

# **SELF-REGULATION OF FOOD PURCHASING AND EATING BEHAVIOUR IN ADOLESCENCE**

**By LILIYA NUREEVA**

A PhD thesis submitted to

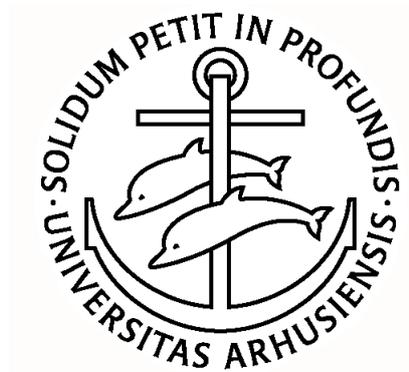
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## **EXECUTIVE SUMMARY IN ENGLISH**

This PhD thesis contributes to the fields of health psychology and consumer behaviour research with knowledge on self-regulation of food purchasing and eating behaviour in adolescence. Adolescents belong to a specific age group where important consumer competences are still under development; also they are surrounded by a large number of easily accessible energy-dense foods in the same way as adult consumers. One of the possible ways to address the vulnerability of this age group is to apply regulatory efforts which would limit the availability of unhealthy eating options. Since this approach is not always easy and reasonable to implement, other options have to be considered. This thesis focuses on self-regulation – an individual resource, which is considered to be a valuable supplement or alternative to a regulatory approach.

Through exploring and discussing the phenomenon of self-regulation in food purchasing and eating domains in adolescence, the overall aim of this thesis is to find possible ways to improve eating patterns already at a young age.

The thesis starts with a General Introduction where the reasons for studying adolescents' eating and food purchasing behaviour are discussed. The Research Background chapter provides the reader with an overview of the most relevant studies and prepares the ground for formulating research questions. The most important concepts, as well as the peculiarities related to application in the adolescent age group, are introduced and discussed in the Theoretical Framework chapter. Based on the insights from the Research Background and the Theoretical Framework, an overview of the existing gaps in current research is presented and three research questions are formulated. These research questions are then addressed in three studies, corresponding to three research papers.

Self-regulation as one of the key mechanisms used to reach long-term eating goals has gained a lot of attention but finding more concrete and practical tools would be beneficial for future research

and healthy eating interventions. The first paper aimed at exploring particular self-regulatory strategies, which are clear and easy to use for adolescents, through answering Research Question 1: Which strategies can adolescents use to regulate their eating behaviour?

The gap between the intention to perform health-related behaviour and performing such behaviour is another topic that has gained a lot of attention over the last decades. The second paper provides a further discussion of self-regulatory mechanisms relevant to eating situations and explores their role in an intention-behaviour relationship. The role of social influence and attitude towards healthy eating in the formation of intention to eat healthy is discussed as well. The paper aims at answering Research Question 2: What is the role of self-regulatory strategies in the relationship between intention to eat healthy and snack consumption?

Impulse buying is often considered to be one of the common unregulated purchasing behaviours. Nordic adolescents act as consumers on an everyday basis and are likely to transfer their consumer competences into adulthood. However, impulse purchasing in adolescence has received limited attention from health psychology and consumer behaviour researchers. The role of habit in snacking behaviour was discussed in previous research but no studies focusing on the relationship between habit, impulse buying, self-regulation and snacking were conducted with adolescents. The third paper aims at covering this gap by answering Research Question 3: What is the impact of impulse snack purchasing, self-regulatory mechanisms and emotional eating on snacking behaviour and what is the role of snacking habits in these interactions? The study distinguishes between healthy and unhealthy snacking in order to explore whether the same mechanisms trigger these two behaviours.

Each of the three papers makes an individual contribution to the field of health psychology and consumer behaviour research by focusing on a powerful resource of self-regulation and on its applications in snack purchasing and eating situations. The first study reveals Danish adolescents'

ideas for strategies that can be used for eating behaviour regulation. Twelve self-regulatory strategies were formulated based on the 142 suggestions that were made and grouped by adolescents themselves: Following nutrition recommendations, Developing own rules, Making healthy contracts with oneself, Ensuring the right balance and regularity of food intake, Awareness, Thinking of consequences, Good advice for shopping and cooking, Seeking help from parents, Influencing family and others, Avoiding temptations, Replacing unhealthy food with a healthier option, Reducing the amounts of unhealthy food in diet. The study revealed two unique strategies not mentioned by previous research: Influencing family and others and Ensuring the right balance and regularity of food intake.

The second study discusses the role of self-regulatory strategies in explaining the gap between intention to eat healthy and eating behaviour. According to the findings, the use of self-regulatory strategies mediated the relationship between the intention to eat healthy and eating behaviours. Strategies addressing temptation fully mediated the relationship between intention and snacking behaviour, and strategies addressing goals fully mediated the relationship between intention and eating fruit. The findings suggest that it is beneficial to use different self-regulatory strategies depending on whether decreasing unhealthy snacking or increasing fruit intake is targeted.

The third study focused on the relationship between impulse buying, emotional eating, self-regulatory strategies and snacking behaviour and discussed the role of habit of snacking in these interactions. According to the results of the study, habit of snacking fully mediated the relationship between impulse snack buying and unhealthy snacking and partially mediated the relationship between the use of self-regulatory strategies and unhealthy snacking. The use of self-regulatory strategies was associated with healthy snacking. Habit of snacking did not mediate the relationship between using self-regulatory strategies and healthy snacking. Emotional eating was associated with habit of snacking, but not with actual snacking. Findings from Study 3 suggest that the self-

regulatory strategies help decrease unhealthy snacking through preventing the development of a habit of unhealthy snacking. The use of self-regulatory strategies also leads to an increase in healthy snacking but this relationship cannot be explained by the development of healthy snacking habits. These findings suggest that unhealthy snacking is more often an automatic or/and impulsive behaviour while healthy snacking is more often driven by reflective mechanisms. The findings allow a better understanding of self-regulatory mechanisms applied to eating behaviours in adolescence and make a significant contribution to health psychology and consumer behaviour research by taking an important step in exploring and discussing self-regulation of food purchasing behaviour in adolescence. Besides possessing theoretical novelty, this contribution has practical value as it provides policy makers with insights which can be used to help adolescents become more competent consumers.

Study 1 and Study 2 of this thesis were a part of the EU project TEMPEST (Temptations to Eat Moderated by Personal and Environmental Self-regulation Tools). The findings from the first study were used when developing a scale for evaluating self-regulatory competence in adolescence TESQ-E (De Vet et al., 2014).

## **EXECUTIVE SUMMARY IN DANISH**

Denne ph.d.-afhandling ligger inden for felterne sundhedspsykologi og forbrugeradfærdsforskning og bidrager med viden om unges selvregulering i forbindelse med fødevarerindkøb og spiseadfærd.

Unge tilhører en særlig aldersgruppe, hvor vigtige forbrugerkompetencer stadig er under udvikling; de har samtidig rigelig og let adgang til ernæringsrige fødevarer – på samme måde som voksne forbrugere har det. En af måderne hvorpå, man kan nå denne sårbare aldersgruppe, er ved regulering i form af at mindske udbuddet af usunde fødevarer. Da denne tilgang ikke altid er let at få implementeret, må man overveje andre muligheder. Denne afhandling fokuserer på selvregulering – en ressource på individniveau, som anses for at være et værdifuldt supplement eller alternativ til regulering.

Ved at undersøge og diskutere fænomenet selvregulering, hvad angår unges fødevarerindkøb og spiseadfærd, er det overordnede mål for denne afhandling at finde veje til at forbedre spisemønstrene fra en tidlig alder.

Afhandlingen lægger ud med en introduktion, hvor grundene til at undersøge unges spise- og fødevarerindkøbsadfærd diskuteres. Kapitlet om baggrunden for studiet giver læseren et overblik over de mest relevante undersøgelser og danner grundlag for formulering af forskningsspørgsmålene. De vigtigste begreber, såvel som deres særlige anvendelse i den unge aldersgruppe, introduceres og diskuteres i kapitlet om den teoretiske ramme. Ud fra den viden, der er blevet afdækket i kapitlerne om baggrunden for studiet og den teoretiske ramme, præsenteres hullerne i den eksisterende forskning, og tre forskningsspørgsmål formuleres. Disse spørgsmål behandles så i tre studier, der svarer til de tre artikler.

Selvregulering som en af mekanismerne, der bruges til at nå mål i forbindelse med fødevarerindtag, har været meget i vælten, men for fremtidig forskning og spis-sundt-interventioner ville det være

nyttigt at finde konkrete og praktiske redskaber. Målet med den første artikel var at afdække selvreguleringsstrategier, som er klare og nemme at bruge for unge mennesker; forskningsspørgsmålet i den første artikel var: Hvilke strategier kan unge bruge til at regulere deres spiseadfærd?

Springet fra intentionen om at udføre sundheds-relateret adfærd og faktisk at udføre den er et andet emne, der har fået stor opmærksomhed i de seneste årtier. Den næste artikel diskuterer selvreguleringsmekanismer, som er relevante i spisesituationen, og undersøger deres rolle i intention-adfærdsforholdet. Social påvirkning og holdning til at spise sundt diskuteres også. Artiklen søger at besvare forskningsspørgsmål 2: Hvilken rolle spiller selvreguleringsstrategier i forholdet mellem intentionen om at spise sundt og snackforbrug?

Impulskøb anses ofte som en almindelig ureguleret købsadfærd. For unge i Norden er det en dagligdags ting at forbruge, og de vil sandsynligvis tage deres forbrugerkompetencer med sig ind i voksenlivet. Imidlertid har unges impulskøb kun haft begrænset opmærksomhed hos forskere inden for sundhedspsykologi og forbrugeradfærd. Den rolle, som vane spiller for snacking, har været diskuteret i tidligere forskning, men ingen har studier har fokuseret på forholdet mellem unges vaner, impulskøb, selvregulering og snacking. Den tredje artikel søger at fylde dette tomrum ved at besvare spørgsmål nr. 3: Hvorledes er impulskøb af snacks, selvreguleringsmekanismer og trøstespisning et element i snacking-adfærd, og hvilken rolle spiller snack-vaner i disse forhold? Studiet skelner mellem sunde og usunde snacks for at afdække, om det er de samme mekanismer, der udløser disse to typer af adfærd.

Hver især bidrager de tre artikler til sundhedspsykologiområdet og til forbrugeradfærdsområdet ved at fokusere på selvregulering som et effektivt middel og på dette middels anvendelse ved snackindkøb og snackindtagelse.

Den første undersøgelse afdækker unge danske forbrugeres ideer om, hvilke strategier der kan bruges til at regulere spiseadfærden. De unge formulerede 12 selvreguleringsstrategier på baggrund af 142 udsagn, som derefter blev sortret i grupper: følge kostråd, lave egne regler, lave sunde aftaler med sig selv, sikre den rigtige balance og regelmæssige måltider, være bevidst, tænke på konsekvenserne, gode råd til indkøb og madlavning, søge hjælp hos forældre, påvirke familie og andre, undgå fristelser, erstatte usunde fødevarer med sunde alternativer, begrænse mængden af usunde fødevarer i kosten. Undersøgelsen afslørede to særlige strategier, der ikke har været nævnt i tidligere forskning: påvirke familie og andre og sikre den rigtige balance og regelmæssige måltider.

Den anden undersøgelse omhandler selvreguleringsstrategier, hvor formålet var at forklare spændet mellem intentionen om at spise sundt og spiseadfærd. Ifølge resultaterne påvirker selvreguleringsstrategier forholdet mellem intentionen om at spise sundt og spiseadfærd. Strategier til at kæmpe mod fristelser påvirker i høj grad forholdet mellem intention og snack-adfærd, og målstrategier påvirker i høj grad forholdet mellem intention og at spise frugt. Resultaterne tyder på, at det giver god mening at bruge forskellige selvreguleringsstrategier alt efter, om man vil reducere sit indtag af usunde snacks eller at spise mere frugt.

Den tredje undersøgelse fokuserede på forholdet mellem impuls køb, trøstespisning, selvreguleringsstrategier og snackadfærd og diskuterede, hvilken rolle snack-vaner har i denne sammenhæng. Ifølge undersøgelsens resultater påvirkede snack-vaner i høj grad forholdet mellem impuls køb af snacks og usunde snacks og delvis forholdet mellem brugen af selvreguleringsstrategier og usunde snacks. Brugen af selvreguleringsstrategier blev forbundet med sunde snacks. Snack-vaner påvirkede ikke forholdet mellem brugen af selvreguleringsstrategier og sunde snacks. Trøstespisning blev forbundet med snack-vaner men ikke med faktisk snack-spisning. Resultaterne fra den tredje undersøgelse tyder på, at brugen af selvreguleringsstrategier hjælper til at mindske indtagelsen af usunde snacks ved at hæmme udviklingen af usunde snack-vaner. Brugen

af selvreguleringsstrategier fører også til en øgning i sund snacking, men dette forhold kan ikke forklares ud fra opbygning af sunde snack-vaner. Disse resultater tyder på, at indtagelse af usunde snacks ofte er en automatisk og/eller impulspræget adfærd, hvorimod sund snacking ofte er resultat af refleksion. Resultaterne giver en bedre forståelse af selvreguleringsmekanismer i forbindelse med unges spiseadfærd og yder et væsentlig bidrag til sundhedspsykologien og forbrugeradfærdsforskningen ved at tage et vigtigt skridt til undersøgelse og behandling af unges selvregulering af adfærd i forbindelse med fødevareindkøb. Ud over at være teoretisk nyskabende har dette bidrag også praktisk værdi, da det giver beslutningstagere en indsigt, som kan bruges til at hjælpe unge til at blive kompetente forbrugere.

Undersøgelse 1 og 2 i denne afhandling var en del af TEMPEST EU-projektet (Temptations to Eat Moderated by Personal and Environmental Self-regulation Tools). Resultaterne fra det første studie blev brugt under udvikling af en evalueringsskala for unges selvreguleringskompetencer TESQ-E (De Vet et al., 2014).

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## GENERAL INTRODUCTION

Overweight is one of the most discussed topics in health research today: according to the World Health Organization (2015a), the amount of overweight people doubled between 1990 and 2008. Overweight and obesity are associated with a number of health-related consequences, such as adverse metabolic effects on blood pressure, cholesterol, triglyceride and insulin resistance; higher body mass index is also likely to increase the risk of certain types of cancer (breast, colon, endometrium), cardiovascular diseases (mainly heart diseases and stroke), diabetes; musculoskeletal disorders (especially osteoarthritis) (World Health Organization, 2015b). Energy imbalance between calories consumed and expended is mentioned as the main reason for overweight: the intake of energy-dense foods increases while physical activity decreases (World Health Organization, 2015c). The healthy eating issue should be addressed already in childhood and adolescence: previous research points out that obesity at a young age is associated with higher risks of obesity and obesity-associated diseases in adulthood (Dietz, 1998; Lobstein & Frelut, 2003). Besides, there are difficulties that overweight children experience already in childhood, e.g. breathing difficulties and psychological effects of being overweight (World Health Organization, 2015c). According to the World Health Organization (2007), an unhealthy diet in childhood and adolescence is one of the predictors of overweight and other health-related consequences in adulthood. This thesis focuses on some of the mechanisms that can facilitate and impede healthy eating; through exploring and discussing the phenomenon of self-regulation in food purchasing and eating domains in adolescence, the *overall aim* is to find possible ways to improve eating patterns already at a young age.

Two main approaches are used when healthy eating and an environment where unhealthy foods are easily available, are discussed in the literature: regulation and self-regulation (Verplanken, 2011). A

regulatory approach when trying to confront unhealthy eating seems to be effective: removing unhealthy options from supermarket shelves would probably solve the problem. Consumers do not buy something that is not for sale or may be expected to buy less if unhealthy options are, for instance, disproportionately expensive. At the same time, regulating consumption externally requires resources which may not always be available. An alternative approach would be teaching consumers to regulate their purchasing and buying behaviour already at a young age, long before the problem may arise. There will always be temptations around – this is an unavoidable reality consumers live in and therefore it is important to teach young people to live in this reality and to navigate in the diversity of tempting options. One of the key concepts related to this approach is self-regulation, which is often defined as a purposive process of altering own behaviour to override one action tendency to reach another long-term goal (Carver & Scheier, 2010). Examples may be found in different areas of life, such as education, purchasing, eating, alcohol consumption. Young people may experience a strong temptation to buy a ticket for a concert but successful confrontation will mean saving more money to buy a bike which fills a greater need in the long perspective. It may feel very tempting to participate in a party but the importance of getting a good grade at the next exam is also high. What will help an adolescent make the decision in a favour of the long-term goal? What are the tools consumers can use to confront the temptations they meet? Do they exist? Do they have to be invented? These questions are the starting point and the main source of inspiration for this thesis.

This thesis contributes to existing knowledge in health psychology and consumer behaviour research by exploring the phenomena of self-regulation of food purchasing and eating behaviour in adolescence and by discussing their possible contribution to improving eating patterns in adolescence.

## RESEARCH BACKGROUND

### Adolescent consumers

*Adolescents* are defined as young people at the age of 11-19 years; this thesis focuses only on the 11-17-year age group – adolescents who live at home with their parents and the food that they eat is paid by their parents. This does not mean though that they have no influence on purchasing decisions. Food choice is considered to be one of the areas where children have gained major influence in recent years: according to Nørgaard, Brunsø, Christensen and Mikkelsen (2007), adolescents have the opportunity to influence purchasing decisions and they actively use it, especially in the food domain. Families where children have much influence are more likely to consume less healthy food (De Bourdenaudhuij & Van Ost, 1998). Young consumers have more influence when choosing unhealthy food (e.g. sweets) and less influence on choosing healthy food (e.g. fruit, vegetables and fish) (Nørgaard et al., 2007). Thus, adolescent consumers do influence family food purchasing decisions, but at the same time they also act as consumers themselves because they have significant amounts of money at their discretion. On average Danish adolescents' pocket money amount to EUR 50 per month, besides, 55 percent of Danish adolescents have part-time jobs and their average salary is EUR 152 per month (Synovate Vilstrup for Nordea Bank, 2007). Another interesting and relevant finding from the study is that 82 percent of Danish adolescents spend at least some of their money on unhealthy snacks (high energy-dense foods consumed between meals).

While developing as consumers, young people go through different age stages: in her conceptual framework of consumer socialization Roedder (1999) proposes three stages in which consumer knowledge, strategies and skills differ: *perceptual stage* (3-7 years), *analytical stage* (7-11 years) and *reflective stage* (11-16 years). This distinction is useful when trying to capture the peculiarities of each age group, based on their stage in their cognitive and social development processes. This

research aims at 11-17-year old adolescents but all stages defined by Roedder (1999) will be described briefly in order to capture the changes that children and adolescents go through while developing as consumers. In the perceptual stage children's decisions are based on limited information and also their influence strategies are characterized by a limited adaptivity. They are still unable to take other people's opinions into account and thus are egocentric in their approaches to influence others and to negotiate with others. The analytical stage is characterized by dramatic cognitive and developmental changes which also results in increasing consumer knowledge and skills: children become more thoughtful, more flexible, more adaptive and more responsive. Their egocentrism is replaced by an ability to adapt their influence strategies depending on the person they approach. The cognitive and social dimensions of consumers in the reflective stage develop even more; they become more reflective, aware of other people's perspectives, adaptive in making consumer decisions. Their influence strategies also become more sophisticated because they are now able to choose the strategies which they expect will work best. At the same time, the author points to a special need that adolescents have when they are in the reflective stage of their development: they have to shape their new identity which leads to focusing on social aspects of being a consumer. The author bases the described division into stages on the existing knowledge on cognitive and social development: Piaget's stages of cognitive development (1977), information processing theories (Roedder, 1981), and social development perspectives (Selman, 1980).

When discussing the consumer development of children and adolescents, researchers often use the term consumer socialization. The traditional definition of consumer socialization was proposed by Ward (1974, p. 2): "processes by which young people acquire skills, knowledge, and attitudes relevant to their functioning as consumers in the marketplace". These processes aim at gaining consumer competence, defined by Berg (2007) as knowledge about products together with knowledge of the way markets function. In their definition of consumer competence, Lachance and

Legault (2007) outline the importance of consumer activities being well-advised and responsible. In the study by Mallalieu and Palan (2006), when asked about areas of improvement, adolescents mentioned controlling impulsive purchasing, making confident and independent decisions, dealing with salespeople and managing money. The authors emphasize that it is important to add a sense of self-control and self-confidence to consumer knowledge in order to use it effectively.

According to Pechmann, Levine, Loughlin and Leslie (2005), adolescent consumers are a very specific and vulnerable age group as they experience more intense urges than children and adults, while the ability to resist them is still under development. They experience more and stronger negative emotions, more self-doubts and are more self-conscious compared to adults and younger children. According to the authors, strong negative emotions may lead to following immediate impulses and using risky products and may influence already weakened self-control negatively.

### **Self-regulation and eating behaviour**

Food choice implies a complex decision where many factors play a role. Schifferstein et al. (2001) distinguish between product-related, individual-related and context-related factors, which seems to be a generally accepted approach in food choice research. According to the authors, product-related factors include, e.g. sensory properties, short-term physiological effects, and long-term health effects. The individual-related factors include all the variables which help to understand where the difference between individuals' behaviour stems from, e.g. demographics, lifestyle, and health status. Context-related factors then refer to physical, social, cultural and legal settings of the context where the choice is made. Acknowledging the importance of all the factors mentioned by Schifferstein et al. (2001), I delimit the focus of this thesis to the discussion of the individual resource of self-regulation which may be used in different domains, including food choice and eating. People live in an environment where tempting food choices surround them in everyday situations (Stok, de Vet, de Ridder & de Wit, 2012) and failure to regulate some of the behaviours

may lead to negative health-related consequences (Baumeister, 2003). The lack of self-control was also mentioned as one of the most important barriers to healthy eating by adult consumers in a study by Lappalainen et al. (1997), where one fifth (18%) of Europeans considered (lack of) willpower to be an important barrier to healthy eating.

Many authors use the terms self-regulation and self-control roughly interchangeably (Carver & Scheier, 2010); the authors define self-control as overriding of one action tendency in favour of another goal. When discussing self-regulation, they underline having a sense of purposive process as well as corrective adjustments generated by oneself. In that sense self-regulation becomes a broader term comparing to self-control. To the definition of *self-control* used in this thesis should, probably, be added a dimension of ability that has to be present for engaging in self-regulation. *Self-regulation* then is defined as engaging in an effort to control own thoughts and actions in order to confront short-term (hedonistic) goals and to reach long-term goals. The term *self-regulation* is central in this research; the term *self-control* is mostly mentioned with a reference to other authors. This thesis also presents the term *self-regulatory strategies* – particular strategies used for purposive self-regulation. Self-regulatory strategies discussed in this thesis refer solely to food purchasing and eating situations.

