghurt drink in a short glass, nonetheless, this has no significant influence on the satiety experienced. This indicates that consumers respond more to their internal cues and experienced satiety depends on the actual consumption volume and the actual satiety-ability of the food consumed.

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1.0 INTRODUCTION

Obesity has emerged as a worldwide phenomenon in both developed and developing nations of the world, affecting not only the wealthy but also the middle-income and low income population. The prevalence of obesity has more or less become an epidemic (Popkin and Doak 1998; Philip 2004). In the last decade, the occurrence of obesity has more than doubled in the Western and Westernizing countries with over 65% of the American population classified as being overweight or obese (Verduin et al., 2005). In Latin America, more than 50% of the Mexican population and 30% of the Peruvian population is obese (Philip 2004). Obesity has been identified to be the cause of various health problems such as hypertension, atherosclerosis, certain types of cancer, type 2 diabetes etc. (Bray 2004). Apart from the aforementioned medical consequences, obesity also has economic consequences such as increased medical cost; obese individuals have been reported to incur up to 36% higher annual medical expenditures than normal weight people. Furthermore, there is higher rate of absenteeism among obese workers when compared to normal weight workers (Finkelstein et al.,2005) resulting in reduced productivity. The abovementioned medical and economic consequences of obesity have made it imperative that the obesity epidemic is reversed.

The cause of obesity has been identified to be multi-factorial; with genetic composition playing a role (Fishbein 2001). However, the widely recognised cause of obesity is imbalance between energy intake and expenditure i.e. high energy intake and low energy expenditure (Bray 2004; Finkelstein, et al. 2005; Fishbein 2001; Raben et al. 2003). As a result, the best way to tackle obesity is to reduce energy intake and increase energy expenditure. The latter can be achieved through increased physical activity (Sallis and Glanz 2009) while foods with high satiety effect are desirable for achieving the former as they help to control appetite and prevent overconsumption (Blundell 2010). This led to the development functional foods with ingredients chosen based on the premise that compared to conventional foods; they can make consumers full for long thereby helping to manage or prevent obesity (van Kleef, van Trijp et al. 2012). There is scientific evidence that some food components have beneficial physiological and psychological effects in the area of satiety (van Kleef, van Trijp et al. 2012). For instance dietary fibres are isolated and used as functional food ingredient to promote high satiety as they reach the colon undigested thus keeping consumers satiated for long (Benelam 2009). Satiety claims on such functional foods products are used to communicate the ability of such foods to help achieve reduced body weight. Although this has generated a lot of controversy in past literature as it is the belief of many authors that satiety alone is not the only means of achieving reduced body weight (Bellisle and Tremblay 2011; Booth and Nouwen 2010; David 2011; Smeets and van der Laan 2011). As such, claims should not be stated in the context of promoting weight loss, rather in the context of making consumers feel full for long thereby reducing energy intake (David 2011).

When consuming foods, consumers have expectations regarding the satiety a particular food confers, this expectation is important as it influences decisions about portion size (Brunstrom 2008). Meaning that expected satiety is highly correlated with food portion size decisions and the expectation is governed by the satiation experienced after the food has been consumed (Fay et al., 2011). This expectation enables anticipatory control of meal size in the pre-meal planning stage and thus informs subsequent meal size decisions. As such, small portion size is consumed for food with high expected satiety, thus preventing overconsumption and weight gain. Also, satiety has been reported to have a

cognitive aspect such that having knowledge of the satiating effect of a food can result in reduced intake and increased feeling of fullness (Brunstrom et al., 2011). Hence, emphasizing the potential satiating attributes of a food on packaging labels has been recommended so as to 'prepare' the mind of the consumer as regards what to expect after consuming such food, this influences the amount of the food consumed (Brunstrom et al., 2011). In addition, studies have shown that food consumption volume decisions are not based on the feeling of hunger alone but they are unconsciously influenced by external cues such as plate size and shape, lighting, layout etc. (Wansink 2010). There is need for an understanding of how these cues influence satiety in order to tackle the obesity epidemic (Hetherington 2007).

Various studies have been carried out to investigate the effect of manipulating beliefs about the satiating effects of foods on expected and experienced satiety (Brunstrom et al., 2011; Yeoman et al., 2001; Shide and Rolls 1995; Pliner and Zec 2007; Wooley 1972). Although it has been shown that information about the satiety ability of food can help enlarge expected satiety thereby reducing food intake, however, the claims alone are not necessarily credible and sufficient in achieving this. This is because there are wide varieties of factors (both internal and external) that influence satiety and food intake such as the nutritional composition of the food (Benelam 2009), the colour, weight, shape and size of the dinnerware (Smith and Ditschun 2009; Ares and Deliza 2010; Piqueras-Fiszman and Spence 2012) as well as the framing of the food as either a meal or snack (Pliner and Zec 2007).While various studies have been carried out to investigate the role of cognition with respect to nutrition and satiety labelling on food intake, less has been done to investigate how external cues can make these claims more impactful on consumers. This study is thus aimed at understanding which external factor is best able to enlarge the effect of satiety claims thereby making them more credible. Development of effective persuasive claims for functional foods is rather difficult (van Kleef et al., 2005), this study is thus important for manufacturers and marketers of satiety enhancing functional foods to help them have an understanding of how to best communicate the satiety ability of food products to consumers through food package cues in addition to the use of satiety claims alone. It is also hoped that the outcome of this study will be useful in restaurants for the selection of appropriate dinnerware for presenting foods with high satiety. The research questions this study hope to answer are:

- What is the influence of satiety claim (e.g. 'keeps you full for long', 'hunger relieving') on expected and experienced satiety?
- What is the influence of external cues particularly related to framing of the food, as well as colour, shape and size of the dinnerware on expected and experienced satiety?
- To what extent do external cues influence the relationship between satiety claim, expected satiety and experienced satiety?

2.0 THEORETICAL BACKGROUND

This chapter is devoted to the review of literature on studies carried out in the field of satiety claim, external cues influencing food intake, expected satiety and experienced satiety. This is divided into two sections. The first section is a review of past literatures on hunger and satiety in general, how it contributes to weight management and the relationship between expected satiety, food intake and experienced satiety. The second section is devoted to the review of literature on external and internal cues (physiological factors) that influence satiety. The theoretical model that forms the basis of this study is depicted in Fig 1. The model shows that both external cues (i.e. nutritional labelling, the shape, weight and size of the food) and internal cues (i.e. food structure and composition factors and gastrointestinal mechanisms) affect satiety (Mela 2001; Mela 2006; Van Kleef, Van Trijp et al. 2012).

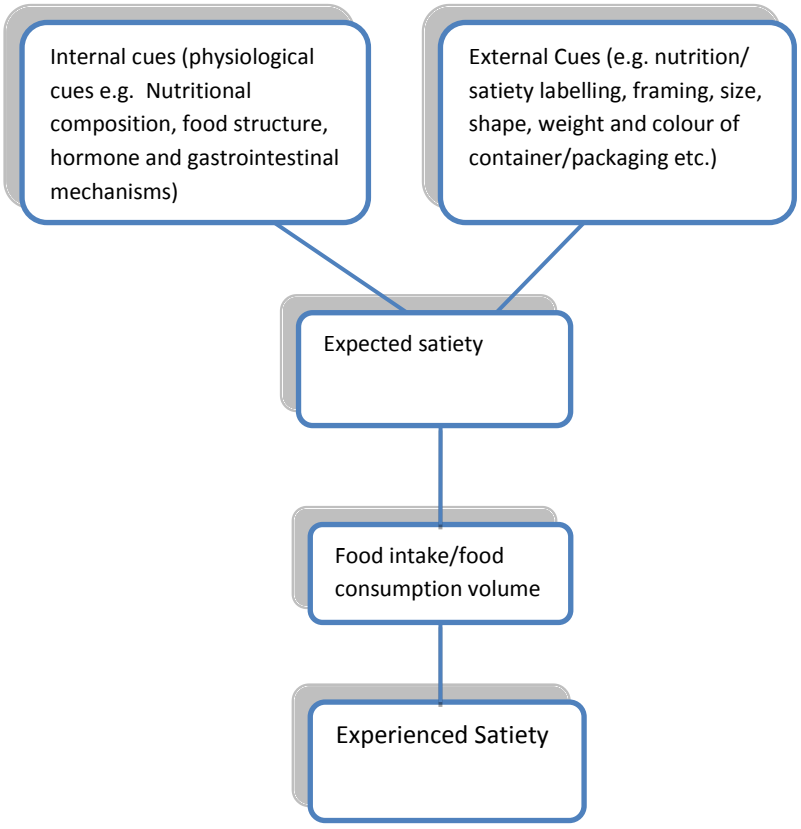

Fig 1: Theoretical framework of internal and external cues influencing satiety and food intake; adapted from Mela (2001; 2006) cited by van Kleef et al., (2012).

2.1 Hunger and Satiety

Often times, people start eating when they are hungry and stop eating when they are satiated (Read 1992). According to De Graaf (2011), hunger is an unpleasant sensation that drives people to want to eat. Also, Davis and Tarasuk (1994) define hunger as a physiological sensation related to lack of food and the desire to eat. On the other hand, satiety is a pleasant state. It has been defined as the inhibition of eating or the subjective feeling of the absence of the motivation to eat following the end of a meal (De Graaf 2011; Welch 2011). As stated earlier in the introduction, the major cause of obesity is an imbalance between energy intake and energy expenditure, thus, a reduction in energy intake and an increase in energy expenditure is recommended for management of body weight and

ultimately obesity control. A study by Wing (2008) reported by de Graaf (2011) shows that increased reported hunger after weight loss is involved in weight regain. Thus, hunger plays a crucial role in adhering to diets requiring control of energy intake. For this reason, foods with high satiety effect are useful in this regard as they keep consumers full for a long time thereby inhibiting food consumption and energy intake within a time period. However, reduction in food/energy intake at a particular point in time may not necessarily result in overall reduced energy intake and body weight (de Graaf 2011), rather there is need for sustained, goal directed change in diet and lifestyle (David 2011; de Graaf 2011; Pan and Hu 2011). Furthermore, changes in satiety and hunger alone do not influence food intake directly as it is possible to still keep eating even when satiated or not eat when hungry (de Graaf 2011). Furthermore, Read (1992) reported that though eating a meal drives away hunger, however, hunger may not be completely driven off even with food in the stomach, though it may be uncomfortable to eat anymore. The decision whether to eat or not also depends on factors related to the food (e.g. palatability) the person (e.g. the state of health of an individual) and the eating environment (e.g. eating alone versus eating with others) (de Graaf 2011). Although hunger, satiety and food intake may be disconnected in some ways, nonetheless, several studies have connected satiety with food intake and also food/energy intake with changes in body weight (de Graaf 2011).

