

# **Temptation and children's consumption of unhealthy food products:**

*The effect of pre-exposure on subsequent food consumption and liking*

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Sabine Jansen

880308393120

Supervisors: dr.ir. Ellen van Kleef

dr. Emely de Vet

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## **Abstract**

**Background:** Childhood obesity in Western society is of growing concern. In 2013 it was estimated that 11% of the Dutch Children are overweight. From an early age children are tempted to consume highly palatable, and mostly, unhealthy food. Conventional approaches challenging the unhealthy diets of children are mainly centred around prevention and restriction. One limitation of this approach is that, when these measures fail, a child will again be exposed to tempting foods and is prone to fall for the temptation. In some contexts the situation applies that pre-exposure to temptation can enhance self-control in a subsequent situation, opposing the traditional view that pre-exposure leads to self-control depletion. This study tests this theory of pre-exposure which is based on the theory of cognitive control. When children aged 4 to 6 are effectively pre-exposed to a temptation, their subsequent consumption and liking will be less in the next occurrence. The effect of the previous exposure still lingers making it easier to resist the same temptation in a subsequent situation. Earlier research has shown significant effects for an older population with children aged between 7 and 12.

**Objective:** An experiment at two primary schools in Wageningen was conducted in January 2015 to research if effective pre-exposure would lead to a lower consumption and liking of three different types of candy amongst children aged 4 to 6.

**Method:** A experimental design with two conditions was used to study the effect of effective pre-exposure on subsequent self-control, by measuring the consumption and liking of candy. In total 85 children aged 4 to 6 successfully participated in the research. In the control condition a non-food product with no tempting qualities was used that would not evoke an internal conflict. In the experimental setting mechanisms enhancing the critical level of the internal conflict caused by the temptation were applied. The children would perform a task based on the two staged pre-exposure paradigm. In the first stage children were asked to create a peacock made of candy or beads, in the second stage the children could eat as much candy as they wanted. The amount of candy eaten and the liking of the three types of candy was reported upon. Also the children were asked in advance on their appetite, and afterwards they would report on their perceived effort. The outcomes of the experiment were used to test the hypotheses.

**Results:** Based on the outcomes of the experiment no significant effect was found between the control condition with beads and the experimental condition with candy, looking at the amount of candy children consumed and how much they liked the candy.

**Conclusion:** Effective pre-exposure to a temptation did not make children aged 4 to 6 consume and like candy less when exposed to a temptation in a subsequent setting. This suggests that the mechanisms for effective pre-exposure described did not create the desired state for subsequent self-control in this age category. More research is needed to underpin these assumptions, to see whether children up to 6 years of age can apply the strategies of subsequent self-control successfully.

## Preface

This research has been carried out as the final part of the MSc program Management, Economics and Consumer Studies at Wageningen University.

Firstly I would like to thank my supervisors Ellen van Kleef and Emely de Vet. Together we had productive meetings about the angle of my research and how to create a fitting methodology for children aged 4 to 6. Also it was great to see and learn from the passion they have for their work, which was also reflected in the way they supported me in the creation of this thesis. With Sanne Raghoobar I spend many hours gathering information and working hard, fortunately there was always room for light conversations and coffee. Thank you for making the process of writing my thesis so much more fun to do! A special thanks goes to the two schools in Wageningen that participated, and of course the children who helped with the creation and eating of all the peacocks.

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## 1. Introduction

In the last decades obesity has become a serious problem in western society. From an early age people are exposed and encouraged to consume highly palatable and mostly, unhealthy food. Childhood snacking trends in western society are moving toward three snacks per day, and more than 27% of children's daily calories are coming from snacks (Piernas and Popkin 2010). Media outlets like advertisements and commercials are relevant actors in this process as well as accessibility and the convenience of the palatable food products (Geuskens, Dewitte et al. 2008).

One of the outcomes of the unhealthy diet, in combination with less physical activity, is that an increasing amount of the population is becoming overweight. It is estimated by the World Health Organization (2014) that 48.3% of the Dutch population is currently overweight, with 12.7% to be labelled as obese. In 2011, 11% of the Dutch children exceeded the healthy BMI norm and 40% of children in the US were obese (de Wilde, Verkerk et al. 2014). The term obese is used when a child weights more than a specific cut off point based on  $\text{kg}/\text{m}^2$ , mediated by age, ethnic and gender differences (Troiano and Flegal 1998). These cut off points are comparable to the adult obesity cut off point of  $30 \text{ kg}/\text{m}^2$ , and the standard of  $>25 \text{ kg}/\text{m}^2$  for adults with overweight (Cole, Bellizzi et al. 2000, World Health Organisation 2014). The most straightforward explanation for obesity is that children become overweight when the dietary intake exceeds the energy expenditure (Wabitsch 2000). Being obese holds several health-related risks, such as hypertension, diabetes type 2 and heart failure, not to mention the social effects of being a 'bigger' person in today's society (Kopelman 2007, Fiese, Bost et al. 2013, Landsberg, Aronne et al. 2013). Moreover there are strong indications that obesity puts a considerable strain on the nations' public health system as estimated for the Netherlands and the US (Sturm 2002, Cornelisse-Vermaat, Maassen van den Brink et al. 2003).

Studies show that the effects of adult obesity interventions are relatively short lived, and cost significantly more effort than endeavour tackling childhood obesity (Must and Strauss 1999, Fiese, Bost et al. 2013). It is estimated that obesity in children younger than eight is associated with severe obesity when those children reach adulthood (Freedman, Khan et al. 2001). Also children who are obese after reaching the age of six, are 50% more likely to become obese as adults (Whitaker, Wright et al. 1997). Combining all implications and information on childhood obesity, it can be considered more than convenient to let children adapt a healthy lifestyle from an early age, decreasing the risk of becoming obese.

In the last decades multiple practices have been used to influence the unhealthy eating behaviour of children to challenge overweight and obesity. Healthy school meals, increasing physical activity and creating awareness of the child's direct environment are some examples of these tactics, mainly centred around a controlled environment restricting or limiting access to tempting unhealthy food (Hesketh, Waters et al. 2005, O'Dea and Wilson 2006, Gentile, Welk et al. 2009). However, restricting a child from a palatable food group triggers the idea of a forbidden fruit, making it even more tempting (Fisher and Birch 1999, Jansen, Mulkens et al. 2008, Papies, Stroebe et al. 2008). Another limitation of prevention and restriction is that when the control measurements of the environment fail, the child again falls for temptation (Faith, Fontaine et al. 2007).

Self-control is a central concept in resisting the temptation of consuming unhealthy food. Traditionally, the theory of self-regulatory strength, a capacity based theory, is applied when addressing self-control. The self-regulatory strength model states that an individual cannot exercise self-control unlimited and will be depleted from self-control at one point after repeated self-control exertion (Baumeister and Heatherton 1996, Muraven and Baumeister 2000, de Vries 2013). Evidence for this depletion effect can be found in different domains like dieting, impulse buying and general food intake (Baumeister 2002, Hofmann, Rauch et al. 2007, Hagger, Wood et al. 2010). Recently studies start to challenge the concept of self-regulatory strength in some contexts. These studies indicate the contrary, that being pre-exposed to temptation enhances self-control, and does not necessarily lead to self-control depletion.

These outcomes based on the cognitive control model states that a person is able to alter ones' response by slowly modifying mechanisms such as responses towards stimulus and perceptual selection (Botvinick, Braver et al. 2001). When a person is confronted with tempting food, it triggers an internal conflict. The person then has a choice, giving in to the temptation or resisting it. When a person successfully resists the temptation using intentional or unintentional mechanisms, cognitive control theory suggests that these self-control mechanisms will still linger when another tempting situation arises, making it easier to resist the subsequent temptation. Recent studies have shown promising effects applying the cognitive control model to a consumer setting. For instance, boys aged 7 to 12 significantly ate less candy when being previously pre-exposed and girls between the age group of 8 to 11 had a lower liking of candy after first being pre-exposed to a temptation (De Boer, De Ridder et al. 2014, Grubliauskienė and Dewitte 2014).

In this thesis it is argued that when a child is pre-exposed to a temptation this may increase the self-control in a subsequent situation, leading to a lower liking and consumption of the palatable product. The main aim of the thesis is to replicate the effect of pre-exposure on subsequent consumption and liking that previously have been found within adults and children, focusing on a population consisting of children within the age group of 4 to 6 years old. Although effects have been found for older participants, currently no claims can be made for this younger age category. Moreover, the thesis describes the key studies in the field of subsequent consumption and liking from a cognitive control perspective and untangles some of the mechanisms that increase the effectiveness of pre-exposure on subsequent consumption and liking.

In this study a two staged pre-exposure paradigm is used. In the first stage a child crafts with candy, a tempting food, or with a non-food product that will not evoke a distinct desire. In the second stage the child will be confronted with candy (again), and is asked to eat as much as he or she wants. This type experiment is related to the delay of gratification experiment, first introduced as the Marshmallow experiments by Mischel and Ebbesen (1970). The tempting palatable foods chosen in the experiment are soft candies, since this type of food has attributes tempting for the target population (Zeinstra, Koelen et al. 2007). Two dependent variables are identified, the total consumption of candy and the overall liking of the candy .The independent variable that will be manipulated is the level of self-control that children experience by letting children craft with candy or beads in the first stage of the two staged pre-exposure paradigm.

A better understanding of the effect of pre-exposure on subsequent food consumption can lead to new spectrum of applications that tackle child obesity. If effectively used one of the long term implications will be that children are able to obtain and maintain a healthy life style by becoming more resistant to tempting food ques. Not only will this benefit the well-being of the child itself, but also society as a whole.

## 2. Theoretical background

In this second chapter, the literature necessary to understand and substantiate the hypotheses of this thesis is explained. In paragraph 2.1, the theory of cognitive control will be discussed as well as how this theory supports the phenomenon of subsequent self-control. Paragraph 2.2 is used to explore the meaning of tempting foods and how the children develop their cognitive abilities and this fits into the theory of cognitive control. How previous studies interpret and have researched the phenomenon of subsequent self-control is described in section 2.3. As a deduction of the information acquired in the other sections, paragraph 2.4 presents several mechanisms that help to evoke subsequent self-control. In the last paragraph the conceptual model and the corresponding hypotheses are set.

### 2.1 Self-control: a cognitive control approach

The importance of self-control on the eventual intake and liking of foods has been a topic that has been long discussed. Baumeister and Heatherton (1996) state that self-control failure leads to impulsive behaviour, which subsequently causes problematic outcomes like substance abuse and unhealthy eating. However the way self-control is viewed and what the outcomes are, differs. In theory two recurring approaches are distinguished, the self-regulatory strength model and the cognitive control process. The self-regulatory strength model is the most common interpretation, while the cognitive control theory is relatively new. The latter will be leading in the context of this thesis.

#### 2.1.1 Self-regulatory strength

Self-regulatory strength (one of the capacity based approaches) claims that self-control cannot be exercised unlimited, at one point the self-regulatory skills will be exhausted (Baumeister and Heatherton 1996, Muraven and Baumeister 2000, de Vries 2013). A commonly used example of the self-regulatory strength model is the muscle metaphor. Here self-control can be seen as a muscle that when exercised too frequently, will lose its flexibility and wears out. After the effect depletes people tend to respond to their impulse and give in to temptation, a situation also described as ego depletion. Many studies have been conducted according to this model, mainly set in the consumer environment (see for instance Kahan, Polivy et al. 2003, Bruyneel, Dewitte et al. 2006, Vohs and Faber 2007).

Looking at tempting food products the self-regulatory strength model would indicate that if someone would be exposed to a temptation long enough, eventually the person will give in and consume the tempting food. Based on the principle of self-regulatory strength avoiding tempting situations or prevent temptation would be a good mechanism to tackle obesity. Exemplary are the campaigns that provide only healthy food at schools, or have a healthy snack policy.

One important limitation of this widely acknowledged theory is that when the environment is unable to provide the protection against temptation, the individual is exposed and falls prey to eating unhealthy food (Faith, Fontaine et al. 2007). Also, Fisher and Birch (1999) reported that restricted access to palatable foods can result in focusing the child's attention on these items and consequently may promote their overconsumption. Moreover, it was previously described that controlling child-feeding strategies were associated with a decrease in children's ability to self-regulate energy intake (Johnson and Birch 1994).

Another point that is overseen in the line of research, is that if a temptation is resisted successfully it can boost the self-control in the next occurrence where the temptation arises. This contradicts the principle of the self-regulatory strength model, and opens a window of opportunity for the theory of cognitive control, that can explain this contradiction of the overall solid self-regulatory strength model in some contexts.

### **2.1.2 Cognitive control model**

The cognitive control model initially originated from the neurosciences (Botvinick, Braver et al. 2001, Miller and Cohen 2001). According to Botvinick, Braver et al. (2001) the cognitive system is able to program itself to perform different tasks by making ongoing adjustments in several domains such as response biasing, perceptual selection and the on-line maintenance of contextual information. When a conflict is detected, so when a perception is not in line with the previously acquired information, control processes are activated by the cognitive system.

Examples of early adaptations of this process can be found in the colour-word task, first conducted by Stroop (1935). Here participants were asked to say the colour of the ink when a word written in that ink resembled another, or the same colour. The results presented that when the word did not align with the colour of the ink the reaction time would be longer. From a cognitive control perspective this longer reaction time was the cognitive system adapting to the conflict that occurred as soon as the colour did not match the ink. After the experiment was repeated several times with the same participant, the reaction time needed would decrease, the cognitive system had adjusted its routing.

### **Goal activation**

Applying the cognitive control principles to a consumer setting leads to a somewhat similar interpretation as the Stroop test. People experience a behavioural control conflict when exposed to a tempting food product. A behavioural control conflict is a conscious or unconscious sensation triggered when short term goals interferes with a long term objective (Muraven and Baumeister 2000, Fishbach, Friedman et al. 2003, Fishbach and Shen 2014). If the participants are able to successfully resist the temptation and are rewarded, they are adjusting their initial routing. This makes the same temptation less difficult to resist in a subsequent situation because the previous successful action still lingers and so the temptation is devaluated (Bruyneel, Dewitte et al. 2006, Papies, Stroebe et al. 2008, Braem, Verguts et al. 2012, Fishbach and Shen 2014).

### **Critical level**

When an internal conflict is experienced, the strength self-control needed to resist the temptation depends greatly on the level of anticipated temptation. When a temptation is almost unnoticeable, the activated self-control is lower, thus increasing the chance of falling for a tempting food product (Fishbach and Shen 2014). The critical level theory described by Gilbert, Lieberman et al. (2004) stresses the importance of the intense hedonic state in order to activate counteractive self-control strategies, also described as the region  $\beta$  paradox. When a person does not experience extreme measures of anticipated pain or, in this thesis, an internal conflict caused by a temptation, an individual is less likely to undertake measures to resolve this pain or internal conflict.

### ***Delay of gratification- The two staged pre-exposure paradigm***

One way of testing the theory of cognitive control is the use of delay of gratification tasks. In the 1960s the ‘Marshmallow Experiment’ was introduced at Stanford (see for instance Mischel, Ebbesen et al. 1972, Mischel, Shoda et al. 1988, Shoda, Mischel et al. 1990). In these experiments a child is presented a tempting food for the grasps, for example a marshmallow. The child can choose to eat the food instantly and get immediate gratification. However, if the child waits for an undefined amount of time, the food reward will be bigger. The dilemma of immediate gratification or a bigger reward leads to a behavioural conflict demanding the child to exercise self-control. Different from the delay of gratification task, subsequent self-control experiments are more interested in the second time that a child is presented with the reward rather than the initial self-control (Grubliauskienė and Dewitte 2014). Important for the delay of gratification approach is the two staged pre-exposure paradigm. In the first stage the participants are exposed to a temptation that encourages self-control, and in the second stage the temptation is presented without the encouragement of self-control (Geyskens, Dewitte et al. 2008, De Boer, De Ridder et al. 2014).