A high level of self-control among adolescents is associated with higher fruit and vegetable intake, less sedentary behaviour and more frequent participation in sports, while a low level of self-control is associated with higher saturated fat intake and less exercising (Wills, Isaisi, Mendoza & Ainette, 2007), participation in risky behaviour, especially in alcohol use (Glassman, Werch & Jobli, 2007; Magar, Philips & Hosie, 2008; Vazsonyi, Trejos-Castillo & Huang, 2006). Negative effects of poor self-control on health-related behaviours in adolescence is a problem by itself, but it was also pointed out that self-regulation patterns in childhood and adolescence may affect well-being in adulthood, for instance, binge eating was associated with weak self-control in adolescence

(Ricciardelli, Williams & Finemore, 2001). Thus, improving self-regulatory skills in younger age may help consumers to improve their current eating behaviour as well as to contribute to a healthier life in adulthood.

Even though adolescents today are aware of what healthy eating is, this knowledge does not always lead to healthy eating (Croll, Neumark-Sztainer & Story, 2001). In order to be used in practical settings this knowledge has to be complemented by specific strategies helping to regulate one's behaviour (Stok et al., 2012). The term *Self-regulatory strategies* is relatively new and only few studies have applied it when studying eating behaviour in adolescence. Stok et al. (2012) discussed the gap between knowledge of particular strategies and their actual use and suggested that adolescents may not always recognize situations in which they should use them.

It is important to mention that other factors, e.g. genetic and environmental ones, contribute to overweight and obesity as well. However, as stated by Rhee, Phelan and McCaffery (2012), genetic susceptibility, probably, has always existed while the dramatic increase in obesity level is seen only in the recent 30 years. The authors explain the obesity prevalence by the influence of an obesogenic environment; the individual differences in obesity levels are then explained by interaction of genes and the environment. Acknowledging these factors is important but it is also important to take into consideration that some of them are impossible to change (e.g. genetic factors) and others require resources that may not be available (environmental factors; legal regulations related to them). Thus, taking small steps on the individual level seems to be a realistic and practicable approach to reaching a healthier diet for consumers.

Self-regulation of eating behaviour in adolescence has been widely discussed in the literature in recent years but self-regulation of purchasing behaviour in adolescence did not get the same attention. One of the few exceptions is a study by Malalleu and Palan (2006), where the authors conclude that developing better self-control in young consumers may prevent deficient self-control

and its consequences, such as compulsive shopping. No further research focusing on self-regulation of food purchasing in adolescence was revealed by the literature review and this is a serious gap in current research because the consumption process starts before particular food is eaten and even before the decision to buy takes place. Some of the previous research also points to a clear link between unhealthy shopping and unhealthy eating (e.g. Verplanken, 2005), which makes it reasonable to propose that improving food purchasing behaviour can improve eating behaviour.

### **Impulse buying**

The classic definition of *impulse buying* is probably Rook's (1987): "Impulse buying is characterized by a sudden, often powerful and persistent urge to buy immediately". Another definition is given by Baumeister (2002), who sees impulse buying as an unregulated and unplanned purchasing behaviour caused by impulse. The difference between the two definitions does not seem to be crucial but Baumeister's definition imparts some sense of an individual's hypothetical ability to control such behaviour by underlining that it is being unplanned and unregulated. Impulse buying seems to be a widespread phenomenon: Bellenger, Robertson and Hirschman (1978) found that 37.8 percent of purchases of department store are impulsive, while a more recent study by Luo (2005) revealed that 62 percent of supermarket sales were impulsive.

Compulsive buying is another unregulated purchasing behaviour, which is characterized by a continuous failure to self-regulate (Faber & Vohs, 2004). The difference between impulse and compulsive buying tends not to be clearly outlined but if we want to make a distinction then compulsive buying is defined as impulse buying which develops into a frequent and entrenched strategy for mood amelioration (Brici, Hodkinson & Sullivan-Mort, 2013). According to the authors, investigating both of the phenomena bring equally valuable insight into impulse buying research. Findings from other studies help draw a clearer line between the two behaviours though: that is, when compulsive buying is conceptualized as an impulse control disorder related to other

mental disorders such as Obsessive-Compulsive Disorder (Frost, Kim, Morris, Bloss, Murray-Close & Steketee, 1998) and Binge Eating Disorder (Faber, Christenson, de Zwaan & Mitchell, 1995). According to Faber and Vohs (2010) both behaviours stem from self-regulation failure but the causes and the forms of this failure differ: impulse buying is a result of underregulation while compulsive buying is a result of misregulation, or using unproductive strategies.

Different approaches were taken in studying impulse buying and in defining its nature; the general approach changed from being product oriented to becoming more consumer oriented (Faber & Vohs, 2004). According to the authors, product-oriented research of the 1960-1970s investigated whether impulse purchasing of some products is more likely compared to others, while environment-oriented research focused on external factors that may influence buying impulse, such as proximity of a product, retail environment and other marketing stimuli. Hoch and Loewenstein (1991) concluded that physical proximity can trigger desire: the closer the consumer is to the point of sales, the higher the desire to buy may become, and the closer the time of a possible purchase, the more difficult it is to delay gratification. According to some researchers, environmental effects can be influenced and reduced by individual resources: Babin and Darden (1995) pointed out that environmental effects differ depending on consumers' ability to regulate their own behaviour; this approach is closer to consumer-oriented research focusing on consumers themselves as initiators of impulse buying. This stream of research investigates the self's ability to resist impulse buying or, in other words, the ability to establish effective self-control on purchasing behaviour. While some research considered impulse buying to be rooted in personality, related to the Big Five personality dimensions and therefore difficult to change (Verplanken & Herabadi, 2001), other authors argue that over time impulse buying can be curbed through exercising one's self-control (Sultan, Joireman & Sprott, 2012). In their later integrative study, Verplanken and Sato (2011) come to the conclusion that consumers should be protected against the possible negative outcomes of impulse purchasing by strengthening their self-regulatory capacities and by regulating retailers' misleading practices.

The two approaches are complementary but the scope of the thesis is limited to studying self-regulation: while regulatory practices are believed to be effective, the self-regulatory resource may be easier to access in practice.

According to Brici et al. (2013), academic research on young consumers' impulse buying is limited with only a few exceptions, e.g. Haytko and Baker (2004) and Mangleburg, Doney and Bristol (2004). Some other studies discussing impulse buying in adolescence may be added to the list; many of them focused on individual factors associated with impulse buying in adolescence: emotional intelligence (Lin & Chuang, 2005), attitudes towards credit and money (Lai, 2010), demographic parameters, such as gender, age and amount of pocket money available (Lin & Lin, 2005), materialism and hedonic shopping (Lins, Dóka, Bottequin, Odabašić, Pavlović, Merchán, Golasa & Hylander, 2015). Even though individual studies appear in the literature, it is still relevant to conclude that impulse buying in adolescence has had undeservedly limited attention. Very few attempts to compare impulse buying in adults and adolescents have been made: the exception is the above-mentioned study by Brici et al. (2013), which revealed the evidence of potentially crucial differences. The authors note that young consumers are more vulnerable to environmental factors promoting impulse buying because they are less aware of long-term factors and because their impulse buying is more strongly associated with negative moods when comparing to adult consumers. The authors suggest that impulse buying and risks deriving from it can be addressed by consumer education initiatives.

### **Snacking behaviour and habit of snacking**

The term *snacking* is widely used in this thesis: in the first study adolescents themselves mention it as a concept related to healthy/unhealthy eating. It is also used in the other two studies where its relation to self-regulation and other constructs is discussed. In this thesis *snacking* is defined as any food intake that takes place between main meals. *Unhealthy snacking*, when discussed in this thesis,

refers to consuming energy-dense food with low nutritious value (e.g. sweets, fast food, crisps) and *healthy snacking*, when mentioned in this thesis, refers to foods where increased consumption is recommended (e.g. vegetables, fruit).

According to Verplanken et al. (2007), the influence of snacking on one's health depends on a number of factors where the main ones are intake of other kinds of food, type and amount of snacks, and total energy balance. The authors consider frequent intake of sweet and/or fatty snacks as being unhealthy. Larson and Story (2013) reviewed a number of studies discussing the role of snacking in weight status in childhood and adolescence and provided evidence for a large variety in the results: many studies found no clear association between snacking behaviour and weight status (e.g. Kerr, Rennie, McCaffrey et al., 2009, Cheah et al., 2011, Field et al., 2004), some found positive associations (e.g. McDonald et al., 2009, Maffeis et al., 2000) and some found negative associations (e.g. Sun et al., 2009). Inconsistency in the choice of instruments across studies is a source of concern in studies on the relationship between snacking and BMI: while some studies used self-reported snacking behaviour (e.g. Kerr et al., 2009 Cheah et al., 2011, Sun et al., 2009), the others used parental reporting (e.g. McDonald et al., 2009). Since the patterns of the evidence are not completely clear, the authors of the review do not suggest discouraging children and adolescents from snacking, but they suggest ensuring that snacking does not contribute to excess energy intake which should be done through promoting consumption of healthy snacks.

Studying impulsive tendencies is one of the approaches used in self-regulation research (Hofmann, Rauch & Gawronski, 2006); another approach is studying habits and possible ways of controlling them (Vohs & Heatherton, 2000). Habits are defined by Verplanken and Aarts (1999, p. 104) as “learned sequences of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals or end-states”. Habitual behaviour is characterized by being repetitive and by having a high degree of automaticity (Verplanken & Aarts, 1999; Verplanken &

Orbell, 2003). This can be applied to eating situations as well: consumers who have a habit of eating particular foods in particular ways follow the once established pattern without thinking about it. Some of the behaviours can only be considered potentially harmful if they occur with a minimum awareness or habitually: according to Verplanken, Herabadi, Perry and Silvera (2005), unhealthy snacking only becomes problematic if it is frequent and habitual, or in other words, performed with minimum awareness and is difficult to control. In their recent paper, Orbell and Verplanken (2015) underline the importance of not equating the concept of habit with concepts of impulse and impulsivity, as, in contrast to those, habits do not necessarily possess an affective component and persist without reward.

Impulse purchasing tendencies and snacking habits are both potential predictors of unhealthy snacking: according to Verplanken et al. (2005), impulse purchasing contributes to developing snacking habits which can lead to eating behaviour deviations. Habit strength was found to be the most important and significant predictor of unhealthy snacking in the study by Verhoeven, Adriaanse, Evers and de Ridder (2012). Habit strength was also found to mediate the relationship between self-control and unhealthy snacking: people with better self-control developed healthier habits which, in turn, led to healthier snacking behaviour (Adriaanse, Kroese, Gillebaart & de Ridder, 2014).

Self-regulation, impulse purchasing and habit of snacking in adolescence are the key concepts in the third study; possible interaction between these constructs has not been discussed in the literature in a comprehensive way before; this gap will be covered by this thesis.

Different eating behaviours may come into focus when researchers strive to find ways to improve consumers' eating behaviour; this thesis focuses on fruit consumption and snacking. According to Pearson, Ball and Crawford (2011), nutrition interventions targeting adolescents should focus on increasing fruit and vegetables consumption and decreasing consumption of energy-dense food in

order to prevent negative health-related conditions; in line with that, the Danish official eating guidelines include recommendations regarding the amount of fruit and vegetables that consumers should eat per day/week (Danish Veterinary and Food Administration, 2015).

Adolescents' unhealthy snacking has been increasing in recent years: the findings of Kerr et al. (2008) suggest that the frequency and the portion sizes of unhealthy snacks, in particular high-energy carbonated and soft drinks, increased significantly between 1997 and 2005 among adolescents. The authors propose reducing portion sizes of popular unhealthy snack choices in future interventions. In line with these suggestions, unhealthy snacking is considered in this thesis to be another eating behaviour that is of interest when searching for ways to support a healthy diet.



## **THEORETICAL FRAMEWORK**

This section provides an overview of the self-regulation theories that are most relevant for this research. More detailed attention will be given to the theories applied when developing models in individual studies.

### **Self-regulation: overview of the relevant theories**

One of the commonly used approaches in self-regulation research is considering successful self-regulation to be a purposive process of overriding of a long-term goal over a short-term goal of less value (e.g. Carver and Scheier, 2010). Another approach to self-regulation focuses on the struggle between reflective and impulsive systems, where the final behaviour is a result of information processing by these two systems (Hofmann, Strack & Deutsch, 2008). In this approach self-control represents the *Reflective system* and is involved in reaching long-term goals while the *Impulsive system* is represented by impulses and implies a more emotional reasoning when choosing a more pleasant immediate outcome over long-term goals. Hoch and Loewenstein (1991) describe the outcome of the struggle between desire and willpower as being dependent on the relative strength of these forces; the authors define two groups of strategies that consumers can apply in the purchasing domain: those decreasing desire and those increasing willpower.

A number of researchers have focused their attention on Baumeister's *Strength Model of Self-Control* (Baumeister, 2002, 2003). According to this model, self-control works as a muscle that gets tired, and using self-control leads to ego-depletion in subsequent actions requiring self-control (Baumeister, Vohs & Tice, 2007). At the same time, the analogy with a muscle means that regular training of self-control can improve willpower strength (Baumeister, Gailliot, DeWall, & Oaten, 2006). The effect of training self-control was supported by Muraven et al. (1999), who concluded

after a series of experiments that exercising self-control for two-week period improved self-control resources. Some authors suggest a conservation hypothesis: when some of the self-regulatory resources have been expended, self-controllers begin to conserve their remaining strength (Muraven, Shmueli & Burkley, 2006) and then self-control may be exerted even in the case of ego-depletion (Muraven & Slessareva, 2003). The Strength Model was supported in the studies investigating self-regulation in terms of impulsive buying (Vohs & Faber, 2007). The authors concluded that temporarily reduced self-regulation capacity resulted in stronger impulsive buying tendencies. One of the other findings on self-regulation depletion was that making choices and decisions depleted the same resource as acts of self-regulation (Vohs, Baumeister, Twenge & Tice, 2008), which is relevant to consumer behaviour because the purchasing process requires making choices and decisions (Baumeister, 2002). However, some researchers did not find support for the model: Murtagh and Todd (2004) concluded that the nature of self-regulation was still unclear. According to these authors motivation might play a central role in self-regulation. Motivation was also investigated by Baumeister and Vohs (2007), who reviewed the role of motivation in the context of the Strength Model and concluded that motivation can compensate the ability to regulate, reduced after the previous acts of self-regulation. Muraven's studies (2008) were based on the Strength Model and the *Self-determination* theory which suggests the existence of two different types of regulations that may influence the self's behaviour – extrinsic motivation and intrinsic motivation. The conclusion was that an externally motivated person would be less effective in resisting subsequent eating temptations on subsequent tests of self-control.

In contrast to majority of research, Letzring, Block and Funder (2005) claim that being able to control own behaviour is an important construct but only an adequate level of self-control is beneficial: e.g. overcontrolled individuals may be disciplined, which can be an advantage, but they may have difficulties in making decisions or may deny themselves pleasure, while undercontrol may have its drawbacks and lead to unorganized and even dangerous behaviours. The authors'

conceptualization is based on the Ego-Control Model (Block & Block, 1980), where ego-control ranges from overcontrol to undercontrol.

In this thesis self-regulation is considered to be a powerful resource and a skill that can be trained through exercising and used in a conscious effort to regulate own behaviour through overcoming impulses and reaching long-term goals.

### **Intention-Behaviour Gap**

The *Theory of Reasoned Action (TRA)* (Ajzen & Fishbein, 1980) and the *Theory of Planned Behaviour (TPB)* (Ajzen, 1991) are probably the two most cited theories when attempting to explain human behaviour. According to TRA and TPB, intention to perform behaviour will to some extent predict the behaviour. Sometimes intention is easier to explain than behaviour (McEachan, Conner, Taylor & Lawton, 2011) but sometimes intention is not translated into behaviour (Webb & Sheeran, 2006). The *Intention-behaviour gap* is the focus of the second study and it refers to the possible inconsistency between the intention to perform a particular behaviour and performing such behaviour. The intention-behaviour gap is widely discussed in healthy eating research, and attempts to find possible mediators and moderators in this relationship are made (e.g. De Bruijn, Kremers, De Vet, De Nooijer, Van Mechelen & Brug, 2007; Menozzi & Mora, 2012). Self-regulation processes were also hypothesized to influence the intention-behaviour relationship (e.g. Mullan, Allom, Brogan, Kothe & Todd, 2014; Wong & Mullan, 2009; Godinho, Alvarez, Lima & Schwarzer, 2013). The *intention-behaviour gap* is the focus of the second study in this thesis and the role of self-regulatory processes in intention-behaviour relationship is discussed. Three groups of self-regulatory strategies will be used in the second study to represent self-regulatory processes: strategies addressing temptations directly, strategies addressing the psychological meaning of temptations and strategies addressing goals (De Vet, De Ridder, Stok, Brunsø, Baban & Gaspar, 2014).

TPB is an extension of the TRA where an additional construct of Perceived Behaviour Control was included. Including this construct increased the predictive power of the theory especially in cases with constraint on action (Belleau, Summers, Xu & Pinel, 2007). The Theory of Reasoned Action is advocated for adequately predicting behaviours with full volitional control, where PBC does not contribute much to the intention-behaviour relationship (Armitage & Conner, 2001). Using the TRA approach is thus more applicable to volitional behaviours; healthy eating behaviour can probably not be considered as fully volitional as specific skills (e.g. self-regulatory ones) may be required to perform the behaviour and constraints that are not rational (e.g. habit) may obstruct the relationship between intention and behaviour.

According to the TRA and the TPB, *attitude towards the behaviour* and *subjective norms* contribute to the intention to perform a behaviour. The relation of subjective norms (perceived social pressure) on intention is often evaluated to be weak for adults when compared to attitudes and perceived control (Armitage & Conner, 2001). The same was found to be true for adolescent consumers in the study by Grønhøj, Bech-Larsen, Chan and Tsang (2012), where subjective norms were not associated with intention to eat healthy, and PBC followed by attitude were the strongest intention predictors. The reason for this may stem from the claim that subjective norms are not able to capture social influences sufficiently (Hagger and Chatzisarantis, 2005). A norm-focus theory introduced by Cialdini, Reno and Kallgren (1990) is one of the attempts of finding ways to improve prediction of intention through distinguishing between different social norms. The authors introduce two types of social norms: descriptive and injunctive, where *descriptive social norms* refer to the perception of how others perform behaviours and *injunctive social norms* refer to the perception of the expectation of others towards oneself. According to Ball, Jeffery, Abbot, McNaughton and Crawford (2010), social norms were associated with fruit and vegetables intake, which contradicts the results of the study by Povey, Conner, Sparks, James and Shepherd (2000). In research with

adolescents, descriptive social norms are sometimes conceptualized as parental modelling. In the *Social Learning Theory (SLT)* (1977) Bandura considers observing others as an important component of learning most of the behaviours. In line with the SLT, parental modelling was found to be associated with healthy eating by Pearson, Ball and Crawford (2011). Subjective norms as formulated in TRA and TPB are sometimes used as conceptually consistent with injunctive norms as formulated by Cialdini et al. (1990) (e.g. in Hagger and Chatzisarantis, 2005), and distinctiveness of the subjective norms and the descriptive and injunctive norms as formulated within the normative approach is not always straight forward (Park & Smith 2007). According to Ravis and Sheeran (2003), subjective norm in the TPB is an injunctive social norm as it represents perceived social pressure, while descriptive norms refer to significant others' own behaviour (Ravis and Sheeran, 2003). Ajzen (2006) recommends covering both injunctive and descriptive aspects of perceived norm when constructing a questionnaire. Injunctive and descriptive norms are both a representation of social pressure (Fishbein, 1993) but their distinction is not always clear and operationalization may differ among researchers (Ball et al., 2010). Park and Smith (2007) call for more empirical tests to answer whether the terms of subjective, personal injunctive and personal descriptive norms are distinct within certain domains. In contrast to the previously mentioned approach, where subjective and injunctive norms are defined as conceptually consistent, the authors provide a distinction: subjective norms are defined as perceptions of important others' *expectation* for a given individual's behaviour, and personal injunctive perceived norms are defined as perceptions of important people's *approval* of a given individual's behaviour. The authors segregate social norms even further into personal-level perceived norms and societal-level perceived norms, which is a valuable addition within the domains where legal, religious and cultural discourse may be present (e.g. organ donation, as in their study). The present research focuses on healthy eating behaviour among adolescents; since the importance of this is probably not a controversial subject among different cultures and countries, personal-level social norms are therefore discussed.

*Perceived social support* is another construct that was proven to have a positive association with healthy eating: the evidence was found for parental support (Pugliese & Tinsley, 2007; Sallis, Prochaska & Taylor, 2000; Villard, Ryden, & Stahle, 2007) and support from best friends (Pearson et al., 2011).

According to the *Model of Action Phases* (MAP) (Heckhausen & Gollwitzer, 1987), an individual who aims at reaching the intended goal goes through four stages: predecisional, preactional, actional and postactional. First, a choice over competing goals has to be made, then a goal intention is formed and translated into behavioural intention, which is, in turn, translated into implementation intention with the structure 'If I encounter situation S, then I shall perform behaviour Y' (Gollwitzer, 1999). In the study by Bamberg (2013), implementation intentions were found to be a mediator in the relationship between goal intention and environmental behaviour.

The theories and concepts described above provided a solid basis for conducting this research: some of them were used for establishing a foundation for exploring new perspectives in self-regulation research (e.g. Impulsive-Reflective systems approach, Strength Model, Consumer Socialization framework), while others were applied directly when testing models (e.g. Theory of Reasoned Action and Model of Action Phases).