The satiety consumers expect to derive from consuming a particular food has been shown to depend on their beliefs on that particular food and this belief is developed prior to consuming the food. The expected satiety has been reported in various studies to influence food consumption volume decisions so that a large portion size may be consumed for foods with low expected satiety (Brunstrom et al., 2011). Expected satiety has been shown to depend on external (psychological) and internal (physiological) factors. These factors are further discussed in subsequent chapters.

2.2 Internal Cues and their Impact on Expected and Experienced Satiety

This section explains how the nature of the food (i.e. its nutritional composition and structure) influences gastrointestinal processes and how this interaction influence satiety.

2.2.1 Nature of the Food and Satiety

This section describes the influence of food composition (protein, fat and carbohydrate) as well as food structure (solid or liquid) on satiety.

Food Composition and Satiety

Studies have shown that at sufficiently high levels, protein has as stronger effect on satiety than equivalent quantities of energy from carbohydrate and fat. Next to protein is carbohydrate and then finally fats (Benelam 2009; de Graaf 1992; Raben et al., 2003; Welch 2011) Although fat is higher in calorific value than protein and carbohydrate (protein and carbohydrate 4Kcal/g , fat 9Kcal/g), it has been shown to have weaker effect on satiety than protein and carbohydrate. In their study to investigate whether the effect of variety on food intake can be reduced by modifying the properties of food that are known to affect satiety, Rolls et al. (2004) varied the energy density and portion size of salad consumed as compulsory first course meal. Result showed that more of the main course (pasta) was eaten when smaller salad with higher energy density (15.5g fat) was consumed as a first course than when larger salad with lower energy density (1.6g fat) was taken as first course. This further shows the weak satiety effect of high fat food when compared to low fat one. Though the

salad with 15.5g fat is more energy dense and is thus higher in calorie (200kcal against 100kcal for the large salad portion) participants were reported to still eat more of the main course because it was less satiating when compared to the less energy dense salad.

Food Structure and Satiety

On the effect of structural factors on satiety, several studies have shown that solid foods confer stronger satiety than liquid foods even at equivalent weight and energy levels (Benelam 2009; De Graaf 2011; Ranawana and Henry 2011). Ranawana and Henry (2011) argue that sugars provided in liquid form tend to encourage passive over-consumption of energy due to their low satiety effect. In their study to investigate the comparative effect of liquid and solid carbohydrate foods on glycaemic and insulin responses and satiety, Ranawana and Henry (2011) reported a significant difference in the subjective feelings of hunger and satiety between respondents fed with Basmati rice (Solid carbohydrate) and sugar- sweetened carbonated soft-drink (liquid carbohydrate). This result was corroborated by Pan and Hu (2011) in their paper titled 'Effects of carbohydrates on satiety: differences between liquid and solid food'. There, they stated that liquid carbohydrates in general are less satiating than the solid form and as such incomplete energy compensation associated with sugar-sweetened beverages can contribute to obesity (de Graaf 2011). This has led to a suggestion of a causal link between beverage consumption and weight gain.

2.2.2 Gastrointestinal Mechanisms and Satiety

Read (1992) reports that gastrointestinal factors also play a role in the control of eating behaviour in humans and that hunger and satiety are controlled by different gastrointestinal mechanism. Although gastrointestinal mechanisms are not the only mechanisms controlling eating behaviour, nonetheless, they constitute important control systems that influence what is eaten. This thus explains the influence of gastrointestinal processes on satiety, based on the nutritional composition and structure of the food. The low satiety effect of liquid foods when compared to solid foods has been attributed to the swift passage of liquids through the stomach and intestines, which makes it difficult for the human body to perceive the energy content of the food thus resulting in reduced satiety signals Pan and Hu (2011). Also, the longer time needed to consume low energy density foods have been reported to lead to longer oro-sensory exposure times which results in higher satiety effect of low energy density foods when compared to high energy density (de Graaf et al., 1992).

Furthermore, studies have shown that physiological processes are activated in the gastrointestinal tract even before food consumption. As such, the sight, smell or thought of food can bring about anticipatory physiological process known as Cephalic Phase Responses (CPRs) (Nederkoorn et al., 2000; Williams 2010). According to Power and Schulkin (2008), CPRs are anticipatory changes in physiology and metabolism which work to prepare the digestive tract for the digestion of food and the absorption of nutrients and also to prepare the organs for the metabolism and storage of the absorbed nutrients. They are necessary for the optimization of the digestion, absorption and usage of the food nutrients ingested (Nederkoorn et al., 2000). In the absence of these responses, ability to ingest large amount of meals is limited (Williams 2010). Thus, CPRs play important role in the amount of food that can be eaten by an individual and preventing CPRs will result in consumption of smaller meals (Power and Schulkin 2008). The list of secretions involved in CPRs is rather long and it keeps

expanding however, few of them are: insulin, produced in the pancreas which regulates storage of glucose and fat; Cholecystokinin (CCK) which is produced in the small intestine and which helps to terminate feeding; Ghrelin, produced in the stomach and which stimulates appetite, fat absorption etc. (Power and Schulkin 2008).

It has been recently shown that CPRs play important role in appetite and satiety and hence determine the commencement and termination of eating thereby regulating meal size and duration as sensory contact with food can stimulate CPRs secretion leading to feeling of hunger (Power and Schulkin 2008). Preventing CPRs has been reported to result in consumption of smaller meals (Nederkoorn et al. 2000) so that reduced food intake can be achieved by altering CPRs processes e.g. by making the timing of meal unpredictable (Nederkoorn et al., 2000). Nonetheless, much attention is not given to the internal cues influencing satiety and food intake as this is not the focus of this study.

2.3 External Cues Relating to Satiety

In this section, important external cues that have been shown to impact expected and experienced satiety as well as food intake are reviewed. In addition to the compositional, structural and gastrointestinal mechanisms factors stated in section 2.2 above, there is a cognitive aspect to the satiety ability of a food. This can be inferred from information about the labelled qualification of the food i.e. satiety claim and nutrition labelling (Wansink et al., 2004; Wansink 2006) the eating occasion or framing of the food (meal or snack) (Pliner and Zec 2007) and also from external cues such nature of container / packaging i.e. the size, weight, shape (Wansink 2004; Smith and Ditschun 2009) etc.

Nutritional and Satiety labelling

Various studies have been carried to investigate the role of cognition on satiety through manipulating beliefs about nutritional composition and some other aspects relating to the satiety ability of various foods. Results have shown that beliefs about recently consumed food has an influence on the satiety it confers (Brunstrom et al., 2011). Consequently, consumers can be manipulated into feeling full or hungry depending on what they are made to believe they ate. The satiety consumers expect to derive from consuming a particular food has been shown to depend on their beliefs on that particular food and is developed prior to consuming the food. For instance, Brunstrom et al. (2011) reported that participants shown large portion of fruit as ingredients of a fruit smoothie and who believed that the smoothie contained the large portion fruit ingredient rated the smoothie as more filling than participants shown small fruit smoothie ingredients. This further show the effect of beliefs about food consumed on expected and experienced satiety.

In addition to cognitive factors of satiety claims, nutritional composition information and environmental cues, food familiarity has been shown to influence expected satiety. The result of the study by Brunstrom et al. (2008) on measuring expected satiety of common foods shows that expectation is learned over time. As such, satiety may be a conditioned reflex so that consuming a familiar food, whether it has been satiating in the past or not can result in conditioned response to the food when consumed subsequently (Capaldi et al., 2006; Fay et al., 2011).

The influence of nutritional information on satiety and food intake has been investigated in various studies. A study by Wooley (1972) shows that cognition plays a role in satiety and food intake regulation. By manipulating beliefs about the calorie content of a pre-load i.e. making participants believe they have taken a high calorie pre-load, participants report feeling fuller and also consumed less of the test meal. This study shows the influence of nutritional labelling on satiety and food intake. In the same manner, the influence of nutritional labelling (such as 'low-fat' or 'diet') on food intake was investigated in a study by Wansink (2006). His result showed that labelling a food as 'low-fat' or 'diet' led participant to consume more of the food regardless of whether it is hedonic or utilitarian. By labelling the same M&M chocolate as 'low-fat' for some participants and 'regular' for others, consumption was increased by 28%. Participants made to believe they are consuming low-fat M&M ate 28% (54 calories) more than participants in the regular M&M condition. This further shows the influence of manipulating beliefs about food consumed on food intake. Similar result was reported by Shide and Rolls in 1995 when they investigated the influence of information about the fat content of pre-loads on food intake and the subjective feelings of hunger and satiety. The result shows that information about the fat content of food influences food intake as participants given yoghurt pre-load labelled as low fat consumed more of the main meal than participants given the same yoghurt pre-load labelled as high fat. Meanwhile, the reverse was reported when information about the fat content of the pre-load was not provided as the highest food intake reported was in the high-fat condition. However, information about the fat content of the pre-load had no significant effect on hunger ratings in the study by Shide and Rolls (1995) as the subjective sensations of hunger reported by the participant did not differ on the basis of information about the fat content. Nevertheless, no satiety ratings were obtained in the studies

A contrary result to that of Shide and Rolls (1995) and Wansink (2006) was stated by Yeomans, et al., (2001) in their study to investigate how beliefs about fat content influence subsequent eating. The actual fat content of a soup pre-load was reported to influence the consumption volume of the test meal and not the labelled fat content as participant ate less of the test meal after the high-fat soup labelled as low-fat than after consuming the actual low-fat soup. This result suggests that realistic claims also influence satiety and food intake.

Eating occasion framing (meal versus snack)

Various studies have been carried out to investigate environmental cues which contribute to food intake. A study by Capaldi et al., (2006) shows that cognitive representation of food moderate short term food choices. Participants consumed more of the test food when the pre-load food was labelled as snack than when it was labelled as a meal. The total calorie consumed by the snack-group category was reported to be about 223kcal whereas that of the meal-group category was about 120kcal. Showing that participants who were made to believe they had snack as pre-load ate significantly more than participants made to believe they had meal. Similar result was reported by Pliner and Zec (2007). By activating the meal schema in some of the participants during the pre-load (through cues associated with meals such as dishes, cutlery, sitting at the table etc.) a significant difference was reported in the feeling of hunger and the amount of the test food consumed between participants in the meal and non-meal condition. Hunger ratings were higher among the participants in the non-meal condition than in the meal condition. Also, participants in the meal condition ate less of the test food than participants in the non-meal condition. Similar result was reported by Marmonier et al., (2002) in their study to investigate ways in which snacking in non-hungry state

contributes to obesity. They reported that consuming snacks at any interval within a meal have no influence on the time and the volume consumed of subsequent meal.

