

THE FAT-GAP

Mirroring yourself or windowing the outside world?

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Abstract

Objective: To investigate how exposure to overweight and obese ordinary 'average' people influences high-BMI peoples' commitment to diet and exercise goals and indulgent food consumption.

Methods: In this between-subjects experiment, 80 participants were randomly assigned to either a group exposed to pictures of normal weight females or to pictures of overweight and normal weight females. Afterwards the groups were subdivided based on their weight and length into a group with a BMI below 23 or a BMI of 23 and above.

Results: Analysis of covariance showed that when exposed to obese and overweight females, the high-BMI group had a smaller gap between their objective and perceived weight (-2.0 kg versus -3.7 kg, $p < .05$), higher intentions to engage in dieting behavior ($p < .05$) and lower intentions to exercise ($p < .05$), compared to those exposed to normal weight females.

Conclusions and implications: These findings highlight the differences between people varying in BMI and environment.

Preface

The master thesis that is lying in front of you is the result of six months research at the department Management and Consumer Behavior (MCB) at the Wageningen University. This report gives insight into the differences in weight management behavior for people varying in Body Mass Index and social environment. I would not have been able to write this report without the help of some people that I would like to thank.

My first word of thank goes to my supervisor at the Wageningen University, Ellen van Kleef, for helping me to set up the experiment, for giving me valuable comments on my report and for helping me to achieve the final result. Furthermore I would like to thank my second supervisor at the Wageningen University, Hans van Trijp, for his help and critical feedback.

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1. Introduction

One of today's major health issues concerns overweight and obesity. After smoking, it is the greatest threat to public health. Recent research has shown that the percentage of obese people has doubled worldwide since 1980. The problem is mainly focused in wealthy countries, with the United States leading the pack (Finucane et al., 2011). The consequences of obesity are translated into devastating outcomes including diabetes, heart disease, and cancer (Campbell and Mohr, 2011, Haslam and James, 2005). Not only does overweight and obesity cause these immediate physical problems, when accompanied by dissatisfactory feelings, it also can play a major role in the development of low self-esteem, depression and eating disorders. This latter effect is strengthened by the influence of the media. Since the idea is created that thin is 'in', by presenting images of thin people in the media, frequent exposure may evoke unrealistic perceptions about what is normal and healthy and what is not (Smeesters et al., 2010).

The main cause of the obesity trend is found in the increase of consumption of food and drinks. People typically make more than 200 choices a day related to food (Wansink and Sobal, 2007); important decisions that seem to be underestimated most of the times. Next to the increase in the amount of food consumed, another determinant contributing to the increase of obesity is the insufficient amount of physical activity people perform on a daily basis (Heini and Weinsier, 1997). Important to note is that especially food is the main driver of obesity, as shown by Westerberp and Speakman (2008). They claim that the obesity trend is not being caused by a decrease in activity energy expenditure but state that, although obese people perform less physical activity than normal weight people, there is no difference in their expenditure of energy while performing an activity. This is caused by the amount of weight they have to bear. It makes that their energy expenditure is higher than that of normal weight people while being active. A contradiction with other research to the causes of obesity might be due to the fact that other studies did not take into account the effects of body mass on the physical activity level. So in short, it seems that food intake and thus the amount of consumed energy, is the main reason why many people are gaining excess weight.

A key question that has been and still should be asked is how this obesity-epidemic can be stopped? Several national and global organizations have tried to take action on this by launching various campaigns like for instance 'Balance day', '30 minutes of physical activity' (Rijksoverheid, 2011) and 'the 2008-2013 action plan for the global strategy for the prevention and control of non-communicable diseases' (World Health Organization, 2011). Unfortunately, these campaigns and action plans do not seem to help because globally the number of people with a high Body Mass Index (BMI) is still rising and rising (Finucane et al., 2011).