## OVERVIEW OF RESEARCH GAPS AND RESEARCH QUESTIONS

Even though some of the topics discussed above gained a lot of attention in the last decades, the other areas would still benefit from more in-depth research. Self-regulation as one of the key sources to reaching long-term eating goals gained a lot of attention but finding more concrete and practical tools would be beneficial for future research and possibly also for healthy eating interventions. The first study aims at finding particular self-regulation strategies which are clear and easy to use for adolescents through answering *Research Question 1: Which strategies can adolescents use to regulate their eating behaviour?*

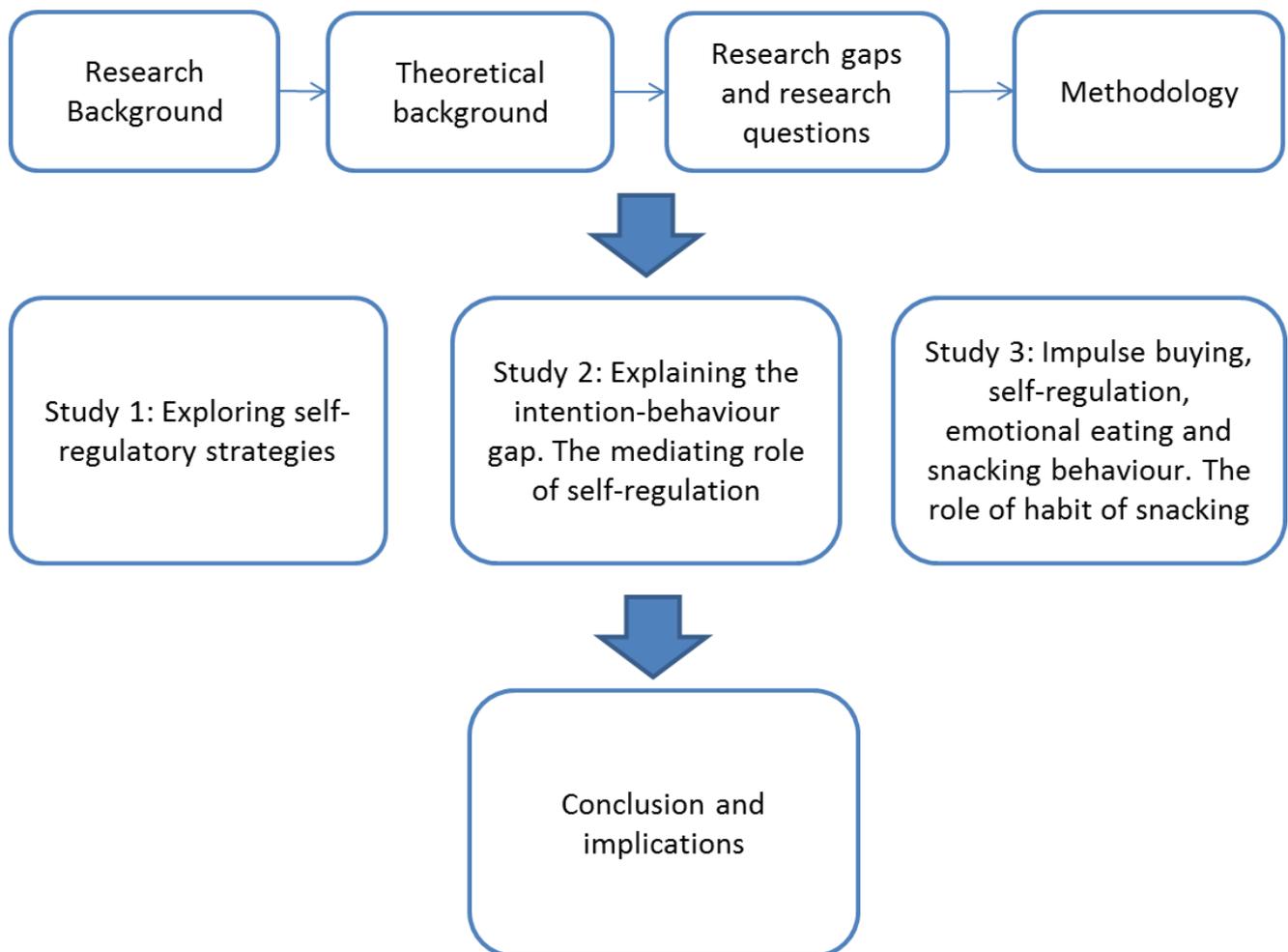
The second study is conducted in order to discuss the application of self-regulatory strategies in practice and in order to discuss their possible contribution to healthy eating behaviours. Formation of intention to perform a particular behaviour does not always lead to performing that behaviour, and the gap between intention to eat healthy and healthy eating is a topic that has gained a lot of attention in the last decades. Different possible mediators and moderators were discussed in previous literature but only a limited number of studies focused on self-regulatory processes. The second study aims to discuss self-regulatory strategies that can be applied to eating situations and to test whether they mediate the intention-behaviour relationship. Using the normative approach the study also aims to discuss the factors that form the intention to eat healthy in adolescence. The aims will be reached through answering *Research Question 2: What is the role of self-regulatory strategies in the relationship between intention to eat healthy and snack consumption?*

The third study was conducted in order to discuss application of self-regulatory strategies to the eating and food purchasing domains and in order to discuss their interaction with other snacking-related constructs, such as habit, impulse buying and emotional eating (the latter is defined by Nguyen-Rodriguez, Spruijt-Matez and Unger (2009, p. 211) as “eating in response to negative affect”).

Nordic adolescents have significant purchasing power and act as consumers on an everyday basis. Until now the phenomenon of impulse purchasing has not been studied much in this age group and the phenomenon of self-regulation of purchasing behaviour even less. This gap is important to cover since unhealthy eating begins with unhealthy shopping (Verplanken et al., 2005) and being able to confront impulse purchasing therefore means a healthier diet. The third study aims to cover these gaps by discussing the phenomena of impulse food purchasing, self-regulation of purchasing behaviour in adolescence and their interaction with snacking behaviour. The role of snacking habits in these interactions is discussed as well. The aim of the study is to be reached through answering ***Research Question 3: : What is the impact of impulse snack purchasing, self-regulatory mechanisms and emotional eating to snacking behaviour and what is the role of snacking habits in these interactions?***

## STRUCTURE OF THE THESIS

This thesis consists of the introductory part presented above, methodology, three scientific papers (corresponding to each of the three above-mentioned studies) and overall conclusions and implications. The structure of the thesis is presented in Figure 1.



*Figure 1.*



## **METHODOLOGY AND RESEARCH DESIGN**

### **Ethical guidelines for doing research with adolescents**

It is important to consider all the possible ethical implications before the study is conducted and an ethical approach should be used in all the stages of the research. Ethical research with children has almost the same characteristics as ethical research with adults; however, children may possess developmental, social, power-related vulnerabilities and therefore are in need of protection from embarrassment and distress (Tinson, 2009). Thus, even though children may contribute to research in the same significant way as adults, it is important to take societal concerns into account and to ensure that all ethical requirements are fulfilled. The studies presented in this thesis were conducted based on the ethical approach of doing research with children: guidelines provided by Tinson (2009), and the ESOMAR World Research Codes and Guidelines (ESOMAR, 2009) were used for consultations.

Tinson (2009) suggests two different approaches in researching children and adolescents: the first approach implies treating children in the same way as adults and the second approach considers children to be similar to adults but having different competences and implies promoting children's values and opinions. The second approach was used in the present research and this had a clear impact on the choice of methodology: the first study was conducted with the use of the Concept Mapping method, which allowed collecting participants' opinions formulated in their own words.

### **Design of the studies**

This thesis consists of three papers, each deriving from one of the three studies conducted in Denmark and other European countries. Both qualitative and quantitative approaches were used.

Study 1 and Study 2 were conducted as a part of the *TEMPEST project* while Study 3 was conducted independently. The author's contribution to the Tempest project within Study 1 and Study 2 includes: participation in developing the study designs, conducting data collection in Denmark for Study 1, for a pilot version of Study 2, and for Study 2, analysis of the data, and dissemination of the findings.

### **Study 1: Concept Mapping method**

Seeking better insight into the topic of self-regulation in adolescence was the reason behind conducting the first study. The Concept Mapping method was chosen to explore strategies adolescents can use to ensure healthy eating. The method is interesting in terms of its novelty as it is rarely used in consumer behaviour research. Besides, it has only been used a few times in research with adolescents in other research fields, and therefore some important implications of using it with this specific age group will be discussed later in more detail.

The decision in favour of concept mapping was made for several reasons as indicated in the Handbook of Concept Mapping using Ariadne (Netherlands National Centre for Mental Health and Talcott BV, 1995): first of all, it is a relatively fast method; secondly, concept mapping allows collecting opinions of each of the participants, which is especially important when children or adolescents are involved in a study; the third advantage of the method is its transparency and equal weight given to each opinion. The method makes it possible to explore adolescents' own ideas about healthy eating stated in their own words and thus the method does not put any constraints into the process. This is especially important when conducting research with children and adolescents, since an adult researcher may have a limited understanding of the ways children think (Tinson, 2009).

Concept mapping is a group-based method designed to make complex issues easier to understand (Netherlands National Centre for Mental Health and Talcott BV, 1995). According to the authors, the method offers a deeper understanding of a topic and allows to find connections between different elements; concept mapping can be used for research in general, for supporting decision-making, for defining assessment criteria or as a preliminary investigation before developing a questionnaire. In this thesis the method was used for exploring participants' ideas on eating behaviour self-regulation. The result of the study is presented as a map or as a number of maps of participants' opinions in a structured and easy to interpret manner. The usual procedure also includes discussion of the results with participants and corrections if necessary.

Adolescents aged between 12 and 15 participated in the first study. The study aimed at investigating adolescents' ideas about self-regulatory strategies that can be used to ensure healthy eating. At the first meeting participants completed the phrase: "Things I can do myself to ensure healthy eating are...". All the ideas were written down by participants individually. All the statements were discussed by researchers and all the irrelevant or repeated statements were removed. At the second meeting participants rated the statements and sorted them into groups. The data was entered into the Ariadne Program and different clustering solutions were tested. At the third meeting the results (maps and statements) were presented and participants were invited to comment.

Results from the Concept Mapping study were analysed and discussed in the first paper comprising this thesis; they were also used when developing the TESQ-E scale for evaluating self-regulatory competence in adolescence (De Vet et al., 2014) as a part of EU project TEMPEST. Up till now there has been a number of measurement instruments in the field of self-regulation and eating behaviour but none of them was meant for evaluating self-regulatory competences for eating behaviour in adolescence. One of the aims of the TEMPEST project was to contribute to preventing

overweight among adolescents in Europe by developing new measurement tools and providing specific recommendations for ensuring healthy eating.

The Concept Mapping study was conducted in four countries: Denmark, the Netherlands, Portugal, and Romania. Results from the four countries were summarized and discussed by researchers involved in the project from the four countries, including the author of this thesis. The outcome was a list of self-regulatory strategies which was a part of a pilot study with 800 respondents in the four countries. Thus, the pilot study was also conducted in Denmark where the author of the thesis was responsible for data collection and data analysis. Subsequently, the list of strategies was reduced and the data was collected in nine European countries: Romania, Denmark, Poland, Germany, The Netherlands, the United Kingdom, Finland, Belgium and Portugal. Exploratory and confirmatory factor analyses resulted in a three-factor second order solution, which revealed three groups of self-regulatory strategies: action towards temptations, change of psychological meaning of temptations and action towards goal. Each of the strategies includes eight items, thus the total number of self-regulation items in the TESQ-E scale is 24 (De Vet et al., 2014).

## **Study 2: Questionnaire-based survey in nine European countries**

The survey was conducted in nine European countries: Belgium, Denmark, Finland, Germany, The Netherlands, Poland, Portugal, Romania, and the United Kingdom. Respondents were adolescents attending school and aged eleven to seventeen. In total, 11,826 questionnaires were collected in the nine countries in 123 schools in 21 towns. The number of participants ranged from 1158 to 1500 in each country. Translation of the questionnaire (self-regulatory items as well as other parts of the questionnaire) from English to Danish was done by means of a back-translation procedure. The collected data was used to develop the final version of TESQ-E scale (De Vet et al., 2014), which is a part of Tempest project's outcomes but not a part of this thesis. In this thesis, the TESQ-E scale

was used to evaluate self-regulatory strategies used by adolescents. After excluding outliers and cases with too much missing data and treating the rest of the missing data with the Expectation-Maximization (EM) algorithm, the total number of the cases included into the analysis was 10972.

A structural equation model was estimated in order to test for possible mediation effects of self-regulatory strategies in intention-behaviour relationships. Due to deviation from normality, the parameters of the model were estimated using robust maximum likelihood (Satorra & Bentler 1988, 1994, 2001; Hu, Bentler & Kano, 1992) based on asymptotic covariance matrices using LISREL 8.72 (Jöreskog & Sörbom, 1996a, 1996b; Jöreskog, Sörbom, du Toit & du Toit, 1999).

### **Study 3: Web-based survey in Denmark**

A web-based questionnaire was filled out by 228 Danish adolescents in the 14-17-year age group. A multiple choice questionnaire was developed and uploaded on a webpage, and respondents could answer the questions via a link either at school or at home. Three schools from different parts of Denmark were recruited. The recently developed TESQ-E scale was adapted to the purpose of the impulse purchasing study and included in the survey; the details of the procedure are provided in the third paper comprising this thesis. Translation of the questionnaire (SR items as well as other parts of the questionnaire) from English into Danish language was done by means of a back-translation procedure. Associations between emotional eating, impulse snack purchasing, self-regulatory strategy use, snacking habits and snacking behaviour were assessed through path modelling using robust maximum likelihood estimation in AMOS, version 21.

This chapter provided a brief overview of the methodological decisions made in order to answer the research questions formulated; more detailed explanations are provided in the individual papers.



# STUDY 1. EXPLORING SELF-REGULATORY STRATEGIES FOR EATING BEHAVIOUR IN DANISH ADOLESCENTS

*Liliya Nureeva, Karen Brunsø and Liisa Lähteenmäki*

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## ABSTRACT

**Purpose:** Healthy eating behaviour in adolescence may be negatively affected by lack of self-regulation. The purpose of this paper is to discuss strategies for regulating eating behaviour as formulated by adolescents themselves.

**Design/methodology/approach:** Self-regulatory strategies were elicited with Concept Mapping, which is a group-based method. Three meetings were conducted with each of four school classes in Denmark. Participants in the 12-15-year age group were recruited for the study. At the first meeting participants had to complete the phrase “Things I can do to ensure my healthy eating are: ...” At the second meeting participants had to group the statements. At the third meeting the results were discussed with participants.

**Findings:** The results suggest that adolescents’ knowledge about healthy and unhealthy eating is in line with the official guidelines provided by health organisations. Adolescents made 142 statements about things they could do to ensure healthy eating; the statements were grouped by adolescents, and twelve strategies were formulated: Following nutrition recommendations, Developing own rules, Making healthy contracts with oneself, Ensuring the right balance and regularity of food intake, Awareness: remember to eat healthy, Thinking of consequences, Good advice for shopping and cooking, Seeking help from parents, Influencing family and others, Avoiding temptations, Replacing unhealthy food with a healthier option, Reducing the amounts of unhealthy food in diet.

**Practical implications:** Focusing on improving adolescents’ self-regulatory skills in the domain of eating behaviour is a promising approach in developing future interventions

**Originality/value:** The present article explores self-regulatory strategies for eating behaviour in adolescence and discusses their relevance.

## **Introduction**

There is a link between obesity in childhood and obesity associated diseases in adulthood (Dietz, 1998; Lobstein and Frelut, 2003) and an unhealthy diet is known to be one of the predictors of overweight and other health-related consequences in adulthood (World Health Organization, 2007; Bingham *et al.*, 2003). Thus, it is important to find ways to improve eating patterns already at a young age.

An obesogenic environment surrounds young people in their everyday life (Stok *et al.*, 2012). The obvious solution would be to make changes to the environment and eliminate all the temptations but since this is often unrealistic, alternative ways and tools to deal with the problem have to be found. Providing adolescents with personal tools to deal with temptations may be a solution. Previous research provides evidence that knowing what healthy eating is does not always lead to healthy eating (Croll *et al.*, 2001). Knowledge of what healthy eating is needs to be complemented by knowledge of how to regulate eating behaviour; in other words, awareness of the available strategies is important (Stok *et al.*, 2012).

In order to succeed in changing or maintaining a particular behaviour, one must be able to regulate it. Failure to self-regulate may lead to negative health-related consequences (Baumeister, 2003). A high level of self-control among adolescents is associated with higher fruit and vegetable intake, and more frequent participation in sports; a low level of self-control is associated with higher saturated fat intake and less exercising (Wills *et al.*, 2007); and participation in risky behaviour, especially in alcohol use (Vazsonyi *et al.*, 2006; Glassman *et al.*, 2007; Magar *et al.*, 2008). The terms of self-regulation and self-control are sometimes used interchangeably (Baumeister *et al.*, 2007), and there is no consensus in the literature regarding self-regulation and its conceptualization: e.g., self-regulation is considered to be a resource that is limited and gets tired from exertion in

Baumeister's Strength Model (2003), while other approaches discuss particular steps or components of engaging in self-regulation efforts, e.g., goal-setting and monitoring (Schnoll and Zimmerman, 2001). The latter comes closer to the approach taken in the present study, where self-regulation is considered to be a skill; improving this skill may help adolescents to avoid participation in unwanted behaviours, such as unhealthy eating. Then, self-control is considered to be an ability and the precondition for engaging in self-regulation – effortful confronting environmental temptations to achieve long-term goals.

Few studies have discussed adolescents' self-regulatory strategies to ensure healthy eating: Stok *et al.* (2012) identified the gap between the knowledge of what adolescents should do and how they can do it, and suggested that one of the possible reasons for such a discrepancy is that adolescents do not recognize situations in which they should employ the self-regulation strategies. The authors revealed the existence of the following strategies that adolescents potentially could use to ensure healthy eating: preparation, substitution, avoidance of temptations, goal setting, seeking information, mindful eating, stimulus control, distraction, planning, compensation, seeking help, reminding of consequences and adhering to healthy eating patterns. Craciun *et al.* (2012) also explored adolescents' self-regulatory strategies and discussed their use as a function of age and socio-economic status and concluded that the avoidance strategy was predominant in all age groups regardless of socio-economic status.

The present study aims to explore which self-regulatory strategies Danish adolescents identify as a means to ensure healthy eating. Participants formulated strategies individually in their own words while researchers facilitated the process. Results are discussed with a reference to official healthy eating guidelines provided by Danish authorities.

## **Methodology**

### ***Participants and recruitment procedure***

The study was conducted in four classes at two schools in the Aarhus area – the second largest city in Denmark with 350 000 inhabitants. Teachers in School 1 mentioned that they had had some educational initiatives about healthy eating recently. Teachers pointed out that adolescents in School 2 had very easy access to unhealthy food in a new discount supermarket offering chips, candy and soda at low prices.

Seventy-seven adolescents were recruited via telephone conversations with school representatives – teachers or headmasters. Two age groups were recruited for this study: younger adolescents (12-13 years old) and older adolescents (14-15 years old). All the approached students agreed to participate and retained throughout the study.

Consent letters were sent to the participants' parents and participants were informed that they could terminate their participation at any stage of the study without giving a reason. At least one teacher and two researchers were present in class during the study.

### ***Concept Mapping: Overview of the Method***

The study was conducted using the Concept Mapping method. Concept Mapping allows collecting opinions from each participant in their own words and all opinions are given equal weight (Netherlands National Centre for Mental Health, & Talcott BV., 1995). This is especially important when conducting studies with children and adolescents because an adult researcher may have a limited understanding of the way they think and communicate (Tinson, 2009). The author points out that researchers should strive for promoting participants' opinions instead of imposing their own. Using the concept mapping method addresses the peculiarities of doing research with adolescents:

participants first have to get their own ideas on the topic and then they have to work with these ideas individually.

Concept-mapping allows making complicated issues easier to overview and it also helps researchers to understand which aspects of the subject are of lesser or greater importance. The method uses a qualitative manner of data collection (using an open research question) with some quantitative elements (using questionnaires with importance ratings) making it ideal for researching subjects where no “right” answers exist. It also includes an opportunity to use some of the quantitative techniques in the analyses, e.g. simple statistics may be computed for some of the data (Netherlands National Centre for Mental Health, & Talcott BV., 1995).

According to Trochim and Kane (2005), Concept Mapping was introduced in order to address complex issues in health care where integrating the perspectives of different stakeholders was needed. The authors discuss tools such as mind maps, causal mapping and cognitive mapping as being similar in the approach, but the authors outline the main difference which stems from the fact that Concept Mapping is designed to be used by groups while the other approaches, including cognitive mapping, are designed to map an individual’s ideas or enhancing a person’s creative thinking. Even though the presentation of findings via the two methods is a map or a number of maps, the procedures for achieving this are different. According to Daughtry and Kunkel (1993), the difference lays in a more thorough qualitative analysis in Concept Mapping as well as in using open sorting in contrast with spatial presentation of relations between categories. Another advantage mentioned by the authors is the larger group of participants that can be involved in a study. This may as well derive from the differences in data collection procedures: the data for Cognitive Mapping is often collected in the form of an individual interview while in Concept Mapping, a group of people is involved in data collection simultaneously.

Concept Mapping is considered to be an alternative method when researchers are interested in exploring a certain phenomenon, its structure and elements (Trochim, 1989). The method was used in health care research when exploring complex constructs and developing frameworks such as depression, anxiety, quality of care and others (Trochim and Kane, 2005). Previous successful application of the Concept Mapping method for the purposes of exploring complex health care constructs provides ground reasoning for choosing this method for the purposes of this study where the aim is to explore and discuss self-regulatory strategies formulated by adolescents.

### ***Procedure: Concept Mapping***

Three meetings were held with each of the four classes – one week apart; meetings lasted 40-45 minutes. A Study Guide was prepared to ensure that the same procedure was followed in all classes.

#### *1<sup>st</sup> meeting: Brainstorming*

At the first meeting participants were asked to complete the phrase: “Things I can do to ensure my healthy eating are: ...”. They were asked to write down all their statements on a piece of paper without discussing them, in contrast with the usual procedure in Concept Mapping. This decision was made to adapt the technique to the specific age group because adolescents are more responsive to peers’ opinions than adults (Pechmann *et al.*, 2005).

In order to proceed with the study, all the statements from the first meeting were discussed by two researchers, and a summarizing technique of Qualitative Content Analysis was applied (Flick, 2006): all unclear statements were removed, some of the statements were paraphrased (in case of grammatical or stylistic errors), and similar statements were bundled. This resulted in a total of 142 statements, on average 30-40 statements per class.

*2<sup>nd</sup> meeting: Sorting statements and prioritization according to importance*

Statements generated at the first meeting were printed out on cards (one on each card). At the second meeting, participants were asked to group the statements according to similarity. Each statement could only be used once and each group of statements was named. The results of sorting were written on a special form. Participants were told that there were no right or wrong answers.

The second task in this meeting was to rate the importance of the statements. All the statements from the first meeting were printed out as a list. Each of the statements was rated from 1 to 5 according to their importance to participants; “1” is relatively unimportant and “5” is the most important.

The second meeting was held with the same classes that participated in the first meeting, which means that adolescents worked both with their own statements and those developed by their classmates. All the tasks at the second meeting were accomplished individually.

Participants did not experience any difficulties with accomplishing these tasks described above in cases where the amount of statements did not exceed 30-35. Some of the participants who had to sort 42 statements worried that it might be challenging but, still, accomplished the task.

Individual groupings and importance ratings collected at the second meeting were entered into the Ariadne programme, designed for analysing data from concept-mapping studies. The program combines individual clusters and priorities and forms a Concept Map. For this purpose, two statistical techniques are used: Principal Component Analysis (PCA) and Cluster Analysis. First Ariadne runs a PCA in order to translate correlations between items into a multidimensional space. Then the software classifies items by running a cluster analysis with item coordinates. The results are drawn on a two-dimensional graph. Statements which are linked by participants are placed close to each other forming clusters. A larger distance between statements represents a weaker link

between them (Netherlands National Centre for Mental Health, & Talcott BV., 1995). Each of the clusters was interpreted as a particular strategy adolescents could use to ensure healthy eating; the latter term “strategy” will be used further in the text.

### *3<sup>rd</sup> meeting: Interpretation*

At the third meeting, results were validated. Concept maps were shown in each class as a presentation and a discussion moderated by a researcher aimed at finding answers to the following questions: “Do these statements belong to the same strategy? Why? Are the strategies given the right names?” Participants shared their opinions about the results with the moderator and all the comments were written down and discussed later by two researchers. In case participants insisted on making changes to the maps (e.g. moving some statements from one cluster to another), these changes were made and updated maps were created and used in the further analysis.