Nature of Dishware

Studies have been carried out to investigate the influence of nature of dishware and utensils on food intake and satiety. Piqueras-Fiszman and Spence (2012) investigated the influence of weight of container on expected satiety and perceived density of yoghurt served in heavy and light bowls. They reported that the expected satiety and perceived density differed significantly between yoghurt served in heavy bowl and that served in light bowl. Yoghurt served from the lighter bowl was perceived to be less dense and expected to be less satiating than yoghurt from a heaver bowl. Apart from weight of the plate, plate size has also been shown to influence food intake. The same amount of food served on a small plate appears to be large while it appears small when served on a large plate (Smith and Ditschun 2009). As a result, people serve more and consume more when eating from a large plate than from a small plate (Wansink 2004). Similar to this is the impression that tall slender glasses hold more drink than short wide glasses leading to the tendency to overcome when drinking from short wide glasses than from tall slender glasses (Wansink 2004; Smith and Ditschun 2009).

Colour has also been reported to influence consumer perception and acceptance of food products (Nazlin 1999) so that the attribute of a food can be inferred from its colour. According to Wansink etal., (2004) colour constitutes the search attribute of a product and this can be accurately evaluated before the product is purchased and consumed. A study by Calvo etal., (2001) shows that at the same flavour and sugar level, the perceived flavour and sweetness was stronger at high concentration of colorants. This shows the influence of colour on perceived flavour and sweetness and further corroborates the statement by Nazlin (1999) that the appearance of a food can have a halo effect which modifies the flavour perceived afterwards and the acceptability of the food. Apart from the colour of the food itself, the colour of food package has been shown to influence consumer perception and purchase decision (Ares and Deliza 2010). In their study to investigate the influence of package colour and shape on expected liking and willingness to purchase milk dessert, Ares and Deliza (2010) reported that colour and shape of the packaging had a highly significant effect on the expected liking of the product. The milk dessert packaged in yellow container was liked most, followed by that in white container while the one in black was the least liked. Likewise, package colour had a significant effect on the willingness to purchase the product.

Closely related to the influence of package colour on consumer perception is package shape. In the same study above, package shape was reported to influence liking as milk dessert in round package was preferred to that in square packaging. Nonetheless, package colour was reported to be more important for the evaluation of the product when compared to package shape. In addition to its effect on likeness and willingness to purchase, package shape and colour was also reported to have effect on consumers' product association so that the flavour and texture of the milk dessert was inferred from the colour and shape of the container. For instance in the milk dessert study of Ares and Deliza (2010) above, product in black container was associated with strong disgusting chocolate flavour. On the other hand, the yellow package was associated with creamy delicious vanilla flavour while white was associated with plain tasteless milky vanilla flavour. On the effect of package shape, round container was associated with creamy and soft while square container was associated with

thick and low-calorie. Similar result was reported by Spence (2012) on the influence of package shape on consumers perception and expected sensory properties of the food as angular-shaped containers correspond with sourness, bitterness, carbonation and crunchiness while round shapes correspond more with sweet, creamy flavour.

While several studies have been carried out to investigate the influence of product and product package colour on consumers' perception and evaluation of taste, texture and flavour, not much has been done to investigate the effect of food package colour on satiety. It is hoped that this study will contribute to the understanding of how food package cues contribute to satiety.

2.4 Mechanisms Explaining the Effects of External Cues on Satiety and Food Intake

The influence of container weight on perceived satiety ability of a food has been attributed to sensation transference in which feelings about the packaging of a food product is transferred to the content and it influences the ratings of the content (Piqueras-Fiszman and Spence 2012). As such, foods served or eaten in heavy bowls may be perceived to be denser and more satiating than that served in light bowls. The sensation transference mechanism works based on the weight-density-illusion in which food served in a heavy container is expected to be more satiating, which in turn affects subsequent feeling of fullness reported (Piqueras-Fiszman and Spence 2012). Closely related to the sensation transference mechanism is the size-contrast or Delboeuf illusion and vertical-horizontal illusion (Wansink 2004; Smith and Ditschun 2009). The vertical-horizontal illusion affects liquid portion sizes and it gives the impression that tall slender glasses hold more liquid than short wide glasses. The size-contrast or Delboeuf illusion on the other hand is driven by the relative size of two concentric circles and is likened to the amount of empty space on a plate of food (Wansink 2004; Smith and Ditschun 2009). The same quantity of food appears small on a large plate than on a small plate due to the large amount of empty space remaining on the large plate (Piqueras-Fiszman and Spence 2012). This makes it hard for consumers to correctly estimate the amount of food consumed thus leading to overconsumption when eating from a large plate (Piqueras-Fiszman and Spence 2012).

Furthermore, the presences of low-fat claim on food product reduce the guilt of indulgence on the part of the consumers and thus give them the freedom to over consume. This explains why people eat more of a food when it is labelled as 'low-fat' or 'diet' than when it is labelled as 'regular' (Wansink 2006). Emotions have been reported to play a role in determining how much food is consumed and this is anticipated before the food is consumed (Wansink 2006) so that anticipating guilt after consuming a particular food will result in reduced consumption of the food while. Hence, if the guilt is reduced or eliminated by the presence of 'low-fat' or 'diet' claim, intake of the food is increased. Another psychological mechanism which explains the influence of cognition on food intake is consumption norm. As snack foods are not 'normally' eaten to satiety, the expected satiety from snacks is mostly low. As such, consumers ignore the contribution of calories from snacks to their 'normal' daily food consumption and this leads to increased energy intake and hence overweight and obesity in the long-term. A food that is 'normally' eaten as snack may not be perceived as filling and consuming such food may not influence the consumption of a main meal soon after.

In summary, both physiological mechanism of gastrointestinal processes as well as the psychological mechanisms of sensation transference, size-contrast illusions as well as anticipated guilt and consumption norms influencing satiety has been investigated in past studies. Nonetheless, it is relatively unclear the exact role played by either of these two processes on satiety.

2.5 Framework for Study

Based on the theoretical background above, it is proposed that the combination of satiety claim and high expected satiety external cue will increase satiety expectations and satiety experienced afterwards than the presence of satiety claim or high expected satiety external cues alone. This is explained further in the figure below.

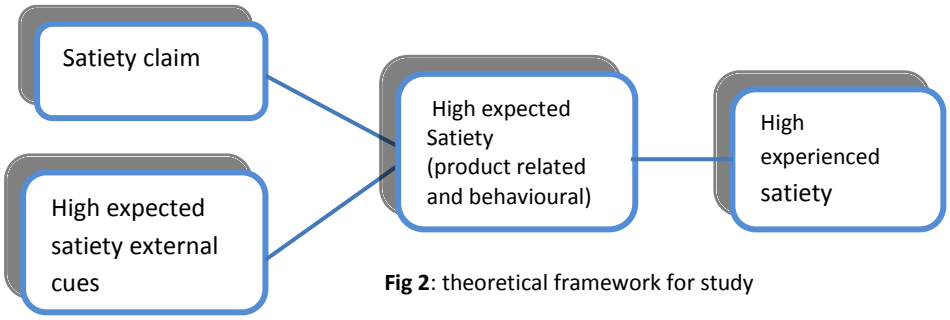

Fig 2: theoretical framework for study

2.6 Hypotheses

Based on the theoretical review and framework above, it is hypothesized that cognition i.e. prior information about the satiety ability of a particular food, provided through satiety claim will lead to high expected satiety (both in relation to the food and the consumer) and experienced satiety. However, this relationship is moderated by external cues such as the manner of presentation of the food (meal versus snacks) weight, size, colour, shape etc. of dinnerware. The hypotheses tested in this study is thus divided into three stages: the overall effect of claim on expected satiety and experienced satiety; the overall effect of external cue and finally the interactive effect of satiety claim and environmental cue on expected and experienced satiety .

Overall effect of satiety claim

- H 1 The presence of a satiety claim on a food leads to a higher expected and experienced satiety, compared to the same food without satiety claim.

Overall effect of external cue

- H2a Compared to framing a food as a snack, framing foods as a meal will lead to higher expected and experienced satiety.
- H2b Compared to a short and wide dinnerware in which food is presented; a tall and slender dinnerware will lead to higher expected and experienced satiety.
- H2c Compared to a round shape of dinnerware in which a food is presented, a square shape will lead to higher expected and experienced satiety.
- H2d Compared to a light colour of dinnerware in which a food is presented, a dark colour will lead to higher expected and experienced satiety.

Additional effect of external cues included with the claim attached to food

- H3a There will be an additional interactive effect of external cue on expected and experienced satiety so that the satiety claim (H1) will lead to the highest expected and experienced satiety, when it is combined with either a dark colour, square shape, tall and slender dinnerware or framed as meal.

3.0 METHODOLOGY

3.1 Online Pre-test Experiments on Expected Satiety

In order to decide which external cue could best moderate the relationship between satiety claims, expected satiety and experienced satiety, and to determine the influence of satiety claim and external cue manipulations on perceptions and expectations of consumers on satiety ability of food without actual consumption, an online pre-test was carried out. Four 2x2 between subject experimental studies were carried out using pictures of some of the external cues identified in the theoretical background. The presence or absence of claim was manipulated in all four experiments together with external cues relating to framing as a meal or snack (experiment a), height of the dinnerware - tall and slender versus short and wide (experiment b) shape of the dinnerware (experiment c) and lastly colour of the dinnerware in which the food is presented – dark versus light (experiment d). A detailed description of each experiment is presented in section 3.1.1. Across studies, the same quantity (200ml) of yoghurt drink was selected as the product. Participants were provided with pictures depicting each of the experimental conditions and randomly assigned to one of the four experimental conditions of each experiment (i.e. experiment a, b, c, and d). The sequence of which participants took part in each study was also randomised.

3.1.1 Description of the experiments

Experiment a

The first factor manipulated was the satiety claim attached to the product (absent versus present on product). The second factor manipulated was the framing of the food as a meal versus a snack; resulting in a 2x2 experimental design. The meal schema was activated by serving the yoghurt in ceramic dinnerware (soup bowl), with cutlery and napkin while the snack schema was activated by serving the yoghurt in plastic cup with drinking straw.