But how does it come that despite these actions against obesity, people are still gaining weight? Recent research shows that a lot of people do not feel called upon, because they fail to perceive themselves as being overweight or obese (Rand and Resnick, 2000, Paeratakul et al., 2002, Truesdale and Stevens, 2008). These studies show that certain groups of people, like females and people with obesity, often do not correctly assess their own weight status and that of others (Knight et al., 2010, Ali et al., 2011, Maximova et al., 2008, Trogdon et al., 2008, Gil and Mora, 2011). They do not experience themselves as having overweight, while according to objective criteria they have. In the popular media this latter concept is better known as the 'Fat Gap' (The Seattle Times, 2009, The

Telegraph, 2009). It refers to the phenomenon that overweight and obese people are not fully aware of their own weight status and the corresponding negative health consequences because many people in their surroundings are as well overweight and obese. This could create the impression that being overweight or obese is the norm. In other words, it is not unusual and risky in the eyes of overweight individuals.

That this 'norm' also has influence on how people feel about themselves and how they behave, has been shown in several studies to the effects of exposure to heavy and thin models. Smeesters and colleagues (2010) examined how advertisements containing thin or heavy models influence the self-esteem of overweight, normal, and underweight consumers. Their findings indicated that social comparison processes and their succeeding self-evaluative and behavioral outcomes are different for individuals differing in BMI. Papiés and Nicolaije (2011) also used advertisements containing either a normal weight female or an overweight female, to measure the effects of viewing images of slim and plus-size models on the self-evaluation processes. Results showed that the images led to either inspiration or deflation due to the amount of perceived similarity with the presented model. McFerran et al. (2010b) used real people wearing professionally constructed obesity prostheses to investigate how people's food choices can be shaped by the body type of others around them. The outcomes showed that the body type of the server influenced both the quantity of the food consumed as specific food choices participants made. Campbell and Mohr (2011) investigated the effect of activation of a negative stereotype (the overweight stereotype) on behaviors such as eating indulgent food, that are perceived to increase the chance of becoming a member of the stereotyped group. Therefore they exposed the participants to a picture of someone having overweight. The outcomes indicated that exposure to a negative stereotype can increase the imitation of the behavior of that stereotype, even when it is negative.

The majority of previous research has primarily focused on the effects of exposure to media images of models. However, few studies have focused on exposure to ordinary individuals with different weight statuses. Overweight and obese people represent a growing part of the population in many countries worldwide. A global estimation done by WHO in 2008 showed that 1.5 billion adults in the age of 20 years and older were overweight. Of those overweight adults, over 200 million men and almost 300 million women were obese. Overall they estimated that more than one in ten of the world's adult population is obese (WHO, 2011). In the Netherlands, twenty-five years ago, about one of the three adults had overweight, but in 2010 this has increased to about one of the two. Besides that, 14 percent of de Dutch society has obesity (Hartstichting, 2011). This increase implies that the streetscape is more and more determined by overweight and obese people, especially in the United States where 64 percent of the adults has overweight or is obese. As a result, the weight distribution has shifted to the higher end of the BMI scale, which in turn co-affected people's view of their own body weight status (Ali et al., 2011, Kuk et al., 2009).

This study contributes to recent research by examining how exposure to images of overweight and obese ordinary 'average' people influences people's commitment to their diet and exercise goals and the consumption of indulgent foods. Furthermore, the research aims to investigate more closely the underlying psychological mechanisms that translate this exposure effect into behavioral actions. In particular, we expect that comparison mechanisms are responsible for boosting peoples' self-esteem which in turn makes people less inclined to commit to their diet and exercise goals and more inclined

to consume indulgent food. We hereby particularly look to females with a high BMI, compared to females with a lower BMI.

Therefore the research objective is to investigate *'how exposure to overweight and obese ordinary 'average' people influences high-BMI peoples' commitment to diet and exercise goals and indulgent food consumption'*.

For campaigns aiming to decrease the number of people having overweight or obesity to succeed, it is important that more insight is obtained into the effect of exposure to the environment on the behavior that increases the chance of getting overweight or obesity. It can be useful for governmental organizations who deal with the obesity prevention campaigns, in getting better insights in how people conceive the information and how behavioral change can be induced.