### *Additional instruments*

After completing the Concept Mapping tasks at the first meeting, adolescents were asked to fill out a questionnaire with two scales: one evaluating a general level of self-regulation and the other one evaluating healthy eating behaviour; an additional item assessing the importance of healthy eating to participants was also included.

#### *Adolescent Self-Regulatory Inventory (ASRI)*

The Adolescent Self-Regulatory Inventory was used to measure the level of self-regulation (ASRI; Moilanen, 2007). Thirty six items were measured on a 5-point Likert scale ranging from 1 (not at all true for me) to 5 (totally true for me). After reversing some of the items, the self-regulation level was computed as a mean of all the items. Cronbach’s Alpha= .85.

### *Eating behaviour*

Unhealthy snack intake, soda intake, vegetable intake and fruit intake were assessed on a 6-point scale, where “0” was less than 1 per day and “5” was 5 or more per day. Examples of unhealthy snacks were provided; fruits were counted in pieces, vegetables were counted in handfuls and soda was counted in glasses.

### *Importance of healthy eating*

Importance of healthy eating was assessed on a 4-point scale, where “1” is not important at all and “4” is very important.

Descriptive statistics and correlation analysis of the data from ASRI and eating behaviour scales were calculated in SPSS, version 21.

## **Results**

All in all, 40 boys and 37 girls participated in the study. The mean age was 13.60 (SD= .85). The results of descriptive statistics analysis may be found in Table 1.

*Table 1. Means for eating behaviour, “0” is less than 1 per day and “5” is 5 and more per day*

	Mean	Std. deviation
Glasses soda per day	.7	1.27
Fruits per day	2.8	1.29
Handful vegetables per day	3.5	1.58
Snacks per day (cake, chips, energy bar, etc.)	1.5	1.34

The results of the descriptive statistics analysis suggest that adolescents ate more than 2.8 pieces of fruit and 3.5 handful of vegetables per day on average, which is in line with the official food-based dietary guidelines (Danish Veterinary and Food Administration, 2015a). At the same time, adolescents drank 0.7 glasses of soda per day which exceeds the recommended “Max. 0.5 litres of soda a week” (Danish Veterinary and Food Administration, 2015b).

Independent samples T-tests were run to assess possible differences in assessing ASRI scores and importance of healthy eating by boys and girls. Healthy eating was significantly more important for girls ((M=3.4, SD=.61 vs M=3.0, SD=.78);  $t(73) = 2.585$ ,  $p = .012$ ), while boys scored higher on Adolescents Self-Regulatory Inventory (M=3.4, SD=.42 vs M=3.1, SD=.47);  $t(75) = 2.519$ ;  $p = .014$ ).

The results of the bivariate correlation analysis may be found in Table 2.

Table 2. Bivariate correlations of eating behaviour items, importance of healthy eating and ASRI scores

	Self-regulation (ASRI score)	Snacks per day (cake, chips, energybar, etc)	Handful vegetables per day	Fruits per day	Glasses soda per day	Importance of healthy eating
Self-regulation (ASRI score)	1					
Snacks per day (cake, chips, energybar, etc)	-.219	1				
Handful vegetables per day	.422**	-.252*	1			
Fruits per day	.214	.062	.358**	1		
Glasses soda per day	-.222	.559**	-.236*	.144	1	
Importance of healthy eating	.041	-.161	.225	.294*	-.047	1

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

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

There was a significant correlation between participants' scores on ASRI (Adolescents Self-Regulatory Inventory) and their breakfast eating behaviour, meaning that participants with higher levels of self-regulation had breakfast more often. There was also a significant correlation between ASRI scores and vegetable intake, meaning that participants who were better at self-regulation ate more vegetables. The importance of healthy eating was significantly correlated with fruit intake, meaning that those participants who found healthy eating more important also ate more fruit. Intake of soda was significantly and positively associated with snack intake, and significantly and

negatively associated with vegetable intake. Fruit intake was significantly and positively associated with vegetable intake, while vegetable intake was significantly and negatively associated with snack intake.

Adolescents were generally able to formulate statements and they had a good idea about what constitutes healthy eating. After the analysis of the concept maps, 5-7 strategies were identified in each of the classes. The analysis results of all the four maps are presented in Table 3. Means in parenthesis refer to the importance of the particular strategies rated by participants. Each of the strategies will be discussed in further detail below. Even though it was not always possible to find a complete match between strategies across classes, the overall content of the individual statements in different classes was similar in many cases and therefore easier to match. Hence, further discussion in most of the cases will summarize the overall findings from the four classes rather than focus on the results from individual classes.

Table 3. Strategies mentioned by participants from four school classes with mean values for importance

<i>School 1</i>		<i>School 2</i>	
<i>Class 1:</i> <i>10 boys and 10 girls. Mean age: 12.85 (SD= .49). Initial number of statements: 70. Analysis was conducted with 36 statements.</i>	<i>Class 2:</i> <i>19 boys and 14 girls. Mean age: 13.93 (SD= .50). Initial number of statements: 90. Analysis was conducted with 42 statements.</i>	<i>Class 1:</i> <i>8 boys and 7 girls. Mean age: 13.00 (SD= .53). Initial number of statements: 100. Analysis was conducted with 32 statements.</i>	<i>Class 2:</i> <i>3 boys and 6 girls. Mean age: 15.00 (SD= .00). Initial number of statements: 105. Analysis was conducted with 32 statements.</i>
Statements about drinks (M=3.60)	Sophisticated strategies (M=3.64)	Balance (M=4.10)	Nutrition recommendations and things I can think about (M=3.60)
Rules (nutrition recommendations) (M=3.50)	Balance (M=3.46)	Awareness: remember to eat healthily (M=3.82)	Make healthy contracts with yourself (M=3.41)
Statements about fast food (M=3.43)	Replace unhealthy foods with healthier options (M=3.41)	Make healthy deals with yourself (M=3.66)	Avoid temptations (M=3.22)
Balance (M=3.40)	Eat/use less unhealthy food (M=3.06)	Thinking of consequences (M=3.58)	Good advice for shopping and cooking (M=2.67)
Replace sugar with healthier options (M=3.19)	Rules (nutrition recommendations) (M=3.01)	Help from parents (M=3.29)	Family's healthy nutrition plan (M=2.31)
Eat wholemeal bread (M=3.14)	Stop eating unhealthy food (M=2.74)	Avoidance (M=3.16)	
Sophisticated strategies (M=2.62)			

### *Following official recommendations and creating own rules*

The “*Rules*” or “*Nutrition recommendations*” strategies contained statements about rules that participants have picked up from parents/educational programs/ public intervention campaigns or rules that participants set up for themselves based on their beliefs about healthy eating. A large number of the respondents mentioned statements referring to these strategies in their answers, e.g. “Following the eight nutrition recommendations”, “Diversifying nutrition”, “Eating 6 units of fruit and vegetables per day”.

Another strategy identified by participants was “*Making healthy contracts with yourself*”. Statements referring to this strategy were mostly about creating own rules and following them. Some of the statements corresponded to those from “Nutrition recommendations” from two classes at School 1 but some of them were unique: “Pick one or more days a week when you eat low fat food”, “Do a lot of exercising along with eating healthily”. Some of the statements also referred to trying to make it easier to eat healthily. Different classes used different strategy names and clustering solutions were different, but still, creating rules and following the existing ones were the most often identified strategies (identified in all the classes). Some statements referred to getting a *good balance* of different ingredients and foods and regularity of food intake: “I should not eat too little or too much”, “Eat regularly, e.g. breakfast, lunch and dinner”, “Have more vegetables than meat on the plate“, etc..

The “*Awareness: remember to eat healthy*” strategy was compiled by participants from some of the classes and in the other classes statements about being aware were placed in the same cluster with statements about nutrition recommendations. Awareness here refers to remembering to make it easier to access healthy food, e.g. “Get healthy lunchbox: remember to bring healthy sandwich filling and fruit” or listening to yourself before eating something, e.g. “Only eat when I am hungry–

not when I only want to eat something tasty” or “I can eat a little that is unhealthy, but I should think about how much I eat”. A “Thinking twice” strategy was also identified in a more clear appearance: “Think about what unhealthy food can do to your body”, “Think about the fact that healthy food may give a better life” – these two statements refer to the strategy “*Thinking of consequences*” which includes statements considering possible outcomes of different eating behaviours.

The strategy referring to *good advice for shopping and cooking* was compiled by the older participants. Still, even young adolescents mentioned changing cooking patterns as one of the means for ensuring healthy eating, therefore cooking should be considered as one of the situations where adolescents may influence and improve their eating behaviour. Young participants in all the classes also mentioned changing their own buying behaviour as a strategy for ensuring healthy eating, e.g. “Only go to the vegetable department in supermarkets”. In general, supermarkets were mentioned quite often, especially at School 2 which has a new supermarket just a minute’s walk away. The supermarket offers many low-priced unhealthy foods (just like fast food restaurants), and the proximity of such a supermarket is, according to the teachers, quite tempting for children. Avoiding the supermarket was mentioned several times and it was also rated as one of the most important statements in the younger class. The so-called *Avoidance* strategies referred to avoiding places where buying or eating unhealthy food is tempting (e.g. “Not going to the supermarket every day”), or situations where eating unhealthy food may be tempting (e.g. “Not bring money to school”).

Participants in all the classes also formulated statements about *getting help from parents or trying to influence* them. In the younger classes participants mentioned: “Ask my family or friends to remind me to eat healthily” while the older adolescents mentioned different “Influence” statements, e.g. “Tell my parents to buy more fruit and vegetables and ask them not to buy sweets, crisps” and had

only one statement about getting help from parents. Statement “Ask my mother to cook” is a direct request and it was rated by boys as the second most important in one of the classes (M=3.71), while girls rated the statement as one of the least important (M=2.60). There was also a cluster with a similar content “Family’s nutrition plan”, representing *influence strategy*: “Ask my parents to buy healthier bread” and specific ideas about how to implement nutrition recommendations in the family context: “Hang nutrition pyramid at home”.

#### *Statements related to specific foods*

Some of the statements were food specific. Sometimes these statements were clustered based on the mentioned food items: “Beverages”, “Eat wholemeal bread” and “Fast food”, and in some cases they were included into other strategies. Statements like “Eat less fast food” and “Remember that homemade food tastes better than fast food” were mentioned often by participants in one of the classes at School 1. In that class boys chose “Don’t buy fast food” as the most important statement (M=3.86), while girls preferred “Remember that homemade food tastes better than fast food” (M=4.50). Boys and girls alike seem to understand the relation of limiting fast food consumption to healthy eating. In the younger class at School 1, strategies about fast food were rated as the third most important. In the older class at School 1, participants also mentioned several strategies concerning fast food. In the older class, the statement about avoiding McDonald’s and Burger King was one of the five most important strategies.

Many of the participants suggested using a *replacement strategy*, such as “Replace sugar with fruit sugar”, “Replace white bread with wholemeal bread”, “Drink water instead of soda” and others. Each of the classes constructed statements about replacing unhealthy foods with healthier choices; however, these statements were not placed in the same cluster in all the classes.

A similar but more restrictive strategy was to *eliminate some kinds of foods or ingredients* from the nutrition plan or from the shopping list, e.g. statements like “Don’t buy pizza”, “Don’t drink soda” or “Don’t eat sweets”. Even though this formulation was used by participants when developing statements, it met some criticism from the participants in the discussion in all the four classes where adolescents suggested not completely excluding some of the unhealthy foods from the nutrition plan but just *reducing the amount of unhealthy foods/ingredients*. Participants in all the four classes mentioned that “It is ok to eat some fast food, but it is important not to eat too much of it” or “It is OK to drink some soda, but it is bad for your health to drink a lot of it”. Other examples of statements are: “Eat less sugar and sweets”, “Use less fat, e.g. when you fry meat” and others. A reducing strategy may be considered to be an alternative way of using a replacement strategy: reducing means replacing large amounts of some foods or ingredients with smaller amounts. Participants rated these statements as quite important.

An example of a Concept Map and the list of the identified strategies from one of the classes may be found in Figure 1.

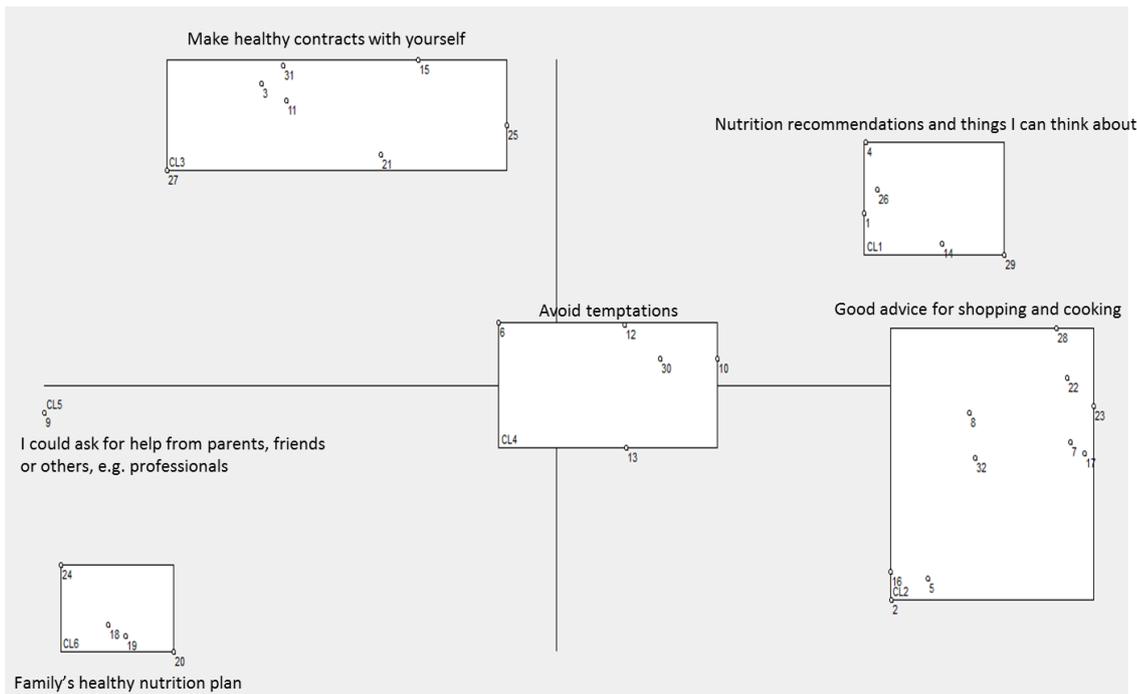


Figure 1. An example of a Concept map from the older adolescents in School 2, the initial cluster solution generated by Ariadne software. Numbered dots correspond to individual statements.

The list of statements and strategies corresponding to the Concept Map given as an example on Figure 1:

Nutrition recommendations and things I can think about

- Eat more fish
- Eat 6 units of fruit and vegetables per day
- Make your own food instead of eating out
- Think about those things I put in food or in the oven
- I can eat a little unhealthy, but I should think, how much I eat
- Max drink 0.5 litre "sweet drink" (soda and similar) a week (moved from Good advice for shopping and cooking)

### Good advice for shopping and cooking

- Avoid buying sweets, crisps and similar: buy e.g. healthy snacks like nuts as supplements to sweets and other unhealthy things
- Use olive oil when cooking
- Use a lot of vegetables when cooking instead of meat with a lot of fat/high fat %
- Think about the fat % in food you buy
- Buy and eat organic food
- Buy healthier food: e.g. buy a lot of vegetables and low fat meat when you are shopping

### Make healthy contracts with yourself

- Do a lot of exercising along with eating healthily. So that you can avoid weight increase
- Pick one or more days a week, when you eat food with low fat content
- Eat more meals a day instead of two large meals
- Stop eating at McDonald's/Burger King (moved from Good advice for shopping and cooking)
- I could bring my own (healthy) lunchbox to school/work
- Eat 3 meals a day
- Begin to eat healthily every time you think about sweets and want some. You should stop thinking about it and get a piece of fruit or a smoothie. It will help and make you feel better about yourself

### Avoid temptations

- Keep away from the places where they sell junk food (moved from Good advice for shopping and cooking)
- Remember that water benefits skin in puberty – so you should drink water instead of soda, alcohol and similar things
- Stop bringing money to school – so that I do not go to the kiosk and buy sweets (moved from Good advice for shopping and cooking)

- Stop buying unhealthy things so you and others do not get tempted
- I could avoid bringing money when I go out and thus avoid temptations
- I could remember to eat a healthy, substantial and good breakfast so that I do not get hungry in 1-3 hours after and do not eat something quick like sweets
- Eat oatmeal instead of cornflakes and stop putting sugar on breakfast products

#### Family's healthy nutrition plan

- Make fruit accessible – at home, at school (moved from Make healthy contracts with yourself)
- Hang nutrition pyramid at home
- Tell my parents that they should buy more fruit and vegetables and ask them not to buy sweets, crisps, etc.
- Ask my parents to buy healthier bread (whole meal bread)
- Ask my parents also to eat more healthily
- I could ask for help from parents, friends or others, e.g. professionals (1 statement)

### **Discussion**

Results from the study suggest that adolescents know what healthy and unhealthy eating is. Many of the statements about nutrition recommendations were in line with official guidelines (Danish Ministry of Food and Environment, 2015). In all the classes participants mentioned eating fish twice a week and drinking water when thirsty as rules to follow. Many of the statements corresponded almost word for word to some of the recent campaigns, e.g. “Max. 0.5 litres of soda a week” (Danish Veterinary and Food Administration, 2015a) and “6 units of fruit/vegetables a day” (Danish Veterinary and Food Administration, 2015b). Participants from School 1 participated in a number of lectures on nutrition, which may explain why they came up with more statements about rules and nutrition recommendations compared to the other school. The fact that participants were able to

recall the recommendations so precisely confirms that lectures and/or campaigns were successful in delivering the message to this age group. Adolescents use this knowledge when trying to find ways to improve their eating behaviour by following the general nutrition recommendations or by creating their own rules. These results are in line with previous research: strategies towards creating rules for food choice were already discussed in earlier research by Contento *et al.* (2006).

The younger participants showed interest in getting their parents to help them improve their eating patterns while the older adolescents' strategies, related to parents and family, were focused on influencing the family rather than on getting help. The reason is that the older adolescents become, the more influence on family purchasing decisions they get (Rust, 1993). Both groups of strategies – trying to influence their family and getting help from parents correspond, to some extent, to the strategy “specific ways to interact with family”, which is used to resolve possible conflicts between one's own food preferences and that of the family (Contento *et al.*, 2006). Whether getting help from others is a self-regulation strategy may be questioned. Even though getting help implies some kind of environmental influence, asking for such help still requires some initiative from an individual and, thus, defining it as a self-regulation strategy is not at odds with the definition of self-regulation provided earlier. Thus, sometimes it may be difficult to distinguish between healthy eating strategies and self-regulation strategies since using any strategy revealed in this study will require a self-regulation effort.

Strategies related to giving extra thought to choice situations or to consequences of particular choices were suggested by adolescents in this study, and have also been identified earlier. In his study of adult consumers' behaviour, Karlsson (2003) discusses a willpower strategy “Thinking twice” – consumers using this strategy are supposed to think twice before they buy something. In this study avoidance strategy refers to avoiding unhealthy food outlets and also to avoiding situations when eating unhealthily may be tempting and even avoiding people who have unhealthy

food. It is quite interesting that statements about avoiding places were usually rated as important while statements about avoiding situations/people were rated as unimportant. Thus, some of the statements about avoiding situations may seem useful, e.g. “Don’t get any money because I use them for sweets”, but given low ratings from participants, it is unlikely that adolescents will use these strategies much in practice. At the same time, introducing strategies about avoiding places with temptations may be beneficial because those statements were rated relatively high by participants. Avoidance strategy has been mentioned earlier in research: e.g. Hoch and Loewenstein (1991) and Stok *et al.* (2012). Hoch and Loewenstein only investigated buying behaviour and therefore their “Avoidance” strategy only referred to avoiding places where the impulse to buy may become irresistible.

Adolescents from both age groups suggested that they may influence eating behaviour through food purchasing behaviour, but only the older participants formed a separate cluster referring to shopping situations (Good advice for shopping and cooking). In general, most statements aiming to improve purchasing behaviour were rated relatively high. Thus, one possible approach to improve adolescents’ eating behaviour is to try to influence their food purchasing behaviour.

Statements suggesting cooking instead of buying fast food or junk food were rated as very important by girls but not by boys, which may be explained by the fact that girls spend more time on household tasks, including food preparation (Ferrar *et al.*, 2012). At the same time it indicates that girls consider healthy eating to be their own responsibility: if they want to eat healthy, then they should cook healthy food. Boys think that somebody else (their mother) is responsible for providing them with healthy food: they rated the statement where they ask their mother to cook as the most important while girls did not rate it as important.

Previous researchers have discussed fast food consumption and its role in prevention of overweight: fast food consumption in adolescence was associated with weight gain in the study by Niemeier *et al.* (2006). Adolescents from all four classes formulated fast-food related statements, many of which were rated as important. Location of fast food restaurants was found to have an effect on overweight levels in the study by Davis and Carpenter (2009) and even though there were no fast food restaurants close to the schools, participants from school 2 mentioned the new supermarket and the unhealthy food that is sold there. Supermarkets often offer unhealthy options at low prices and it is crucial to help adolescents to make the right choices. The results of the present study show that some of the self-regulatory strategies (e.g. avoidance) may be used beneficially in helping to not to choose unhealthy food offered in supermarkets.

The statement “Run, so you feel healthy and want to eat healthily” was rated as one of the most important in one of the classes. High importance rating of this statement should be taken into account when using the findings in practice: adolescents relate healthy eating with exercising and reminding them about the necessity of physical activity is crucial.

The interpretation of the results in this study was based on the grouping solutions suggested by adolescents; researchers played the role of facilitators in discussions. The alternative way of interpreting the results, namely sorting done by researchers, was used in Stok *et al.*'s (2012) study. Despite the different approaches used in the sorting process, some of the strategies from this study corresponded to similar strategies from the other study: replacement (substitution in Stok *et al.*'s), avoidance of temptations, seeking help, thinking of consequences, following nutrition recommendations, making own rules (preparation in Stok *et al.*'s). Some of the strategies identified in this study were unique: influencing others and ensuring the right balance and regularity of food intake. According to Palan and Wilkes (1997) variety of strategies adolescents can use to influence purchasing outcomes increases with age, therefore strategies such as influencing others in order to

improve own eating behaviour may be very useful especially for older adolescents in the family context. Keeping the right balance between different ingredients and foods as well as the regularity of food intake was rated as rather important in this study. Even though it may be considered a way to create rules for healthy eating, distinguishing it as a separate group in this study confirms its importance and magnitude to adolescents.

Goal-setting and monitoring are important when trying to regulate eating behaviour (Schnoll and Zimmerman, 2001), and according to the results of this study, using goal-setting as a self-regulation tool is an option for adolescents: the statement “Set myself a goal to eat only healthily over a period” was formulated, but no strategies implying monitoring were mentioned. Self-monitoring strategies were identified by Stok *et al.* (2012); thus, it is important to inform adolescents about the use of self-monitoring strategies independently as well as in addition to the other self-regulation strategies. Different approaches taken in the sorting process are not the only possible reason for discrepancies between the results of the two mentioned above and the present studies; cultural differences should not be underestimated. This study was conducted in Denmark and Stok *et al.*'s (2012) study was conducted in the Netherlands.