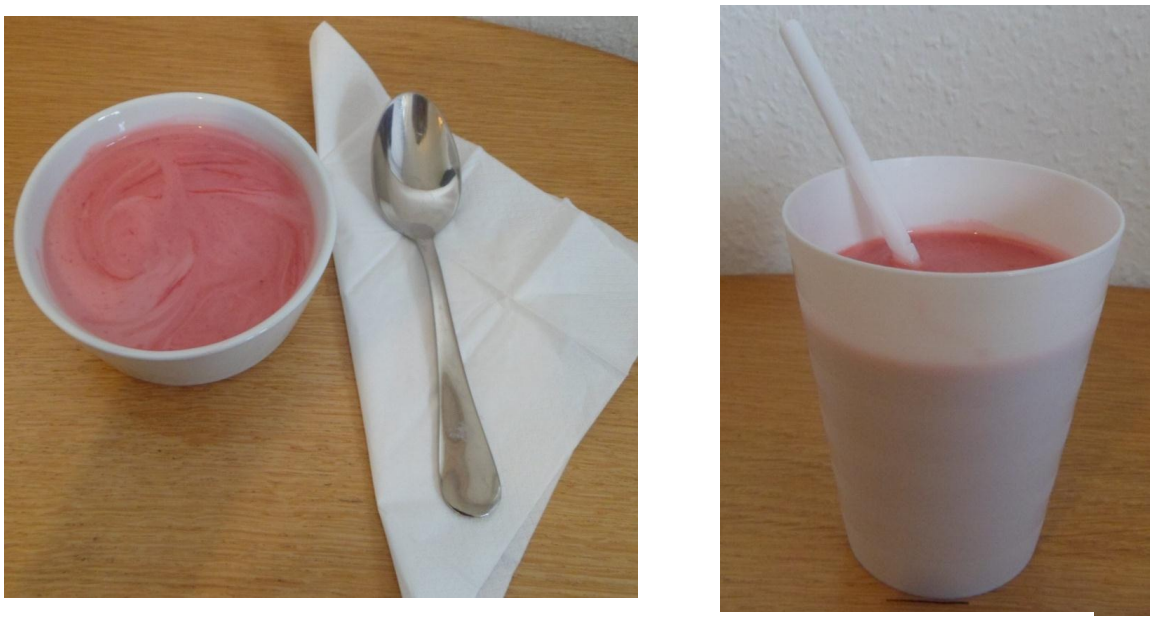

Fig 3: The picture on the left represents framing as meal (operationalized by the use of ceramic dinnerware, cutlery and napkin) while the picture to the right represents framing a snack (operationalized by the use of plastic cup and drinking straw)

Experiment b

The presence or absence of satiety claim was also manipulated in this condition, together with the height of the dinnerware (tall and slender versus short and wide). The tall glass is 14cm tall and is 6.1cm in diameter while the short glass is 8.5cm tall and 7.6cm in diameter.

Fig 4: the picture on the left represents the tall and slender container experimental condition while the picture on the right represents the short and wide container experimental condition

Experiment c

Similar to experiment a, the first factor that was manipulated is the satiety claim attached to the product (absent versus present on product). The second factor was the shape of the dinnerware (round versus angular). Both containers are 11cm in diameter.

Fig 5: the picture on the left represents the round container experimental condition while the picture on the right represents the angular container experimental condition

Experiment d

Similar to experiment a, the first factor manipulated was satiety claim attached to the product (absent versus present on product) while the second factor was the colour of the dinnerware in which the yoghurt drink was presented (dark versus light). A dark grey container was used in the dark condition while a white container was used in the light condition. Both containers are 9cm tall and 10cm in diameter.

Fig 6: the picture on the left represents the dark container experimental condition while the picture on the right represents the light (white) container experimental condition

3.1.2 Participants

Participants were 235 (194 females and 41 males) Dutch students recruited from the students mailing list of Wageningen University and Research Center, the Netherlands. The participants' age range from 18 to 54 years, {mean age 22.2 years (SD = 4.1)} and BMI range from 15.8 to 32.1 Kg/m^2 {mean BMI 21.8Kg/m^2 (SD = 2.7)}. The restraint eating score of the participants measured based on the Dutch Eating Behaviour Questionnaire (DEBQ) (van Strien et al., 1986) is 2.3 (SD = 0.7). Assessment of the 10 questionnaire items that made up the restraint eating DEBQ shows that the reliability is high (Cronbach's α = 0.89). The questionnaire questions are thus compressed into a single restraint eating scale.

3.1.3 Measures

***Expected Satiety Measure*:** This is divided into expected satiety measures related to the perceptions and expectations of the participants on the satiety ability of the yoghurt drink (product related expected satiety measure) as well as perceptions and expectations of how satiated the yoghurt drink will make them feel (consumer related expected satiety measure) The former was measured using six satiety related questions (filling, satisfying, satiating, will make me full quickly, will keep me full for long and will keep me full till next meal) on a 7-point scale ranging from "strongly disagree" to "strongly agree". The reliability of these six items is very high (Cronbach's α = 0.91), they are thus compressed into a single product related expected satiety scale. The latter was measured based on

the estimate of how full they expect the yoghurt drink to make them feel and how soon they expect to be hungry after consuming the yoghurt drink these are however measured on different scales. Expected fullness was measured on 100mm Visual Analog Scale (VAS) ranging from “not full at all” to “extremely full” while expected time frame between consumption and when hunger sets in was measured in minutes (0 minute to 300 minutes) (Brunstrom et al., 2011).

In order to determine the how satiety claim and external cue manipulations influence participants’ expectations of the sensory and other attributes of the yoghurt drink, their perceptions of other attributes of the yoghurt drink under the different experimental conditions described in section 3.1.1 was measured. These attributes include: those relating to taste and flavour (i.e. freshness, fruitiness deliciousness and tastiness), texture (i.e. thickness of texture and creaminess), healthiness (i.e. calorie richness and fattiness) price and convenience were also measured on a 7-point scale ranging from ‘strongly disagree’ to ‘strongly agree’. The calorie estimate and willingness to pay were measured on a separate scale. Calorie estimate was measured in calories from 0 to 500 calories on a slider while the amount of money they were willing to pay for a litre of the yoghurt drink was measured in euros from 0 to 7 euros also on a slider.

3.2 Food Consumption Experiment

In order to determine the interactive influence of satiety claim and package cues on expected satiety and experienced satiety, a food consumption experiment was carried out among female Dutch students of Wageningen University and Research Center, Netherlands. The choice of female Dutch participants was to eliminate variations in food consumption patterns across cultures and gender. As males tend to consume more than females, the quantity of food that will satiate a female participant may not satiate a male participant, thus resulting in variation in result obtained from the study. Also, food consumption patterns vary across culture so that the amount of food that will satiate an individual from a culture where small portion size is normally consumed may not satiate an individual from used to large portion sizes.

A 2x2 experimental design was carried out with two levels of cognition (presence versus absence of claim) and 2 levels of external cue manipulation (tall and slender versus short and wide container). The choice of height of container manipulation is based on the result of the online pre-test which shows significant influence of height of the container and the presence of claim on the satiety-expectations of the participants. Result of the online pre-test is presented in the next chapter. The dimensions of the containers are given below:

- Tall and slender: height = 12cm, diameter =5.9cm
- Short and wide : height = 6.5cm, diameter= 7.3cm

Fig 7: the picture on the left represents the tall and slender container food consumption experimental condition while the picture on the right represents the short and wide container food consumption experimental condition

3.2.1 Procedure

A between subject study was carried out for 5 days in which participants were invited to participate in a yoghurt tasting study, the purpose of which was not stated. Each external cue manipulation was randomised daily so that participants received yoghurt drink in the same type of glass/dinnerware per session. This was done so to avoid them guessing the purpose of the study. After receiving yoghurt drink, participants were randomly assigned to either the 'claim' or 'no claim condition' based on computer-based questionnaire containing purported picture of the package of the yoghurt drink presented to them. They were told the picture of the package label in the survey belong to the yoghurt drink presented to them. Although the same yoghurt served from the same pack was presented to the participants, they were made to believe they received different types of yoghurt by serving the yoghurt in an isolated place, away from their eyes and just presenting the already served yoghurt drink to them. As such, those assigned to the claim condition believed they received yoghurt that is actually more filling than those in the without claim condition, this way, they were unable to guess the purpose of the study. 210g (170ml) of yoghurt drink was used across all conditions. In order to make the satiety claim more believable, yoghurt drink with not too thin consistency was used in the study. This is achieved by mixing yoghurt drink with thin consistency (Friesche Vlag Milk and Fruit™) together with a thick yoghurt dessert (Arla Natuurlekkere Yoghurt™) in equal proportion. The calorie content of the new mixture is 138Kcal per 170ml portion.

Before consuming the yoghurt drink, participants' hunger and fullness ratings were taken on 100 VAS ranging from 'not hungry' to 'extremely hungry' and 'not full' to 'extremely full' for hunger and fullness respectively. Also, the extent to which they desire to eat and an estimate of how much they thought they could consume was taken on 100mm VAS from 'not at all' to 'extremely' and 'nothing at all' to 'large amount' for food desire and food consumption estimate respectively. Participants' satisfaction ratings were measured on 100mm VAS from 'not satisfied' to 'extremely satisfied' (Blundell, De Graaf et al. 2010). Both product related and consumer related expected satiety was measured using the measurement scales used in the online pre-test. They were also asked questions relating to their beliefs about other attributes of the yoghurt drink such as creaminess, fruitiness, freshness, WTP, calorie estimate, quantity estimate thickness of texture, tastiness, healthiness and convenience on a 7-point scale prior to consuming the yoghurt. Participants were then asked to drink all the yoghurt drink presented to them and their hunger, fullness, food consumption estimate, food desire ratings and satisfaction ratings were taken afterwards on 100mm VAS.

3.2.2 Participants

Participants were 101 female Dutch students of Wageningen University and Research Center, Netherlands. One of the participants was unable to drink all the yoghurt drink presented to her; she was thus exempted from the study, leaving a total of 100 participants for data analysis. The number of participants available for the study differed each day as such; there were more participants in the tall and slender dinnerware experimental condition than the short and wide condition (56 participants in the tall condition and 45 in the short condition). Nonetheless, the Pearson's Chi-square (χ^2) value shows no significant difference in the distribution of the participants into the experimental conditions. Participants' age range from 18 to 27 years {mean age 21 years (SD = 1.8)} and their BMI range from 16.82 to 31.35 Kg/m^2 {mean BMI is 22.0 Kg/m^2 (SD= 2.8)}. Mean restraint eating is 2.42 (SD = 0.75). The 10 questionnaire items of the DEBQ which measured the participants' restraint eating is shown to have high reliability (Cronbach's $\alpha = 0.90$). They are thus compressed into a single restraint eating scale.

3.2.3 Measures

Expected satiety: As done in the online pre-test, expected satiety was measured in relation to the yoghurt drink itself and in relation to the consumers. The former was measured based on the belief of the participants on the satiety ability of the yoghurt drink presented to them in the picture using six satiety related questions (e.g. filling, satisfying, satiating, will make me full quickly, will keep me full for long and will keep me full till next meal) on a 7-point scale ranging from "strongly disagree" to "strongly agree". The reliability of these items is high (Cronbach's $\alpha = 0.83$), they are thus combined into a single expected satiety scale. The latter was measured based on the estimate of how full they expect the yoghurt drink to make them feel and how soon they expect to be hungry after consuming the yoghurt drink these are however measured on different scales. Expected fullness was measured on 100mm Visual Analog Scale (VAS) ranging from "not full at all" to "extremely full" while expected time frame between consumption and when hunger sets in was measured in minutes (0 minute to 300 minutes) (Brunstrom et al., 2011).