2. Theoretical framework

Figure 1 represents a conceptual framework that shows the expected key factors determining the weight management behavior related to exposure to overweight and obese people. In this section, literature related to the effects of exposure to overweight and obesity on the various concepts of the model in figure 1 will be discussed.

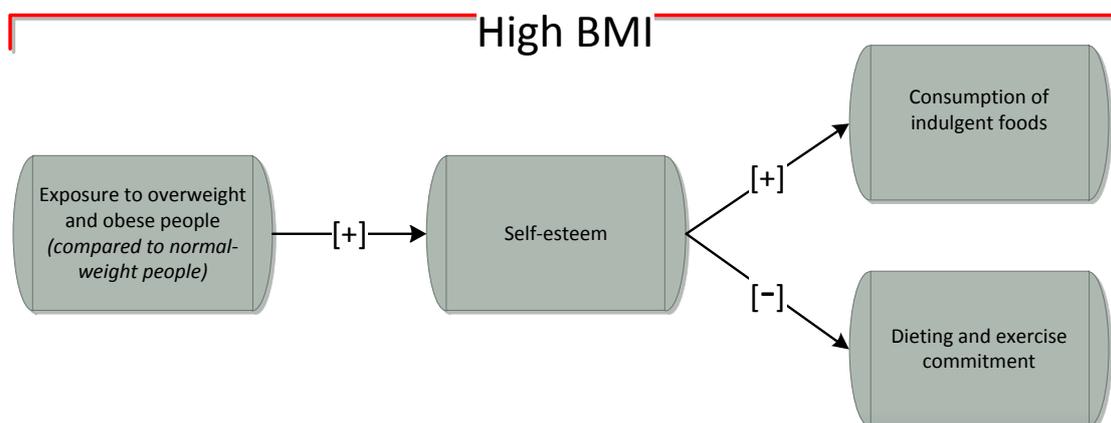


Figure 1: Theoretical model

The model refers to the situation by which the contemporary environment, displayed by the exposure to overweight and obese people, is expected to lead to a certain weight management behavior. Through comparison mechanisms, people with a high BMI get a higher self-esteem after being confronted with other high-BMI people. This in turn leads to a certain behavior in terms of higher consumption of indulgent foods and lower commitment to dieting and exercising.

2.1. Comparison mechanisms regarding weight status and influence on self-esteem

People's perception of their own weight status is not static, but is influenced by a wide variety of factors. In particular, the environment appears to be very decisive for a misperceived weight status. Seeing surroundings getting fatter may change the perception of one's own size in whether it is a healthy weight or not (Ali et al., 2011, Kuk et al., 2009). People compare themselves socially to other people. Research has shown that exposure to thin media images or models is related to higher levels of body dissatisfaction (Grabe et al., 2008) and thus a lower self-esteem (Grabe and Hyde, 2006, Furnham et al., 2002), stronger internalization of the thin ideal, and more frequent bulimic and anorexic attitudes and behaviors (Grabe et al., 2008). This indicates that cultural ideals play a key role for people's weight perception. But the social network one is assigned to and its social norms are as well very determinant. The social network consists mainly of peers; people that are similar on social and cultural ground, such as family and friends. Appropriateness of own weight status is often being judged relative to these peers and their social norms, rather than it is to an externally imposed health-based ideal (Chang and Christakis, 2001). So people rationally assess their own weight, having in mind the body weight or desired body weight of their peers (Burke and Heiland, 2007, Etilé, 2007, Blanchflower et al., 2009).

The bias of misperceiving can be the consequence of a cognitive distortion, which affects people's perception of their own weight status (Gil and Mora, 2011). This latter can best be described with the use of Festingers' social comparison theory (1954). According to this theory, individuals have the tendency to evaluate their abilities and opinions by comparing themselves with others. Social comparison is often an automatic process, from which people themselves are not aware (Festinger, 1954). People with a high BMI may be more sensitive for feeling unhappy with their appearance, what makes them more likely to use the process of downward social comparison. It can be seen as a sort of coping strategy with the basic principle that people can increase their subjective well-being or reduce distress by comparing themselves with a less fortunate other, like for instance an (other) obese person. This comparison enables people to feel better about their own situation (Smeesters et al., 2010). Normally, people do not like to pay attention to negative things from others, but when people experience negative affect such as low self-esteem, dissatisfactory feelings and low self-acceptance, they have a preference for downward social comparison. People could employ downward social comparison either for self-evaluation; to determine where they stand relative to others, or for self-enhancement; so that comparison produces a favorable evaluation of the self (Wills, 1981).