Experience from conducting the study with 12-15-year old adolescents shows that the number of statements they have to work with at the second meeting should not exceed 35 and preferably be less than 30. These conclusions are derived from observations and from the discussion of the procedure with participants – some of them found it quite difficult to sort more than 35 statements. According to the guidelines for Concept Mapping studies (Netherlands National Centre for Mental Health, & Talcott BV., 1995), dimensions on a map can be interpreted together with participants at the third meeting. This study showed that this task may be quite difficult for adolescents. The reason may be that the sorting task was accomplished individually while the discussion was accomplished together with classmates. Adolescents may be sensitive to possible criticism from

peers and therefore unwilling to express their opinions. Besides, it may be difficult for them to interpret results which are not theirs. The discussion with participants did not reveal any further results that could be used for labelling dimensions on the maps.

The study provides an overview of adolescents' ideas about self-regulation strategies, but it is important to mention that adolescents may not be aware of some of the strategies, which, however, does not imply that these strategies are not applicable to this age group.

Future research may benefit from focusing on the strategies which were not identified by this research but which may have a potential for improving eating patterns, and which have been identified by previous studies focusing on adults' self-regulation: e.g., improving intrinsic motivation (Muraven, 2008), fostering self-efficacy and using monitoring (Bandura, 1991). This study had an exploratory nature and aimed at revealing self-regulatory strategies which can be used by adolescents in eating situations. The next research on the use of self-regulatory resource for eating behaviour might focus on individual preferences for using different self-regulatory strategies. It will also be important to link the use of strategies with actual eating behaviours as this would allow to evaluate the effectiveness of particular strategies in everyday situations and to identify where to focus in possible interventions. The results of the study also show that adolescents have some knowledge of nutrition recommendations which may derive from successful public interventions. This study did not aim to measure the effects of any particular campaign, but future research could benefit from focusing on the effects of these campaigns on actual eating behaviour as well as on the use of self-regulatory strategies in adolescence.

By applying an available and powerful self-regulatory resource the present study makes one of the initial steps into the development of personal tools to confront environmental temptations.

## **Conclusions**

The present study has demonstrated that concept mapping is an effective tool for revealing self-regulatory strategies which can be used to improve adolescents' eating behaviour. The results of the study show that Danish adolescents are aware of what healthy and unhealthy food choices are. Health promoting organizations may benefit from going beyond knowledge dissemination when developing interventions targeting adolescents. Focusing on self-regulatory aspects of promoting a healthy diet in the domain of eating behaviour seem to be a logical direction for future research and a promising approach in developing future interventions. The concept of self-regulation may be introduced to adolescents along with introducing self-regulatory strategies and their possible applications in everyday situations. This way of applying the findings may require involving adolescents in more thorough educational activities focusing on developing self-regulatory skills and recognizing the situations where these skills may be applied. Eating situations were the focus of this study, but educational activities aiming at improving self-regulatory skills do not have to be restricted to this domain: applying the self-regulatory strategies for eating may as well be a part of a more general training within self-regulation. While this comprehensive approach seems promising, it may sometimes be difficult to implement in practice since it requires a certain amount of resources. Therefore, alternative approaches, such as presenting particular strategies as a part of healthy eating interventions, may be taken by health promoters.

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## **STUDY 2. EXPLAINING THE GAP BETWEEN INTENTION TO EAT HEALTHY AND EATING BEHAVIOUR IN ADOLESCENCE. THE MEDIATING ROLE OF SELF-REGULATION**

*Liliya Nureeva, Bjarne Sørensen and Liisa Lähteenmäki*

*Submitted at Psychology & Health.*

### **Abstract**

**Objective:** The possible gap between consumers' intention to eat healthy and actual eating behaviour is of high significance to consumer behaviour and health psychology research. However, it is even more important to bridge these constructs by identifying possible mediators in this relationship. This study examines whether particular self-regulatory strategies mediate the relationship between intention to eat healthy and eating behaviours, such as fruit consumption and snack consumption.

**Design:** More than 11 000 adolescents (aged 10 to 17 years) from nine European countries filled out the questionnaire, where the use of self-regulation strategies, attitude, and social influence were assessed. Respondents completed the questionnaires individually.

**Main outcome measures:** A cross-sectional study assessing intention to eat healthy and eating behaviour was conducted.

**Results:** The mediating role of self-regulatory strategies was confirmed by the model exploring the relationship between the intention to eat healthy and eating behaviours. Strategies addressing temptations fully mediated the relationship between intention and snacking behaviour. Strategies addressing goals fully mediated the relationship between intention and eating fruit.

**Conclusion:** The results suggest that self-regulatory strategies help adolescents overcome the existing gap between the intention to eat healthy and performing healthier eating behaviours, in particular less unhealthy snacking and more fruit consumption.

**Keywords:** Self-regulation, adolescents, snacking, healthy eating, intention-behaviour gap

## **Introduction**

### ***Eating as Health-related Behaviour***

The number of overweight children in the European Region grew significantly from 1990 to 2008, which is quite worrisome because more than 60 per cent of overweight children will also be overweight as adults. Childhood obesity is associated with various health-related and social consequences, such as an increased risk of developing a cardiovascular disease, type 2 diabetes, orthopaedic problems, mental disorders, underachievement in school, lower self-esteem (World Health Organisation, 2015), teasing and social isolation (Lobstein, Baur & Uauy, 2004).

The link between obesity in childhood and obesity associated diseases in adulthood has been discussed by previous studies (Lobstein & Frelut, 2003; Dietz, 1998) and researchers have addressed unhealthy diets as one of the predictors of overweight and other health-related consequences (World Health Organization, 2007; Stice, Shaw & Marti, 2006). Preventing these consequences may be attempted through improving diet quality by increasing fruit consumption (World Health Organization, 2003) and decreasing intake of snacks high in saturated fat, salt and sugar (Lloyd-Williams, Mwatsama, Ireland & Capewell, 2009).

Improving eating patterns in childhood and adolescence is therefore of high importance in health behaviours research; contributing to finding new ways of doing so is the main purpose of this paper.

### ***Intention to Eat Healthy and its Predictors***

The two most cited theories explaining the possible drivers of human behaviour in Social Science are probably Theory of Reasoned Action (Ajzen & Fishbein, 1980) and Theory of Planned

Behaviour (Ajzen, 1991). According to these theories, the intention to perform a behaviour will to some extent predict the behaviour itself.

Attitude towards a specific behaviour and *subjective norms* are predictors of *intention to perform the behaviour* according to the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB). Subjective norms are usually defined as perceived social pressure (Povey, Conner, Sparks, James & Shepherd, 2000) or perception of acceptance or disapproval of the behaviour. The relation of subjective norms to intention in TPB is evaluated to be weak in general for adults (Godin & Kok, 1996), especially when compared to attitudes and perceived control (Armitage & Conner, 2001). This is in line with the majority of studies with adolescents: Grønhøj, Bech-Larsen, Chan and Tsang (2012) in their study with Danish adolescents found that perceived behavioural control followed by attitude were the strongest predictors of intention to eat healthy while subjective norms did not contribute to prediction of intention; in their study on understanding soft drink consumption Kassem and Lee (2003) found that behavioural control followed by attitude were the strongest predictors of intention while subjective norm was the weakest predictor.

Another interesting aspect to focus on when analysing social influence on intention is social norms, which are widely accepted to be strong predictors of behaviours in adult consumers even though their conceptualization is quite heterogeneous (Ball, Jeffery, Abbot, McNaughton & Crawford, 2010). Earlier social norms were proven to have a potential of determinants of eating behaviours, such as fruit and vegetables intake (Ball, et al., 2010) even though the evidence is not always consistent with results from other studies (Povey, et al. 2000). Further attempts to improve the prediction of intentions and behaviours led to introducing a norm-focus theory and further distinguishing between injunctive and descriptive social norms (Cialdini, Reno & Kallgren, 1990), where descriptive norms are related to perception of how others perform particular behaviours, and injunctive norms is a perception of what others expect one to do. There is no consensus regarding

the measurement instruments of the descriptive and injunctive norms: sometimes the first one may be measured as percentage of people engaging in behaviour or the extent of agreement on how people behave; the latter may be measured as rating of others' approval of desired behaviour and encouraging it or disapproval of undesired behaviour (Ball et al., 2010).

Descriptive *social norms* may sometimes be conceptualized as *parental modelling* when predicting children's and adolescents' eating behaviour and this conceptualization seems to be fair: parents are important role models for these age groups. The results of a study by Brown and Ogden (2004) suggest that modelling influence the way children both think and behave around food. The study by Pearson, Ball and Crawford (2011), where the authors use social-ecological models to distinguish between individual, social and environmental factors influencing health behaviour, resulted in a conclusion that modelling of healthy eating by an adolescent's mother was positively associated with the change in fruit consumption. This is in line with the Social Cognitive Theory (Bandura, 1977), according to which observing others is an important component of knowledge acquisition.

Injunctive and descriptive norms are not always distinguished in empirical settings where TRA and TPB are applied but Fishbein (1993) suggests that both represent perceived social pressure. We believe that distinguishing between the two will be useful in predicting intention to eat healthy; this will be reflected in the choice of measurement tools.

Perceived social support being, perhaps, the most studied social correlate to healthy eating behaviour (Ball et al., 2010) should be differentiated from social pressure. Social support is assistance and help one receives from surroundings when an effort to perform a desirable behaviour or not perform an undesirable (Povey et al., 2000). A large body of research evidenced positive influence of a supportive environment, including parental support, on health behaviours (Pugliese &

Tinsley, 2007; Sallis, Prochaska & Taylor, 2000 and Villard, Ryden, & Stahle, 2007). According to Pearson et al. (2011) vegetable consumption was positively associated with support of best friends. The important role of social support is not always confirmed by previous research although a study by Wu, Snider, Floyd, Florence, Stoots and Makamey (2009) did not find clear evidence in support of its significant role in predicting adolescents' intention to eat healthy.

### ***Intention – Behaviour Gap and Self-regulation***

Intention has repeatedly been confirmed to be the most proximate predictor of actual behaviour but the evidence is not always strong in empirical research: the extent to which the behaviour may be predicted by intention varies depending on the type of behaviour but generally it is believed that around 20 per cent of the variance in health behaviours may be explained (McEachan, Conner, Taylor, & Lawton, 2011). The discussion on how many percent of the variance should be explained in order to consider the prediction good or poor has been on for the last decades for conceptual as well as empirical reasons. In some cases intention can be better explained than behaviour (McEachan et al., 2011) but intention is not always translated into behaviour (Webb & Sheeran, 2006). The intention-behaviour gap should be taken into consideration when applying theories predicting behaviour: why do those who intend to eat healthy not do so? Which mechanisms can help people transfer intentions into actual behaviour? All these questions of a very high practical importance have been addressed by previous research: different mediators/moderators in the relationship of intention to eat healthy and healthy eating have been discussed and additional variables tested: e.g. De De Bruijn, Kremers, De Vet, De Nooijer, Van Mechelen & Brug, (2007) examined whether habit strength moderated the relationship between intention and fruit consumption in adults, and Menozzi and Mora (2012) tested the mediating role of habits in the intention – fruit consumption relationship. Self-regulation processes are also one of the potential focus areas when trying to explain the gap: self-regulation is believed to be one of the main factors

in successful functioning in life (Baumeister, 2003) and improving self-regulatory skills in adolescence is expected to lead to better self-regulatory skills in adulthood and to better behavioural outcomes, including healthier eating patterns.

Recent research suggests that a person's ability to self-regulate their behaviour may influence relationship between intention and actual eating behaviour (Mullan., Allom, Brogan, Kothe, & Todd, 2014), e.g. eating breakfast (Wong & Mullan, 2009) and fruit and vegetable consumption (Allom & Mullan, 2012); in the study by Godinho, Alvarez, Lima and Schwarzer (2013) coping planning and action control mediated the relationship between intention and fruit and vegetable consumption. Self-regulatory tools influencing the relationship of intention and other health-related behaviours were also discussed in literature where, for instance, physical activity was predicted (Bruin, Kok, Prins, Sheeran, Hiemstra, & Hospers 2012).The authors suggest that self-regulatory processes explain how intentions to exercise are transferred into exercising behaviours.

The model of action phases (MAP) (Heckhausen & Gollwitzer, 1987) assumes that in order to reach the intended goal, an individual must take specific actions, which can be divided into four stages: predecisional, preactional, actional and postactional. An individual starts by reflecting on competing wishes; this results in forming a goal intention translated in turn into behavioural intention. In the last stage implementation intention is formed and actions constituting it are executed automatically (Gollwitzer, 1999). In this case implementation intention has the structure 'If I encounter situation S, then I shall perform behaviour Y'. Bamberg (2013) applied the MAP for the environmental behaviour domain and concluded that implementation intention mediated the relationship between goal intention (self-reported car use reduction intention) and actual behaviour (frequency of actual public transportation use).

Assessing the role of self-regulation in intention-behaviour relationships may be done by testing the mediating role of specific self-regulatory strategies. Performing self-regulatory strategies here implies an effortful self-regulatory exercise in order to reach the desired goal of healthier eating. De Vet, De Ridder, Stok, Brunsø, Baban and Gaspar (2014) identified groups of self-regulatory strategies used by adolescents to improve eating behaviour: strategies addressing temptations directly, strategies addressing the psychological meaning of temptations and strategies addressing goals. The study revealed correlation between using self-regulatory strategies and healthier eating patterns, such as higher fruit and vegetable intake, as well as lower soda and snack intake.

### **The Present Study**

Theory of Reasoned Action (TRA) and the Model of Action Phases (MAP) were used when designing the framework for the present study. The study, using TRA that defines attitude as predictor of intention, explores how two types of social norms – descriptive norms and injunctive norms – predict the intention to eat healthy. The role of social support towards healthy eating in predicting intention is examined as well. As mentioned above, conceptualizations of the normative constructs appear to be quite heterogeneous, often depending on whether TRA/TPB or a social norms approach was used in a particular study. In order to avoid possible misunderstandings, the terms of descriptive social norms and injunctive norms will be applied.

Classic theories, like TPB and TRA, explaining the role of intention in predicting behaviours, do not focus on the mechanisms which can explain this relationship. This study aims to find mediators explaining the relationship between intention and healthy eating as well as to suggest possible ways of explaining this relationship. MAP suggests that implementation intention –

transferring goal intention into specific actions – may be one way of enhancing the relationship between goal intention and actual behaviour. There is no single way of formulating constructs used in classic and newly developed theories related to predicting intention and health behaviours, and a large variety of terms is used for constructs with similar meanings. The relationship between intention to eat healthy and healthy eating behaviour was assessed and possible predictors of intention to eat healthy were included in the framework: attitude towards healthy eating, social influence and social support. The mediating effect of three groups of self-regulatory strategies was tested in an intention-behaviour relationship: Strategies addressing temptations directly, strategies addressing the psychological meaning of temptations and strategies addressing goals.

## **Method**

### ***Recruitment, Participants and Procedure***

Recruitment was conducted via council schools. Each of the nine countries (Denmark, the Netherlands, the UK, Belgium, Portugal, Finland, Poland, Romania, and Germany) was responsible for recruiting a minimum of 1200 respondents: 600 respondents in the 10 to 13-year age group and 600 respondents in the 14 to 17-year age group. Each of the nine countries aimed to recruit participants from a minimum of five schools: two to three schools from urban areas and two to three schools from rural areas; two to three low socio-economic status (SES) schools and two to three schools in high SES areas. The schools were contacted via telephone first, and researchers collected the data personally when visiting the schools. One researcher and one school representative (usually a teacher) were present in the classroom where the data were collected. Respondents were informed that participation was voluntary and anonymity was guaranteed. Ethical requirements of conducting research with adolescents were met by sending consent letters to parents prior to data collection;

here the objectives of the study were stated and actions towards prevention of participation were provided.

The survey was conducted in nine European countries: Belgium, Denmark, Finland, Germany, The Netherlands, Poland, Portugal, Romania, and the United Kingdom. Respondents were adolescents attending schools aged ten to seventeen. In total, 11,826 questionnaires were collected in the nine countries and 123 schools in 21 towns. The number of participants ranged from 1158 to 1500 in each country.

After excluding outliers and cases with too many missing data and treating the rest of the missing data with Expectation Maximization Algorithm, the total number of the cases included into the analysis was 10972.

### ***Measures***

The draft version of the questionnaire was tested with 10-17-year old adolescents in four countries (Romania, Portugal, Denmark and Netherlands). Eight hundred questionnaires were collected and analysed which resulted in the removal 20 of the items. The reasons for removing items were: large amount of missing values for some of the items, comments from respondents about difficulties with understanding some of the items, not meeting the criteria on kurtosis on some of the items. After the first round of removing the items, a number of factor analyses and reliability tests were run. More items had to be removed and the final list of items was determined.

Intention to eat healthy, social influence and attitude items were assessed on a 5-point Likert scale (“1” – totally disagree to “5” – totally agree).

### ***Intention to Eat Healthy***

Intention to eat healthy was assessed with an item “I intend to eat healthy”.

### ***Social Influence and Attitude***

A Principal Component Analysis was run in order to confirm the predefined structure of social influence and attitude items; the items loaded into four factors in the following way:

*Injunctive norms* were assessed with an item “My parents tell me I should eat healthy”.

*Descriptive social norms* were assessed with an item: “My parents eat healthy themselves”.

*Perceived social support* was assessed with two items: “The people around me help me to eat healthy”, “A lot of things are being done to help me to eat healthy”, Cronbach’s Alpha = .63.

*Attitude towards healthy eating* was assessed with two items “Healthy eating is important to me” and “I myself pay attention to eating healthy”, Cronbach’s Alpha= .72.

### ***Self-regulatory Strategies***

Self-regulatory strategies were assessed using the TESQ scale (De Vet et al., 2014). Twenty-four items were used to assess the use of the strategies: eight items for strategies addressing the temptations directly (avoidance of temptations and controlling temptations), eight items for strategies addressing the meaning of temptations (distraction and suppression) and eight items for strategies addressing healthy eating goals (Goal setting and goal deliberation). Items were assessed on a 5-point scale (“1” - never, “5” - always).

The full list of the items may be found in Appendix 1.

### ***Eating Behaviours***

Eating behaviours were assessed with two items: “How many servings of fruit do you eat on an average day?” and “How many snacks do you eat on an average day?” on a 6-point scale (“0” - less than 1 and “5” - more than 4). Respondents were instructed that they should think about unhealthy

snacks when answering the latter question and were provided with some examples: energy bars, candy, etc.

## Analysis

Descriptive statistics and inter-item correlations were calculated in IBM SPSS Statistics 21.

A structural equation model was estimated. In the Jöreskog-Keesling-Wiley parameterisation, the model consists of three simultaneous equations. The first two specify the measurement models of the exogenous and endogenous variables:

$$x = \Lambda_x \xi + \delta \quad (1)$$

$$y = \Lambda_y \eta + \varepsilon \quad (2)$$

The first equation specifies the measurement model for the exogenous variables, where  $\mathbf{x}$  is a  $J \times 1$  vector of observed responses,  $\Lambda_x$  a  $J \times K$  matrix of factor loadings,  $\xi$  a  $K \times 1$  vector of latent factors, and  $\delta$  a  $J \times 1$  vector of latent measurement errors, with  $E(\delta) = 0$  and  $\text{Cov}(\xi, \delta) = 0$ . The second equation specifies the measurement model for the endogenous variables, where  $\mathbf{y}$  is a  $S \times 1$  vector of observed responses,  $\Lambda_y$  is a  $S \times T$  matrix of factor loadings,  $\eta$  is a  $T \times 1$  vector of latent factors, and  $\varepsilon$  is a  $S \times 1$  vector of latent measurement errors, again with  $E(\varepsilon) = 0$  and  $\text{Cov}(\eta, \varepsilon) = 0$ . The third equation specifies the structural model:

$$\eta = \mathbf{B}\eta + \Gamma\xi + \zeta \quad (3)$$

where  $\mathbf{B}$  is a  $T \times T$  matrix of coefficients from the regression among the endogenous latent factors,  $\Gamma$  is a  $T \times K$  matrix of coefficients from the regression of the endogenous on the exogenous latent factors, and  $\zeta$  is a  $T \times 1$  vector of latent disturbances.

## Results

### *Descriptive Statistics and Bivariate Correlations*

More than half of the children (56%) were between 10 and 13 years old, and the rest of the participants were between 14 and 17. About half of the children were girls (51%) and the mean age was 13.3 years with a standard deviation of 2.1.

Participants' mean scores in intention to eat healthy, social influences, attitude, using self-regulation strategies, fruit and snack intake can be found in Table 1.

*Table 1. Means for intention to eat healthy, social norms, attitude, social support (“1” -totally disagree, “5” – totally agree), self-regulation strategies (“1” - never, “5” - always) and eating behaviours (“0” - less than 1, “5” - more than 4).*

	Mean	Std. Deviation
Intention to eat healthy	3.4	1.08
Injunctive norms	3.4	1.23
Descriptive norms	3.7	0.94
Social support	2.9	1.01
Attitude towards healthy eating	3.6	0.87
Strategies addressing the meaning of temptations	2.3	0.86
Strategies addressing healthy eating goals	2.5	0.93
Strategies addressing the temptations directly	2.4	0.87
Fruit items per day	1.9	1.34
Snacks per day	1.9	1.43

Respondents did not agree that people around them help them to eat healthy, but claimed that it was important for them to eat healthy. Respondents assessed the use of each of the three groups of strategies as being close to “sometimes” and reported that they ate less than two snacks and a less than two pieces of fruit per day in average.

Bivariate correlation coefficients are presented in Table 2.