Experienced satiety: measured based on the difference between participants' hunger, fullness, satisfaction, food desire and estimated food consumption ratings before and after consuming the

yoghurt drink on 100mm VAS (Blundell, De Graaf et al. 2010). Hunger ratings range from 'not hungry' to 'extremely hungry', fullness ratings from 'not full' to 'extremely full', satisfaction from 'not satisfied' to 'extremely' satisfied, food desire from 'extremely low' to 'extremely high' and food consumption estimate from 'nothing at all' to 'a very large amount'. These are recoded and combined into a single satiety scale (Cronbach's $\alpha = 0.92$). This method was used as participants were not told to refrain from eating anything apart from water prior to taking part in the study as it is done in most past literatures, as such; participants were not at the same hunger and fullness level prior to taking part in the study, as such, they were not at the same hunger/fullness level.

Other attributes: attributes relating to taste and flavour, texture, healthiness and convenience were also measured in the food consumption experiment using the same scale used in the online pre-test in order to determine the influence of external cue and satiety claim on Participants' perception of these attributes. Calorie estimate and participants' estimate of the quantity of yoghurt presented to them were also measured. The former was measured on a slider from 0 calories to 500 calories while the latter was measured on a slider from 0 to 400ml. The amount of money they were willing to pay for the quantity of yoghurt presented to them was also measured in euros from 0 to 5 euros.

3.1.4 Data Analysis

The online pre-test data were analysed using Analysis of Variance (ANOVA) procedure while the food consumption data were analysed using Analysis of Covariance (ANCOVA), controlling for the effect of differences in participants' BMI and restraint eating on their expected and experienced satiety. In both studies, the presence and absence of claim as well as external cue manipulations were the independent variables while satiety scores and other attributes scores of the yoghurt drink are the dependent variables.

4.0 RESULT AND DISCUSSION

4.1 Online Pre-tests Experiments on Expected Satiety

4.1.1 Experiment a – Meal versus Snack Manipulation

Investigation of the accuracy of randomisation shows no significant difference in the distribution of participants into all four experimental conditions in terms of age, gender, BMI and restraint eating; are randomly assigned into all 4 experimental conditions in terms of age, BMI and restraint eating. The mean age across all conditions is 22 years (SD= 4.17), mean BMI is 21.79Kg/m^2 (SD = 2.68) while mean restraint eating SD is 2.26 (SD = 0.74). Result of cross tabulation of gender across all conditions shows equal distribution of participants in terms of gender into all four experimental conditions (χ^2 = 0.79).

Result of ANOVA with expected satiety being dependent on the presence or absence of satiety claim and framing as meal or snack shows significant main effect of framing as meal on satiety expectations related to the consumers (expected fullness and time frame between consumption and hunger). Framing as meal has significant effect on how full participants expected to feel after consuming the yoghurt drink {F (3, 231) = 5.84, p = 0.016} and time frame between consumption and when they expect hunger to set in {(F = 10.76, p =0.001)}.Participants expect to feel fuller and also expect longer time frame before hunger sets in after drinking yoghurt drink framed as meal than for the same yoghurt drink framed as a snack. This thus proves hypothesis 2a (compared to framing of a food as snack, framing foods as meal leads to higher expected satiety). Result is presented in Table 1a. No main effect of satiety claim was reported and a combination of satiety claim and framing as a meal did not have additional significant effect on the satiety expectations of the participants.

Table 1a: Mean (SD) of Influence of Satiety Claim and Framing as Meal or Snack on Satiety Ratings of Yoghurt Drink

	Claim		No claim	
	Meal Mean (SD)	Snack Mean (SD)	Meal Mean (SD)	Snack Mean (SD)
Product related expected satiety (7-point scale)	4.24 (1.17)	4.33(1.24)	4.42(1.04)	4.18 (1.19)
Expected fullness after consuming yoghurt drink in the picture (100mm VAS)	47.17 (20.41)**	44.40 (19.83)	51.36 (17.18)**	41.85(20.35)
Time frame between consumption and when hunger is expected to set in(minutes)	77.27 (38.45)**	68.03 (40.14)	86.22 (37.10)**	63.38(34.05)

* *Significant effect of framing as meal or snack ($p < 0.05$)

Table 1b shows the result of ANOVA on the expectations of the participants on taste, texture and other attributes of the yoghurt drink. Result shows that framing as a snack has significant effect on the taste and texture ratings of the participants as they expected the yoghurt drink presented as a snack to be thicker, creamier, tastier and fruitier than yoghurt drink presented as a meal {F(3, 231) = 5.62, p =0.02} . Framing as a snack also has significant influence on convenience as yoghurt drink presented as a snack is rated more convenient to drink than that presented as a meal. However, the presence of satiety claim alone has significant effect on the participants' willingness to pay as they are willing to pay more for the yoghurt drink with satiety claim than that without satiety claim {F (3, 231) = 4.49, p = 0.04}.

Table 1b: Mean (SD) of Influence of Satiety Claim and Framing as Meal or Snack on Other Attributes of Yoghurt Drink

	Claim		No claim	
	Meal Mean (SD)	Snack Mean (SD)	Meal Mean (SD)	Snack Mean (SD)
Creamy and thick texture	4.89 (1.17)	5.36 (1.04)**	4.98 (1.27)	5.23 (1.21)**
Fresh, fruity delicious taste	4.44 (1.00)	4.98 (1.13)**	4.53 (1.18)	4.83 (0.96)**
un(Healthiness)	3.71 (1.13)	3.65 (1.21)	3.56 (1.00)	3.92 (1.18)
WTP (euros)	1.65 (0.67)*	1.75 (0.66)*	1.44(0.56)	1.58 (0.83)
Convenience	4.08 (1.51)	4.90 (1.35)**	4.05 (1.56)	5.03 (1.35)**
Suitability as light snack	4.27 (1.42)	4.55 (1.47)	4.43 (1.38)	4.17 (1.40)
Expensive	5.03 (1.44)	5.05 (1.37)	4.90 (1.39)	4.60 (1.37)
Calorie estimate	180.93 (79.21)	159.07 (78.22)	152.84 (64.82)	157.08 (66.32)

* Significant effect of claim ($p < 0.05$)
** Significant effect of framing as meal or snack ($p < 0.05$)

4.1.2 Experiment b – Tall versus Short Dinnerware Manipulation

Test of accuracy of randomisation shows no significant difference in the distribution of participants into all four experimental conditions in terms of age, gender, BMI and restraint eating; are randomly assigned into all 4 experimental conditions in terms of age, BMI and restraint eating. The mean age across all conditions is 22 years (SD = 4.20), mean BMI is 21.8 Kg/m^2 (SD = 2.67) while restraint eating is 2.26 (SD = 0.74). Result of cross tabulation of gender across all conditions shows equal distribution of participants in terms of gender into all four experimental conditions ($\chi^2 = 2.12$).

Result of ANOVA in Table 3b shows that the presence of satiety claim {F (3, 231) = 3.94, p = 0.05}, and the height of the dinnerware {F (3, 231) = 2.74, p=0.02} have significant effect on both product and consumer related satiety expectations of the participants. Participants expected yoghurt drink with satiety claim presented in a tall dinnerware to be more satiating than that in short dinnerware without satiety claim, thus proving hypothesis 1 and hypothesis 2b. The hypothesis of significant influence of satiety claim on expected satiety is also proved in this study as participants expect to feel fuller after consuming yoghurt drink with satiety claim {F(3, 231) = 4.48, p = 0.04}. Furthermore, result shows the influence of height of the dinnerware in which the yoghurt was presented on how soon consumers expect hunger to set in after consumption. Participants expected a longer time frame before hunger sets in for yoghurt drink presented in a tall dinnerware {F(3, 231) = 4.17, p = 0.04} thus proving hypothesis 2b i.e. tall and slender dinnerware will lead to higher expected satiety than short and wide dinnerware. Although the presence of claim and the height of the dinnerware

have significant main effect on the product related satiety expectations of the participants, nonetheless, only marginal additional effect of height of the dinnerware on the relationship between satiety claim and expected satiety was reported {F (3, 231) = 2.74, p = 0.10}. The graph in Fig. 8 shows that though the expected satiety was higher in the presence of satiety claim, however, expected satiety for yoghurt drink presented in a tall dinnerware with satiety claim was higher than that presented in short and wide dinnerware with satiety claim.

Table2a: Mean (SD) of Influence of Satiety Claim and Height of dinnerware (Tall and Slender versus Short and Wide) on Satiety Ratings of Yoghurt Drink

	Claim		No claim	
	Tall and slender Mean (SD)	Short and wide Mean (SD)	Tall and slender Mean (SD)	Short and wide Mean (SD)
Product related expected satiety (7-point scale)	{4.67 (1.14)*}**	4.08 (1.10)	4.13 (1.22)**	4.03 (1.14)
Expected fullness after consuming yoghurt drink in the picture (100mm VAS)	49.73 (19.10)*	45.25 (18.22)*	41.27 (20.35)	42.41 (20.00)
Time frame between consumption and when hunger is expected to set in(minutes)	78.49 (35.83)**	63.11(31.82)	73.88 (41.51)**	69.44 (38.13)

* Significant effect of claim ($p<0.05$)
** Significant effect of container height ($p<0.05$)

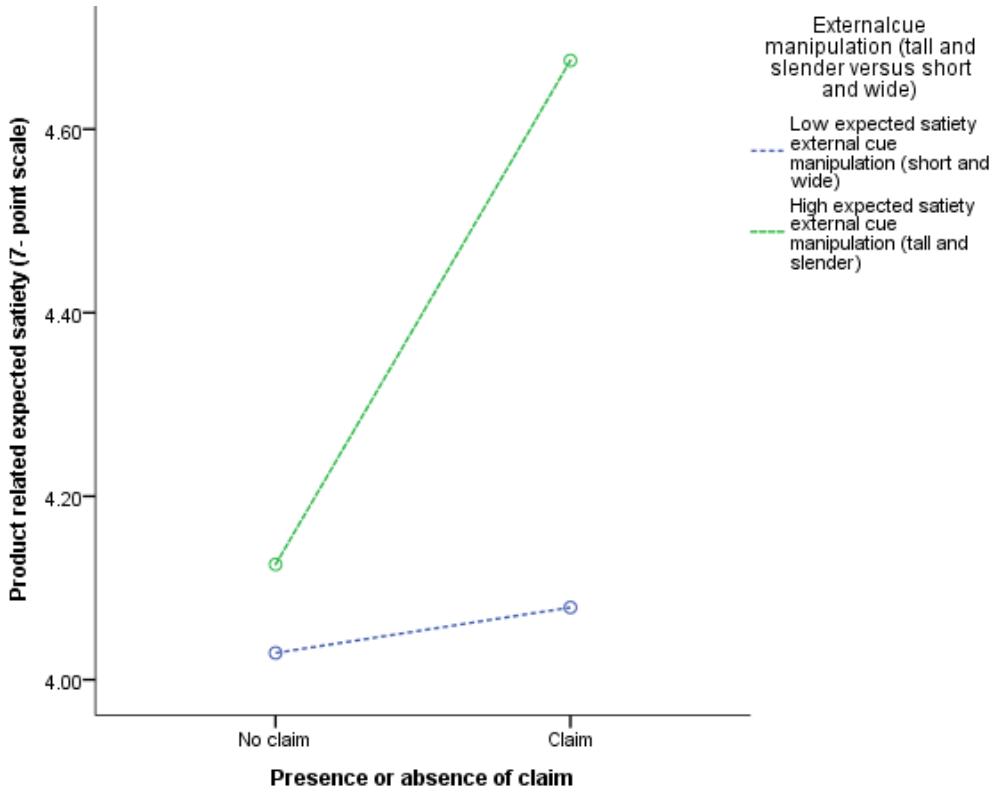

Fig8: Graph of expected satiety against satiety claim manipulations depicting additional effect of height of the dinnerware