Mainly due to an increased tolerance of higher body weights, there has been a shift in ideal weight status. Just as the objective weight status, it has risen over time and particularly among obese people. This increase in ideal weight status seems to be related to a higher body satisfaction, but also to lower intentions to lose weight and to adopt healthier lifestyle behaviors (Kuk et al., 2009). There are people who, even while they are overweight or obese and report a discrepancy between their current and ideal body size, consider their body size as being acceptable (Rand and Resnick, 2000).

According to Higgins' self-discrepancy theory (1987), discrepancies between actual and ideal weight still can lead to negative feelings such as disappointment and dissatisfaction. Body size dissatisfaction can best be described as displeasure with one's own body (Rand and Resnick, 2000) and is related to

the attempt of losing weight. So in other words, when a person is dissatisfied with his or her weight status, he or she will try to lose weight. On the contrary, body size satisfaction is associated with a lower weight status, a higher age, a lower level of education and a healthy self-assessed health status. The degree of (dis)satisfaction partly depends on a personal evaluation of one's body (Anderson et al., 2002). When taken into account the findings of Rand and Resnick (2000), it looks like discrepancy does not automatically creates tension, because people can be unhappy with their current weight status, but relatively happy with their total general appearance.

In short, people unconsciously compare themselves with their social environment, using the principle of social comparison. Because the contemporary environment is more and more composed with overweight and obese people, a misperception may be created, especially for high-BMI people, because being fat is now seen as normal. An underlying type of social comparison that overweight and obese people often use is downward social comparison. It enables them to increase their subjective well-being by comparing themselves with a less fortunate other.

Stereotyping and social norms

Stereotyping can be defined as the characteristics, such as attitudes, goals, traits and behavioral tendencies, that are associated with members of a social category. So is the category 'Asian people' often associated with the characteristics; short, quiet and intelligent. Stereotype activation can happen by a broad variety of environmental stimuli. These stimuli can be very subtle like for instance subliminal face or word presentation, but they also can be very clear like the explicit reminding of characteristics of a stereotyped group (Wheeler and Petty, 2001). When people engage in stereotyping, what can happen both conscious and non-conscious, stereotypic characteristics are automatically activated when one is exposed to a stereotyped group member. This exposure leads to an increased accessibility of associations with the social group the stereotyped member belongs to (Campbell and Mohr, 2011).

Activation of a stereotype can influence behavior. This often results in an increase in stereotype-conducive behavior, even when the stereotype and its related behavior are negative (Campbell and Mohr, 2011). On the other hand, people can have goals that could override this stereotype-conducive behavior. In that case, they try to avoid choices, actions and products that are linked to the negative stereotype, just because they do not want to be associated with a negatively viewed group (Campbell and Mohr, 2011). So people's behavior can become consistent with a stereotype, which is defined as the assimilation effect, or it can become inconsistent with the stereotype, also referred to as the contrast effect (Wheeler and Petty, 2001).

Social norms and stereotypes are somehow related, just as stereotypes do social norms seem to influence behavior. Within this social influence there are two types of norms; the descriptive norms, which tells us what other people do, and the injunctive norms, which tells us what people approve or disapprove of. Because people are motivated to create and maintain social relationships with other persons, they may imitate others or engage in behaviors that others approve, so that they will be approved by them too (Cialdini and Goldstein, 2004). The attention paid to the social norm has influence on which norm is utilized. Thus the most salient norm will guide ones' behavior (McFerran et al., 2010a). It has been shown that if a close relative in a person's social network gains weight, the person itself is also more likely to gain weight. People anchor on the food choices of others, whereby