## **2.2 Tempting food and children**

The concept of self-control in children plays a crucial part in this thesis. However, self-control only needs to be exercised when something is tempting. In these paragraphs the term temptation is explained, as well as palatability and the cognitive development of children aged 4 to 6, the age group focussed upon in this thesis.

### **2.2.1 Temptation**

When looking at the dictionary the word temptation is best explained as a ‘desire’ or ‘a desire to do’. However, the concept is more complex than this brief explanation indicates. Tempting objects have the properties to be attractive and both forbidden (Hughes 2002). Tempting attributes of a product can be inherent to the product composition itself or are given to the product by external sources (Hughes 2002). For instance, candy is tempting because of the sweet taste and a ‘Furby’ can be a tempting object because of effective commercials and the social context. Another property of temptation is that it holds a moral component. A temptation thus always has the connotation that giving in to it, is somewhat wrong. The product evoking the desire is morally wrong, a forbidden fruit (Hughes 2002, Papies, Stroebe et al. 2008).

Children are exposed to tempting foods from an early age in different contexts, such as their home environment and facilities like supermarkets and schools. Young children are also increasingly influenced by the internet and television. The time preschool children spent behind their computer and television screen is still rising, in 2007 more than 50% of preschool children spent at least 1 hour behind the computer or television (Rideout, Vandewater et al. 2003, Fletcher, Whitaker et al. 2014). It is shown that advertisements and advergaming on these devices can alter the preference and the consumption pattern (Harris, Bargh et al. 2009).

## **2.2.2 Palatable foods**

In general palatable food is seen as tempting and attractive to people. Palatable foods, which are foods high in fat and sugar, increase general food intake and can lead to dependence of that specific food group (Erlanson-Albertsson 2005). They activate a reward system so that food consumption is driven by enjoyment and gratification rather than by energy deficit (Pelchat 2002). Based on an evolutionary point of view it is agreeable that palatable foods are attractive because they can be easily transferred into energy (Nesse and Berridge 1997). Infants for instance, show a natural preferences for sweetness and saltiness, and a distinct dislike for sour and bitter tastes (Birch 1999). Examples of palatable foods for children in the age group between 4 and 5 are fast food and sweets. These foods share the characteristics that they are soft, sweet and/or savoury (Zeinstra, Koelen et al. 2007).

## **2.2.3 Cognitive development of children**

Children in the perceptual stage (ages 3-7) of the cognitive development have actively started to develop their food preferences (Guinard 2000, Roedder John 2008). Children in this phase of development are explicitly bound to the ready observable aspects of their environment and use the concept of centration, so observe situations in a one dimensional way (Roedder John 2008). They are limited processors and have a short attention span. Limited processing skills indicate that the process is not fully developed and that children have difficulty utilizing these skills in learning situations (Popper and Kroll 2005, Roedder John 2008).

In earlier studies such as Contento (1981) it is pointed that children in the age group 2 to 7, the pre-operational stage, are not able to make the distinction between foods and snacks. However, a recent study by Nguyen, Girgis et al. (2015) shows that children do understand the concept of healthy and unhealthy foods from the age of four and know how to categorize them. Moreover the research indicates that taste and fulfilling hedonic needs are the most important factors for a child to choose a specific food group. This is in line with the findings of Roedder John (2008) and shows that temptation is present when children are confronted with palatable food , thus making it agreeable that there is an internal conflict presented.

## 2.3 Key studies on temptation and subsequent self-control

In the first two paragraphs the central concepts related to pre-exposure and subsequent self-control were described. During the last decade a growing interest in these theories and concepts have led to a series of experiments looking into the effect of subsequent self-control and resisting food temptation. Initially the research focussed on adults, more recently steps are made to explore the consumption behaviour and liking or preference of children. For additional information on the studies interpreted in this section please consult Table 1 on pages 16 to 17.

Although the phenomenon of self-control in subsequent tempting situations is shown in all studies, the underlying mechanism or factors explaining the whole process remains undefined. Interesting to find is that every study uncovers new insights on relevant mechanisms or confirms the statements made by previous publications.

The studies are centred around the phenomenon of the effect of pre-exposure on subsequent intake or preference. In some instances the research on the phenomenon is expanded by looking at variables like actionability, the influence of sensory cues such as scent and the convenience of the tempting product (see for instance Geyskens, Dewitte et al. 2008).

Regarding the methodology all studies examined use a variant of the two staged pre-exposure paradigm where in the first stage the person is pre-exposed or not pre-exposed to a tempting food choice. In the second stage the participants are asked to do an eating test or a preference test to see how much the earlier pre-exposure has changed the self-control in the subsequent situation. In the earliest studies applicable for this thesis, the participants are female students. Here the main objective is to research the tempting effect based on dietary rules and restrictions (Geyskens, Dewitte et al. 2005, Geyskens, Dewitte et al. 2008). More recent studies transfer the attention of the studies towards a younger population and include male participants in the experimental setting. The youngest age group in the experimental setting is seven years old (Grubliauskienė and Dewitte 2014). The tempting foods used differ slightly between the experiments, although all can be assumed to hold the same tempting attributes. The time frame of the experiments is nearly always limited to one occurrence, only in the study by De Boer, De Ridder et al. (2014) children were exposed to the same temptation four times in a week in their own classroom.

The results are not always consistent, in some studies the phenomenon of subsequent self-control is found in girls, but not boys (De Boer, De Ridder et al. 2014) and vice versa (Grubliauskienė and Dewitte 2014). However, unpublished studies shows that the phenomenon occurs within both girls and boys indicating that there is a general concept at work, applicable to both genders (Grubliauskienė In preparation).

In the next section an overview of all the selected studies is presented, including the key findings and distinctive aspects of that study based on the theory, methodology or results.

### ***Overview selected studies***

Geyskens, Dewitte et al. (2008) extensively researched the importance of actionability of the temptation on the activation of self-control with a subsequent temptation using a population of undergraduate female students. The study in 2008 shares strong resemblance with a previous study from the same authors where the effect of actionability was researched using a female population (Geyskens, Dewitte et al. 2005). The results of the three experiments advocate that if a temptation is non-actionable in a situation of prior exposure, an eating goal is activated and no self-control in the subsequent situation is found. If the temptation is actionable, the eating goal is not activated. As a result, pre-exposure to an actionable temptation increases the self-control of a subsequent situation, while a non-actionable temptation decreases the self-control.

Dewitte, Bruyneel et al. (2009) explore response conflict similarity as a mechanism to explain the enhancement of subsequent self-control. In the second study of the paper a clear link between food consumption and subsequent self-control is made. Participants that were tempted in the first stage consumed significantly less with the taste test in the second stage. The testing reassured that the self-regulatory strength model is not always successful in predicting the behaviour of an individual and that instead depleting, self-control can be strengthened.

In the study by Kroese, Evers et al. (2011) three studies were conducted where temptation strength was tested. Each study measured the temptation of different items, from tempting texts about chocolate, pictures of tempting food, to a study measuring cake consumption. The last study can be incorporated most easily into a food consumption context of this thesis and indicated that when someone is exposed to a minor temptation, the self-regulatory effect does not come into practice. When a food is seen as very tempting, less of that product is consumed.

Grubliauskienė and Dewitte (2014) explored the effect of pre-exposure on subsequent consumption among schoolchildren aged 7 to 12. The outcome of the two phased pre-exposure paradigm based on a delay of gratification task entailed that boys ate less candy after pre-exposure, but girls did not. There was a clear interaction effect between the amount of Smarties and M&Ms boys consumed and pre-exposure to candy. The researchers here choose different candy per phase. Candy letters were chosen to complete a word task, and Smarties and M&Ms were used for phase two. It can be argued that the temptation (candy) in the second phase was different from the first phase, possibly altering the outcomes of the experiment. However, the tempting attributes of all candies can be considered much alike. This study opens an interesting point of view on how children cope with temptation. On a small scale the effects are known for the age group between 7-12, but the impact for younger children remains indistinct.

In the experiment by De Boer, De Ridder et al. (2014) two studies were completed to underpin the role of behavioural conflict and to determine the mechanisms necessary. The participants were between 8 to 11 of age. The results of the first study led to the conclusion that when girls are repeatedly pre-exposed to temptation this may lead to long term resistance of the temptation. Different from other studies, the pre-exposure in the first study was exercised four times consecutively and so measures the effect over a longer period of time. Moreover, the preference test was done upfront.

In the second study it was aimed to study the effect of the intensity of temptation by directing the participants towards the tempting aspects of candy by measuring salvia flow and the desire for the candy was measured. Girls produced significantly less salvia in the hot condition and they also preferred the candy in the hot condition less. A higher behavioural conflict during the exposure reduces the preference for the candy. In this study the actual consumption behaviour was not measured.

Grubliauskienė (In preparation) shows in the second study of the upcoming paper that the consumption after pre-exposure to temptation was lower for boys and girls than in the condition where they were not pre-exposed to temptation. Strikingly, children that were exposed to a tempting picture of a child eating candy and did a task with candy showed no enhancement of self-control in the subsequent situation. This displays that jointly presented ways of pre-exposure do not necessarily lead to increased resistance to a temptation.

Authors	Participants	Experiment	Objective	Investigated Mechanisms	Key Findings
<b>Geyskens, Dewitte et al. (2008)</b>	-	See studies 1-3	To examine if prior pre-exposure to temptation aids or harms the self-control mechanism with actionability as the main variable.	-Actionability of the temptation -Goal activation	Exposure to temptation can lead to self-control enhancement. The critical level need to be exceeded by using an actionable food temptation.
<b>Study 1</b>	Female students (N=74)	Participants had to associate a candy or a picture of a candy with the colour of a wrapper. Afterwards they had to perform a lexical test with stimulus words like 'diet'.	Explore if non actionable and actionable food temptations both elicit eating goals.	-Goal activation	Non actionable and actionable food temptations both activate goals.
<b>Study 2</b>	Undergraduate female students (N=143)	Participants had to perform the same task as in study 1 replacing the word 'diet' with 'eating'. During the lexical task a bowl of candy was presented to half of the participants. After the task both groups could eat from the candy.	Discover the role of actionability on the initiation of the eating goal in tempting situations.	-Goal activation -Actionability	Exposure to actionable food temptation reduces the activation of the eating goal in a subsequent setting.
<b>Study 3a</b>	Undergraduate female students (N=251)	Scent manipulation with tempting or neutral scent. Same tasks as in study 1 and 2. Consumption test where participants were told to judge two types of candy and could eat as much as they wanted.	The effect of food temptation with different actionability on consumers subsequent food intake control	-Goal activation -Actionability	Pre-exposure to a actionable food temptation subdues the effect of scent.
<b>Study 3b</b>	Undergraduate Female students (N=201)	In addition to study 3a a convenience manipulation was added by offering the candy an easy accessible bowl or a narrow difficult accessible bowl.	The effect of food temptation with different actionability on consumers subsequent food intake control	-Goal activation -Actionability	Pre-exposure to a actionable food temptation subdues the effect of convenience.
<b>Dewitte, Bruyneel et al. (2009)</b>	Students (N=75)	Using the two phased paradigm participants were asked in the first stage not to consume tempting chocolate or did a control task. In the second phase half of the participants were asked to do a difficult test whereas the other half did a taste test	Moderating role of conflict similarity between two subsequent self-regulatory tasks on the depletion effect.	-Conflict similarity	Depletion does not necessarily occur especially when the subsequent tempting situation triggers similar internal conflicts.
<b>Kroese, Evers et al. (2011)</b>	Female Students (N= 41)	An attractive or unattractive cake was presented, and people were asked to eat and evaluate the cake on taste.	The effect of temptation strength on self-regulation strength by measuring consumption.	-Temptation strength -Critical level	Weak temptations have an inhibitory effect on the self-regulation processes.
<b>Grubliauskienė and Dewitte (2014)</b>	Children between 7 and 12 years (N=183)	Phase 1: Participants were asked to do a 2 minute word formation task with either candy letters or cardboard letters. Phase 2: Participants filled out questionnaires about candy and were then allowed to eat as much as they wanted.	Examine whether pre-exposure to food temptation is likely to enhance subsequent resistance to similar temptation in children.	-Goal activation	Exposure to palatable obesogenic foods can facilitate resistance after pre-exposure to temptation in boys, but not girls.

Table 1 Key studies on temptation and subsequent self-control, page 1 of 2

Authors	Participants	Experiment	Objective	Investigated Mechanisms	Key Findings
De Boer, De Ridder et al. (2014)	-	See studies 1 and 2	Do contexts that endorse self-regulation effect preferences and consumption beyond the situation where the endorsement applies.	-Goal activation -Behavioural conflict -Hot cool system	Repeated prior exposure to temptation leads in a subsequent situation leads to better resistance in girls but not in boys.
Study 1	Fourth and fifth grade primary school children (N=63)	Children did the same delay of gratification task four times on consecutive days where they could have one candy (experimental) or marble (control) immediately or wait until the end of the week to get three candies or marbles. On the fifth day a taste test was done with candy and children had to indicate the preference of the candy.	To demonstrate that the behavioural change is sustainable.	-Goal activation -Behavioural conflict	Repeated implementation of a self-supportive context by rewarding the postponement reduced candy consumption on a subsequent situation in girls.
Study 2	Children between 8-11 (N=133)	Children were randomly assigned to one of the three conditions hot, cold and control. After choosing a candy type salvia was measured. A delay of gratification task of 7 minutes was conducted. In the hot conduction tempting features were emphasised in the cool condition the concrete and cool ones were emphasised. In the control condition children got a non-food object. After the delay the salvia flow was measured.	To determine which mechanism has an effect on the subsequent self-control strategies.	-Behavioural conflict -Hot-cool system	Preference for tempting candy was lower for girls when pre-exposure to a tempting food. The hot-cool mechanism did not have an effect on boys or girls.
Grubliauskienė (In preparation)	Children (N=83)	In the first stage of the two stage pre-exposure paradigm children were asked to make a flower out of gummy bears or Lego. Half of the total participants were also tempted by a picture of a child. In the second stage the children did a taste test.	To research if pre-exposure to a tempting picture had the same result as an actual temptation in a subsequent tempting situation.	- Behavioural conflict - Actionability of temptation	Pre-exposure to temptation increases the resistance of temptation in a subsequent situation but not if different forms of temptation are presented jointly.

Table 1 Key studies on temptation and subsequent self-control, page 2 of 2

## 2.4 Conditions for effective pre-exposure and subsequent self-control

As section 2.3 already stated there are certain mechanisms that influence the composition and intensification of temptation which can lead towards more self-control in a subsequent situation. In the coming paragraphs these mechanisms found in the key studies and supporting literature are further explained, leading to a clear overview of the known mechanisms enhancing effective pre-exposure. This effective pre-exposure then can result in a lower liking and consumption of tempting foods in children. The mechanisms that aid reaching the critical level are actionability, the hot-cool system, appropriateness, effort and similarity. Factors not included in the context of this experiment are depicted in the section ‘other mechanisms’. All mechanisms for effective pre-exposure are portrayed in Figure 1.