Result of ANOVA of the other attributes of the yoghurt drink shows no significant main effect of satiety claim and height of the dinnerware the taste, texture, healthiness, calorie estimate and participants' willingness to pay. However, a marginal statistically significant additional effect of height of the dinnerware on the relationship between satiety claim and participants' willingness to pay was reported {F (3, 231) = 3.01, p = 0.08}. Participants were willing to pay more for yoghurt drink presented in tall dinnerware with satiety claim. Result is presented in table 2b.

Table 2b: Mean (SD) of Influence of Satiety Claim and height of Dinnerware on Other Attributes of Yoghurt Drink

	Claim		No claim	
	Tall and slender Mean (SD)	Short and wide Mean (SD)	Tall and slender Mean (SD)	Short and wide Mean (SD)
Creamy and thick texture	5.13 (1.21)	5.04 (1.07)	4.86 (1.10)	4.91 (1.11)
Fresh, fruity delicious taste	5.00 (1.01)	5.05 (0.74)	5.04 (1.00)	5.05 (0.93)
un(Healthiness)	3.66 (1.13)	3.49 (1.06)	3.45 (1.06)	3.49 (1.12)
WTP (euros)	1.79 (0.86)***	1.60 (0.71)	1.59 (0.59)	1.70 (0.60)
Convenience	5.23(1.35)	5.18 (1.29)	5.21(1.32)	5.11 (1.19)
Suitability as light snack	4.39 (1.44)	4.51 (1.30)	4.57 (1.32)	4.53 (1.47)
Expensive	5.25 (1.32)	5.07 (1.17)	4.98 (1.32)	5.11 (1.22)
Calorie estimate	167.82 (70.31)	150.09 (69.02)	164 .56 (67.57)	157.81 (78.66)

*** Marginally significant additional effect of height of dinnerware ($p < 0.1$)

4.1.3 Experiment c – Round versus Angular Dinnerware Manipulation

Participants are also randomly assigned into all four experimental conditions in terms of age, BMI, restraint eating and gender. The mean age across all conditions is 21.6 years (SD = 13.2) mean BMI is 21.9 Kg/m^2 (SD = 8.6) while mean restraint eating is 2.2 (SD = 2.3). Result of cross tabulation of gender across all conditions shows equal distribution of participants in terms of gender into all four experimental conditions (χ^2 = 2.5).

The result of ANOVA on all the satiety sub-scales shows no significant main effect of satiety claim and shape of the dinnerware on the satiety expectations of the participants. This refutes all hypotheses tested in this study and suggests that package shape may not make claim more credible.

Table 3a: Mean (SD) of Influence of Satiety Claim and Shape of Dinnerware (Round versus Angular) on Satiety Ratings of Yoghurt Drink

	Claim		No claim	
	Round Mean (SD)	Angular Mean (SD)	Round Mean (SD)	Angular Mean (SD)
Product related expected satiety (7-point scale)	4.55 (1.13)	4.34 (1.14)	4.49 (1.10)	4.39 (0.94)
Expected fullness after consuming yoghurt drink in the picture (100mm VAS)	48.12 (20.08)	47.21 (20.19)	49.42 (18.52)	44.73 (19.11)
Time frame between consumption and when hunger is expected to set in (minutes)	86.20 (45.21)	76.02 (36.92)	77.05 (39.61)	71.45 (34.77)

Result of ANOVA on other attributes relating to taste, texture, flavour, healthiness and WTP of the yoghurt drink under this condition shows no significant main effect of satiety claim and shape of dinnerware. However, the shape of the container has significant effect on the convenience (i.e. ease of drinking) of the yoghurt drink {F (3, 231), = 3.40, p = 0.04} as yoghurt drink presented in a round dinnerware was reported to be more convenient to drink than that presented in an angular dinnerware. Furthermore, the presence of satiety claim has significant effect on the amount of calories participants estimate the yoghurt drink contains as yoghurt drink without satiety claim is reported to contain more calorie than that with claim {F (3, 231) = 5.08, p= 0.03)}.

Table 3b: Mean (SD) of Influence of Satiety Claim Shape of Dinnerware (Round versus Angular) on Other Attributes of Yoghurt Drink

	Claim		No claim	
	Angular Mean (SD)	Round Mean (SD)	Angular Mean (SD)	Round Mean (SD)
Creamy and thick texture	5.36 (0.93)	5.15 (0.93)	5.39 (0.82)	5.16 (0.93)
Fresh, fruity delicious taste	4.94 (1.00)	4.81 (0.96)	4.94 (0.80)	4.78 (0.96)
Un(Healthiness)	3.84 (1.14)	3.46 (1.00)	3.83 (1.23)	3.76 (1.09)
WTP	1.59 (0.49)	1.67 (0.58)	1.78 (0.91)	1.57 (0.62)
Convenience	4.05 (1.66)	4.62 (1.35)**	4.15(1.51)	4.61 (1.57)**
Suitability as light snack	4.17 (1.48)	4.74 (1.21)	4.40 (1.48)	4.32 (1.40)
Expensive	5.22 (1.26)	5.12 (1.09)	5.12 (1.19)	4.98 (1.37)
Calorie estimate	168.03 (78.72)	144.86 (62.51)	187.17 (87.83)*	171.57 (79.39)*

* Significant effect of satiety claim ($p < 0.05$)

** Significant effect of shape of dinnerware ($p < 0.05$)

4.1.4. Experiment d – Dark versus Light Dinnerware Manipulation

Participants were also randomly assigned into all four experimental conditions in terms of age, BMI, restraint eating and gender. The mean age across all conditions is 22.6 years (SD = 4.2) years, mean BMI is 21.8 Kg/m^2 (SD = 2.7) while mean restraint eating ±SD is 2.3 ± 0.7. Result of cross tabulation of gender across all conditions shows equal distribution of participants in terms of gender into all four experimental conditions ($\chi^2 = 2.0$).

ANOVA reveals significant main effect of colour of the dinnerware on the product related expected satiety and participants' expected fullness. Participants expect yoghurt drink presented in a light dinnerware to be more satiating than that presented in dark dinnerware. This result negates the hypothesis that a dark dinnerware will lead to a higher expected satiety than light one. Furthermore, participants presented with yoghurt drink in light dinnerware expected to feel full for longer than those presented with yoghurt drink in dark one, nonetheless, this effect is on marginally statistically significant {F (3, 231) =3.31, p = 0.07}. Result is presented in Table 4a.

Table 4a Mean (SD) of Influence of Satiety Claim and Colour of Dinnerware (Dark versus Light) on Satiety Ratings of Yoghurt Drink

	Claim		No claim	
	Dark Mean (SD)	White Mean (SD)	Dark Mean (SD)	White Mean (SD)
Product related expected satiety (7-point scale)	4.31 (1.05)	4.69 (0.97)**	4.17 (1.00)	4.73(1.03)**
Expected fullness after consuming yoghurt drink in the picture (100mm VAS)	42.05 (18.83)	50.89 (20.32)**	44.19 (20.22)	49.30(17.80)**
Time frame between consumption and when hunger is expected to set in(minutes)	66.93 (32.03)	80.74 (38.11)	71.46 (33.93)	74.87(39.63)

** Significant effect of colour of dinnerware ($p < 0.05$)

Results in Table 5b show significant effect of colour of dinnerware on the perceived thickness and creaminess, calorie estimate of the yoghurt drink as well as participant's willingness to pay. Result shows that participants perceived yoghurt drink presented in a light dinnerware to be thicker and creamier {$F (3, 231) = 17.12$, $p < 0.001$} and to contain more calorie {$F (3, 231) = 11.502$, $p = 0.001$} than that presented in dark dinnerware. They are also willing to pay more for yoghurt drink in light container than dark one {$F (3, 231) = 13.22$, $p < 0.001$}.

Table 4b: Mean (SD) of Influence of Satiety Claim and Dark versus Light Container Manipulations on Other Attributes of Yoghurt drink

	Claim		No claim	
	Dark Mean (SD)	Light Mean (SD)	Dark Mean (SD)	Light Mean (SD)
Creamy and thick texture	5.08 (1.00)	5.64 (0.87)**	5.11 (1.04)	5.53 (0.74)**
Fresh, fruity delicious taste	4.77 (0.93)	4.84 (0.93)	4.89 (0.93)	5.04 (0.90)
un(Healthiness)	3.64 (1.17)	3.75 (1.04)	3.62 (1.01)	3.81 (1.10)
WTP	1.52 (0.53)	1.72 (0.63)**	1.50 (0.45)	1.89(0.79)**
Convenience	5.00 (1.35)	4.67 (1.36)	4.74 (1.33)	4.67 (1.29)
Suitability as light snack	4.12(1.42)	4.52 (1.38)	4.62 (1.34)	4.52 (1.45)
Expensive	4.86 (1.41)	5.14 (1.26)	4.93 (1.49)	5.11 (1.14)
Calorie estimate	146.12 (63.49)	182.12 (73.58)**	144.67 (70.30)	171.58 (69.83)**

** Significant effect of colour of the dinnerware ($p < 0.05$)

4.1.5 Summary of Pre-test Result

Summary of the analysis of the online study data shows that under different experimental condition, satiety claims and external cues influence satiety expectations and perception of the participants on the taste, texture and other attributes of the same yoghurt drink. The height of the container in

which the yoghurt is presented and satiety claim manipulations seems to have main effect on the satiety expectations of the participants whereas no effect on taste, texture and other attributes of the yoghurt drink was reported. Although only marginally significant, an interaction effect of satiety claim and external cue was reported under this experimental condition, hence the choice of height manipulation for the food consumption experiment. Furthermore, result of the meal versus snack framing study shows that only framing as a meal has significant effect on the satiety expectations of the participants while the presence of satiety claim does not have significant effect.