anchors can be seen as reference points. They eat more food when another does so, even when that other is overweight or obese. This latter is actually an influence of the descriptive norm, whereby people do what others do. But not only anchoring has an influence on the amount of food consumed, even exposure to someone having overweight or obesity can result in an increase of food consumption. Exposure then leads to the activation of the high-BMI stereotype by which the goal to pursue stereotype-conducive behavior, such as eating high caloric food and being lazy, is made more accessible than commitment to the countervailing goal of being healthy. This in turn leads to the actual performance of the stereotype-conducive behavior (Campbell and Mohr, 2011). Stereotype activation through exposure can be intentionally manipulated by priming. Campbell and Mohr (2011) showed that priming people with overweight images leads to an increase in the quantity of food consumed.

To conclude, next to social comparison, another comparison mechanism people often use is that of stereotyping. Hereby behavior is influenced by the activation of a certain stereotype. This may either result in non-stereotype-conducive behavior or in stereotype-conducive behavior, even when the stereotype and its behavior are negative. Related to stereotypes are social norms, whereby the most salient norm influences one's behavior. Applied to practice, stereotyping and social norms may lead to imitation of the behavior of people in one's direct environment.

Overweight individuals are particularly vulnerable

As proposed earlier, social comparison may lead to a misperception of weight status, especially among high-BMI people. Several researchers examined the determinants of weight biases and showed that particularly people with a higher BMI have a higher bias (Danubio et al., 2008). Besides BMI and waist-to-hip ratio, other variables such as gender, age, education, income, nationality, ideal weight and health and health-care variables also have a significant impact on one's self-reported weight (Gil and Mora, 2011, Danubio et al., 2008, Chang and Christakis, 2001). Moreover, Gil and Mora (2011) found that especially women, people with a healthy self-assessed health status and people with obesity (Maximova et al., 2008) tended to underestimate their weight and so think that they weigh less than they actually do. The mismatch between actual weight and perceived weight, which is also prevalent among high-BMI people, can be explained by reference to the changing streetscape wherein higher weights become normative. As a result, the perception of normal weight, overweight and obesity may have changed over time. (Paeratakul et al., 2002, Truesdale and Stevens, 2008).

Another explanation for weight misperception among high-BMI people is related to the fact that a number of those overweight and obese people hold negative attitudes towards obesity and blame themselves for their condition (Crocker et al., 1993). In combination with the desire to weigh less, this can make people to intentionally underreport their weight (Jeffery, 1996, Gil and Mora, 2011). Truesdale and Stevens claim, in contrast to most of the studies, that obese people are accurate in reporting their current weight in kilograms, but that they became less accurate when they had to label it as being obese. They thought that it might have to do with the fact that social associations such as negative bias, stigma and discrimination make them more reluctant to label themselves as obese. Next to that, images of obese people in popular media often show class II or III obesity, so the ones having a BMI above 35kg/m². This could distort the perceived definition of obesity (Truesdale and

Stevens, 2008), just as the changing streetscape changed the perception of what is a normal and healthy weight.

Research has shown that overweight and obese people have to deal with weight stigmatization, whereby discrimination and bias of these high-BMI people are driven by stereotypes that depict such people as being sloppy, lazy and unmotivated (Schvey et al., 2011). Exposure to stigmatization is related to a negative body image. Body size dissatisfaction, feelings of embarrassment about weight and physical self-consciousness can be increased by negative social feedback about physical appearance and by peoples' perceptions of being mistreated due to their weight (Carr and Friedman, 2005). Next to the negative feelings due to weight stigmatization, people can become distressed of being overweight or obese in evaluative situations that are related to physical functioning like moving and exercising. So negative feelings are either created through evaluation by others or by self-evaluation (Conradt et al., 2008).

Regarding people with overweight or obesity, there is a difference between weight-related shame and weight-related guilt. Where shame may lead to disengaging responses like problem avoidance, so does guilt lead to more engaging responses like problem solving and weight control behaviors (Conradt et al., 2008). People who are not that often confronted with weight stigmatization in their environment may be less susceptible for body image problems. Besides a disturbed body image, exposure to stigmatization also affects self-esteem and may contribute to the development of mental health problems (Myers and Rosen, 1999). Thompson and Heinberg (1993) showed that a history of being teased about weight was a significant predictor of body size dissatisfaction in adult females, while a history of being teased about general appearance was not related to body size dissatisfaction.