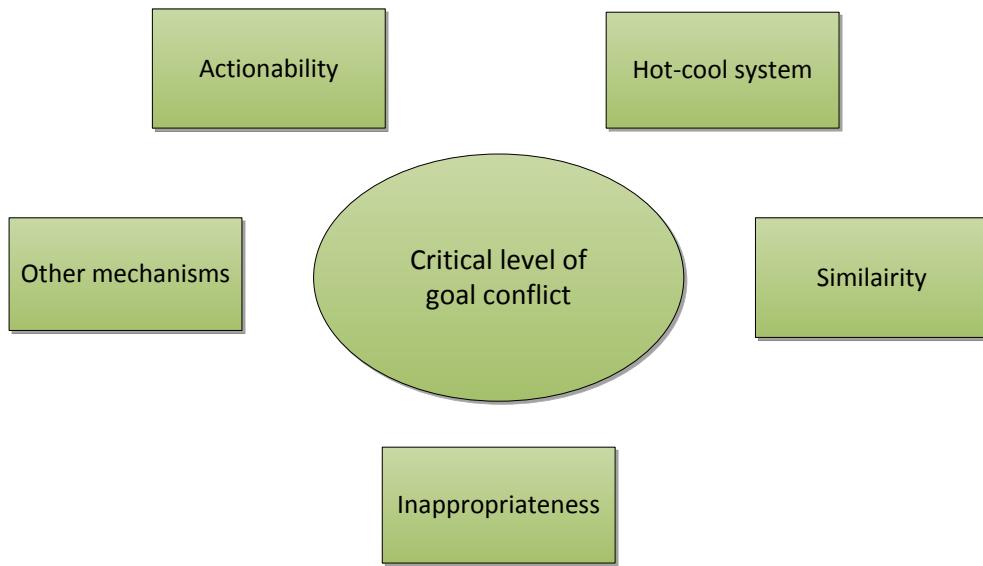


Figure 1 Mechanisms for effective pre-exposure

### 2.4.1 Actionability

As an addition to the critical level theory of Gilbert, Lieberman et al. (2004), actionability of the temptation plays a role in effective subsequent self-control conditions in women. In the article by Geyskens, Dewitte et al. (2008) actionability is researched, this is the extent to which the consumer can physically consume the temptation. When a picture of a temptation is shown, it is more likely that the critical level of the conflict is not met, thus the subsequent self-control is not activated. When the temptation is present and within reach, the temptation is actionable and so it is more likely that the critical level is activated. In the context of the experiment the control condition should hold a non-actionable temptation in the first stage, and an actionable temptation for the experimental condition.

### 2.4.2 Hot-cool system

The hot-cool system is centred around the mental depictions of goals and temptations. The hot system evokes emotions and is action driven, while the cool system is considered cognitively oriented and thoughtful (Metcalfe and Mischel 1999). Temptations that are hot are more ‘dangerous’: an individual is more prone to give in to this temptation type of temptation than to a cold temptation. Using the marshmallow experiment it was found that by making the goal (getting the reward) concrete, and depicting the tempting marshmallows as ‘puffy clouds’, an abstract form, self-control was endorsed (Mischel and Baker 1975). To sustain the long term interest of the goal and

to promote subsequent self-control in the future it is desirable that individuals think in a concrete way about the goals, and abstractly about the temptation itself (Fishbach and Shen 2014). When applying this to a food context the food is depicted abstractly while the goal itself, like finishing a task, is presented in a concrete way.

#### 2.4.3 Inappropriateness of the situation

People seem to activate regulatory strategies to deal when a situation makes free consumption of a tempting food inappropriate (Grubliauskienė and Dewitte 2014). For instance, at a birthday nobody eats from the birthday cake before the candles are blown by the birthday boy or girl. So when a child is told that a task needs to be completed with a food product, it is not appropriate to consume one of the foods during the task itself, thus the behavioural conflict intensifies. The instruction that the children cannot eat does not influence the activation of the initial eating goal, as results by Geyskens, Dewitte et al. (2008) show. Here the explicit instruction did not diminish the participant's desire to consume tempting food.

#### 2.4.4 Similarity

Products can have different meanings in different context. So for the subsequent self-control to be activated it is necessary that the product in the first stage of the pre-exposure paradigm and the product in the second stage evoke the same internal conflict (Dewitte, Bruyneel et al. 2009). For instance, an internal conflict arises when a person needs to decide between an apple and a chocolate bar for a snack. This may create an internal conflict. However when this person needs to make a choice between a chocolate bar and an apple to give away as a gift, another conflict arises with different stakes and a different context. Therefore the internal conflict children experience in the first stage should be the same as the one in the subsequent situation.

#### 2.4.5 Other mechanisms

Other factors that can be identified but are not applicable to the context of this thesis are related to the time span of the exposure. Two examples of potential mechanisms are frame width and consistency. When a person habitually buys a product that evokes an internal conflict the temptation will be more tempting. However, when a person only buys a tempting product once in a while the internal conflict is lower, this factor is described as frame width by Fishbach and Shen (2014). This factor is not incorporated because it focuses more strongly on adult buying behaviour than children's consumption.

Consistency is another mechanism that can affect the effect of pre-exposure on a subsequent situation. Fishbach and Shen (2014) mention that when a person makes the same choices across similar opportunities this can influence the state of the internal conflict and with that the effectiveness of the self-control in a subsequent situation. The children in the experiment will only be tested once, for this reason the mechanism is left out of the context of the experiment.

In conclusion it can be stated that in order for a person to exercise effective subsequent self-control the temptation in the prior exposure state needs to activate a goal conflict that meets a critical level. The temptation needs to be actionable, similar and the context of the pre-exposure discourages direct consumption because of inappropriateness. Moreover, the long term goal needs to be presented in a concrete way while the temptation is presented in an abstract manner. These factors help strengthening the subsequent self-control and limiting the intake and liking of the tempting food in a subsequent situation.

## 2.5 Conceptual model and hypotheses

In the conceptual model (Figure 2) three key elements are presented. The first element 'Effective pre-exposure' refers to the state where all the mechanisms mentioned in paragraph 2.4 are activated. The second element of the conceptual model 'Consumption' indicates the amount of candy eaten by the children in the age group from 4 to 6 and the third element 'Liking' refers to how much the consumed candies are liked.

Based on the principles of cognitive control it is likely that when children between 4 to 6 years old are pre-exposed to temptation that evokes an internal conflict and has met the critical level, their subsequent consumption and liking will be less. Children will intentionally or unintentionally activate self-control measures that linger when a new similar situation arises. So when the children first have to perform a task with candy and successfully resist consumption of the candy, the consumption and liking will be lower in a subsequent situation. This leads to the following two hypotheses:

*H1: Children will consume less pieces of candy when pre-exposed to candies in the first stage of the pre-exposure paradigm.*

*H2: Children will like candy less when pre-exposed to candies in the first stage of the pre-exposure paradigm.*

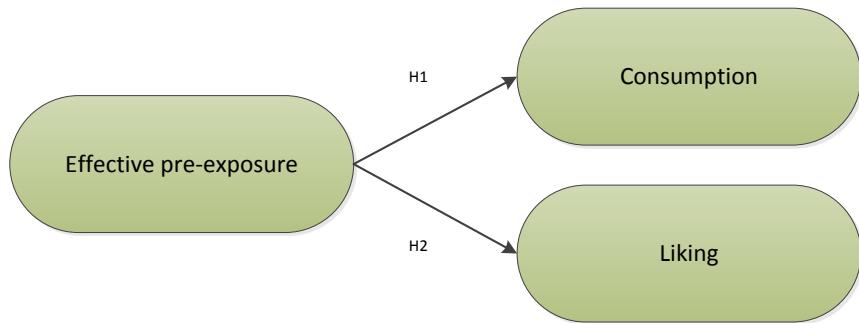


Figure 2 Conceptual model

### 3. Methodology

The methodology explains how the experiment is conducted in detail, from the design to the measurements of the outcomes of the experiment. Moreover, insight is given on the data analysis of the experiment.

#### 3.1 Design

The experiment is built upon the two staged pre-exposure paradigm (De Boer, De Ridder et al. 2014). In the first stage the participants are exposed to a temptation in combination with a task that encourages self-control mechanisms (candy) or the children are exposed to an object that does not hold tempting qualities (beads). In the second stage candy is presented without the encouragement of self-control. In this stage the subsequent self-control is measured by self-report of children on liking and by measuring the consumption of the candy (Geyskens, Dewitte et al. 2008, De Boer, De Ridder et al. 2014). In total there are two conditions, the control group and the experimental group, see Table 2 for an overview. The two conditions only differ in the materials used to craft with, and other variables are kept constant. This ensures that only the effect of effective pre-exposure can be examined.

	Stage 1	Stage 2
<b>Control condition</b>	Crafting with beads	Consumption of candy
<b>Experimental condition</b>	Crafting with candy	Consumption of candy

Table 2 Experiment design

#### 3.2 Participants

The participants of the experiment were Dutch primary school children between the age of 4 to 6 ( $N=86$ ), randomly assigned to one of the conditions. The assignment children received was to make a peacock out of candy (experimental condition) or beads (control condition). In total there were 40 boys and 46 girls who participated. These children were assigned to the control condition ( $N=42$ ) and to the experimental condition ( $N=44$ ). The tests were conducted at two primary schools in Wageningen between the 8<sup>th</sup> and 15<sup>th</sup> of January, 2015. All children attended the first or second year of primary school (Groep 1/2).

Informed consent of the parents of the children was in place. Parents were informed by a letter with information sent in writing and if the schools had the data available, per mail. The letters to the parents and primary schools can be found in Appendix 1. In the letter the parents were asked for any food allergies or intolerances, any children with allergies or intolerances were not included in the study. Also the parents were allowed to decline participation of their child in the experiment using mail or a provided printed template. The research was conducted by two female instructors who were familiar with the procedure and background of the research.

### 3.3 Procedure



Figure 3 Pre-test in progress

The tests were performed at two primary schools in Wageningen, where two children per instructor participated in the test at the same time. Before the actual testing took place a pre-test was conducted with a small sample of six children to eradicate potential flaws in the procedure (Figure 3). Two pre-tests were completed for the experimental condition, one pre-test was conducted for the control condition, each with two children. In

these pre-tests several minor flaws were detected and eliminated.

The procedure of the experiment can be divided into six stages, excluding the preparation phase. For an overview of the phases in the testing see Figure 4. The procedure for both conditions is described in detail in Dutch in Appendix 2. These experiment manuals include a script that is used during the experiment. In addition to the six stages an evaluation form is used, here disturbances and general observations can be written down. Examples of observations are for instance if the children understand the task at once or additional explanation is needed when they construct the peacock. Another example is the section on the form that is filled out when a child shows an outspoken emotion like shyness or a lack of concentration.

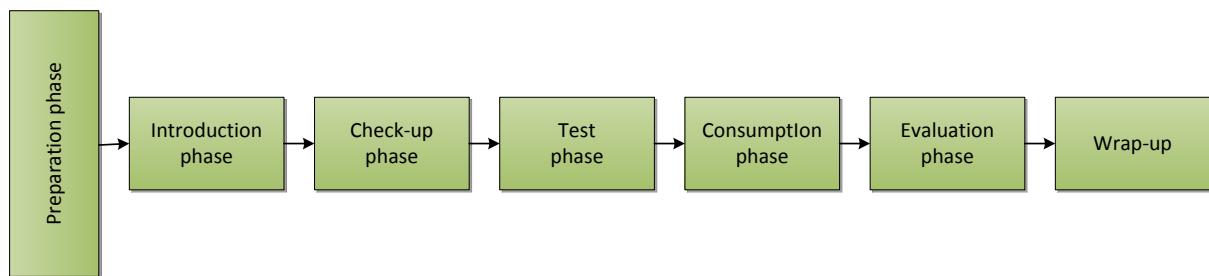


Figure 4 Experiment procedure

#### 3.3.1 Preparation phase

During the preparation phase the children could not see one others performance since the two tables they were seated on were separated by a screen. The tables and chairs were all adjusted to the size of the children, to make them feel more at ease (Guinard 2000). The exact set up of the room and the table can be found in the experiment manual, for both conditions. An evaluation form was in place (Appendix 3), on which the instructor could register all measurements needed during the process, and if they occurred, any irregularities during the experiment. Before the start of each experiment the instructor made sure that all the materials were in place and that the experiment could start without any detectable disruptions.

#### 3.3.2 Introduction phase

In the introduction phase the instructor makes the children at ease by informing them on who she is and what they are going to do. Basic information about the children is written down and some ground rules are explained. One of the ground rules is that the children can stop at any time they want and that they are not allowed to communicate with each other during the experiment.

### 3.3.3 Check-up phase

In the check-up phase the children first need to indicate the feeling of fullness, here related to the construct of appetite. The method used is as following: the children were asked about their appetite by showing three pictures of a teddy's tummy (translated into Dutch using Beertje z'n Buik): full, half full and not full. In Appendix 4 the template of the questionnaire is shown, a smaller picture is seen in Figure 5 (Rolls, Engell et al. 2000, Bennett and Blissett 2014). Before the children were asked to stamp, a test question was presented. Here the instructor asks how the stomach of the child feels just after dinner, and before dinner. In both cases the instructor would indicate the feeling of the stomach after dinner as 'full' and the feeling of the stomach just before dinner as 'empty'. With this approach, derived from a similar study of Bell and Tepper (2006) a reference is created which makes it easier for the child to comprehend the context of the question. After the test question the instructor asks the child to indicate how he or she is feeling at the moment using the 3-point scale.

### 3.3.4 Test phase

	 Geen trek	 Een beetje trek	 Heel veel trek
Hoeveel trek heb je nu?			

Figure 5 Appetite scale

In this phase the procedure between the experiment condition with the palatable foods (candy) and the control condition with non-food items (beads) differs. Both conditions work with an example of a 'complete' peacock consisting of palatable food that serves as an example. Furthermore, the peacock with palatable food guarantees the pre-exposure of tempting food in the control condition.

### Experimental condition: Crafting with Candy

The participants were asked to perform a task in which they had to assemble several pieces of candy to form a complete peacock. The peacock was crafted onto a placemat. The prefabricated three dimensional body of the peacock made of plastic was already in place. The children were asked to assemble the pieces of candy onto a cocktail stick in a specific order and with a specific amount. To assure that the children understood the task, the instructor would explain the task using instruction sheets (Appendix 5). There was no time limit set for the children to complete the task. Moreover it was stated that the children could eat the candy after the completed the task. If the task was unclear the instructor would explain the procedure again.

### ***Control condition: Crafting with Beads***



**Figure 6 Testing phase in progress**

The participants were asked to perform a task in which they had to assemble beads in different colours to form a complete peacock (Figure 6). The peacock was crafted onto a placemat, where the prefabricated three dimensional body of the peacock made of plastic was already in place. The children were asked to assemble beads in different colours onto a cocktail stick in a specific order and with a specific amount. To assure that the children understood the task, the instructor would explain the task using instruction sheets (Appendix 5). There was no time limit set for the children to complete the task. If the task was unclear the instructor would explain the procedure again.

### ***3.5 Consumption phase***

In this phase the procedure between the experiment condition with the palatable foods (candy) and the control condition with non-food items (beads) differs slightly. After the child finished creating the peacock out of candy or beads the instructor would invite the child to eat.

### ***Experimental condition***

After the child finished creating the peacock out of candy the instructor would invite the child to eat as much as they wanted from their peacock creation. If the amount on the peacock was not sufficient the child could also take food from the bowls with the three sorts of palatable foods. The time taken to eat as much as the child wanted was recorded by the instructor using a stopwatch. To ensure the safety of the child, it was indicated that the child should not eat the candy directly off the cocktail stick. After the child was finished with eating the instructor handed the child a napkin to clean the hands and face.

### ***Control condition***

After the child finished creating the peacock out of beads the instructor would switch the peacock with beads with a candy peacock. Also the bowls with beads would be replaced with the three types of candy. Subsequently the instructor would invite the child to eat as much as they wanted from the candy peacock. If the amount on the peacock was not sufficient the child could also take food from the bowls with the three sorts of palatable foods. The time taken to eat as much as the child wanted was recorded by the instructor using a stopwatch. After the child was finished with eating the instructor handed the child a napkin to clean the hands and face.

### 3.3.6 Evaluation phase

Once the child ate as much as he or she desired the instructor asked how much he or she liked the foods represented in the peacock and the feathers of the peacock using a five point scale with smiley faces derived from the scale by Guinard (2000). A small version of the scale is shown in Figure 7.