Interestingly, result also shows a tremendous influence of colour of dinnerware on the perceptions of texture and calorie estimate of the yoghurt drink. Result also shows influence of colour of the dinnerware in which the yoghurt drink was presented on satiety expectations of the participants. Lastly, result of the container shape manipulations shows no significant effect of satiety claim and shape of the container on the satiety expectations of the participants, indicating that shape of dinnerware may not necessarily have impact on the satiety expectations of consumers. Summary of the online studies is presented in Table 5.

Table 5: Summary of Pre-test Result

Expected Satiety and other Attributes	Experiment a (Meal versus Snack)		Experiment b (Tall and Slender versus Short and Wide)		Experiment c (Angular versus Round)		Experiment d (Dark versus Light)	
	Effect of Satiety Claim	Effect of External Cue	Effect of Satiety Claim	Effect of External Cue	Effect of Satiety Claim	Effect of External Cue	Effect of Satiety Claim	Effect of External Cue
Product Related Expected Satiety	-	X	X	X	-	-	-	X
Expected fullness (100mm VAS)	-	X	X	-	-	-	-	X
Estimated hunger time (minutes)	-	X	-	X	-	-	-	-
Creaminess and thickness	-	X	-	-	-	-	-	X
Flavour and taste	-	X	-	-	-	-	-	-
WTP	X	-	-	-	-	-	-	X
Calorie estimate	-	-	-	-	X	-	X	X

{X}:Significant effect
{-}: No effect

4.2 Food Consumption Experiment

Test of accuracy of randomisation shows significant difference in the distribution of participants into all four experimental conditions in terms of age F (3, 96) = 5.24, p = 0.02. Participants in the tall dinnerware experimental condition are significantly older than those in the short dinnerware experimental condition (21.1 ± 2.4 years versus 20.3 ± 2.7 years). In order to control for this difference in age distribution, age was used as a covariate in the subsequent ANCOVA. Nonetheless, participants are equally distributed into all four experimental conditions in terms of BMI; mean BMI across all conditions is 22.01Kg/m^2 (SD =2.8). Furthermore, there is no significant difference in the distribution of participants into all four experimental conditions in terms of restraint eating. Mean restraint eating score across all experimental conditions is 2.42 (SD = 0.8).

4.2.1 Expected Satiety

Table 6 shows the result of ANCOVA on the influence of satiety claim and height of dinnerware on expected satiety, with participants' BMI and restraint eating being the covariates. Results show a marginally significant main effect of satiety claim on the food related expected satiety scale {F(3, 96)= 3.39,p=0.07}, indicating that participants expected the yoghurt drink with claim to be more satiating than that without claim, thus proving part of hypothesis 1 (presence of claim will lead to higher expected satiety). Result also show a marginally significant effect of the height of the container on time frame between consumption and when participants expected hunger to set in as participants served with yoghurt in tall dinnerware expected to be full for a longer period of time than those served with yoghurt drink in a short dinnerware {F (3, 96)= 3.53, p= 0.06}. This result thus proves part of hypothesis 2d (tall and slender container will lead to higher expected satiety). A marginally significant additional effect of height of the dinnerware on the influence of satiety claim on expected satiety was reported. Participants expected a longer time for hunger to set in after drinking yoghurt served in tall dinnerware with satiety claim {F (3, 96) = 2.91, p = 0.09}. In all cases however, no significant effect of age, BMI and restraint eating on the satiety expectations of the participants.

Table 6: Mean (SD) of Interactive Influence of Satiety Claim and Height of Container (tall and slender versus short and wide) on Expected Satiety

	Claim		No claim	
	Tall Mean (SD)	Short Mean (SD)	Tall Mean (SD)	Short Mean (SD)
Product related expected satiety (7-point scale)	4.67 (0.92)*	4.45 (0.93)*	4.25 (1.16)	4.17 (0.94)
Expected fullness after consuming yoghurt drink in the picture (100mm VAS)	72.31 (17.60)	64.79 (17.26)	68.33 (17.56)	68.92 (16.35)
Time frame between consumption and when hunger is expected to set in(minutes)	{ 87.86 (38.47)**}***	62.48 (33.41)	70.77 (43.07)	71.08 (32.00)

* Marginally significant effect of satiety claim (p = 0.07)

** Marginally significant effect of height of the dinnerware (p = 0.06)

*** Marginally significant additional interactive effect of height of dinnerware (p=0.09)

4.2.2 Experienced Satiety

Result of repeated measures ANOVA in Table 7 shows that satiety differs significantly before and after consuming the yoghurt drink {F (1, 96) = 321.02, p < 0.001}. However, this cannot be attributed to the presence of satiety claim or the height of the dinnerware in which the yoghurt is presented or a combination of satiety claim and height of the container. Test of between subject effects reveals no significant main effect of satiety claim and height of the dinnerware in which the yoghurt drink was presented. Also, no significant additional effect of height of the dinnerware was reported. Although test of within subject effects reveals that yoghurt drink in a tall dinnerware with satiety claim gave the highest experienced satiety, this effect is however not statistically significant { F (1, 96} = 0.03, p = 0.87}. Hence the hypothesis of additional interactive influence of height of dinnerware on experienced satiety was not proved in this study. A graphical representation of the relationship between height of the dinnerware and experienced satiety is given in fig. 7. The figure shows a significant difference in the satiety experienced after consuming the yoghurt drink and the insignificant influence of height of the dinnerware on the satiety experienced after consuming the yogurt drink. No significant effect of age, BMI and restraint eating as covariates was reported.

Table 7: Mean (SD) of Influence of Satiety Claim and Height of Dinnerware on Experienced Satiety

	Claim		No claim	
	Tall Mean (SD)	Short Mean (SD)	Tall Mean (SD)	Short Mean (SD)
Satiety before consuming yoghurt drink	49.33 (20.02)	44.19 (15.29)	51.00 (16.77)	48.72 (18.84)
Satiety after consuming yoghurt	75.27 (14.55)	71.47 (15.59)	73.52 (15.48)	73.24 (16.83)

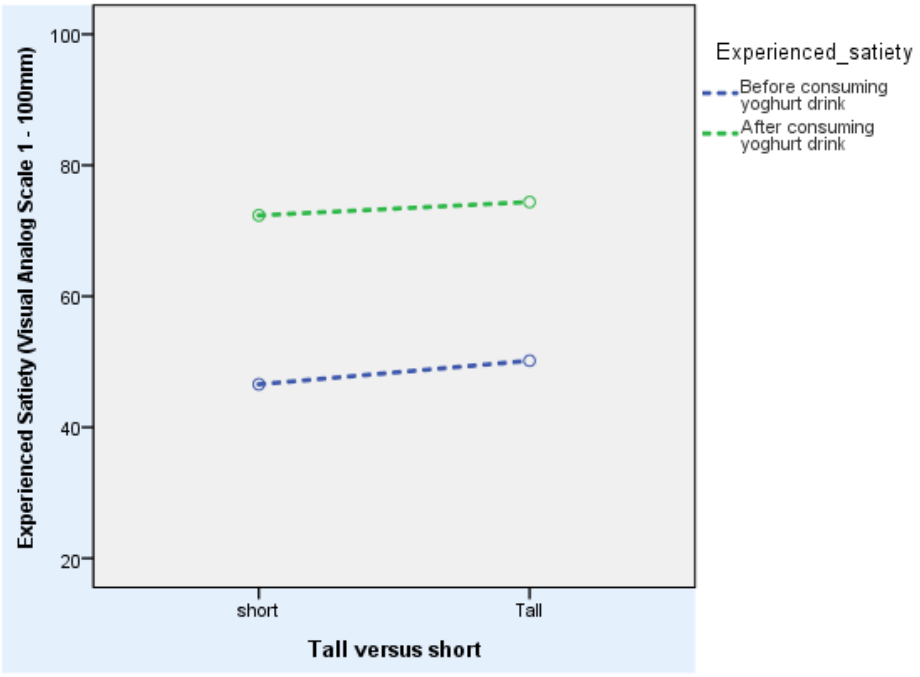

Fig 9: Graph of experienced satiety against height of dinnerware manipulations depicting significant increase in experienced satiety ratings after consuming yoghurt drink and slight effect of height of dinnerware.

4.2.3 Other attributes

The result of ANCOVA shows no significant effect of satiety claim, container height and combination of satiety claim and container height on attributes relating to taste, flavour, texture and healthiness. However, a marginally significant additional effect of the height of the dinnerware was reported on participants' willingness to pay {F (3, 96) = 4.132, p = 0.05}. Result shows that participants were willing to pay more for yoghurt drink presented in a short container with satiety claim (1.03 ± 0.43 euros) and that presented in a tall container without satiety claim (1.08 ± 0.4 euros). Furthermore, result shows a significant effect of height of the container in which the yoghurt drink was presented on the estimate of the quantity of the drink participants perceived they had. Participants presented with the drink in a tall dinnerware estimated drinking 22ml more than participants presented with the same quantity of drink in a short container (186.04 ± 69ml vs 165.03 ± 76ml).

4.3 Discussion

This study provides an understanding of how satiety claim and external cues (related to framing of the food, shape, height and colour of dinnerware) influence satiety expectations and the actual satiety experienced by consumers. The most important finding in this study is that while satiety claim and external cues seem to have significant influence on the satiety expectations of consumers, they do not have such significant influence on the satiety experienced after consuming the food. This thus refutes the notion that the presence of satiety claim together with high expected satiety external cues will result in a direct positive relationship between expected satiety and experienced satiety. Hence, while satiety claim can be used to 'prepare' the minds of the consumers and enlarge their expectations on the satiety the food can confer, the actual satiety experienced depends on other factors other than satiety claim and external cues alone. Factors such as the actual satiety-ability of the yoghurt drink used in this study (based on its composition) could have led to a totally different result. Since the yoghurt drink used was not actually satiating as consumers were made to believe through the satiety claim, the presence of the satiety claim only succeeded in raising the expectations of the participants on the satiety it will confer without actually influencing the satiety they experienced after consumption. Perhaps if a truly satiating yoghurt drink was used in the 'claim' condition, the satiety claim would have been more credible and a significant influence of satiety claim on experienced satiety would have been reported. The result of this study is similar to that reported by Yeomans et al., (2001) where they reported that actual, and not labelled fat content of soup pre-load influence fullness and hunger ratings after consuming a soup pre-load. Although labelled as 'low-fat' , participants were reported to feel fuller after consuming soup pre-load that is actually high-fat than that which is actually low-fat. It is thus likely that the actual satiety-ability of the yoghurt drink influenced the experienced satiety of the participants in this study hence no significant influence of satiety claim on experienced satiety was reported.