When confronted with weight stigmatization, most people believe that the best way to eliminate these unwanted experiences is to lose weight. Compared to 1996, in 2003 more American adults with overweight or obesity attempted to lose weight (Andreyeva et al., 2010). However, losing weight is not a permanent effective solution for all high-BMI people because for some of them, moderate fatness feels comfortable and inevitable (Bennet and Gurin, 1983). Therefore they often rely on psychosocial strategies to cope with stigmatization (Myers and Rosen, 1999). The most common used coping strategies were heading off the negative comments, using positive self-talk, seeking of social support and eating more. When people still have some self-esteem, they cope through self-acceptance, but when having a low self-esteem, they cope through avoidance, negative self-talk and crying (Puhl and Brownell, 2006).

Taken altogether, people with overweight or obesity seem to misperceive their weight status, whereby they think that they weigh less than they actually do. Just as through social comparison with the environment, misperception can be created by weight stigmatization, what makes people to intentionally underreport their weight. This latter can best be seen as a sort of coping strategy that high-BMI people use to eliminate the negative feelings they experience due to stigmatization.

2.2. Consequences of exposure to overweight and obese individuals

Weight management behavior

An effect of comparison with others may be expressed by the behavior related to weight management. In any case, weight management behavior has been shown to be related to peoples' level of satisfaction and amount of self-esteem. Furnham et al. (2002) showed that for females, dissatisfaction with body image was negatively related with self-esteem, indicating that those who are dissatisfied with their bodies have lower self-esteem. At first sight, some small amount of body weight dissatisfaction seems to lead to healthy weight management behaviors to reduce the tension. This makes it appear to be beneficial for overweight and obese people. But further research indicates that body dissatisfaction is more associated with health-compromising behaviors like unhealthy weight control, restrained eating and binge eating, and much fewer with health-promoting behaviors like physical activity and fruit and vegetable intake. This latter may have to do with a perceived inability to make meaningful changes in weight status (Neumark-Sztainer et al., 2006). Anderson and colleagues showed that those who were dissatisfied with their weight status, stopped trying to lose weight because of unsuccessful attempts to lose weight in the past (Anderson et al., 2002). On the other hand, people who are satisfied with their weight status, irrespective of their objective weight, are more likely to engage in healthy weight management behaviors such as performance of physical activity (Kruger et al., 2008). However, this latter is refuted by a study to ideal weight and weight satisfaction and the association with health practices. It shows that for people with a high BMI, an increased weight satisfaction together with increases in societal overweight and obesity may result in a decreased motivation to lose weight and to adopt healthier lifestyle behaviors (Kuk et al., 2009).

These findings of Kuk and colleagues are strengthened by other studies to the behavior of high-BMI people as a result of a changing environment. So seem people with overweight or obesity, who misperceived their current weight status, less likely to report that they want to lose weight. This in turn leads to a reduced likelihood of interest in or attempts at weight loss and the performance of physical activity (Duncan et al., 2011). Jones and colleagues (2010) found that obese adults who had inaccurate weight perceptions, had less weight concern and less distress regarding overeating. And finally Forman et al. (1986) found that overweight adults who misperceived themselves as having an average weight, were dieting less often than those who correctly perceived their weight.

So it seems that for high-BMI people, satisfaction can lead to decreased weight management behaviors, whereby they perform less physical activity and diet less often. This satisfaction, in turn, might be the result of a misperceived weight status people develop by comparing themselves with their environment.

Food intake

Just as its influence on weight management behavior, the environment might influence ones' food intake. When taken a closer look at food consumption, it can be divided into needs and indulgence. Where food in terms of needs can best be seen as an essential, so is indulgence related to luxury and hedonics. People need to make use of self-control strategies to avoid hedonic temptations such as eating tasteful but therewith often unhealthy food. The availability and affordability of those temptations require people to exert self-control on a daily basis (De Witt Huberts et al., 2011).