Table 2. Bivariate correlations between the key variables

	Fruit per day	Snacks per day	Intention to eat healthy	My parents tell me I should eat healthy	My parents eat healthy themselves	Social support	Attitude towards healthy eating	Strategies addressing the meaning of temptations	Strategies addressing healthy eating goals	Strategies addressing the temptations directly
Fruit per day	1									
Snacks per day	-.008	1								
I intend to eat healthier	.150**	-.121**	1							
My parents tell me I should eat healthy	.052**	.003	.355**	1						
My parents eat healthy themselves	.148**	-.070**	.171**	.269**	1					
Social support	.139**	-.089**	.335**	.350**	.280**	1				
Attitude towards healthy eating	.273**	-.206**	.420**	.225**	.396**	.387**	1			
Strategies addressing the meaning of temptations	.242**	-.329**	.299**	.119**	.144**	.232**	.363**	1		
Strategies addressing healthy eating goals	.341**	-.281**	.359**	.148**	.191**	.256**	.461**	.758**	1	
Strategies addressing the temptations directly	.236**	-.360**	.260**	.105**	.190**	.231**	.392**	.711**	.687**	1

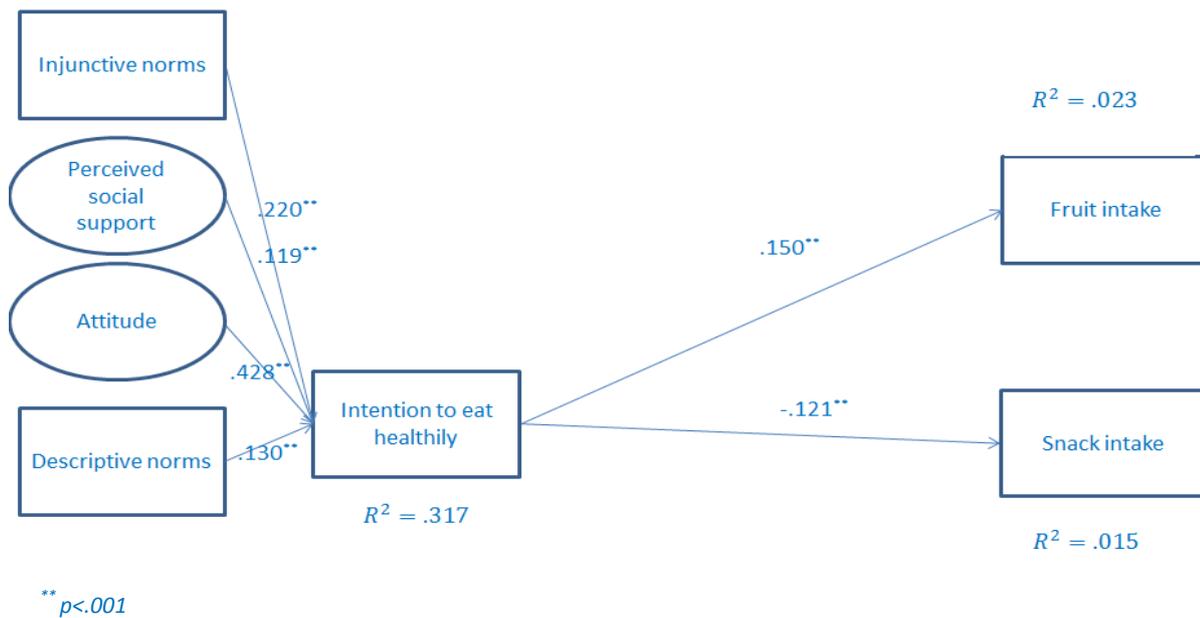
\*\* . Correlation is significant at the 0.01 level (2-tailed).

Most of the constructs were positively and significantly correlated with each other with an expected exception of snack intake, which was negatively associated with most of the other constructs. Snack intake was not associated with injunctive norms and association with descriptive norms and social support was poor but, still, significant. There was also poor but significant correlation between fruit intake and injunctive norms. Fruit intake and snack intake were not significantly associated.

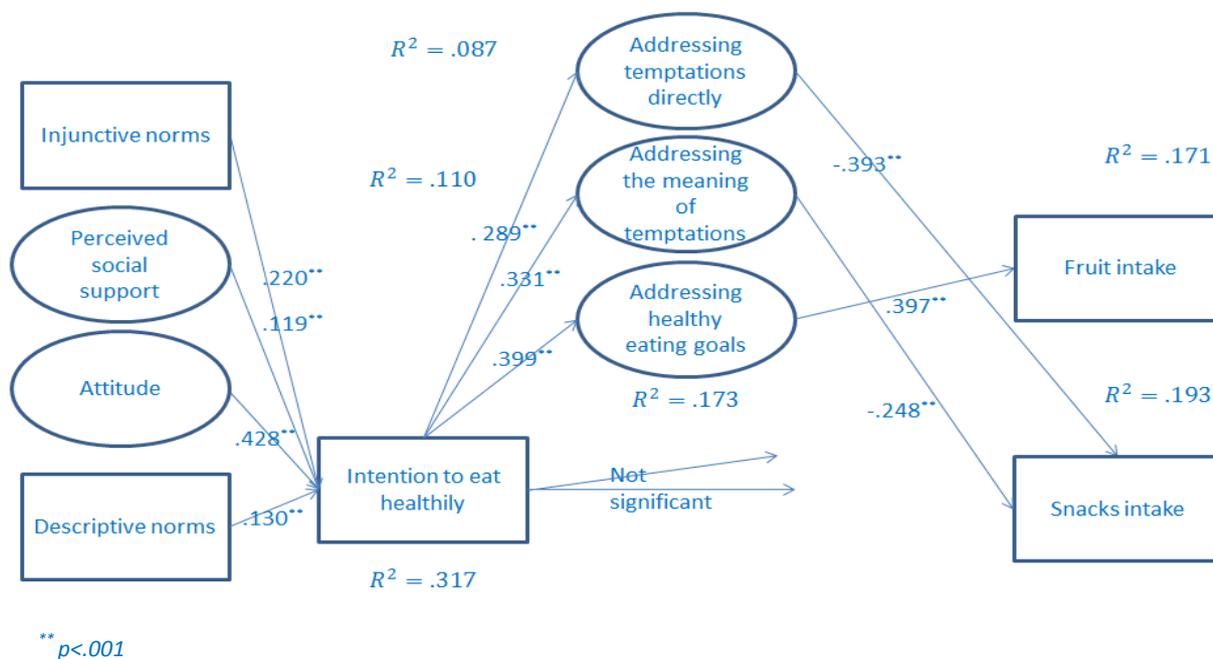
### ***Structural Equation Modelling***

Due to deviation from normality, the parameters of the model were estimated using robust maximum likelihood (Satorra & Bentler 1988, 1994, 2001; Hu et al., 1992) based on asymptotic covariance matrices using LISREL 8.72 (Jöreskog & Sörbom, 1996a, 1996b; Jöreskog, Sörbom, du Toit, & du Toit, 1999).

Two models were estimated. The first was a model without the self-regulation strategies, and the second model included these strategies. Intention was no longer significant when the strategies were controlled for; hence the finding supported full mediation. Two graph representations of the two models are displayed in Figures 1 and 2. All non-significant relationships were suppressed and all effects were standardized.



**Figure 1. Modelling Total Effects of Intention to Eat Healthily on Fruit and Snack Consumption**



**Figure 2. Modelling Direct and Indirect Effects of Intention to Eat Healthily on Fruit and Snack Consumption**

The resulting goodness-of-fit measures for the larger model were within the conventional acceptance limits<sup>1</sup> and can be regarded as highly satisfactory. The first model, however, demonstrated some problems making it the statistically inferior of the two models. The fit indices for both models are presented in Table 3.

*Table 3. Fit indices for Model 1 (without self-regulation strategies) and Model 2 (with self-regulation strategies)*

Total N = 10972

	$\chi^2$	df	RMSEA	SRMR	CFI	TLI
Model 1	1355.131	19	0.080	.053	.921	.854
Model 2	9456.711	463	0.042	.059	.932	.923

By and large, the total effects from intention to healthy and unhealthy eating behaviour remained the same. In the second, nonetheless, the total effects stemmed primarily from indirect effects. The intention behaviour link was weak but significant. The relationships from the antecedents to intention were the same in the two models as these parts remained unchanged.

The strongest effect on intention stemmed from attitude. The effects from descriptive norms, injunctive norms and perceived social support on intention were of medium size. The effect from intention to the self-regulation strategies, addressing temptations directly, addressing psychological meaning of temptations and addressing healthy eating goals, were positive. Finally, the relationship from addressing healthy eating goals to eating fruit was positive and the relationship from

<sup>1</sup> Conventions on the acceptance limits for the goodness-of-fit-measures reported here can be found in Bentler (1990), Browne and Cudeck (1992), and Jöreskog and Sörbom (1996a).

addressing temptations directly and addressing psychological meaning of temptations to snacking behaviour were negative, as expected.

The use of self-regulatory strategies was found to be a significant mediator in the relationship between intention to eat healthy and fruit and snack intake. Intention to eat healthy, in turn, was strongly predicted by attitude to healthy eating and, to a lower extent, by the constructs representing social influence.

## **Discussion**

Understanding the gap between intention and actual behaviour is an important topic in health psychology research in general and in the field of eating and other health-related behaviours in particular. The importance of understanding how intentions are translated into action is essential because intention is one of the most used predictors of behaviour. A large body of research in health-related behaviours focused on the intention-behaviour relationship trying to find how it can be explained. Researchers looked at different mediators and moderators but only few of them focused on self-regulatory aspects of the transition process. The aim of this study was to investigate the role of self-regulatory processes in intention-behaviour relationship. Self-regulatory aspects were conceptualized as three types of self-regulatory strategies: strategies addressing temptations directly, strategies addressing the psychological meaning of temptations and strategies addressing the goals.

Intention was a weak predictor of snack and fruit intake in the model measuring total effects, which is in line with a previous study with university students by Mullan et al. (2014), where 7.6 per cent of variance in fruit and vegetable consumption was explained by intention. At the same time intention accounted for 45 per cent of variance in fruit and vegetable consumption in the study

by Guillaumie, Godin and Vézina with adults (2010). It seems that there is no consensus in the existing literature regarding the predictive power of intention but still intention is one of the strongest behaviour predictors used today.

The hypothesis about self-regulation strategies explaining transition of intention to eat healthy into actual behaviour was confirmed and the mediating role of three groups of strategies was proven for snack and fruit consumption behaviour. Introducing self-regulation strategies helped improve the model: the variance explained in fruit consumption increased from 2.3 to 17.1 per cent and variance explained for snack consumption increased from 1.5 to 19.3 per cent. Strategies addressing temptations directly and strategies addressing the psychological meaning of temptations fully mediated the relationship between intention to eat healthy and snacking behaviour. Strategies addressing goals fully mediated the relationship between intention to eat healthy and eating fruit.

Self-regulation and its possible role in closing the intention-behaviour gap has been discussed in the literature earlier and a number of studies have been conducted to test the mediating/moderating role of self-regulation. Mullan et al. (2014) found no significant association of self-regulatory variables (impulsivity and temporal orientation) with fruit and vegetables consumption and did not prove the moderating role of self-regulation in intention-behaviour relationship. Other studies, however, did prove the moderating role of self-regulation on the intention-behaviour gap; for instance, in the study by Allan, Johnston and Campbell (2011), executive control was found to be important for translating dietary intentions into actual behaviour, particularly into increased fruit and vegetable consumption and decreased snack consumption. These contradictions may derive from the differences in conceptual understanding of the self-regulation term and its possible operationalisations. In this study, the aim was to focus on particular strategies/actions implying the use of self-regulatory skills as well as on particular eating behaviours, while Mullan et al.'s study operationalized self-regulation as self-reported impulsivity

and temporal orientation, and Allan et al.'s study looked at executive control. Moreover, both of the studies discussed self-regulation as a moderator in intention-behaviour relationship, which was not the case in the present study.

Bamberg et al. (2013) who applied the MAP to test whether implementation intentions are mediating the relationship between behavioural intention and environmentally harmful behaviours confirmed the mediating role of implementation intention. In the present study, the authors use the term "self-regulatory strategies" which conceptually may be considered to be very similar to implementation intention from Bamberg et al.'s study (2013) ("If I encounter situation *S*, then I shall perform behaviour *Y*!"). The operationalization of behavioural intention from Bamberg's study corresponds to the operationalization of intention to eat healthy in the present study. In the study by Bruin et al. (2012), the mediating role of self-regulation in the Intention-behaviour gap was also confirmed; the authors concluded that self-regulatory processes explain how intention drives exercising and adherence behaviour. The mediating role of self-regulation was confirmed by all the three studies but the results are difficult to compare since the behaviours in focus were related to three different domains. At the same time, this may lead to an interesting discussion whether the same self-regulatory mechanisms are activated when different domains are involved, which would be an important direction for future research.

Frequent, unhealthy snacking was proven to increase the risk of developing obesity (Bes-Rastrolloa, Sanchez-Villegasa, Basterra-Gortaria, Toledo & Serrano-Martinez, 2010) therefore it is important to find ways of decreasing the frequency of such behaviour in adolescence and the proposed self-regulation strategies can be used to reach that aim. Findings from this study suggest that strategies addressing temptations directly and strategies addressing psychological meaning of temptations may be applied in interventions aiming to decrease adolescents' unhealthy snack consumption. The evidence pointing at association between fruit consumption with decreased risks

of developing certain diseases is substantial (Van Duyn & Pivonka, 2000). Our findings suggest that self-regulatory strategies addressing goals can be used beneficially when implementing interventions aiming at increasing fruit consumption among adolescents.

In this study perceived social support was proven to be a significant but quite weak predictor of intention to eat healthy. Similar findings were revealed from some of the previous studies. In the study with adolescents by Wu et al. (2009), social support did not contribute to intention to eat healthy directly, but contributed to attitude changes towards healthy eating, which, in turn, was translated into intention. Based on their study with adult consumers, Povey et al. (2000) concluded that social support did not add to the classic TPB variables in predicting intention but moderated relationship between behavioural control and intention. Attitude was found to be the strongest predictor of forming intention to eat healthy, which is in line with the results of the present study.

In this study injunctive and descriptive norms were weak but still significant predictors of intention to eat healthy, where injunctive norms were a stronger predictor. These results are in contradiction with the majority of previous research with adolescents, claiming no or weak association of injunctive norms with dietary intake (e.g. Lally, Bartle & Wardle, 2011) but in line with some other research focusing on predictors of intention, for instance Cialdini et al. (2006), who focused on adult visitors to a park, confirmed that focusing on injunctive normative information suppressed theft of wood. At the same time, adolescents are a specific age group where the role of parents in, for instance, purchasing situations becomes less and less remarkable and the role of peers increases (Shepherd & Dennison, 1996; Mallalieu & Palan, 2006). One of the reasons for that may be that adolescents are not as confident as adults and still have to form their identity, so they search for help from peers to form the identity in order to ensure independence from their parents (Pechmann, Levine, Loughlin & Leslie, 2005). Still, adolescents may be ready to heed their parents' advice about healthy eating without perceiving it as pressure but more as a help to remind

them to eat healthy. The way the construct injunctive norms were operationalized in this study (“My parents tell me I should eat healthy”) allows two interpretations: parents’ attempt to insist that their children eat healthy or parents’ attempt to remind their children to eat healthy. Future research should probably distinguish these two possible interpretations by formulating a set of items representing both parental pressure and help.

This study evaluated subjective norms where parents were the role models or those contributing to norm development as well as social support, where help from people surrounding respondents was evaluated. Future researchers may benefit from providing an additional dimension to the perceived support and social influence by introducing the support and influence of friends. One of the limitations of this study derives from lack of confidence whether social support includes, for instance, friends’ support and whether friends’ influence is taken into account. At the same time, friends are an important reference group in adolescence and further segregation of instruments measuring perceived support and social influence may benefit research aiming at predicting intention to eat healthy.

Understanding the factors contributing to healthier eating is important and the findings from this study have a high practical value. Individual level interventions is a promising approach when trying to improve young people’s eating patterns as environmental factors are not always easy to influence. At the same time, self-regulation tools may be easier to access and, thus, may be more available to those interested in improving their eating patterns.

## **Conclusion**

This study contributes to the research on the intention-behaviour relationship and suggests that the use of self-regulation strategies can partly explain the existing gap in this relationship. Using the

discussed self-regulation strategies reveals a transition of intention to eat healthy into actual healthy eating, including less unhealthy snacking and higher fruit consumption. The results can be applied in future interventions targeting the improvement of eating patterns among adolescents, when an individual-level perspective is searched for. One of the important findings of this study is that different types of strategies mediate the intention-eating behaviour gap: while strategies addressing temptations mediated the relationship of intention and snacking, strategies addressing healthy eating goals mediated the relationship of intention and eating fruit. These findings have important practical implications: when used in public interventions, it is important to apply the relevant strategies depending on whether the goal is to decrease unhealthy snack consumption or increase healthy snack consumption. Both of the goals may, of course, and probably should co-exist in future interventions; then strategies should be introduced and applied as one set.

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## Appendix 1.

TESQ (Wet et al., 2014) – 24 items, 5-point scale: “1” – never, “5” - always

### *Strategies addressing temptations directly*

- If I am in town, I make sure that I don't go by fast-food places
- If I pass a bakery, I avoid looking at display in the window
- If I go to the supermarket, I avoid the candy department
- If I am bored, I stay away from the kitchen
- If I want to have a treat, I take a little bit and put the rest out of sight
- If I am watching TV, I make sure that the crisps are out of reach
- If I am behind the PC, I make sure there is some healthy food within reach
- If I want to eat candy, I take a few and put the rest of the bag away

### *Strategies addressing goals*

- If I want to have a snack, I try to realize that snacks are bad for your health
- If I think I may be overeating, I think of how this may compromise exercising
- If I want to take a snack, I remember that I want to stay attractive
- If I feel like eating something unhealthy, I think about whether I really want it
- I plan to bring a piece of fruit to school
- I have an agreement with myself about how many candies I can have per day
- If I want to eat a snack, I take a piece of fruit first
- I set goals to eat healthy for myself

*Strategies addressing the psychological meaning of temptations*

- If I feel tempted to buy candies, I distract myself
- If I feel like eating something, I call a friend instead
- If I am getting hungry before dinner, I try to keep myself busy
- If I have the urge to eat candy, I find something else to do
- If I pass a bakery, I ignore the smells of tasty foods
- If I want to eat unhealthy things, I just tell myself “no!”
- I use willpower to stay away from unhealthy snacks
- If I go to a party with lots of snacks, I ignore the food

### **STUDY 3. THE ROLE OF IMPULSE BUYING, SELF-REGULATION, EMOTIONAL EATING AND HABIT IN ADOLESCENTS' SNACKING**

*Liliya Nureeva*

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#### **ABSTRACT**

Prevention of unhealthy eating should start already at the point of purchase where impulse buying takes place. The aim of this paper is to explore the relationship between impulse snack buying tendencies, self-regulatory mechanisms and snacking as well as to explore the role of habit of snacking in these interactions. A cross-sectional survey with 228 adolescent respondents aged 14-17 years old was conducted in Denmark. Habit of snacking fully mediated the relationship between impulse snack buying and unhealthy snacking and partially mediated the relationship between self-regulatory strategies use and unhealthy snacking. Self-regulatory strategies use was associated with healthy snacking. Emotional eating was associated with habit of snacking, but not with actual snacking. Self-regulatory resource has a great potential when trying to improve snacking behaviour. Health promoters should focus on developing self-regulatory skills in their interventions aiming at healthier snacking behaviour among adolescents.

## INTRODUCTION

### ADOLESCENT CONSUMERS

A healthy diet can lower the risks of certain diseases in the future, and an unhealthy diet can increase the risks of development of those (Ogden 2003; Saba 2001). Increasing consumption of fruit (World Health Organization 2003) and decreasing consumption of unhealthy snacks (Lloyd-Williams *et al.* 2009) may prevent negative consequences of an unhealthy diet. Thus, children and adolescents with unhealthy eating patterns may face long-term health problems related to and derived from unhealthy eating.

According to Verplanken *et al.* (2005), certain consumer styles may result in certain eating behaviours: unhealthy shopping results in unhealthy eating, therefore changing food purchasing behaviour is one of the directions to take when trying to improve eating behaviour. This study is focusing on 14-17 year old adolescents, most of them living at home with their parents who pay for the food eaten at home. At the same time, adolescents today are able to influence family purchasing decisions, especially when it comes to food purchasing (Nørgaard *et al.* 2007). According to John (1999), adolescents in the reflective stage (11-16 years) of their development as consumers use more sophisticated information processing skills compared to younger children: they are more able to focus on the social meanings of the marketplace, they are more aware of other people's perspectives, they try to influence their parents and peers in a more strategic way, applying those strategies that they think would work better instead of the direct approach used by younger children. Along with influencing family food purchasing decisions, young consumers also have resources for making own purchasing decisions: according to a study with Nordic adolescents made by Synovate Vilstrup for Nordea Bank (2007), they get an average of EUR 50 pocket money every month (pocket money is money received from parents, friends or family). Besides, 55% of Danish adolescents at the age of 13-17 have part-time jobs, and the average total amount they have at their

disposal a month is EUR 152. The same study provides other interesting results: on average, 82% of 12-17-year-old adolescents buy snacks, soda, food and sweets (the study does not break down the categories further). Thus, adolescents in Denmark have money to spend, and a part of that money is spent on unhealthy snacks, being defined in this study as high energy-dense foods consumed between meals.

Young people develop consumer competence which refers to skills and knowledge that will be used later when making purchasing decisions (Berg 2007). According to Mallalieu and Palan (2006), it is not enough to have knowledge about products because consumers should also be able to use self-control and self-confidence in order to use the knowledge effectively. In their study of adolescent girls (13-14 years), the authors emphasized these two resources as the most important elements when predicting how consumer knowledge will be used in order to achieve desired shopping outcomes: the lack of consumer expertise and self-control may lead not only to financial and psychological consequences but also to compulsive buying that continues into adulthood. The same study revealed that when asked about possible areas of improvement, adolescents mentioned controlling impulsive purchasing, making confident and independent decisions, dealing with salespeople and managing money, where managing money and controlling impulsive purchasing in that case are related to the individual resource of self-control; making confident and independent decisions and dealing with sales people are related to the individual resource of self-confidence. Self-control is considered in the present study as an ability and pre-condition of engaging in self-regulation exercise – an effortful confronting of environmental temptations in order to achieve long-term goals.

#### IMPULSE BUYING and SELF-REGULATION

Impulse buying is one of the common unregulated purchasing behaviours. As defined by Rook (1987, 191), “Impulse buying occurs when a consumer experiences a sudden, often powerful and

persistent urge to buy something immediately”. The concept gained a lot of attention in the last decades, but adolescents’ buying impulsiveness gained only limited attention. One of the exceptions is Brici *et al.*’s study (2013) on differences of impulse buying tendencies in adolescence and adulthood. Here, the authors conclude that some crucial differences exist, and adolescents seem to be more vulnerable to environmental factors promoting impulse buying compared to adult consumers. Other studies discussing impulse buying in adolescence focused on individual factors associated with impulse buying: emotional intelligence (Lin and Chuang 2005), attitudes towards credit and money (Lai 2010), demographic parameters, such as gender, age and amount of pocket money available (Lin, C. H. and Lin, H. M. 2005), materialism and hedonic shopping (Lins *et al.* 2015).

The focus of impulse buying research has been moving from being product-oriented to becoming more people-oriented during the years, meaning that earlier researchers were studying product and environmental factors influencing consumer behaviour, while later researchers started to focus on consumers themselves being responsible for impulse buying (Faber and Vohs 2004). The latter stream of research investigates the self’s ability to resist impulse buying or, in other words, ability to establish effective self-control over purchasing behaviour.

Different approaches were used in studying and conceptualizing self-regulation in the purchasing domain. Hofmann, Strack and Deutsch (2008) introduced the term “reflective” to refer to a higher order mental control over judgments, decisions and actions. Consumer behaviour is then considered by the authors as a struggle between impulsive and reflective forces. Vohs and Faber (2007) investigated self-regulation in terms of impulse buying and concluded that reduced self-regulation capacity results in stronger impulsive buying tendencies. Thus, Baumeister’s Strength Model (2002), where self-regulation is considered to be a limited resource, was supported by the authors.