					
Heel vies					
Vies					
Niet vies en niet lekker					
Lekker					
Heel lekker					

Figure 7 Liking scale

A mediation question was asked to identify the amount of effort the children had put into the peacock creation. This mediation question was included to assure that the effort put into the creation of the peacock would not impact the outcomes of the experiment. It can be assumed that if a child is not invested the task the effective pre-exposure will not reach the same critical level of conflict, as when a child would put a lot of effort in completing the task. Effort was measured using a three point scale with smileys. The first smiley quantified if a child did not do his best at all. The second smiley stated that the child put some effort into the creation of the peacock and the third smiley indicated that a child made a lot of effort when constructing the peacock. See Appendix 6 for all questions posed in the evaluation phase, Figure 8 shows a small depiction of scale used when measuring effort.

			
Helemaal niet je best gedaan		Een beetje je best gedaan	Heel erg je best gedaan
Hoe erg heb je je best gedaan op je knutselpauw?			

Figure 8 Effort scale

### 3.3.7 Wrap-up

At the end of the experiment the instructor would thank the children for participation, and ask if there are any questions left. After leading the children back to the classroom, the instructor registers how many candies are left and register the final remarks on the evaluation form.

### 3.3 Materials

The decision to choose a peacock was made because it is a task where a child can use imagination, and it makes a colourful picture. In general use of animals and colours can be described as fun and interesting, making the creation of a candy or bead peacock a nice task to do (Datamonitor, 1999). The palatable foods used are yoghurt gums cut in half, popcorn and mini apenkoppen. The candies were selected on the characteristics that they are soft and could be easily pinned on the cocktail stick. Also they are different in colour and shape, which makes them more appealing to the children (Datamonitor, 1999). Moreover, it was secured that the candies were gluten free and free of animal substance such as pork. By taking these requirements into account many children could be included regardless of allergies or (religious) beliefs. The non-food objects are pink, white and black beads. These forms were chosen because they represent the same colours as the candies used, so the children can more easily relate to the candy peacock in the control condition.

The peacock placemat consisted of plain white background and a ‘body’ of the peacock which was egg-shaped and 3D so it could be used multiple time, hence reducing the potential waste. The cocktail sticks are cut in such a way that they fit the A4 placemat and before use, soaked in water to avoid splinters and to make it easier to assemble the palatable foods on the stick.

### 3.4 Measurement

All measurements were taken individually to assure that the information was collected as accurate as possible. The measurements of the crafting and consumption time were done using a stopwatch and measured per second.

In total there are five pieces of candy on one cocktail stick with a maximum of four cocktail sticks per child. The order is specified so an even amounts of each palatable food is used. It is important that the child is able to complete the task that is handed to him or her and time is recorded to see how long the child needs to assemble the sticks. The completion of the task is determined by the child’s own interpretation. So when a participant claims that he is finished, this is an indication of task completion. To ensure that the children would not overeat in the experiment condition, a limit was set in how many units a child could consume. This limit was 265 kcal, an amount corresponding with 20% of recommended daily intake of a four year old girl with a sedentary lifestyle (Stichting Voedingscentrum Nederland 2014). This resulted in the total of seven yoghurt gums cut in half, eleven popcorn and seven mini apenkoppen.

The quantity eaten is measured by counting the consumed palatable foods by type after the child leaves the experiment room. Afterwards the total caloric intake was calculated using the calories per unit as depicted in Table 2. To secure the comparability of the results all foods have a standardized size. If a child would finish half of a popcorn only that amount would be noted by the instructor.

	Kcal per candy	Amount	Kcal Total
<b>Yoghurt gums (per ½)</b>	15 kcal	7	105
<b>Popcorn</b>	5 kcal	11	55
<b>Mini apenkoppen</b>	15 kcal	7	105
<b>Overall total</b>		25	<b>265</b>

Table 2 Caloric value

### **3.5 Data analysis**

In the experiment the sampling method applied was convenience sampling, using the schools that agreed to participate in the experiment. The children were assigned randomly to one of the conditions regardless of their sex or age. For the analysis of the data several statistical methods are used, analysed in IBM SPSS Statistics 20 using the statistical significance level of  $P<0.05$ .

Based on the outcomes of the Q-Q plot, the level of skewness and kurtosis, normality was estimated. The skewness and kurtosis were calculated using the outcome of the test statistic divided by the standard error. Both outcomes need to be between -1.96 and 1.96 ( $P<0.05$ ) to assure an acceptable approach for normality. If applicable, the z scores were corrected for using a square root or log transformation.

One way ANOVA testing was executed to examine the variance between the two conditions based on age, gender and appetite as well as the mediation variable perceived effort. ANOVA was used because this way of testing is more common in an experimental setting, opposed to regression analysis in field research (Field 2013). Other control variables that can be grouped under observations are tested using Pearson chi-square. Pearson's correlation was used to determine if any correlation effects were in place.

To test the main effect and between group effect(s), AN(C)OVA testing was used with the experimental and control condition as fixed factors. Other variables such as liking of the candy and the consumption of candy served as dependent variables. Based on the outcomes of the variance testing, covariates were used to correct for any significant differences between the control and experimental condition.

## 4. Results

This chapter concentrates on the outcomes of the experiment defined in the methodology. First the descriptive information and the randomisation check are described, followed by the outcome of the information noted under observations and the mediation variable perceived effort. Most importantly, insight is given on the main effects by looking at the differences between the experimental and control condition and what the influence has been on the consumption (H1) and liking (H2) of candy. All relevant statistical output is combined in Table 7 on Page 34-35.

### 4.1 Descriptive information and randomisation check

The total sample without exclusion consisted of 86 children. During the experiment one child was excluded from the results, he could not complete the experiment due to a language barrier. The sample that is worked with in the result section therefore consists of 85 children, see Table 3 for the gender distribution between the two groups.

	Control condition		Experimental condition		Both conditions	
	Children	%	Children	%	Children	%
Boys	20	47.6%	19	44.2%	39	45.9%
Girls	22	52.4%	24	55.8%	46	54.1%
Total	42	100%	43	100%	85	100%

Table 3 Gender Distribution

Chi square testing was used when testing for an association between gender and the two conditions because both gender and the two conditions are nominal data, meaning that they do not have a distinct rank or order. The assumptions for the test were met: the sample was random, the sample was sufficiently large enough with more than 30 participants per condition, the observations were independent and the expected cell count was above five, a standard used for a two by two table (Field 2013).

The outcome of the Pearson chi-square test shows that there is no significant association between gender and the conditions ( $p= 0.751$ ). The size of the effect based on Phi is 0.03, making the effect size ‘small’ (Field 2013). The mean age of the sample from the total experiment was 4.73 ( $SD= 0.66$  range 4-6). The average age of the control group was 4.88 ( $SD= 0.67$  range 4-6) and for the experimental group 4.59 ( $SD= 0.62$  range 4-6).

Using a one way analysis of variance an indication can be made that the variance of the variable age is not different ( $P=0.0502$ ) between the control group and the experimental group. The significance level is small, for this reason correction for the age groups is attributed for from this point forward in the result section by using the variable age as a covariate.

The average level of appetite in the control group was 0.98 ( $SD= 0.84$  range 0-2) and the average appetite for the experimental group was 1.09 ( $SD= 0.84$  range 0-2). Following the results conducted with analysis of variance it can be concluded that the differences between the groups were not significant for appetite ( $P=0.51$ ). It can therefore be assumed that the control and experimental conditions were not significantly different from each other. However, in further calculations appetite is used as a covariate, since there is a significant relation between consumption and appetite using Pearson correlation with an outcome of 0.223 ( $P= 0.04$ ).

## 4.2 Control variables and manipulation check

The data gathered from the observation forms is used to determine if there were external factors that influenced the outcomes in both conditions. If ‘No’ was written down, it indicated that for instance no additional information was needed, the desired or preferred outcome of this variable in the experiment. The variable ‘Other’ is a group with observations that could not be grouped under the predefined observations and occurred less than 5%. Going to the bathroom or being ready at the same time as the other participant were listed under this group for instance.

As Table 4 shows, the differences between the control and the experimental group are not significant for most observations, with the exception of the order and amount placed on the sticks. Children did have more difficulty following the instructions correctly when crafting with candy than with beads. An explanation for this outcome is that the children are less familiar with candy as an option to craft with. Another explanation could be that the tempting qualities could have distracted the child from listening or doing the job exactly as asked.

	Control condition (N=42)		Experimental condition (N=43)		Test	Value
	No	%	No	%		
Additional Information	34	81.0%	35	81.4%	$\chi^2=0.003$	P=0.96
Incorrect order of beads/candy	36	85.7%	25	58.1%	$\chi^2=7.97$	P=0.005
Incorrect amount of beads/candy	36	85.7%	26	60.5%	$\chi^2=6.86$	P=0.009
Encouragement	39	92.9%	37	86.0%	$\chi^2=1.04$	P=0.31
Notable emotions	40	95.2%	40	93.0%	$\chi^2=0.19$	P=0.66
External Influences	39	92.9%	39	90.7%	$\chi^2=0.13$	P=0.72
Interaction with other participant	40	95.2%	37	86.0%	$\chi^2=2.11$	P=0.15
Others	23	54.8%	29	67.4%	$\chi^2=1.44$	P=0.23

Table 4 Results from observations

To verify if the independent variable manipulation had the intended effect, the amount of effort was asked in the evaluation phase of the experiment. Here it was checked if all children had invested the same amount of effort into the creation of the peacock. It is labelled as perceived effort since it is self-reported by the children. The average amount of effort in the control group was 1.90 ( $SD= 0.06$  range 0-2) and for the experimental group 1.79 ( $SD= 0.08$  range 0-2). No significant difference was found between the two groups for the variable effort ( $F=1.37$   $P=0.25$ ). The Q-Q plots and histogram show optical outliers. Looking closer at these outliers, these children did not perform differently from the other participants looking at the other variables and will not be excluded from other interpretations. Most children answered that they put a lot of effort into the work that they did. The manipulation of the beads and candy in this experiment can therefore be considered to have had the desired effect.

The control variables and manipulation check did not highlight any troubling outcomes, with a small notation that the order and amount of candy did significantly differ between the two conditions. It is accounted for that they will not have a significant impact on the analysis of the main effects consumption and liking.

## 4.3 Candy consumption

To answer the first hypothesis '*Children will consume less pieces of candy when pre-exposed to candies in the first stage of the pre-exposure paradigm*' the candy consumption in numbers and caloric value is analysed.

### Number of candy consumed

The average number of candies consumed in the control group was 17.64 (SD= 7.64 range 0-25) and for the experimental group 18.174 (SD= 6.73 range 0-25). The analysis of covariance with the covariates age and appetite presented the following outcomes. No main effect was detected regarding the total number of candies consumed ( $F=0.1 P=0.75$ ) as well as the consumption of candies separately. The consumption of yoghurt gums ( $F=0.1 P=0.75$ ), popcorn ( $F=0.79 P=0.38$ ) and apenkoppen ( $F=0.37 P=0.55$ ) did not show significant effect. In total 26 children ate the maximum amount of candy, 25 pieces and none of the children ate no candy at all. For an overview of the number of candy consumed, see Figure 9, the statistics reporting on the candies individually are presented in Table 7. Children were not affected differently in both conditions. The condition with effective pre-exposure did not have an effect on the amount of candy consumed.

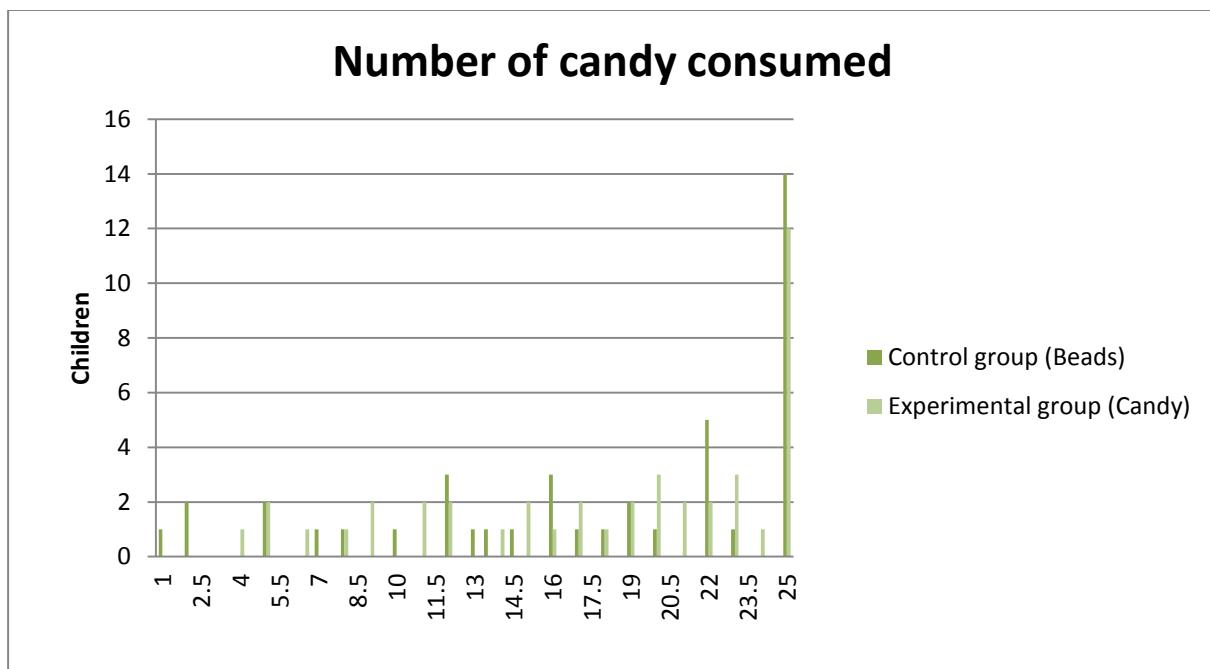


Figure 9 Number of candy consumed

### Calorie intake

The data depicting the candy consumption can also be interpreted using the measurement of calories. The candy used in the experiment had different caloric values, popcorn was kcal 5 per piece and the yoghurt gums and apenkoppen were 15 kcal per piece. The maximum amount of calories a child could eat was 265 kcal.

The average calorie intake of candy in the control group was 184.88 (SD= 84.19 range 0-265) and for the experimental group 187.04 (SD= 75.07 range 0-265). The analysis of covariance with the covariates age and appetite presented the following outcomes. No main effect was detected, not for the calorie intake of all candy ( $F=0.003 P=0.96$ ) as well as the calorie intake based on the candies separately. The calorie intake of yoghurt gums ( $F=0.1 P=0.75$ ), popcorn ( $F=0.79 P=0.38$ ) and

apenkoppen ( $F=0.37$   $P=0.55$ ) did not show a significant effect. For an overview of the amount of calorie intake, see Figure 10, the statistics reporting on the candies individually are presented in Table 7. Children did not consume significantly more or less in both conditions. The condition with effective pre-exposure did not have an effect on the calorie intake.