Furthermore, the notion of a direct positive relationship between high expected satiety external cue (tall and slender dinnerware) and experienced satiety was refuted in this study. Participants presented with yoghurt drink in tall and slender dinnerware estimated to have drunk approximately 22ml more yoghurt drink than those presented with the yoghurt drink in short and wide dinnerware. Nonetheless, the experienced satiety did not differ significantly. This result implies that actual and not estimated food intake influence experienced satiety. Although it is expected that when more

food is eaten, one will feel fuller for longer, nonetheless, the feeling of having drank more was based on the participants perception and not on the actual quantity consumed, hence no significant effect of food intake on experienced satiety was reported in this study. Thus, while the result of the online ***experiment d*** (which manipulates the height of the dinnerware in which the yoghurt drink was presented) and the actual food consumption experiment support the opinion of Wansink (2004) and Smith and Ditschun (2009) that drinking from a tall glass against a short one creates a vertical-horizontal illusion which gives the impression of consuming more from a tall glass than short one. Nevertheless, this does not necessarily translate to higher experienced satiety. The significant effect of the height of the dinnerware on expected satiety in both the online study and food consumption experiment may be attributed to the vertical-horizontal illusion which creates the impression of more yoghurt drink in the tall glass, making the participants expect to feel fuller for a longer time.

The marginally significant additional effect of height of the dinnerware on the relationship between satiety claim and expected satiety in the online experiment, such that yoghurt drink with satiety claim served in a tall dinnerware was rated to be more satiating than that in a short dinnerware without claim can be attributed to a combination of influence of vertical-horizontal illusion and cognition. Prior knowledge or cognition of the satiety ability of the yoghurt drink, made available through the satiety claim led participants to expect more satiety from the yoghurt drink under this condition. This coupled with the fact that they believed they are consuming more due to the illusion created by the tall glass led to higher expected satiety. Nonetheless, this expectation did not result in higher experienced satiety due to the influence of the composition of the food itself and also the actual quantity consumed. This implies that expectations about the satiety a food will confer, generated by illusion and satiety claim may not necessarily translate to higher experienced satiety.

The result of this study contradicts that obtained in a study by Brunstrom et al., (2011) where a direct positive relationship between expected satiety and experienced satiety was reported. In Brunstrom et al., (2011)'s study, participants shown large portion fruit as ingredients in a fruit smoothie reported higher expected and experienced satiety than participants shown small fruit ingredients regardless of whether the fruit smoothie actually contained large fruit ingredients or not. Leading to the conclusion that manipulating beliefs about the amount of fruits in a fruit smoothie can influence the satiety it confers. However, in this study, manipulating beliefs about the satiety ability of the yoghurt drink only influenced the satiety expectations and not the experienced satiety. This is in line with argument of de Graaf (2011) that satiety claims are good for the society only when they are trustworthy. He opined that satiety claim can only be made meaningful to consumers if it delivers high satiety value when compared to other regular foods.

Result of high expected satiety of yoghurt drink presented as a meal over that presented as a snack in ***experiment a*** suggests the ability of framing of a food as either meal or snack to alter the satiety expectations of consumers. Similar results have been reported in various pre-load studies where participants ate less of main course (test) meal and report to feel less hungry after consuming a pre-load presented as a meal rather than as a snack (Capaldi et al., 2006 Pliner and Zec 2007). Result of this study shows that not only does cognitive representation of food moderate food intake and experienced satiety as it was in the studies of Capaldi et al (2006) and Pliner and Zec (2007), but it also influence satiety expectations even before consuming the food.

Another interesting finding in ***experiment a*** was the influence of framing as a snack on perceived creaminess, thickness, tastiness and fruitiness of the yoghurt drink. Yoghurt drink presented as a snack was perceived to be creamier, thicker, tastier and fruiter than that presented as a meal. This can be attributed to the hedonic feelings associated with snack foods which results in the expectations of creaminess, tastiness and fruitiness. This result can be likened to the result reported by Yeomans et al., (2001) on the sensory attributes of a high fat soup pre-load which participants rated as more pleasant and creamier than the low fat one. As snack foods are more hedonic and indulging, they are perceived to have more hedonic sensory characteristics than a meal which is more utilitarian. It can thus be inferred that activating the snack schema triggered hedonic feelings associated with snack foods in the participants, hence the higher creaminess, tastiness and fruitiness ratings.

Result of ***experiment a*** also shows significant influence of satiety claim on willingness to pay, indicating that consumers are willing to pay more for yoghurt drink with satiety claim than that without claim. This can be attributed to the perceptions of the consumers on the choice of ingredients which makes up the yoghurt drink with satiety claim. Price-quality associations could have led to them to infer that yoghurt drink with satiety claim is of higher quality based on the choice of ingredients it contains and special effort put into its production as such it should cost more. This assumption is further substantiated in the food consumption experiment as effect of satiety claim and height of the dinnerware was reported on willingness to pay was reported. Participants were willing to pay more for yoghurt drink served in a short dinnerware with satiety claim and also for yoghurt drink served in a tall dinnerware without claim. The latter may be attributed to the vertical-horizontal illusion which gave the impression of more quantity while the former may be attributed to the consumers' perception of the choice of ingredients which make up the yoghurt and the production effort. This has price - quality implications for manufacturers of satiety enhancing food products, that consumers value food products with high satiating ability more and are willing to pay more for it.

It is no surprise that yoghurt drink presented as a snack was rated to be more convenient to drink than that presented as a meal. The result nonetheless indicated that the snack schema was actually activated in the participants as snack foods are actually mean to be convenient to consume.

Result of the effect of satiety claim and height of the dinnerware on the satiety expectations of the participants in online ***experiment b*** has been explained by the vertical-horizontal illusion and cognition theories discussed in paragraphs 2 and 3 above. It is however interesting to know that both height and satiety claim have no significant effect on sensory attributes relating to taste, flavour, texture of the yoghurt drink. This implies that positive ratings on both expected satiety and sensory attributes can be achieved when the height cue is combined with other external cue such as the colour of the dinnerware. This is closely linked to the result obtained in ***experiment d*** where colour of the dinnerware had highly significant effect ($p < 0.001$) on the sensory attribute (creaminess and thick texture) of the yoghurt drink.

Contrary to the hypothesis that a dark dinnerware will lead to higher expected satiety, result shows that the light dinnerware resulted in a higher expected satiety and expectations of thicker texture and higher calories than the dark one. While this is quite strange as it is expected that the dark colour will be associated with 'heavy' and 'filling' which will then result in higher expected satiety,

nevertheless, the result can be attributed to the nature of the dark and light dinnerware used. Although the dinnerware used under this condition only differed in terms of colour (both are ceramic plastic cups), however, the white coloured type was used to depict the light condition. This may have given the impression of thick, creamy high calorie yoghurt drink which is also satiating. This result is substantiated by a study by Ares et al., (2010) where milk dessert presented in white package was associated with creamy, tasteless vanilla flavour. Although the effect of this association on satiety was not investigated in Ares et al (2010)'s study, the result of the current study has shown the relationship between flavour and texture associations as well as calorie content on satiety expectations. This thus suggests a link between external cues, sensory attributes, calorie estimate/healthiness and expected satiety. The white dinnerware led to the perceptions of thick creamy texture emerging from the belief that creamy foods are high in calorie and hence will be more satiating. A pictorial representation of this relationship is presented below in fig 9 below.

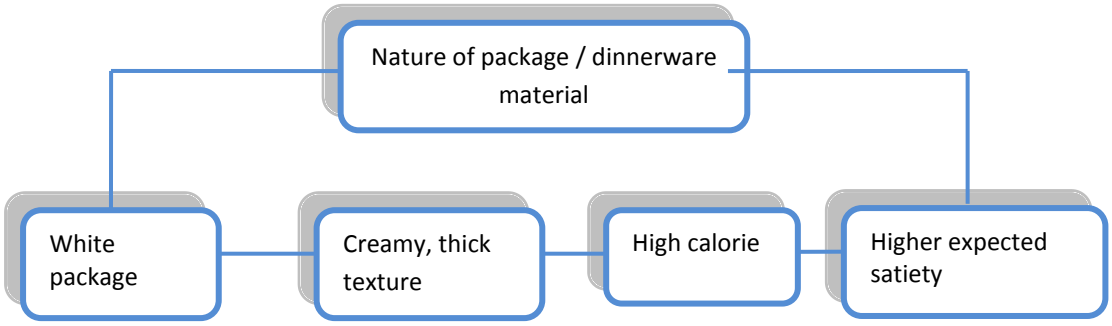

Fig. 10: pictorial representation of the relationship between package colour, sensory attributes, calorie estimate and expected satiety

Nonetheless, a different result may have been reported if a different material of dinnerware other than plastic ceramic was used (probably transparent glass for the light condition against opaque glass for the dark condition). This argument holds as a contradicting effect of satiety claim was reported in the angular versus round dinnerware condition where the yoghurt drink with satiety claim was estimated to contain fewer calories than that without satiety claim, suggesting that consumers perceive foods with satiety ability to healthy and at the same time satiating.The likely positive relationship between calorie estimate and expected satiety is similar to that reported by Wooley (1972) where participants served with a pre-load labeled as high calorie ate less of the test meal and also report higher satiety than participants served with pre-load labeled as high calorie. The perception of high calorie could have led to the higher feeling of satiety though the pre-load was not actually satiating.

Also contrary to the expectation that an angular dinnerware will lead to higher expected satiety, the result of this study shows no significant influence of the shape of dinnerware on satiety expectations. Result also shows no significant influence of shape on consumers' perception of other attributes of the yoghurt drink except for convenience. This result implies that package shape may not necessarily influence satiety expectations of consumers.

5.0 CONCLUSION AND RECOMMENDATION

Findings from this study suggest that while package cues and satiety claim can influence expected satiety, their influence on experienced satiety depends on other factors such as the actual satiety ability of the food itself and the actual consumption volume. Findings also show that external cues influence consumers' perception of the sensory attributes of food products (for instance the white dinnerware conveyed creaminess and high calorie to the consumers) this thus has implication for manufacturers of food functional products on the selection of packaging materials that will convey the right attributes to the consumers. It also has implication on the choice of dinnerware that will give the impression of high consumption thereby preventing overconsumption.

Moreover, this study has implication on development of food products that is both satiety-enhancing and healthy as the presence of satiety claim led to the perception of low calorie by the consumers. It is good to know that consumers attach higher quality to satiety enhancing food products and are willing to pay more. Hence, the effort put into production of such food products will sure pay off.

This study has the limitation of standardizing food consumption across participants (they were all requested to drink all 170ml yoghurt drink presented to them) thus food intake and its effect on experienced satiety was not investigated in this study. It is likely that participants could have drank more and a significant effect of satiety claim or dinnerware height cue would have been reported if the study was carried out *ad libitum*. Further studies into the influence of food intake on the relationship between expected and experienced satiety is thus recommended.

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