Finding ways of using the self-regulatory resource for preventing impulse buying may help to improve eating behaviour: in their integrative study Verplanken and Sato (2011) come to the conclusion that consumers should be protected against the possible negative outcomes of impulse buying by strengthening their own self-regulatory capacities and by regulating misleading practices used by retailers. Using one's self-regulatory resource for gaining a better control over purchasing behaviour and for reaching healthy eating goals may require the availability of concrete tools that can be easily used in practice: according to Stok *et al.* (2012), adolescents have to combine their knowledge of healthy eating with knowledge of specific self-regulatory strategies. Self-regulatory strategies for eating behaviour were described earlier also for adolescents: the study by de Vet *et al.* (2014) reveals three groups of strategies: the ones addressing temptations directly, the ones addressing the psychological meaning of temptations and the ones addressing healthy eating goals. Strategies available for self-regulation of buying behaviour were discussed by Hoch and Loewenstein (1991) in their study with adult consumers where the authors describe two groups of strategies: the ones decreasing the desire and the ones increasing the willpower.

## EMOTIONAL EATING

Emotional eating is often conceptualized as “eating in response to negative affect” (Nguyen-Rodriguez, Unger and Spruijt-Metz 2009, 211). When studying unhealthy snacking and impulse snack buying, it is important to address the issue of emotional eating as, according to Verplanken *et al.* (2005), both, i.e. unhealthy snacking and the impulse buying tendency (in adults), seem to be related to responding to a negative psychological state which is driven by low self-esteem or/and stress in unhealthy snacking and by negative effect and low self-esteem in the impulse buying tendency.

Emotional eating was associated with lower fruit intake in adolescent boys and young men (de Lauzon *et al.* 2004) and with liking fattening food (Wardle *et al.* 1992). Higher stress level in

adolescence was also associated with an unhealthier diet consisting of more fatty foods intake and eating less fruits and vegetables (Cartwright *et al.* 2003). A study by Braet and van Strien's (1997) revealed that emotional eating was associated with overall increased consumption, but sometimes the phenomenon of carbohydrate craving is addressed in connection with emotional eating. According to Wurtman and Wurtman (1995), carbohydrate craving is related to a functional deficiency in brain serotonin resulting in a dysphoric mood. Carbohydrate cravers learn that they can affect their negative mood by consuming snacks that are high in carbohydrates and low in protein (Fernstrom and Wurtman 1971; Fernstrom and Wurtman 1972).

Findings across different studies on emotional eating in adolescence are not always in line with those on adults. However, a study by Lluch *et al.*(2000) did not reveal any association between emotional eating and dietary intake. In line with the findings mentioned above, Adriaanse, de Ridder and Evers (2011) found no association between emotional eating and unhealthy snack consumption in adults, but concluded that unhealthy snacking was explained by habit strength (together with restrained eating).

## HABIT of SNACKING

There are two distinguished approaches that authors used in previous research of self-regulation: focusing on impulsive action tendencies (Hofmann, Rauch and Gawronski, 2006) and focusing on control aspects of habitual behaviour (Vohs and Heatherton, 2000). A limited amount of unhealthy snacks consumed occasionally will not lead to a problem – but if snacks are consumed frequently and, even more important, *habitually* (with minimum awareness and difficult to control) then this may be potentially harmful for one's health (Verplanken *et al.*, 2005). Habitual behaviour is described as being used repeatedly following the same established patterns each time (Vohs and Heatherton, 2000), and habits are defined as “learned sequences of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals or end-states” (Verplanken

and Aarts, 1999, 104). This mechanism may be applied to unhealthy and healthy snacking behaviour – when habitual snacking occurs, consumers automatically follow the established pattern. According to Verplanken *et al.* (2005), impulse buying contributes to developing a habit of snacking which can lead to deviations in eating behaviour. According to Verhoeven *et al.* (2012), habit strength is the most important and significant predictor of unhealthy snacking. In addition, habit strength was found to mediate the relationship between self-control and unhealthy snacking (Adriaanse *et al.* 2014). The authors suggest that people with better self-control will develop healthier habits which, in turn, will lead to healthier snacking behaviour. Thus, buying impulsiveness, self-regulation and habit of snacking all seem to be very important predictors of unhealthy snacking, but it is also interesting to see how these constructs interact. It also seems beneficial to draw a distinction between healthy and unhealthy snacking in order to cover the full range of snacking behaviour. Possible contributors to healthy and unhealthy snacking were discussed earlier: unhealthy snacking was associated with emotional eating (de Lauzon *et al.*, 2004), impulse buying (Verplanken *et al.* 2005), habit of snacking (Verhoeven *et al.* 2012) while healthy snacking was explained by a habit of healthy snacking and better self-control in the study by Weijzen, de Graaf and Dijksterhuis (2009) where the authors concluded that a habit of healthy snacking and a strong self-control improved the consistency between intention to consume healthy snacks and actual behaviour. Thus, healthy and unhealthy snacking may be driven by different mechanisms, and these mechanisms and their possible interaction are the focus of this study. The aim is to explore the association of impulse snack buying tendencies, emotional eating and self-regulatory mechanisms with healthy and unhealthy snacking as well as to understand the role of habit of snacking in these interactions. We therefore hypothesise that:

H1. Emotional eating is associated with unhealthy snacking.

H2. Habit of snacking mediates the relationship between impulse buying tendencies and unhealthy snacking.

H3. Habit of snacking mediates the relationship between the use of self-regulatory strategies and unhealthy snacking.

H4. Habit of snacking mediates the relationship between the use of self-regulatory strategies and healthy snacking.

## PROCEDURE

A web-based survey with 228 adolescents, recruited via school representatives (teachers), was conducted in Denmark. A multiple choice questionnaire was uploaded on a webpage and respondents could answer the questions at school or at home. Respondents were asked to fill out the questionnaire individually and were guaranteed that their responses would be treated anonymously. Respondents were told that they could quit the study at any moment and for any reason. Consent letters were sent to the participants' parents via school representatives. The target was to recruit 14-17-year old respondents.

## INSTRUMENTS

### SPENDING PATTERNS

The following single items are examples of the items used for assessing and evaluating respondents' income and spending on snacks: "How much money do you get a month for a part-time job?", "How much money do you get a month as pocket money from parents?", "How much money do you spend a month on candy/fast-food/fruit/cigarettes/clothes/etc.?"

## SNACKING BEHAVIOUR

Snacking behaviour was assessed on a 10-point scale, where “1” is once a month or less, “2” is 2-3 times a month, “3” is 1-2 times a week, “4” is 3-4 times a week, “5” is 5-6 times a week, “6” is once a day, “7” is 2-3 times a day, “8” is 4-5 times a day, “9” is 6-7 times a day and “10” is more than 7 times a day. Before the analysis, the scale was transformed into a 5-point scale where “1” is less than 1 per week and “5” is 7 or more per week.

The following snacking options were considered to be most common in Denmark and were therefore included in the scale: chocolate, crisps, cakes and cookies, candy, ice-cream and milk-shakes, fast-food, soda and energy-drinks, fruits, vegetables, bread, dried fruits and nuts. Dimensionality was checked by applying Principal Component Analysis where all the healthy snacks (that are recommended to be favoured: fruits, vegetables, bread, dried fruits and nuts, Cronbach’s  $\alpha=.647$ ), were loaded into one factor, and unhealthy snacks (high in sugar and/or saturated fat – consumption of which is recommended to be decreased: chocolate, chips, cakes and cookies, candy, ice-cream and milk-shakes, fast-food, soda and energy-drinks, Cronbach’s  $\alpha=.707$ ) were loaded into the other factor.

## BUYING IMPULSIVENESS TRAIT

Buying impulsiveness trait was measured by a 9-item scale developed by Rook and Fisher (1995). The scale was adapted for the purposes of the present study by adding snack buying dimension to the items, e.g. “I often buy snacks spontaneously” was used instead of “I often buy things spontaneously”. Responses were given on five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), Cronbach’s  $\alpha=.906$ . The item “I plan most of my snack purchasing” was reversed before the analysis.

## SELF-REGULATORY STRATEGIES USE

Participants' use of eating-related self-regulatory strategies was assessed with the 24-item TESQ-E, an instrument assessing dietary self-regulation strategies that reflect three higher-order categories: 8 items for strategies addressing the temptations directly (e.g. "If I go to the supermarket, I avoid the candy department"), 8 items for strategies addressing the meaning of temptations (e.g. "I use willpower to stay away from unhealthy snacks") and 8 items for strategies addressing healthy eating goals (e.g. "I set goals to eat healthy for myself") (De Vet *et al.* 2014). Responses were given on a 5-point Likert-type scale, ranging from 1 (never) to 5 (always), Cronbach's alpha=.934. Some of the items were adapted in order to make them more suitable for snack purchasing situations, e.g. "I have an agreement with myself about how many candies I can have per day" was replaced with "I have an agreement with myself about how many candies I can buy per day".

## EMOTIONAL EATING

Emotional eating was measured with three items from the short Three-Factor Eating Questionnaire (Karlsson *et al.* 2000). Responses were given on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree), Cronbach's alpha=.843. The following item is presented as an example: "When I feel blue, I often overeat".

## HABIT of SNACKING

Habit of snacking was measured by the Self-Report Habit Index (Verplanken and Orbell 2003). Here, however, he adapted version of the scale with six items was used since it had shown good validity and reliability in the study by De Vet *et al.* (2014). Responses were given on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), Cronbach's alpha=.851. The items were coded such that high scores indicated a strong snacking habit. The following item is presented as an example: "Snacking is something I do automatically".

## ANALYSIS

Descriptive statistics and inter-item correlations were calculated using IBM SPSS Statistics 21. Associations between emotional eating, impulse snack buying, self-regulatory strategies use, snacking habit and snacking behaviour were assessed through path modelling using robust maximum likelihood estimation in AMOS, Version 21. The model assessed three observed dependent (endogenous) variables (1. frequency of healthy snacking, 2. frequency of unhealthy snacking and snacking habit, and 3. the hypothesized mediator variable), and three observed independent (exogenous) variables (1. impulse snack buying, 2. emotional eating, and 3. self-regulatory strategies). Associations were also calculated in an unmediated path model.

## RESULTS

### DESCRIPTIVE STATISTICS AND BIVARIATE CORRELATIONS

About half of the respondents were girls (51.6%). The mean age was 14.3 years old with a standard deviation of 1.20. Respondents had BMI scores with a range of 12.1 to 32.3 with the mean of 19.6 and a standard deviation of 2.95.

Respondents' total income was equal to DKK 977.50 a month on average. Respondents spent DKK 763.90 a month, of which DKK 97.30 was spent on healthy and unhealthy snacks. Boys spent DKK 115.1 while girls spent only DKK 81.90 a month on snacks on average, but the difference was not significant based on the results of the t-test.

Participants' mean scores in impulse buying, emotional eating, the use of self-regulatory strategies and habit of snacking can be found in Table 1.

TABLE 1. Means for Some of the Main Constructs

	Min.	Max.	Mean	Std. Deviation
Self-regulatory strategies use	1 (never)	5 (always)	2.8	.79
Habit of snacking	1 (strongly disagree)	5 (strongly agree)	2.7	.86
Snack buying impulsiveness	1 (strongly disagree)	5 (strongly agree)	2.5	.71
Emotional eating	1 (strongly disagree)	5 (strongly agree)	1.8	.89

Respondents did not have a strong tendency for emotional eating (91% of the respondents did not agree that they ate when feeling lonely, blue or anxious) but had some tendency to develop a snacking habit, to purchase snacks impulsively and to use self-regulatory strategies.

An independent samples t-test showed that boys and girls did not use self-regulatory strategies equally often. Girls used the strategies significantly more often ( $M=2.96$ ,  $SD=.79$ ) compared to boys ( $M=2.55$ ,  $SD=.73$ );  $t(216)=3.98$ ,  $p<.001$ . Girls were significantly more likely to develop a habit of snacking than boys ( $M=2.81$ ,  $SD=.82$  and  $M=2.58$ ,  $SD=.88$ );  $t(218)=2.026$ ,  $p=.044$ . The same with emotional eating: girls were more likely to score higher on this scale than boys ( $M=2.07$ ,  $SD=.98$  and  $M=1.57$ ,  $SD=.73$ );  $t(217)=3.834$ ,  $p<.001$ . No significant difference was found in buying impulsiveness between boys and girls.

As expected, unhealthy snacking was positively and moderately correlated with impulse snack buying and habit of snacking while the correlation between unhealthy snacking and the use of self-regulation strategies was negative and moderate (Table 2).

TABLE 2. Bivariate Correlations of the Main Constructs

	Unhealthy snacking	Healthy snacking	Emotional eating	Self-regulatory strategies	Impulse snack purchasing	Habit of snacking
Unhealthy snacking	1					
Healthy snacking	-.035 ns	1				
Emotional eating	.108 ns	-.036	1			
Self-regulatory strategies	-.173*	.323**	.086 ns	1		
Impulse snack purchasing	.281**	-.201**	.437**	-.143*	1	
Habit of snacking	.375**	-.238**	.439**	-.170*	.614**	1
BMI	-.186**	-.106 ns	.078 ns	.173*	-.043 ns	-.076 ns

Healthy snacking was positively correlated with the use of self-regulatory strategies and negatively correlated with impulse snack buying and snacking habit. The degree of these correlations was moderate with the expected signs. As expected, emotional eating was positively and moderately correlated with impulse snack buying and habit of snacking; self-regulatory strategies use was negatively and moderately correlated with impulse snack buying and habit of snacking. Impulse snack buying was positively and strongly correlated with habit of snacking.

BMI was negatively and moderately correlated to unhealthy snacking and positively and moderately correlated to the use of self-regulatory strategies: those with higher BMI used more self-regulatory strategies and ate less unhealthy snacks.

## MODELLING TOTAL EFFECTS of IMPULSE SNACK BUYING and SELF-REGULATORY STRATEGIES USE on SNACKING BEHAVIOUR

The fit of the path model estimating invariant direct and indirect effects of impulse snack buying, emotional eating and self-regulatory strategies on snacking behaviour was good (Chi-square (1) = 2.072,  $p = .150$ ; TLI = .894; CFI = .989; RMSEA = 0.070) (see Figure 1).

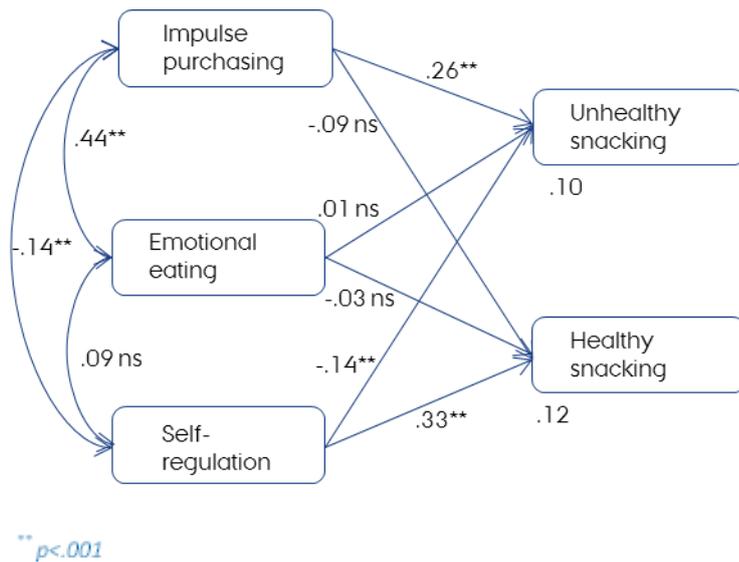


FIGURE 1. Total Effects of Impulse Snack Purchasing and Self-regulatory Strategies Use on Snacking Behaviour

Impulse snack buying tendency was significantly and positively associated with unhealthy snacking, but the association with healthy snacking was insignificant. Self-regulatory strategies were positively associated with healthy snacking and negatively with unhealthy snacking. Emotional eating was not significantly associated with any of the snacking behaviours, thus H1 was not supported. The correlation between emotional eating and impulse purchasing was positive and moderate while the correlation between emotional snacking and self-regulation was insignificant. There was a negative and moderate correlation between impulse purchasing and self-regulation.

MODELLING DIRECT and INDIRECT EFFECTS of IMPULSE BUYING and SELF-REGULATORY STRATEGIES on SNACKING BEHAVIOUR

The fit of the path model estimating invariant direct and indirect effects of impulse snack buying and self-regulatory strategies on snacking behaviour, where snacking habit was hypothesized to be a mediator, was good (Chi-square (3) = 4.594,  $p = .204$ ; TLI = .967; CFI = .993; RMSEA = 0.049) (see Figure 2).

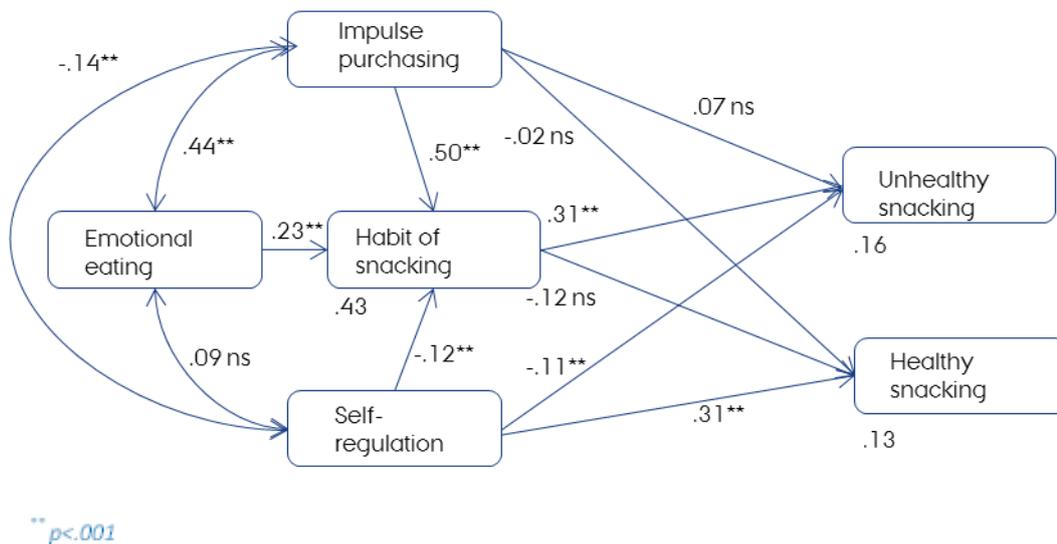


FIGURE 2. Direct and Indirect Effects of Impulse Buying and Self-regulatory Strategies on Snacking Behaviour

Emotional eating was significantly and positively associated with the development of a habit of snacking. Impulse snack buying was significantly and positively associated with the habit of snacking but was not associated with healthy or unhealthy snacking. Habit of snacking was positively associated with unhealthy snacking; this suggests that the relationship between impulse snack buying and unhealthy snacking is fully mediated by snacking habit which supports H2.

The use of self-regulatory strategies was negatively associated with the habit of snacking and positively associated with healthy snacking. The relationship between the use of self-regulatory

strategies and unhealthy snacking became smaller but remained significant in this model. This suggests that habit of snacking partially mediates the relationship between the use of self-regulatory strategies and unhealthy snacking which supports H3. The relationship between habit of snacking and healthy snacking was not significant in this model. This suggests that habit of snacking did not mediate the relationship between the use of self-regulatory strategies and healthy snacking. Thus, H4 was not supported.

## DISCUSSION

Impulse buying tendency and self-regulation of buying behaviour are two domains that have been given a lot of attention in research with adult consumers in the last decades. However, research with adolescents has not focused on these phenomena in the same way, even though adolescent consumers have money at their disposal and are in the process of gaining consumer competences which are likely to be transferred into adulthood (Mallalieu and Palan 2006). Fostering favourable consumer competences, such as strong self-regulatory skills needed for preventing possible negative outcomes of uncontrolled consumption, should gain more attention in consumer behaviour and health psychology research; this study makes the initial steps in this direction. Therefore this study aimed to explore the relationship between impulse snack buying tendencies, self-regulatory mechanisms, emotional eating and snacking behaviour, as well as to discuss the role of habit of snacking in these interactions.

The results of the analysis allow to conclude that Hypothesis 1 (H1) was not supported: emotional eating was associated with the development of snacking habit but there was no direct link to any of the snacking behaviours while a significant link was present in the study by Nguyen-Michael, Unger, and Spruijt-Matez (2007) where adolescents who scored high on emotional eating ate more snacks/high energy-dense food. At the same time, other studies did not confirm the

existence of the direct link: e.g. according to Adriaanse, de Ridder and Evers (2011), snacking was strongly predicted by habit strength while the contribution of emotional eating was not significant. The latter is also in line with our results: snacking habit was the strongest predictor of unhealthy snacking. According to the results of this study, emotional eating cannot be considered to be a serious issue in the chosen sample: respondents in general did not agree that they ate in response to emotional discomfort. This may be a possible reason for the lack of evidence of the relationship between emotional eating and snacking behaviours – too few respondents in the sample reported emotional eating. At the same time, the relationship between emotional eating and impulse buying was rather strong which may be due to similar mechanisms driving the two phenomena. According to Verplanken *et al.* (2005), emotional eating as well as impulse buying may be a result of coping with negative psychological states; thus, the two constructs may have common origins.

The results of the analysis supported hypothesis 2 (H2): habit of snacking was fully mediating the relationship between the buying impulsiveness trait and unhealthy snacking. The mediating role of habit of snacking in the relationship of impulse buying and eating behaviour was also revealed in Verplanken *et al.*'s study (2005) where the relationship between impulse buying tendency and eating disturbance propensity was fully mediated by habit of snacking. Even though Verplanken *et al.*'s study was conducted with adult consumers and the present study was conducted with adolescents, the mechanism of habit formation and its transformation into behaviour seems to work similarly across the two age groups.

Hypotheses 3 (H3) was supported as well: snacking habit mediated the relationship between self-regulatory strategies use and unhealthy snacking; the mediation effect was partial. These findings are in line with those from Adriaanse *et al.*'s study (2014) where better self-control was contributing to developing healthier habits which, in turn, were leading to healthier snacking behaviour, and where habit was confirmed to be a mediator in the relationship between self-control

and unhealthy snacking. The findings from the present study suggest that using self-regulatory strategies is beneficial for developing healthier eating habits and thus for ensuring healthier snacking behaviour.

Hypotheses 4 (H4) was not supported as the results of the analysis showed that habit of snacking did not mediate the relationship of the use of self-regulatory strategies and healthy snacking. The relationship between habit of snacking and healthy snacking was not significant while the relationship between self-regulatory strategies use and healthy snacking was significant. This suggests that healthy snacking is driven by different mechanisms than unhealthy snacking, and that habit does not play the same important role in healthy snacking. It seems that consumers are more likely to get a habit of unhealthy snacking and to perform it automatically while healthy snacking behaviour requires a more conscious self-regulatory effort: self-regulatory strategies were positively contributing to healthy snacking. These results are in line with findings from the study by Adriaanse *et al.* (2014) who suggested that self-control is more useful in preventing the development of a habit of unhealthy snacking than the development of a healthy habit of fruit consumption. In the present study, the direct relationship between the use of self-regulation strategies and healthy snacking stayed almost the same in the model where habit strength was introduced, while the relationship between self-regulatory strategies and habit of snacking was weak.