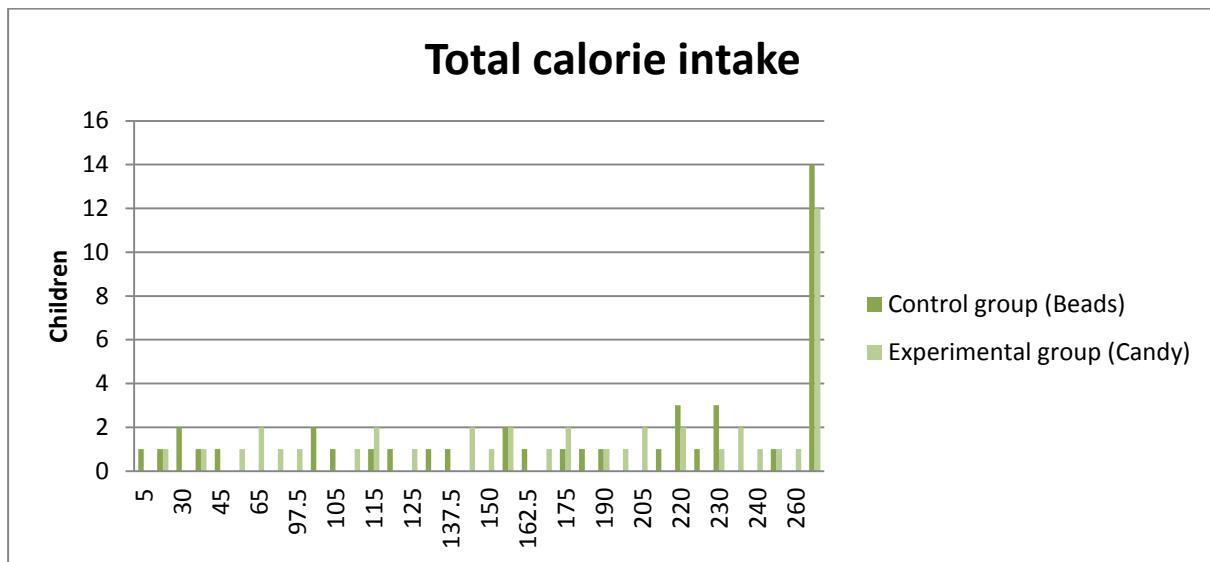


Figure 10 Total calorie intake

Studies on effective pre-exposure and subsequent food intake and liking showed that results between girls and boys can differ. Therefore gender differences between the two groups were examined using an analysis of covariance with the variables age and appetite as covariates. No effect on consumption showed when examining the results, for boys ( $p=0.95$ ) and girls ( $p=0.39$ ). Also, the effect for calorie intake ( $p=0.70$ ) and girls ( $p=0.33$ ) was not significant.

As the figures on number consumed and calorie intake portray, the largest group of children ate the maximum of 25 candies or 265 of calories ( $N=26$ ). To see if putting a maximum on the amount eaten was different amongst the conditions a logistic regression analysis with the dichotomous dependent variable ‘maximum consumption’ (No=0, Yes=1) was created. No significant results were reported, as shown in Table 6.

	B	St. error	Value	Df
<b>Condition</b>	-0.24	0.49	P= 0.62	1
<b>Age</b>	0.24	0.38	P= 0.53	1
<b>Appetite</b>	0.43	0.31	P= 0.16	1
<b>Constant</b>	-0.30	1.88	P= 0.22	1

Table 6 results logistic regression for maximum consumption

The first hypothesis ‘*Children will consume less pieces of candy when pre-exposed to candies in the first stage of the pre-exposure paradigm*’ cannot be accepted based on the outcomes of the experiment. The consumption of pieces of candy measured in pieces and in calories did not significantly differ between the control condition and the experimental condition.

## 4.5 Liking of candy

To answer the second hypothesis '*Children will like candy less when pre-exposed to candies in the first stage of the pre-exposure paradigm*' the liking of the candy is evaluated.

The average liking of the candy in the control group was 4.05 ( $SD= 1.38$  range 1-5) and for the experimental group 4.28 ( $SD= 1.33$  range 1-5). The analysis of covariance with the covariates age and appetite presented the following outcomes. No main effect was detected, not for the liking of the candy ( $F=0.20 P=0.65$ ) as well as liking based on the candies separately. The calorie intake of yoghurt gums ( $F=0.269 P=0.61$ ), popcorn ( $F=2.05 P=0.16$ ) and apenkoppen ( $F=1.56 P=0.22$ ) did not show a significant effect. For an overview of the number of candy consumed, see Figure 11, the statistics reporting on the candies individually are presented in Table 7. Children did not like the candy significantly more or less in both conditions. The condition with effective pre-exposure did not have an effect on the liking of the candy. In addition, no effect was detected for the liking of the candy for boys ( $p=0.75$ ) and girls ( $p=0.69$ ) as well.

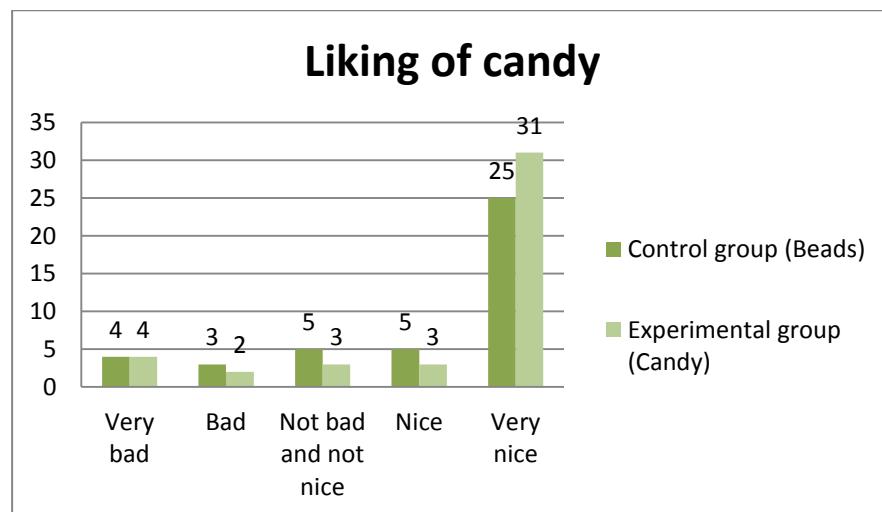


Figure 11 Liking of candy

The second hypothesis '*Children will like candy less when pre-exposed to candies in the first stage of the pre-exposure paradigm*' cannot be accepted based on the outcomes of the experiment. The liking of candy did not significantly differ between the control condition and the experimental condition.

	Control condition (N=42)		Experimental condition (N=43)		Test	Value	Df
	Mean	St. deviation	Mean	St. deviation			
<b>Randomisation and mediation</b>							
Age (4-6)	4.88	0.67	4.59	0.62	F=3.88	P=0.0502	1
Gender (0=boys, 1=girls)					$\chi^2=0.10$	P=0.75	1
Appetite (0-2)	0.98	0.84	1.09	0.78	F=0.44	P= 0.51	1
Effort (0-2)	1.90	0.37	1.79	0.51	F=1.37	P=0.25	1
<b>Food consumption</b>							
Units of candy (0-25)	17.64	7.64	18.17	6.73	F=0.10	P=0.75	1
Units of yoghurt gums (0-7)	4.86	2.66	5.12	2.39	F=0.10	P=0.75	1
Units of popcorn (0-11)	7.98	3.78	8.56	3.41	F=0.79	P=0.38	1
Units of apenkoppen (0-7)	4.81	2.48	4.50	2.55	F=0.37	P=0.55	1
<b>Calorie intake</b>							
Calorie intake candy (0-265)	184.88	84.19	187.04	75.07	F= 0.003	P=0.96	1
Calorie intake yoghurt gums (0-105)	72.86	39.97	76.74	35.89	F=0.10	P=0.75	1
Calorie intake popcorn (0-55)	39.88	18.92	42.79	17.05	F=0.79	P=0.38	1
Calorie intake apenkoppen (0-105)	72.14	37.19	67.50	38.28	F=0.37	P=0.55	1

Table 7 Overview results page 1 of 2

	Control condition (N=42)		Experimental condition (N=43)		Test	Value	Df
	Mean	St. deviation	Mean	St. deviation			
<b>Liking</b>							
Liking of feathers (1-5)	4.05	1.38	4.28	1.33	F=0.20	P=0.65	1
Liking yoghurt gums (1-5)	3.60	1.65	3.88	1.62	F=0.27	P=0.61	1
Liking popcorn (1-5)	3.88	1.57	4.40	1.28	F=2.05	P=0.16	1
Liking apenkoppen (1-5)	3.93	1.57	3.51	1.83	F=1.56	P=0.22	1

Table 7 Overview results, page 2 of 2

## 5. Discussion

The aim of the study was to research if children aged 4 to 6 successfully resisted temptation, and if this would enhance rather than deplete self-control in a subsequent situation. When children learn how to control their food intake from an early age, this strengthens the chance that the child will become an adult with a healthier lifestyle (Whitaker, Wright et al. 1997, Freedman, Khan et al. 2001). In the experiment children were asked to craft with beads or with candy (Stage 1), after the crafting children were allowed to eat as much of the available candy as they wanted (Stage 2). It was proposed that if children would craft with candy they were more likely to consume less candy in the second stage of the two staged pre-exposure paradigm because the self-control mechanisms from the first pre-exposure situation would still linger. Also the children would like the candy less because of the lingering self-control from the previous encounter. The two hypotheses were tested at two primary schools in Wageningen in January 2015, with a total of 86 participants. For the analysis the data of 85 children were used.

Based on the outcomes of the experiment no significant effect was found between the control condition with beads and the experimental condition with candy, looking at the amount of candy children consumed. The hypothesis was tested using the actual amount children ate of the candy and the total calorie intake of candy. The liking of the candy did not show any significant difference between the two conditions. These findings suggest that the mechanisms for effective pre-exposure described did not create the desired state for subsequent self-control in children aged 4 to 6. As can be expected with tempting and palatable foods the candies were mostly described as being 'very nice' by the children. Children in the age group of 4 to 6 did not evaluate the candy different between the control and the experimental condition. Unlike some other studies on pre-exposure also no gender differences were found when looking at the consumption and liking (De Boer, De Ridder et al. 2014, Grubliauskienė and Dewitte 2014). Several explanations for the outcome of the research can be proposed as well as limitations and recommendations for further research.

### ***Limitations and recommendations for further research***

First, the thesis focused on a young age group, children in the age category between 4 and 6 at Dutch primary schools. The delay of gratification test proves, that young children mainly apply physical strategies children to resolve the behavioural conflict when they are confronted with a temptation (Shoda, Mischel et al. 1990, Demetriou 2000). This is a strong indication that young children experience some sort of internal conflict when they are exposed to a temptation. However, the cognitive abilities of young children are still developing and it is plausible that long term goal activation necessary to evoke subsequent self-control is not yet sufficiently shaped, like adults do have (Fishbach, Friedman et al. 2003, Papies, Stroebe et al. 2008). Children aged 4 to 6 can therefore still heavily rely on heuristic cues and impulses when presented with a temptation (Popper and Kroll 2005, Roedder John 2008). So although a conflict is detected, this does not necessarily imply that the level needed for effective pre-exposure is reached. A suggestion for further research could be to determine if younger children need a higher level of internal conflict, so the critical level can be reached for the creation of effective pre-exposure.

The inherent impulsivity of a child can also have played a role in the outcomes of the experiment. In research examining factors for obesity, it is shown that children who are impulsive and extra sensitive to incentives eat more than children who do not have these qualities. Impulsivity is also

linked to binge eating (Schag, Schönleber et al. 2013), which is another possible explanation why more than 25% of the children ate all the candy presented in the study. Impulsivity could therefore be one of the factors explaining the outcomes of this study, and could be a potential angle to research as a factor influencing effective pre-exposure.

The methodology used is clear but also rather complex. Children were asked to execute a lot of different tasks like indicating the level of fullness, crafting in a specific order and using a three- as well as a five-point scale. Literature suggests that young children focus on one aspect, as they have a short attention span and are limited in their concentration. This can alter the results gathered using an age group between 2 to 7 years (Chen, Resurreccion et al. 1996, Guinard 2000, Popper and Kroll 2005). Because the children were exposed to a lot of different stimuli during the experiment, they could concentrate less on the execution of the task and the tempting food itself. Also children had more difficulty completing the task correctly using candy, a tempting object. Whether this could be because of the distracting tempting qualities or being unfamiliar crafting with candy, the complexity of the task for this target group should be kept simple to exclude the potential influence of complexity on the outcomes.

Another factor is that the exposure to the temptation in the first stage of the two stage pre-exposure paradigm was not equal for all children and different across conditions. The duration of crafting was significantly different between the control and the experimental condition ( $F= 23.86 P=0.00$ ). The children who crafted with candy spend more time on the construction of the peacock with a mean of 9:43 minutes ( $SD= 3:48$  min). Children in the control condition spend 5:42 minutes ( $SD= 2:52$  min) on constructing the peacock made of beads. This corresponds to the earlier notion that children could be unfamiliar crafting with candy. As an addition to the previous claim, the stickiness of candy could also have made it more difficult to craft in the experimental condition. Lastly, the candy was more difficult to pin on the sticks, even with the holes being made in advance, as was done with the popcorn. A recommendation could be to create a task that is simple to execute and had limited interaction with the candy to avoid stickiness.

In this thesis self-reported liking of the tempting food products is measured, however the craving for a specific food group by measuring saliva would have been a more objective way to determine if the pre-exposure has an effect for the age group 4 to 6, as used in the paper by De Boer, De Ridder et al. (2014). Besides being an objective measure it would also enable the researcher to make a distinction between liking something and actually craving for a specific food.

Another possible explanation for the outcome of the experiment could be that there was a ceiling effect of 265 calories incorporated. Testing using Pearson's correlation showed that the correlation between appetite and the number of consumed candy was significant ( $F=0.223 P=0.04$ ), indicating that if the appetite increased, the overall consumption of candy increased as well. Although this calorie restriction was definitely necessary for ethical reasons it eliminated the option of unlimited consumption, so children could not actually eat as much as they wanted. If children would have had this option, other outcomes might have been expected. A recommendation therefore could be to pick candy that is low in calories so a large number of it can be used. Illustrations of such candies are micro wave popcorn, puffed rice and Fruitella dummy's.

One child commented during the experiment that he was not allowed to eat a lot of candy at home, implicitly mentioning the restriction rule applied by his parents. Parents see the food consumption behaviour of their young children as the parents responsibility and not as the personal responsibility of a child. The strategies used to enforce restriction are often power assertive and coercive (Johnson 2000). Controlling child-feeding strategies can be associated with a decrease in children's ability to self-regulate energy intake (Johnson and Birch 1994). Also restriction of palatable foods can result in focusing the child's attention on these items and consequently may promote their overconsumption (Fisher and Birch 1999). In the current research on pre-exposure and subsequent consumption or liking of food, the influence of restriction rules imposed by parents is not yet incorporated. For future research it can be proposed to measure this influence. Also the practical implications of effective pre-exposure can be researched, so parents and educators are offered a potentially more effective tool than restriction and prevention strategies.

### **Strengths**

One of the strengths of this thesis is the combination of theories that are rooted in different fields of research like neuro sciences (cognitive control theory) and psychology (self-control). Furthermore, different mechanisms were presented in a structured manner giving an overview of the mechanisms known to be involved with the phenomenon of subsequent self-control due to prior exposure. Also, the two stage pre-exposure paradigm was translated into a methodology fit for a young, mainly illiterate group of young children. Lastly the large amount of documented external influences controlled for a sophisticated measurement. As a result many influences that could alter the outcomes of the experiment could be ruled out. Examples of these influences were interaction between the participants, notable emotions like shyness and whether the children needed additional encouragements.

That pre-exposure of a tempting product can lead to enhancement of self-control in a subsequent situation for older children has already been proven in several studies. It offers a great long term perspective to tackle the growing child obesity epidemic in western society. If children themselves are able to regulate, less restrictions in the environment are needed. The challenge ahead is to see how and when this phenomenon develops, and how consistent results can be accounted for. Moreover it is interesting to see if the baseline for effective pre-exposure lies around children aged six years old, as carefully can be suggested using the outcomes of this thesis. It can be recommended to duplicate the study with the same age group incorporating the adjustments presented in the discussion to strengthen this statement.

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## Appendix 1 Information letter for parents and primary schools

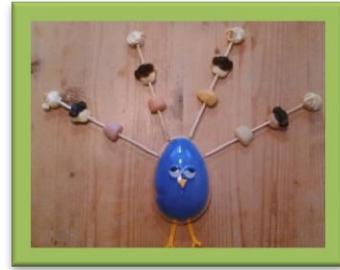
### Letter parents

#### Toestemming onderzoek onder leerlingen van groep 1 en 2 (leeftijd 4 t/m 6 jaar)

Gezond eten is belangrijk voor de gezondheid van uw kind. Toch blijkt dat kinderen vaak te veel snoepen en te weinig groente eten. De Wageningen Universiteit onderzoekt strategieën om kinderen gezonder te laten eten.