Findings from this study allow to conclude that stronger buying impulsiveness is associated with developing a stronger habit of snacking which leads to eating more unhealthy snacks. At the same time, there was no direct association between impulse snack buying and healthy snacking; the explanation to that may be that adolescents are more likely to spend their money on unhealthy snacks and not on healthy snacks which are more likely to be bought by parents and via the above mentioned more conscious and reflective mechanisms contributing to healthy snacking. Influencing buying impulsiveness may then prevent the development of a habit of unhealthy snacking. The

extent to which the impulse buying tendency may be influenced was, however, questioned by previous research: Verplanken and Herabadi (2001) point out that this tendency is rooted in personality and, thus, it is difficult to change.

In the present model buying impulsiveness and the use of self-regulatory strategies are significantly and negatively correlated as expected. While the impulse snack buying tendency addressed only purchasing situations, self-regulatory strategies addressed both purchasing and eating situations. Findings from this study suggest that using self-regulatory strategies helps to prevent the development of a habit of snacking and, thus, leads to less unhealthy snacking. Moreover, the use of self-regulatory strategies was associated with more frequent healthy snacking. It may be beneficial for future research to distinguish self-regulatory efforts in the domains of snack purchasing and snack eating more clearly in order to see whether the contributions of these into the development of snacking habit are equally strong.

BMI was significantly correlated with the use of self-regulatory strategies and unhealthy snacking. The relationship between BMI and the use of self-regulatory strategies was positive, and the relationship between BMI and unhealthy snacking was negative: respondents with higher BMI were using self-regulatory strategies more often and were eating less unhealthy snacks. It is not possible to conclude about causality in these relationships based on correlational analysis but the results are somewhat puzzling. One possible explanation may be that those having higher BMI are aware of the need to focus on improving snacking patterns through applying self-regulatory strategies, and those having lower BMI do not feel the need for using self-regulatory strategies since they do not consider their weight status to be problematic. A possible relationship of snacking and BMI status in adolescence was discussed by previous research, and according to the review summarizing trends in snacking behaviour and its contribution to high BMI among children and adolescents by Larson and Story (2012), the majority of the studies did not reveal a clear correlational link between the

two constructs, and some even revealed an evidence that adolescents consuming more snacks were less likely to be obese. The authors therefore point out a number of methodological issues that have to be addressed in future studies: a need for establishing a consistent definition of snacking and other related constructs is one of them. Instead of discouraging children and adolescents from snacking, it is suggested to encourage them to consume healthful snacks in order to ensure meeting dietary recommendations without exceeding energy intake, which is a clear risk at the moment because of the high availability of energy-dense and nutrient-poor snacks.

Healthy eating research will benefit from focusing on snack purchasing situations: buying unhealthy snacks will in most cases lead to eating them. Future researchers are therefore suggested to deepen research in the area of impulse snack buying and self-regulation of snacking in adolescence. Another interesting construct, which researchers may focus on, is general spending control: it may be worthwhile to study whether the ability to control personal spending has any impact on the amount of purchased snacks and whether improving this ability may also help adolescents to eat healthier. In other words, if adolescents have a goal of saving money – how possible is it that they will save on snacks? Providing a clear answer to this question may open a whole new perspective in developing interventions where aiming at healthy eating behaviour as a motivation to save money may be used in interventions aiming to change snack purchasing behaviour. Specific self-regulatory strategies for preventing adolescents' impulse buying were not discussed in the literature before, and future research focusing on developing these will cover the existing gap in the field of impulse buying research.

In general, impulse buying and self-regulation of buying behaviour in adolescence would benefit from more attention from researchers because of two reasons: firstly, adolescents are already consumers who have and spend their own money, and, secondly, the consumer competences they get as adolescents are likely to transfer into adulthood.

## CONCLUSION

This paper explores relationship between self-regulation, impulse buying tendencies, emotional eating and unhealthy snacking, and it discusses the role of habit of snacking in these interactions. The use of self-regulatory strategies helps to improve snacking behaviour in adolescence through consuming more healthy snacks and through preventing the development of a habit of unhealthy snacking. The findings from this study may be used in order to help young people to improve their snacking behaviour by providing them with knowledge about impulse buying and by helping them to develop self-regulatory skills and apply them in everyday situations.

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## CONCLUSION AND IMPLICATIONS

A dramatic increase in the number of overweight children and adults calls for finding possible contributors to this phenomenon as well as finding instruments that can address the challenge. The World Health Organization (2015c) refers to the imbalance between the calories consumed and expended as the main reason for overweight expansion: the intake of energy-dense foods increases while physical activity decreases. The situation may be influenced through regulatory practices, which are not always and easily available or on a personal level. Individualistic approaches to confronting the temptations of an unhealthy lifestyle including unhealthy eating often result in interventions based on providing specific knowledge and on increasing awareness. However, earlier research, as well as conclusions made in this thesis, suggests that adolescent consumers already have significant knowledge of what healthy and unhealthy eating is, but this knowledge is not always transferred into healthier eating behaviour (Croll, Neumark-Sztainer & Story, 2001). Knowing specific strategies may help adolescents transform this knowledge into improving their eating behaviour (Stok et al., 2012). This thesis addresses the challenge of increasing overweight and unhealthy eating in adolescents by exploring self-regulatory strategies and their role in healthy and unhealthy eating.

Self-regulation in general has gained a lot of attention in research in the recent years, also in the domain of eating behaviour. Research with adolescent consumers was developing fast as well, especially in the eating domain, while self-regulation of food purchasing did not gain the same attention. At the same time it is important to study both food purchasing and eating behaviours: one is closely related to the other and they are both part of the same process of consumption. This notion was taken into consideration when designing the present research and the aim of this thesis was to contribute knowledge on self-regulation in both of the domains.

## Summary of findings

Different approaches have been taken in self-regulation research over the last decades: self-regulation was discussed as being extrinsically or intrinsically motivation driven (Muraven, 2008), it was considered to be working as a muscle (Baumeister, 2003), or a struggle between Reflective and Impulsive systems (Hofmann et al., 2008). Despite the impressive amount of research on self-regulation, the literature review revealed some gaps in the existing knowledge: self-regulatory skills were operationalized as particular strategies only in a limited number of studies. This thesis contributes to developing a list of self-regulatory strategies for Danish adolescents with the help of the first study and to measuring the impact of self-regulatory strategies on eating behaviours in the second and the third studies.

Study 1 revealed twelve strategies that adolescents could use to regulate their eating behaviour: Following nutrition recommendations, Developing own rules, Making healthy contracts with oneself, Ensuring the right balance and regularity of food intake, Awareness, Thinking of consequences, Good advice for shopping and cooking, Seeking help from parents, Influencing family and others, Avoiding temptations, Replacing unhealthy food with a healthier option, Reducing the amounts of unhealthy food in diet. Adolescents demonstrated good knowledge of nutrition recommendations as many of the statements were in line with the official guidelines (Danish Ministry of Food and Environment, 2015). Some of the strategies revealed by the study were in line with the existing literature: creating rules for food choice (Contento, Williams, Michela & Franklin, 2006; Stok et al., 2012), specific ways to interact with family (Contento Williams, Michela & Franklin, 2006), thinking twice (Karlsson, 2003), avoidance (Hoch & Loewenstein, 1991; Stok et al., 2012), substitution, seeking help, thinking of consequences, following nutrition recommendations (Stok et al., 2012). The other strategies revealed by Study 1 were unique: *influencing others* and *ensuring the right balance and regularity of food intake*. The

older adolescents are able to use more varied influence strategies (Palan & Wilkes, 1997) and the fact that adolescents consider influence strategies as part of their self-regulatory effort is an important finding of this study since it adds a social dimension to self-regulatory processes. In this study adolescents distinguished the strategy *ensuring the right balance and regularity of food intake* from creating rules for healthy eating, and it may point to the importance of this strategy to adolescents or to the difference in the way these two strategies are perceived by adolescents. The discrepancy in findings between the previous literature and Study 1 may be grounded in different study designs and methodological approaches. Study 1 used an alternative method of Concept Mapping for exploring adolescents' ideas on self-regulatory strategies while the other mentioned studies used other methods, e.g. interviewing was applied by Contento et al. (2006) in their study where the aim was to understand decision-making processes when making food choices. Study 1 used the same method as was used in the study by Stok et al. (2012) but the procedure for sorting the statements differed: in Study 1 adolescents were sorting the statements themselves while in Stok's study, researchers made the sorting based on theoretical grounds. This may be the reason for the found discrepancy in the results. The cultural aspect may, however, have played a particular role as well: Stok et al.'s study was conducted in the Netherlands while Study 1 was conducted in Denmark.

The intention-behaviour gap was in focus in a relatively large number of health behaviour studies, also healthy eating behaviour. Intention to perform a particular behaviour does not always transfer into actual behaviour and attempts of previous research to find possible mediators and moderators in this relationship are therefore understandable. The second paper aimed to find possible ways to explain the existing gap and to explore the role of self-regulation in the intention – behaviour relationship. Only a few times earlier have self-regulation-related constructs been tested for their mediating role and particular self-regulatory strategies were never included into such models. The

findings suggest that self-regulatory strategies mediate the intention-behaviour relationship and provide explanation as to how three different types of strategies are associated with different types of eating behaviour. Strategies addressing temptations directly and strategies addressing the meaning of temptations were associated with unhealthy snacking, while strategies addressing healthy eating goals were associated with eating fruit. The results suggest that healthy and unhealthy snacking is triggered by different self-regulatory mechanisms and different strategies are used by adolescents when aiming to eat more fruit and when aiming to eat less unhealthy snacks. The conclusion about the significant role of self-regulation in transferring intention into actual eating behaviour is in line with some of the previous research: Allan, Johnston and Campbell (2011) confirmed the moderating role of executive control and found that its role was important for translating dietary intentions into more fruit and vegetable consumption and less snack consumption. The findings on the role of self-regulation in the intention-behaviour gap are not homogenous across different studies though: Mullan et al. (2014) could not confirm the moderating role of self-regulation in the intention-behaviour relationship and found no significant association of self-regulatory variables with fruit and vegetables consumption. The studies by Allan et al. (2011) and Mullan et al. (2014) discussed the moderating role of self-regulation while Study 2 focused on the mediating role of self-regulation. Besides, operationalization of the constructs was different across the studies: Mullan et al.'s study (2014) operationalized self-regulation as self-reported impulsivity and temporal orientation (consideration of future consequences) while in Study 2 the use of specific self-regulatory strategies for eating behaviour was assessed. Allan et al. (2011) discussed the moderating role of executive control, which is sometimes also called executive function or cognitive control (Black, Semple, Pokhrel and Genard, 2011). According to the authors, the term "self-regulation", being a more narrow term than "executive function", is then considered to be one of the components of executive function. Allan's et al. study (2011) discussed the role of

executive control and concluded that a moderation effect of the construct on the intention-behaviour relationship was present while Study 2 discussed a mediating role of self-regulation, which was operationalized as particular eating-related strategies. Methodological inconsistencies of the constructs in Allan et al.'s study (2011) and Study 2 lead to some limitations when concluding on similarities across findings from the two studies.

Possible predictors of the intention were another focus of the second study. The findings from the second study suggest that attitude was the strongest predictor of intention, while association of perceived social support with intention was significant but weak. Attitude is often considered to be one of the strongest predictors of intention, also in eating behaviours, so these findings are in line with previous research (e.g. Povey et al., 2000). Injunctive and descriptive norms were weak but still significant predictors of intention in Study 2; other research with adolescents also found no or weak association of injunctive norms with dietary intake (e.g. Lally, Bartle & Wardle, 2011).

Impulse purchasing has gained a lot of attention in the last decades: the interest has been increasing in recent years and the topic is widely discussed in the literature. However, impulse buying among adolescents has not attracted the same attention: the field is still under development and the amount of research with adolescents is limited, although the initial steps have been taken. An even stronger gap is found in the study of self-regulatory aspects of consumer behaviour in adolescence. Since Nordic adolescents have relatively strong purchasing power and since consumer competence gained in adolescence is likely to transfer into adulthood, focusing on self-regulatory aspects of purchasing behaviour in adolescence is highly relevant. The findings from Study 3 suggest that habit of snacking fully mediates the relationship between impulse buying and unhealthy snacking, which is in line with the study by Verplanken et al. (2005) who found that habit of snacking mediated the relationship between an impulse buying tendency and eating disturbance propensity. In the present study the use of self-regulatory strategies decreased unhealthy snacking through reducing the habit

of snacking; the mediation was partial. The use of self-regulatory strategies also contributed to healthy snacking; the process did not seem to be driven by habit of snacking though. This is in line with the results of the study by Adriaanse et al. (2014) where habit of snacking mediated the relationship between self-control and unhealthy snacking and where the authors suggested that self-control played a more important role in preventing the development of unhealthy snacking rather than the development of the habit of healthy snacking. In Adriaanse et al.'s study, the self-control construct was assessed with a brief Self-Control scale which addresses a more general resource of self-control, while in Study 3, self-regulatory strategies for eating behaviour were assessed; moreover the strategies were adapted so that they were better suited for application in snack purchasing situations. Using different measures in assessing self-control did not lead to contested findings though: findings from the two studies are in line. The contribution of Study 3 is then that it highlights the important role of applying self-regulatory strategies in decreasing unhealthy snacking through applying them in purchasing situations. This leads to a suggestion for practitioners to apply self-regulatory strategies in their interventions aiming at healthier food purchasing and eating behaviour among adolescents.

According to the results of the present study, emotional eating was associated with developing a snacking habit but not with actual snacking behaviours. These findings are in line with the study by Adriaanse, de Ridder and Evers (2011), which did not reveal any significant link between emotional eating and snacking, but contradict the results of the study by Nguyen-Michael, Unger, and Spruijt-Matez (2007) where the direct link between emotional eating and snacking behaviours was present.

## **Limitations**

Several limitations of this research have to be mentioned: most of them are due to the chosen methodological designs.

The first study was conducted in Denmark and inconsistencies with similar studies in other countries were already mentioned in the paper. Danish adolescents have relatively high amount of money at their disposal and are able to use influence strategies in family context when decisions about food are taken, which may differ across cultures. The Concept Mapping method was used to collect the data, and the data collection process revealed some challenges in using the method with adolescents. These challenges were addressed by adapting some of the steps in the data collection process to adolescents' better understanding.

The second study had a cross-sectional design, and introducing a longer term perspective would be beneficial in exploring the intention-behaviour gap. Predicting intention to eat healthy was another focus of the second paper and some of the findings leave some space for interpretation and discussion. The focus of the present research is on an individual resource of self-regulation that can be used for the purpose of improving eating behaviour, but at the same time the influence of social factors should not be underestimated: people regulate their food consumption in reference to eating companions (Herman, Roth and Polivy, 2003). When adolescents make decisions about food, a social context plays a role, and parents' and peers' influences are in focus of most research on the social context (Shepherd and Dennison, 1996). Study 2 in this thesis addresses the issue by discussing the role of parents in the formation of intention to eat healthy. At the same time, adolescents are a specific age group for which the influence of parents becomes smaller while the influence of peers increases (Mallalieu and Palan, 2006). The notation about the increased role of peers is valid for the eating context as well: food choice in adolescence is associated with social

networks (Feunekes, de Graff, Meyboom and van Starven, 1998). Having acknowledged the importance of peers in adolescents' food choice, a more detailed approach to peers' role in adolescents' eating behaviour would be beneficial for getting a more comprehensive understanding of intention formation, but this is beyond the scope of this research due to practical reasons, such as e.g. shortening the questionnaire in order to decrease the amount of questionnaires where not all questions are answered. It is suggested, though, that future researchers distinguish parental pressure and parental help more clearly when operationalizing items evaluating injunctive norms; peer influence can also be distinguished more clearly in order to get an even more detailed picture of possible social influences on intention to eat healthy. The limitations mentioned did not have any significant impact on the main outcome of the study as the main focus was the intention-behaviour gap and possible mediators in this relationship.

The third study was conducted in Denmark and had a cross-sectional design; therefore the above-mentioned limitations related to that are also relevant for this study. Replicating this study with a larger number of respondents in other European countries would be beneficial for future research.

Study 2 and Study 3 were based on self-reported measures which may become a source of bias. The phenomena of healthy and unhealthy eating behaviour were discussed in the studies which may have resulted in a tendency to give socially desirable answers in the questionnaires, especially in overweighed respondents. Besides, both of the studies had a cross-sectional design which leads to some limitations when concluding on causal relationships between the constructs.

It is also important to note that self-reported height and weight measures were used in Study 3 of this thesis which may be a source of bias, especially in the case of children and adolescents, as it may be difficult for them to recall their precise weight and height. Most of the studies on relationship of snacking and BMI discussed in the earlier mentioned review by Larson and Story

(2013) used measured height and weight while some used self-reported numbers. While the finding about the positive relationship between the use self-regulatory strategies and BMI from Study 3 is quite puzzling, the explanation may be that individuals with higher BMI are more concerned about regulating their eating behaviour than individuals with normal weight. Also, individuals with higher BMI may feel a stronger need to give socially desirable answers which may also have an impact on their answers about practicing self-regulatory strategies.

### **Overall contribution and implications**

The overall aim of this thesis was to find possible ways to improve adolescents' eating behaviour through exploring and discussing the phenomenon of self-regulation in food purchasing and eating domains in adolescence. Findings from the three papers each make their specific contribution in reaching this aim.

The first study is exploratory and describes adolescents' insights on the self-regulatory strategies that are available to them. The strategies revealed by the study have a potential of being used when developing public interventions aiming at improving adolescents' eating patterns. The initial steps in finding possible applications of these strategies to improve snacking behaviour were already made in this thesis; conducting more research where situational and social dimensions are taken into account may be a promising direction for future research because snacking at home may be driven by different mechanisms than snacking in other places. Providing more insight into the way strategies are used by consumers in different situations is therefore suggested. The unique contribution of the study is seen in exploring self-regulatory strategies as formulated by adolescents. This approach allowed getting a realistic idea on strategies that can possibly be used by adolescents. This advantage stems from the choice of the Concept Mapping method which implied that

adolescents answered an open question and each of the answers was then given equal weight. The outcome of the study is a list of self-regulatory strategies that can be applied by adolescents aiming at healthier eating behaviour.

The second study focused on the intention-behaviour gap and explored the role of self-regulatory mechanisms in this relationship. The findings suggest that the use of self-regulatory strategies mediate the intention-behaviour relationship and applying these helps establish healthier eating patterns. Three types of strategies played different roles in the intention-behaviour relationships: strategies addressing temptations directly and strategies addressing the meaning of temptations mediated the relationship of intention and unhealthy snacking, while strategies addressing the healthy eating goals mediated the relationship of intention and eating fruit. The results suggest that different self-regulatory mechanisms contribute to healthy and unhealthy eating. These findings provide important implications: if used in the development of interventions based on applying self-regulatory resources, the distinction has to be made depending whether the aim is to increase healthy eating or to decrease unhealthy eating. The important contribution of the study is seen in providing evidence of the positive influence of self-regulatory strategies on snacking behaviour as well as in distinguishing possible applications of strategies addressing temptations and strategies addressing healthy eating goals.

The third study focused on interactions of impulsive, habitual, and reflective mechanisms by introducing the concepts of impulse buying, emotional eating, habit of snacking and self-regulatory strategies. The phenomenon of impulse buying in adolescence has been studied to a very limited extent as discussed earlier; this thesis contributes with knowledge on impulse buying in adolescence and suggests its important role in unhealthy snacking through developing a habit of unhealthy snacking. The findings also contribute to the self-regulation research field by exploring the phenomenon of self-regulation in adolescent consumers further and by discussing its interaction

with other constructs related to snacking behaviour, such as impulse buying, habit of snacking, and emotional eating. The important role of impulse buying and self-regulation in the development of unhealthy snacking habits as well as the role of self-regulation in healthy snacking behaviour should be taken into consideration by practitioners when developing interventions targeting healthy eating among adolescents. The important contribution of the study is seen in providing an idea of how the constructs of impulse buying, self-regulatory strategies and habit of snacking interact in the special case of adolescent consumers, as well as in providing the evidence of the importance of addressing snack purchasing situations instead of focusing solely on eating situations.

### **Suggestions for future research**

Healthy eating research will benefit from putting more focus on snack purchasing situations for two main reasons. Firstly, in most cases buying unhealthy snacks will lead to eating them, and secondly, consumer skills acquired in adolescence will be the basis for buying behaviour in adulthood. Studying impulse food purchasing and self-regulation of purchasing in adolescence further may reveal findings which are interesting and relevant for future interventions. Setting further focus on these phenomena may provide valuable insights into finding ways to educate adolescents and to help them become competent consumers. It may also be useful to draw a clearer distinction between self-regulation of snack purchasing and self-regulation of snacking: developing a separate list of strategies specific to purchasing situations for adolescent consumers may provide insight for helping adolescents gain the competences they need for successful functioning as consumers.

This thesis also calls for research into self-regulation of eating and food purchasing behaviour in adolescence through further exploring the efficiency of different strategies as well as preference for

different strategies based on individual characteristics of adolescent consumers; applying this approach may help improve the existing self-regulatory tools further.

The introduction of the concept of self-regulation and the use of particular strategies in future interventions were suggested as possible implications of Study 1. It is important to underline though, that more empirical studies may be needed in order to support developing the suggested interventions. While Study 2 and Study 3 contribute with knowledge on the use of particular strategies within the eating domain, a more general approach in interventions would require more research on the use of the self-regulatory resource across different domains. More empirical studies are also needed to reveal opportunities for training self-regulatory skills through repetitive performance of self-regulatory strategies. It is suggested that researchers apply the strategies in experimental settings in order to confirm that training of particular self-regulatory strategies is possible and leads to better performance in consequent self-regulation tasks within food purchasing and eating domains among adolescents.

Another interesting construct which researchers may focus on is consumer spending self-control (Haws, Bearden & Nenkov, 2012) and how it is related to controlling impulse purchasing in adolescence. Exploring whether the ability to control spending has any impact on the amount of snacks purchased may provide valuable insight and important practical implications: if adolescents have a goal of saving money – how probable is it that they will save on snacks? Providing an answer to this question can open a new perspective in developing interventions aiming at healthier eating behaviour among adolescents.

## **Overall conclusion**

Self-regulation of eating behaviour in adolescence has received a lot of attention in the recent years, especially from health psychologists, while self-regulation of food purchasing behaviour in adolescence has not been studied much. This thesis covers this gap by focusing on the whole process of consumption starting from snack purchasing in contrast to the conventional approach focusing solely on self-regulation of eating behaviour. The present way of addressing the challenge of unhealthy eating is a more holistic approach when conducting research with adolescent consumers with money to spend and whose specific developmental peculiarities put them at an increased risk of self-regulation failure both in snack purchasing and eating situations.



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