**Doel** Voor veel ouders is het lastig om te bepalen hoe ze moeten omgaan met snoepen. Moet snoep helemaal niet in huis gehaald worden, of kan af en toe snoepen juist helpen bij het leren van vaardigheden om nee te leren zeggen tegen een snack? Deze laatste vraag staat centraal in dit onderzoek.

**Het onderzoek** Het onderzoek vindt eenmalig plaats in de ochtend op de school van uw kind. Alle kinderen worden gevraagd een pauw te knutselen (zie de afbeelding). De helft van de kinderen knutselt de pauw met snoepjes en de andere helft van de kinderen knutselt met kralen. Op basis van toeval wordt bepaald waarmee uw kind knutselt. Na het knutselen mogen alle kinderen van een geknuselde snoeppauw eten en wordt er gemeten hoeveel er gegeten wordt. De kinderen mogen zelf bepalen hoeveel ze eten, wel is er een maximum gesteld zodat de hoeveelheid gegeten snoep binnen een acceptabele grens blijft. Na afloop stellen we hen nog een aantal vragen. De producten waarmee wordt geknuseld zijn niet bewerkt; alleen standaard producten zoals ook in de supermarkt verkrijgbaar worden aangeboden. Al het snoep is glutenvrij en vrij van kunstmatige kleur- en smaakstoffen.



**Allergie, dieet en overige informatie** Is uw kind allergisch of volgt uw kind een speciaal dieet waardoor hij of zij bepaalde producten niet mag eten, meld dit dan bij de leerkracht van uw kind. Op de achterzijde van deze brief vindt u een overzicht van de gebruikte producten. Als uw kind andere voedsel gerelateerde bijzonderheden heeft horen wij dat ook graag.

**Vrijwillige medewerking en anonimiteit** Medewerking aan het onderzoek is volledig op vrijwillige basis. Uw kind mag ten alle tijden stoppen met de deelname. Mocht u besluiten om niet deel te nemen aan het onderzoek, dan heeft dit geen enkele gevolgen voor u of voor uw kind(eren). De gegevens van dit onderzoek worden volledig anoniem verwerkt en zullen alleen voor dit onderzoek gebruikt worden. De gegevens worden niet aan derden verstrekt. Als u om welke reden dan ook niet wilt dat uw kind(eren) meewerken, laat dit dan uiterlijk <dag-maand-jaar> weten aan de leerkracht van uw kind(eren).

**Hoe deelnemen?** Mochten wij geen bericht ontvangen dat uw kind niet deel mag nemen, dan gaan we er stilzwijgend vanuit dat u geen bezwaren heeft en dat uw kind mee mag werken.

**Vragen?** Heeft u vragen of opmerkingen betreft dit onderzoek, dan kunt u hiervoor terecht bij de onderzoeker Sabine Jansen op sabine.jansen@wur.nl of 06-28035536.

Met vriendelijke groet namens het onderzoeksteam,

Sabine Jansen en Sanne Raghoebar (onderzoekers)  
Dr. Ellen van Kleef (Universitair docent Consumentengedrag)  
Dr. Emely de Vet (Universitair hoofddocent Gezondheidscommunicatie)

## Overzicht Producten

### Mini apenkoppen ( Katja)

## Ingrediënten

Suiker  
Glucose-fructosestroop  
Gemodificeerd zetmeel  
Melasse  
Gelatine  
Zoethout (3%)  
Druivensuiker  
Salmiakzout  
Voedingszuur (citroenzuur)  
Natuurlijke aroma  
Natuurlijke aromastof  
Fruit- en plantenconcentraten (passievrucht, mango, gardenia en sinaasappel)  
Glansmiddel (bijenwas wit)  
*Kan sporen van melk bevatten*

### Jimmy's Popcorn ( Jimmy's)

Glucose- fructosestroop  
Suiker  
Maïskorrels  
Maïsolie  
Sojalecithine

### Yoghurt gums (Katja)

Suiker  
Glucosestroop  
Magere yoghurtpoeder (6%)  
Overige melkbestanddelen: wei- en melksuiker  
Appelpulp (3%)  
Voedingszuur (citroenzuur)  
Geleermiddel (pectine)  
Fruit- en plantenconcentraten (kers, druif, wortel, paprika, rode kool, pompoen, bosbes, appel)  
Natuurlijke aroma  
Glansmiddel (bijenwas wit)

## **Letter primary schools**

Geachte mevrouw/meneer <naam>,

Vanuit Wageningen Universiteit en Research centrum wordt er een onderzoek naar eetgedrag onder kinderen uitgevoerd. Om dit onderzoek succesvol af te ronden zijn wij op zoek naar scholen die deel willen nemen aan ons project. Het onderzoek richt zich op kinderen in de leeftijdscategorie van 4 tot en met 6 jaar, wat ongeveer overeen komt met groep 1 en 2.

**Doeleind** Het ontwikkelen van een gezonde levensstijl bij kinderen en de daarbij behorende voeding is een onderwerp dat vele scholen en ouders bezighoudt. Zo worden initiatieven als gezonde pauzehappen, lunches en traktaties vaak al gestimuleerd. Ondanks deze veelbelovende initiatieven blijft het voor veel ouders lastig om te bepalen hoe ze moeten omgaan met snoepen. Moet snoep helemaal niet in huis gehaald worden, of kan af en toe snoepen juist helpen bij het leren van vaardigheden om nee te leren zeggen tegen een snack? Deze laatste vraag staat centraal in dit onderzoek.

**Het onderzoek** Het onderzoek vindt eenmalig plaats op uw basisschool in de groepen 1 en/of 2. In duo's zullen alle kinderen worden gevraagd een pauw te knutselen (zie de afbeelding). De helft van de kinderen knutselt de pauw met snoepjes en de andere helft van de kinderen knutselt met kralen. Op basis van toeval wordt bepaald waarmee het kind knutselt. Na het knutselen mogen alle kinderen van een geknusseerde snoeppauw eten en wordt er gemeten hoeveel er gegeten wordt. De kinderen mogen zelf bepalen hoeveel ze eten, wel is er een maximum gesteld zodat de hoeveelheid gegeten snoep binnen een acceptabele grens blijft. Na afloop stellen we hen nog een aantal vragen. De producten waarmee wordt geknusseerd zijn niet bewerkt; alleen standaard producten zoals ook in de supermarkt verkrijgbaar worden aangeboden. Al het snoep is glutenvrij en vrij van kunstmatige kleur- en smaakstoffen.



**Wat betekent dit voor uw school?** Deelname aan dit onderzoek heeft weinig tot geen impact op de dagelijkse gang van zaken binnen de klassen. Alle materialen en omliggende zaken zullen door de Wageningen Universiteit geleverd worden. Het enige wat wij van uw school vragen is een locatie om het onderzoek af te nemen en tijd van de kinderen om te knutselen.

**Deelname aan het onderzoek** Heeft u interesse om deel te nemen aan ons onderzoek? U kunt een e-mail sturen naar Sabine Jansen op [sabine.jansen@wur.nl](mailto:sabine.jansen@wur.nl) of bellen naar 06-28035536, wij zullen dan zo spoedig mogelijk contact met u opnemen. Ook bij eventuele onduidelijkheden of vragen staan wij u graag te woord.

Wij kijken uit naar uw antwoord!

Met gezonde groet namens het onderzoeksteam,

Sabine Jansen en Sanne Raghoebar (onderzoekers)  
Dr. Ellen van Kleef (Universitair docent Consumentengedrag)  
Dr. Emely de Vet (Universitair hoofddocent Gezondheidscommunicatie)

## Overzicht Producten

### Mini apenkoppen ( Katja)

## Ingrediënten

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Druivensuiker  
Salmiakzout  
Voedingszuur (citroenzuur)  
Natuurlijke aroma  
Natuurlijke aromastof  
Fruit- en plantenconcentraten (passievrucht, mango, gardenia en sinaasappel)  
Glansmiddel (bijenwas wit)  
*Kan sporen van melk bevatten*

### Jimmy's Popcorn ( Jimmy's)

Glucose- fructosestroop  
Suiker  
Maïskorrels  
Maïsolie  
Sojalecithine

### Yoghurt gums (Katja)

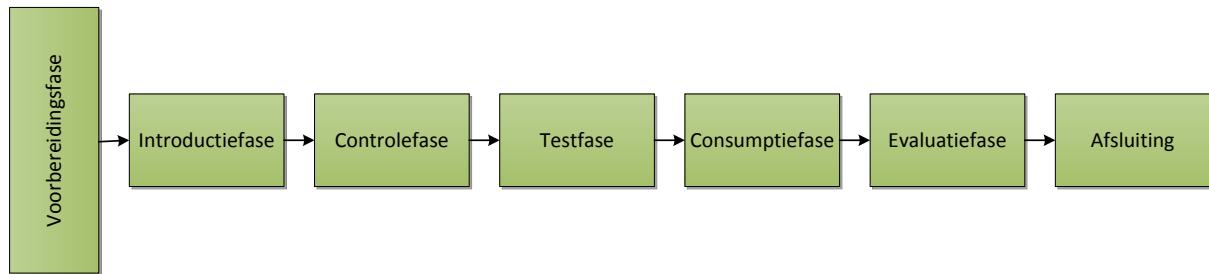
Suiker  
Glucosestroop  
Magere yoghurtpoeder (6%)  
Overige melkbestanddelen: wei- en melksuiker  
Appelpulp (3%)  
Voedingszuur (citroenzuur)  
Geleermiddel (pectine)  
Fruit- en plantenconcentraten (kers, druif, wortel, paprika, rode kool, pompoen, bosbes, appel)  
Natuurlijke aroma  
Glansmiddel (bijenwas wit)

## Appendix 2 Experiment manual

In de experiment manual staan de procedures en het script in detail uitgeschreven. Dit voor zowel de experiment conditie als de controle conditie.

### Experimental condition

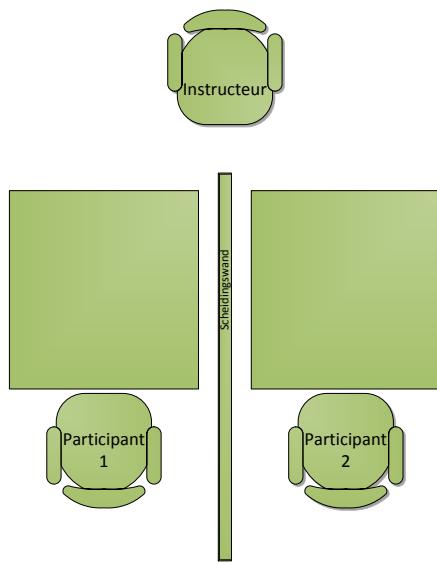
Het experiment kan opgedeeld worden in zes fasen, exclusief de voorbereidingsfase. Ter verduidelijking is er een flowchart toegevoegd die deze fasen weergeeft, zie Figuur 12. In de volgende paragrafen worden de verschillende fasen beschreven, na de voorbereidingsfase wordt dit gedaan in de vorm van een script dat tijdens het experiment gebruikt wordt.



Figuur 12 Onderzoeksfasen

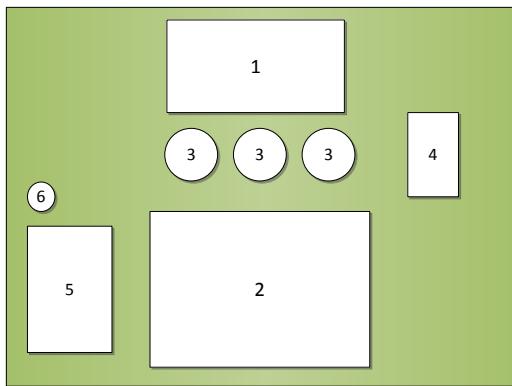
#### 0.Voorbereidingsfase

Twee participanten nemen tegelijkertijd deel aan het experiment. Door middel van een scheidingswand is sociaal contact geminimaliseerd. De instructeur plaatst zich tijdens de introductiefase, controlefase, evaluatiefase en afsluiting in het zicht van beide participanten. Tijdens de testfase en consumptiefase plaatst de instructeur zich op een afstand van beide participanten. In Figuur 13 is de opstelling van de onderzoeksruimte geïllustreerd.



Figuur 13 Opstelling onderzoeksruimte

Voordat het experiment afgenummerd wordt is het belangrijk dat alle benodigde materialen zijn klaargezet op de tafels van de participanten. De opstelling bestaat uit de volgende materialen, de cijfers corresponderen met de cijfers in Figuur 14.



- 1) Voorbeeld snoeppauw;
- 2) Placemat met plastic lichaam van de pauw;
- 3) Bakjes met 7x halve yoghurt gums, 11x popcorn en 7x mini apenkoppen (totaal 285 kcal)
- 4) Vier doorweekte cocktailprikkers (*instructeur bewaart reservecocktailprikkers, indien nodig*);
- 5) Vragenlijst (3 bladen) en instructievel;
- 6) Stempel.

**Figuur 14 Opstelling tafel**

Om de procedure op een correcte manier te laten verlopen en alle relevante gegevens te registreren heeft de instructeur de volgende materialen tot zijn beschikking:

- Evaluatieformulier;
- Vragenlijst;
- Instructievel;
- Tijdschrift;
- Pen;
- Nietmachine;
- Stopwatch;
- Handendoekjes
- Clipboard.

### **1. Introductiefase**

Vanaf dit punt zal de manual als script worden voortgezet, de handelingen die de instructeur tijdens de procedure uitvoert zijn cursief gemaakt.

Welkom, wat leuk dat jullie mee willen doen aan dit onderzoek! Het duurt ongeveer vijftien minuutjes. Ik zal me even voorstellen, ik ben <naam> en ben bezig met een onderzoek waarbij jullie mij gaan helpen. Wat is jullie naam en hoeveel jaar zijn jullie? Ik zal jullie uitleggen wat we in dit onderzoek gaan doen. Jullie gaan straks een pauw knutselen, daarna mogen jullie van deze pauw eten. Als je wilt stoppen dan kan dat altijd, zeg dit dan even tegen mij. Jullie mogen straks niet met elkaar kletsen, daarom hebben wij ervoor gezorgd dat jullie elkaar niet kunnen zien.

### **2. Controlefase**

Ik ben benieuwd hoeveel trek jullie momenteel hebben. Naast jullie ligt een papier, pak het eerste papiertje er maar bij. Op dit papiertje staan drie beertjes afgebeeld. Beertje één heeft geen trek, zijn buikje is helemaal vol. Beertje twee heeft een beetje trek, zijn buikje is half vol en beertje drie heeft heel veel trek, zijn buikje is bijna leeg (*instructeur wijst aan beide kinderen de beertjes aan*). <Naam kind 1> kan je mij uitleggen hoe je buik voelt wanneer je net avondeten gegeten hebt? <Naam kind 2> kan jij mij ook uitleggen hoe je buik voelt wanneer je net avondeten gegeten hebt? Dankjewel, dit gevoel past het beste bij beertje 1, het beertje met de volle buik (*instructeur wijst het beertje aan beide kinderen aan*). <Naam kind 2> kan je mij nu uitleggen hoe je buik voelt vlak voor dat je avondeten gaat eten. <Naam kind 1> kan jij mij ook uitleggen hoe je buik voelt vlak voordat je avondeten gaat eten? Dankjewel, dit gevoel past het beste bij beertje 3, het beertje met de bijna lege buik (*instructeur wijst het beertje aan beide kinderen aan*). Dan ben ik nu benieuwd hoeveel trek

jullie nu hebben, hoe je buik op dit moment voelt. Kunnen jullie een stempel zetten bij het beertje dat het beste bij jouw buik past *instructeur controleert of één stempel achter de vraag is gezet en neemt blad 1 van de vragenlijst in?*)

### 3. Testfase

Dan zijn we nu bij het knutselen aangekomen. Voor jullie ligt een pauw gemaakt van snoep (*instructeur wijst de voorbeeld pauw aan op de tafel van beide kinderen*). Het is de bedoeling dat jullie deze pauw zo goed mogelijk na gaan maken. De verschillende stapjes staan op dit vel uitgelegd in de vorm van plaatjes (*instructeur wijst naar instructieviel*). Dit vel ligt ook op jullie tafel. Het lichaam van de pauw is al voor jullie in elkaar gezet (*instructeur wijst stap 1 aan*), nu heeft hij nog veren nodig. Eerst leg je de prikkers om de pauw heen, deze hoef je niet vast te klikken aan de pauw (*instructeur wijst stap 2 aan*). In de bakjes voor jullie liggen yoghurt gums, popcorn en apenkoppen. Hiermee ga je de veren knutselen. Dit snoep kun je één voor één op de prikker prikken. Zorg ervoor dat de volgorde van het snoep hetzelfde is als op het plaatje, dit geldt ook voor het aantal stukjes dat erop zit (*instructeur wijst stap 3 aan*). Dus begin eerst met een yoghurtgum, daarna een popcorn, daarna een apenkop en als laatste een popcornen zitten. In totaal moeten er vier veren geknuseld worden (*instructeur wijst stap 4 aan*) en dan is de pauw af! Als je klaar bent met je pauw steek je je vinger op (*instructeur wijst stap 5 aan*). Na het knutselen van de pauw mag je van de pauw eten. Het maakt niet uit hoelang je over het knutselen van de pauw doet. Hebben jullie nog vragen? Je kunt altijd naar de plaatjes en de voorbeeldpauw kijken tijdens het knutselen. Veel succes! *De instructeur meet de totale knutstijd.*

### 4. Consumptiefase

*De uitleg van deze fase is individueel, behalve als beide participanten even snel klaar zijn met de testfase.* Nu mag jij zoveel snoep eten als je zelf wilt, eerst van jouw eigen gemaakte pauw en daarna als je wilt uit de bakjes. Het snoep mag je niet mee naar huis nemen. Als je klaar bent met eten steek je je vinger op. *De instructeur meet de totale consumptietijd en meet de tijd dat de ene participant op de andere participant moet wachten.*

### 5. Evaluatiefase

*Deze fase wordt gezamenlijk uitgevoerd.* Vanaf dit moment mag je niet meer uit de bakjes of van de pauw eten. Naast jullie ligt een vragenlijst, pak die er maar bij. Ik ga jullie nu een aantal vragen stellen over het eten. Vond je de veren lekker of vies? Op dit papiertje staan vijf poppetjes afgebeeld. Het eerste poppetje vindt de veren heel vies, hij heeft twee duimen omlaag. Het tweede poppetje vindt de veren vies, hij heeft één duim omlaag. Het derde poppetje vindt de veren niet vies en niet lekker, hij steekt geen duimen op. Het vierde poppetje vindt de veren lekker, hij lacht en steekt één duim omhoog. Het vijfde poppetje vindt de veren heel lekker, hij lacht en steekt beide duimen omhoog (*instructeur wijst aan beide kinderen de poppetjes aan*). Vonden jullie de veren lekker of vies? Zet een stempel bij één van de vijf poppetjes (*instructeur controleert of één stempel achter de vraag is gezet*).

Vond je de yoghurt gums lekker of vies? Het eerste poppetje vindt de yoghurt gums heel vies. Het tweede poppetje vindt de yoghurt gums vies. Het derde poppetje vindt het niet vies en niet lekker. Het vierde poppetje vindt de yoghurt gums lekker. Het vijfde poppetje vindt de yoghurt gums heel lekker (*instructeur wijst aan beide kinderen de poppetjes aan*). Zet een stempel bij één van de vijf poppetjes (*instructeur controleert of een stempel achter de vraag is gezet*).

Vond je de popcorn lekker of vies? Het eerste poppetje vindt de popcorn heel vies. Het tweede poppetje vindt de popcorn vies. Het derde poppetje vindt het niet vies en niet lekker. Het vierde poppetje vindt de popcorn lekker. Het vijfde poppetje vindt de popcorn heel lekker (*instructeur wijst aan beide kinderen de poppetjes aan*). Zet een stempel bij één van de vijf poppetjes (*instructeur controleert of één stempel achter de vraag is gezet*).

Vond je de apenkoppen lekker of vies? Het eerste poppetje vindt de apenkoppen heel vies. Het tweede poppetje vindt de apenkoppen vies. Het derde poppetje vindt het niet vies en niet lekker. Het vierde poppetje vindt de apenkoppen lekker. Het vijfde poppetje vindt de apenkoppen heel lekker (*instructeur wijst aan beide kinderen de poppetjes aan*). Zet een stempel bij één van de vijf poppetjes (*instructeur controleert of één stempel achter de vraag is gezet en neemt blad 2 van de vragenlijst in*).

Ik heb nog twee laatste vragen voor jullie over de geknusselde pauw, pak het laatste blaadje er maar bij. hier komt de eerste vraag; *Hoe trots ben je op je knutselpauw? De eerste pauw is helemaal niet trots, hij heeft géén veren. De tweede pauw is een beetje trots, hij heeft twee veren. De derde pauw is heel erg trots, hij heeft vier veren (instructeur wijst aan beide kinderen de pauwen aan). Hoe meer veren de pauw heeft, hoe trotser je bent. Hoe trots ben je op je knutselpauw? Zet een stempel bij één van de drie pauwen (instructeur controleert of één stempel achter de vraag is gezet). De vraag over trots is niet verwerkt in de studie, vandaar dat deze tekst cursief is.*

*Hoe erg heb je je best gedaan op je knutselpauw? Het eerste poppetje heeft helemaal niet zijn best gedaan, hij heeft één duim omlaag. Het tweede poppetje heeft een beetje zijn best gedaan, hij steekt geen duimen op. Het derde poppetje heeft heel erg zijn best gedaan, hij lacht en steekt één duim omhoog (instructeur wijst aan beide kinderen de poppetjes aan). Hoe erg heb je je best gedaan op je knutselpauw? Zet een stempel bij één van de drie instructeur controleert of één stempel achter de vraag is gezet en neemt blad 3 van de vragenlijst in).*

## 6.Afsluiting

Heel erg bedankt dat jullie mee hebben gedaan aan het onderzoek, ik hoop dat jullie het een beetje leuk hebben gevonden! Heb je nog een vraag aan mij? Jullie mogen alles op de tafel laten liggen, en ik zal jullie terugbrengen naar de groep. *Wanneer de participanten zijn terug gebracht naar hun groep telt de instructeur het aantal overgebleven stukjes snoep en noteert deze op het evaluatieformulier.*

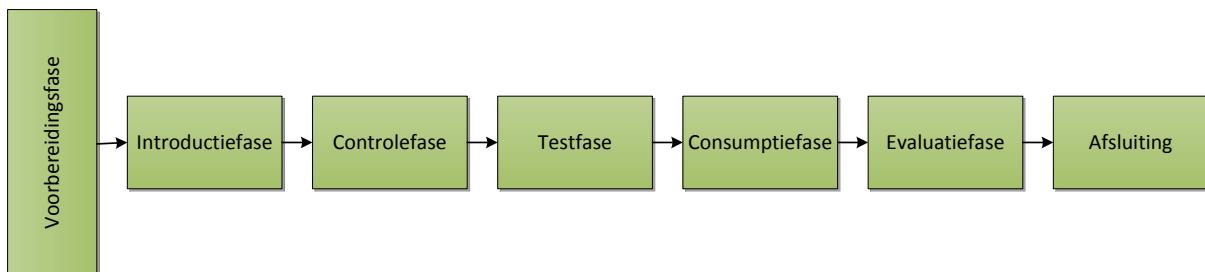
## Algemene aandachtspunten

Een aantal algemene aandachtspunten die tijdens het gehele proces gelden zijn:

- De cocktailprikkers die worden gebruikt zijn eerst doorweekt om splinters te voorkomen;
- De cocktailprikkers zijn op maat geknipt om te passen op de placemat;
- De popcorn is van tevoren voorzien van een gaatje zodat de kinderen makkelijker kunnen prikken;
- Tijdens de test- en consumptiefase trekt de instructeur zich terug en richt zich op een tijdschrift. Het evaluatieformulier is onopvallend in het tijdschrift geplaatst.
- Druk de vragenlijsten enkelzijdig af, in verband met het feit dat stempels door het papier heen drukken;
- Gebruik geen gele stempels, deze zie je niet goed;
- De instructeur maakt gebruik van zijn of haar eigen vragenlijst en instructievel als het proces wordt uitgelegd;
- Zorg ervoor dat de participanten op de ‘juiste’ plek hun stempel zetten, en dat deze duidelijk zichtbaar is;
- Als participanten meerde stempels zetten bij een vraag, zet dan een kruis door de foutieve stempels;
- Let op dat tijdens het onderzoek participanten niet met elkaar communiceren (zowel verbaal als non-verbaal);
- Neem de tijd om alles uit te leggen, lijkt een participant het in eerste instantie niet te begrijpen, herhaal de stap nogmaals;
- Als zich onvoorziene omstandigheden voordoen, noteer deze dan direct op het evaluatieformulier;
- In de testfase is het niet de bedoeling dat participanten communiceren met de instructeur;
- De instructeur blijft tijdens het gehele proces neutraal, dat wil zeggen dat er geen complimenten (verbaal en non-verbaal) gegeven worden aan de participanten.
- Als participanten het snoep rechtstreeks van het stokje af willen eten, aangeven dat ze beter eerst het snoep van het stokje af kunnen halen voordat ze het op gaan eten.
- De participant geeft aan wanneer hij of zij vindt dat het werk af is, indien dit niet geheel overeen komt met wat op het voorbeeld staat is dit geen probleem. Het gaat er om dat de participant vindt dat het knutselwerk ‘succesvol’ afferond is;
- Zorg ervoor dat de stoelen hoog genoeg zijn voor de participanten zodat ze bovenop de tafel kunnen kijken. Neem eventueel kussens mee indien de tafels te hoog zijn;
- Het kan zijn dat een participant het lokaal moet verlaten, bijvoorbeeld bij een toiletbezoek of wanneer een participant wilt stoppen. Loop dan rustig mee met de participant en noteer de bijzonderheid op beide evaluatieformulieren, inclusief de tijd dat de bijzonderheid heeft geduurde. Daarnaast is het belangrijk dat de instructeur kort aan de andere participant uitlegt wat er aan de hand is en dat de instructeur aangeeft zo weer terug te zijn.

## Control condition

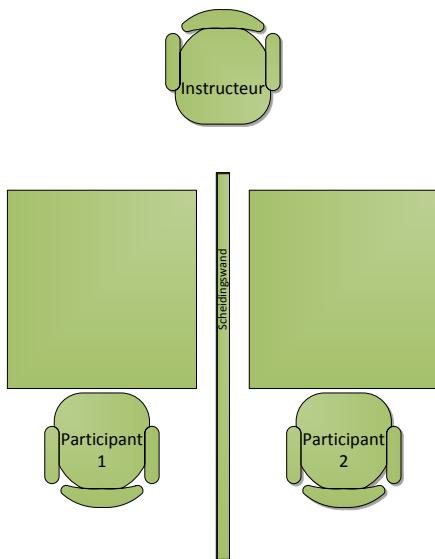
Het experiment kan opgedeeld worden in zes fasen, exclusief de voorbereidingsfase. Ter verduidelijking is er een flowchart toegevoegd die deze fasen weergeeft, zie Figuur 15. In de volgende paragrafen worden de verschillende fasen beschreven, na de voorbereidingsfase wordt dit gedaan in de vorm van een script dat tijdens het experiment gebruikt wordt.



Figuur 15 Onderzoekfasen

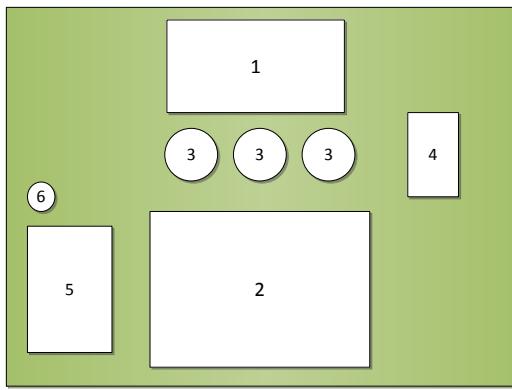
### 0. Voorbereidingsfase

Twee participanten nemen tegelijkertijd deel aan het experiment. Door middel van een scheidingswand is sociaal contact geminimaliseerd. De instructeur plaatst zich tijdens de introductiefase, controlefase, evaluatiefase en afsluiting in het zicht van beide participanten. Tijdens de testfase en consumptiefase plaatst de instructeur zich op een afstand van beide participanten. In Figuur 16 is de opstelling van de onderzoeksruimte geïllustreerd.



Figuur 16 Opstelling onderzoeksruimte

Voordat het experiment afgenummerd wordt is het belangrijk dat alle benodigde materialen klaargezet zijn op de tafels van de participanten. De opstelling bestaat uit de volgende materialen, de cijfers corresponderen met de cijfers in Figuur 17.



**Figuur 17 Opstelling tafel**

- 1) Voorbeeld snoeppauw;
- 2) Placemat met plastic lichaam van de pauw;
- 3a) Voor de testfase: Bakjes met 7x roze kralen, 11x witte kralen en 7x zwarte kralen
- 3b) Na de testfase: Bakjes met 7x halve yoghurt gums, 11x popcorn en mini 7x apenkoppen ( totaal 285 kcal)
- 4) Vier doorweekte cocktailprikkers (*instructeur bewaart reserve cocktailprikkers, indien nodig*);
- 5) Vragenlijst (3 bladen) en instructievel;
- 6) Stempel.

Om de procedure op een correcte manier te laten verlopen en alle relevante gegevens te registreren heeft de instructeur de volgende materialen tot zijn beschikking:

- Evaluatieformulier;
- Vragenlijst;
- Instructievel;
- Tijdschrift;
- Pen;
- Nietmachine;
- Stopwatch;
- Handendoekjes;
- Clipboard.

### **1. Introductiefase**

Vanaf dit punt zal de manual als script worden voortgezet, de handelingen die de instructeur tijdens de procedure uitvoert zijn cursief gemaakt.

Welkom, wat leuk dat jullie mee willen doen aan dit onderzoek! Het duurt ongeveer vijftien minuutjes. Ik zal me even voorstellen, ik ben <naam> en ben bezig met een onderzoek waarbij jullie mij gaan helpen. Wat is jullie naam en hoe oud zijn jullie? Ik zal jullie uitleggen wat we in dit onderzoek gaan doen. Jullie gaan straks een pauw knutselen van kralen, daarna mogen jullie van de andere pauw eten (*instructeur wijst snoeppauw aan*). Als je wilt stoppen dan kan dat altijd, zeg dit dan even tegen mij. Jullie mogen straks niet met elkaar kletsen, daarom hebben wij ervoor gezorgd dat jullie elkaar niet kunnen zien.

### **2. Controlefase**

Ik ben benieuwd hoeveel trek jullie momenteel hebben. Naast jullie ligt een papiertje, pak het eerste papiertje er maar bij. Op dit papiertje staan drie beertjes afgebeeld. Beertje één heeft geen trek, zijn buikje is helemaal vol. Beertje twee heeft een beetje trek, zijn buikje is half vol en beertje drie heeft heel veel trek, zijn buikje is bijna leeg (*instructeur wijst aan beide kinderen de beertjes aan*). <Naam kind 1> kan je mij uitleggen hoe je buik voelt wanneer je net avondeten gegeten hebt? <Naam kind 2> kan jij mij ook uitleggen hoe je buik voelt wanneer je net avondeten gegeten hebt? Dankjewel, dit gevoel past het beste bij beertje 1, het beertje met de volle buik (*instructeur wijst het beertje aan beide kinderen aan*). <Naam kind 2> kan je mij nu uitleggen hoe je buik voelt vlak voor dat je avondeten gaat eten. <Naam kind 1> kan jij mij ook uitleggen hoe je buik voelt vlak voordat je avondeten gaat eten? Dankjewel, dit gevoel past het beste bij beertje 3, het beertje met de bijna

lege buik (*instructeur wijst het beertje aan beide kinderen aan*). Dan ben ik nu benieuwd hoeveel trek jullie nu hebben, hoe je buik op dit moment voelt. Kunnen jullie een stempel zetten bij het beertje dat het beste bij jouw buik past (*instructeur controleert of één stempel achter de vraag is gezet en neemt blad 1 van de vragenlijst in*)?

### 3. Testfase

Dan zijn we nu bij het knutselen aangekomen. Voor jullie ligt een pauw gemaakt van snoep (*instructeur wijst de voorbeeldpauw aan op de tafel van beide kinderen*). Het is de bedoeling dat jullie deze pauw zo goed mogelijk na gaan maken met kralen, deze hebben dezelfde kleur als het snoep. De verschillende stapjes staan op dit vel uitgelegd in de vorm van plaatjes (*instructeur wijst naar instructievel*). Dit vel ligt ook op jullie tafel. Het lichaam van de pauw is al voor jullie in elkaar gezet (*instructeur wijst stap 1 aan*), nu heeft hij nog veren nodig. Eerst leg je de prikkers om de pauw heen, deze hoef je niet vast te klikken aan de pauw (*instructeur wijst stap 2 aan*). In de bakjes voor jullie liggen roze, witte en zwarte kralen. Hiermee ga je de veren knutselen. De kleuren van de kralen zijn ongeveer hetzelfde als de kleuren van de yoghurt gums (roze), popcorn (wit) en de apenkoppen (zwart) (*instructeur wijst dit aan*). Deze kralen kun je één voor één op de prikker prikken. Zorg ervoor dat de volgorde van de kralen hetzelfde is als op het plaatje, en dat het aantal kralen dat erop zit ook hetzelfde is (*instructeur wijst stap 3 aan*). Dus begin eerst met een roze kraal, daarna een witte kraal, daarna een zwarte kraal en ga zo door totdat er vier kralen op een prikker zitten. In totaal moeten er vier veren geknuseld worden, (*instructeur wijst stap 4 aan*) en dan is de pauw af! Als je klaar bent met je pauw steek je vinger op (*instructeur wijst stap 5 aan*). Het maakt niet uit hoelang je over het knutselen van de pauw doet. Hebben jullie nog vragen? Je kunt altijd naar de plaatjes en de voorbeeldpauw kijken tijdens het knutselen. Veel succes! *De instructeur meet de totale knutstijd.*

### 4. Consumptiefase

*De uitleg van deze fase is individueel, behalve als beide participanten even snel klaar zijn met de testfase. De instructeur verwisseld de kralenpauw met de snoeppauw en zet in plaats van de drie bakjes met kralen, drie bakjes met halve yoghurt gums, popcorn en mini apenkoppen op tafel.* Nu mag jij zoveel snoep eten als je zelf wilt, eerst van de snoeppauw en daarna als je wilt uit de bakjes. Het snoep mag je niet mee naar huis nemen. Als je klaar bent met eten steek je vinger op. *De instructeur meet de totale consumptietijd en meet de tijd dat de ene participant op de andere participant moet wachten.*

### 5. Evaluatiefase

*Deze fase wordt gezamenlijk uitgevoerd.* Vanaf dit moment mag je niet meer uit de bakjes of van de pauw eten. Naast jullie ligt een vragenlijst, pak die er maar bij. Ik ga jullie nu een aantal vragen stellen over het eten. Vond je de veren lekker of vies? Op dit papiertje staan vijf poppetjes afgebeeld. Het eerste poppetje vindt de veren heel vies, hij heeft twee duimen omlaag. Het tweede poppetje vindt de veren vies, hij heeft één duim omlaag. Het derde poppetje vindt de veren niet vies en niet lekker, hij steekt geen duimen op. Het vierde poppetje vindt de veren lekker, hij lacht en steekt één duim omhoog. Het vijfde poppetje vindt de veren heel lekker, hij lacht en steekt beide duimen omhoog (*instructeur wijst aan beide kinderen de poppetjes aan*). Vonden jullie de veren lekker of vies? Zet een stempel bij één van de vijf poppetjes (*instructeur controleert of één stempel achter de vraag is gezet*).

Vond je de yoghurt gums lekker of vies? Het eerste poppetje vindt de yoghurt gums heel vies. Het tweede poppetje vindt de yoghurt gums vies. Het derde poppetje vindt het niet vies en niet lekker. Het vierde poppetje vindt de yoghurt gums lekker. Het vijfde poppetje vindt de yoghurt gums heel lekker (*instructeur wijst aan beide kinderen de poppetjes aan*). Zet een stempel bij één van de vijf poppetjes (*instructeur controleert of één stempel achter de vraag is gezet*).

Vond je de popcorn lekker of vies? Het eerste poppetje vindt de popcorn heel vies. Het tweede poppetje vindt de popcorn vies. Het derde poppetje vindt het niet vies en niet lekker. Het vierde poppetje vindt de popcorn lekker. Het vijfde poppetje vindt de popcorn heel lekker (*instructeur wijst aan beide kinderen de poppetjes aan*). Zet een stempel bij één van de vijf poppetjes (*instructeur controleert of één stempel achter de vraag is gezet*).

Vond je de apenkoppen lekker of vies? Het eerste poppetje vindt de apenkoppen heel vies. Het tweede poppetje vindt de apenkoppen vies. Het derde poppetje vindt het niet vies en niet lekker. Het vierde poppetje vindt de apenkoppen lekker. Het vijfde poppetje vindt de apenkoppen heel lekker (*instructeur wijst aan beide kinderen de poppetjes aan*). Zet een stempel bij één van de vijf poppetjes (*instructeur controleert of één stempel achter de vraag is gezet en neemt blad 2 van de vragenlijst in*).

*Ik heb nog twee laatste vragen voor jullie over de geknusselde pauw, pak het laatste blaadje er maar bij. Hier komt de eerste vraag; Hoe trots ben je op je knutselpauw? De eerste pauw is helemaal niet trots, hij heeft géén veren. De tweede pauw is een beetje trots, hij heeft twee veren. De derde pauw is heel erg trots, hij heeft vier veren (instructeur wijst aan beide kinderen de pauwen aan). Hoe meer veren de pauw heeft, hoe trotscher je bent. Hoe trots ben je op je knutselpauw? Zet een stempel bij één van de drie pauwen (instructeur controleert of één stempel achter de vraag is gezet). De vraag over trots is niet verwerkt in de studie, vandaar dat deze tekst cursief is.*

Hoe erg heb je je best gedaan op je knutselpauw? Het eerste poppetje heeft helemaal niet zijn best gedaan, hij heeft één duim omlaag. Het tweede poppetje heeft een beetje zijn best gedaan, hij steekt geen duimen op. Het derde poppetje heeft heel erg zijn best gedaan, hij lacht en steekt één duim omhoog (*instructeur wijst aan beide kinderen de poppetjes aan*). Hoe erg heb je je best gedaan op je knutselpauw? Zet een stempel bij één van de drie poppetjes *instructeur controleert of één stempel achter de vraag is gezet en neemt blad 3 van de vragenlijst in*).

## 6.Afsluiting

Heel erg bedankt dat jullie mee hebben gedaan aan het onderzoek, ik hoop dat jullie het een beetje leuk hebben gevonden! Heb je nog een vraag aan mij? Jullie mogen alles op de tafel laten liggen, en ik zal jullie terugbrengen naar de groep. *Wanneer de participanten zijn terug gebracht naar hun groep telt de instructeur het aantal overgebleven stukjes snoep.*

## Algemene aandachtspunten

Een aantal algemene aandachtspunten die tijdens het gehele proces gelden zijn:

- Tijdens de test- en consumptiefase trekt de instructeur zich terug en richt zich op een tijdschrift. Het evaluatieformulier is onopvallend in het tijdschrift geplaatst.
- Druk de vragenlijsten enkelzijdig af, in verband met het feit dat stempels door het papier heen drukken;
- Gebruik geen gele stempels, deze zie je niet goed;
- De instructeur maakt gebruik van zijn of haar eigen vragenlijst en instructievel als het proces wordt uitgelegd;
- Zorg ervoor dat de participanten op de ‘juiste’ plek hun stempel zetten, en dat deze duidelijk zichtbaar is;
- Als participanten meerde stempels zetten bij een vraag, zet dan een kruis door de foutieve stempels;
- Let op dat tijdens het onderzoek participanten niet met elkaar communiceren (zowel verbaal als non-verbaal);
- Neem de tijd om alles uit te leggen, lijkt een participant het in eerste instantie niet te begrijpen, herhaal de stap nogmaals;
- Als zich onvoorziene omstandigheden voordoen, noteer deze dan direct op het evaluatieformulier;
- In de testfase is het niet de bedoeling dat participanten communiceren met de instructeur;
- De instructeur blijft tijdens het gehele proces neutraal, dat wil zeggen dat er geen complimenten (verbaal en non-verbaal) gegeven worden aan de participanten.
- Als participanten het snoep rechtstreeks van het stokje af willen eten, aangeven dat ze beter eerst het snoep van het stokje af kunnen halen voordat ze het op gaan eten.
- De participant geeft aan wanneer hij of zij vindt dat het werk af is, indien dit niet geheel overeen komt met wat op het voorbeeld staat is dit geen probleem. Het gaat er om dat de participant vindt dat het knutselwerk ‘succesvol’ afgerond is;
- Zorg ervoor dat de stoelen hoog genoeg zijn voor de participanten zodat ze bovenop de tafel kunnen kijken. Neem eventueel kussens mee indien de tafels te hoog zijn;
- Het kan zijn dat een participant het lokaal moet verlaten, bijvoorbeeld bij een toiletbezoek of wanneer een participant wilt stoppen. Loop dan rustig mee met de participant en noteer de bijzonderheid op beide evaluatieformulieren, inclusief de tijd dat de bijzonderheid heeft geduurde. Daarnaast is het belangrijk dat de instructeur kort aan de andere participant uitlegt wat er aan de hand is en dat de instructeur aangeeft zo weer terug te zijn.

## **Appendix 3 Evaluation form**

### **Evaluatieformulier**

Leeftijd:

Geslacht:

Datum:

Tijd:

Locatie:

<b>Tijd registratie</b>	<b>Minuten</b>
Totale knutselijd	
Totale consumptietijd	

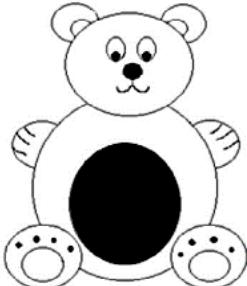
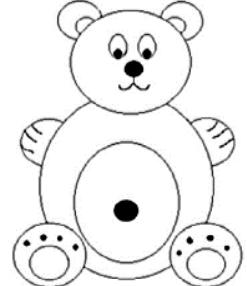
<b>Wachttijd registratie</b>	<b>Ja/Nee</b>	<b>Minuten</b>
Wachten op andere participant na de consumptiefase		

<b>Consumptie registratie</b>	<b>Aantal</b>
Resterende yoghurt gums	
Resterende popcorn	
Resterende apenkoppen	

<b>Observatie</b>	<b>Ja/Nee</b>	<b>Uitleg</b>
Extra uitleg nodig		
Volgorde/hoeveelheid knutselpauw hetzelfde als volgorde/hoeveelheid voorbeeldpauw		

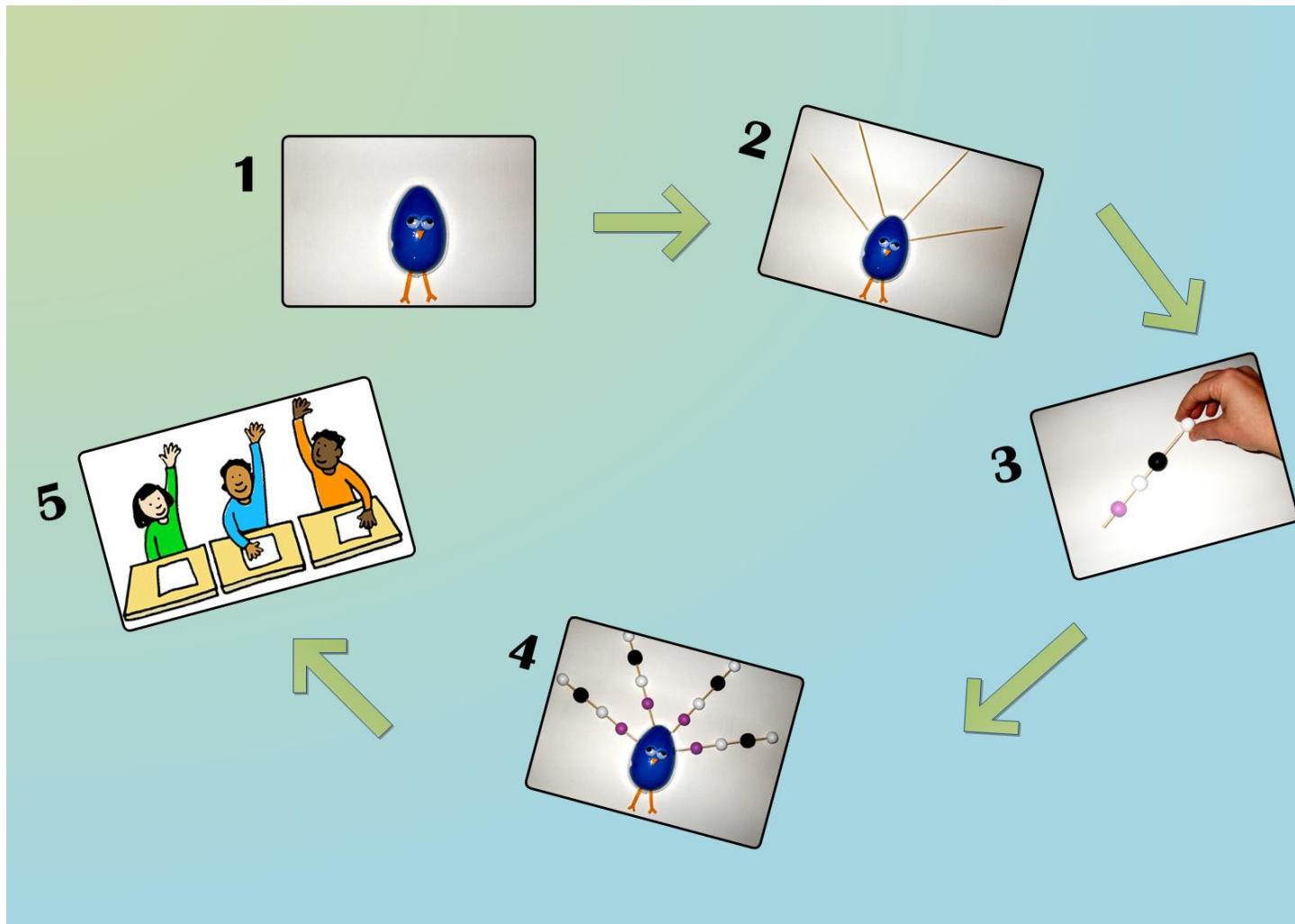
Aanmoediging/complimenten		
Opvallende/uitgesproken emoties van de participant		
Externe invloeden		
Interactie tussen de participanten		
Overige		

#### Appendix 4 Questionnaire- Check-up phase

			
Hoeveel trek heb je nu?	Geen trek	Een beetje trek	Heel veel trek

Scale interpreted from the paper by Bennett and Blissett (2014)

## Appendix 5 Instruction sheet



## Appendix 6 Questionnaire- Evaluation phase

	 Heel vies	 Vies	 Niet vies en niet lekker	 Lekker	 Heel lekker
Vond je de veren lekker of vies?					
Vond je de yoghurt gums lekker of vies?					
Vond je de popcorn lekker of vies?					
Vond je de apenkoppen lekker of vies?					

	 Helemaal niet je best gedaan	 Een beetje je best gedaan	 Heel erg je best gedaan
Hoe erg heb je je best gedaan op je knutselpauw?			