Admitting to such temptations, referred to as 'myopia', indicates that people have a high preference for fulfillment at the present at the expense of the future (Kivetz and Simonson, 2002).

Overweight and obese people have the reputation that they have a preference for calorie-rich food. They select carbohydrates as meals or snacks even if other (more healthy) food is available (Drewnowski et al., 1992). When it comes to food choices, different trade-offs can be made. Eating food that keeps you healthy and so gives a positive long-term consequence, or eating indulgent food that gratifies in the short term but may have a devastating outcome over a longer period. In fact, an approach-avoidance conflict arises; people want to approach the indulgent food because it gives them a good feeling at that moment, but they also wish to avoid it because they know that on the long term it is bad for their health.

That social comparison also may influence the intake of indulgent food, is shown by a study of Smeesters et al. (2010). They demonstrate that when a person with a high BMI compares itself to another person with overweight or obesity, he or she may feel that it is okay to eat indulgent food, rather than when he or she compares itself to someone with a normal weight. Further, a study to the health behavior of overweight people showed that those who misperceived their weight had a higher consumption of fast food, sugary drinks and unplanned snacks, more sedentary time and lower levels of physical activity (Skinner et al., 2008).

Thus, for most people it is very difficult to resist hedonic temptations such as indulgent food. For people having a high BMI, it even may be more difficult because they prefer calorie-rich food above other food. For them, (downward) social comparison with other overweight or obese people seems to strengthen the consumption of indulgent food.

The present research

Summarized, an increase in the number of people having overweight and obesity has changed the current streetscape. Thereby the norm of what is a normal healthy weight seems to have shifted to the higher ends of the BMI scale. Because people tend to evaluate themselves by a comparison with others and because in their social network they become more and more surrounded by people with a high weight status, they might develop a misperception of their own weight status. As a result, people with overweight and obesity may feel as if they have a normal weight and do not feel the need to manage their weight in order to decrease health risks (Paeratakul et al., 2002, Duncan et al., 2011, Chang and Christakis, 2001).

H1 Compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to a higher bias of own weight perception.

Recent studies show that the weight of other people not only affect ones' own weight perception but also the resulting behavior related to food choice and weight management (Campbell and Mohr, 2011). Drawing on the perspectives provided by the literature on social comparison, we argue that exposure to overweight and obese people will lead to a higher self-esteem for people with a high BMI. That is because they make use of the process of downward social comparison whereby they increase their self-esteem through comparing themselves with a less fortunate other. This may create the thoughts that others are worse off and so not see a reason to change their current habits.

We expect that it becomes a sort of argument to eat indulgent food and engage less in exercise and dieting behavior.

H2 Compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to more consumption of indulgent food, due to higher self-esteem.

H3 Compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to less dieting behavior and exercise intentions, due to higher self-esteem.

3. Material and Methods

This chapter describes the material and methods that were used in this study. One experiment was conducted to examine all three hypotheses. In this experiment it was being tested if there are differences in weight (mis)perception, the consumption of indulgent food, dieting behavior and exercise intentions between women who differ in exposure condition and BMI. The participants were randomly assigned to either a group that was exposed to a variation of overweight and obese females or a group that was exposed to normal weight females. The subdividing of the groups based on their BMI was done afterwards. The experiment was carried out in the first week of December 2011 at the Forum building of the Wageningen University.

3.1. Participants

80 Dutch female students with a mean age of 20.4 years ranging from 18 to 26 years and a mean BMI of 21.7 kg/m² ranging from 17 to 29 participated in exchange for a reward in the form of a cosmetic product. Males and people with other nationalities were excluded from participation because this study does not focus on gender- and cultural differences. Participants were randomly assigned to the control condition (n=40) or the overweight exposed condition (n=40). For comparing the low-BMI (n=55) and high-BMI (n=23) groups with each other, two groups were created afterwards based on a measured BMI-cut-off of 23. This implies that a total of four groups (2*condition x 2*BMI) were created.

3.2. Procedure

The experiment had a between-subjects design with one factor: exposure to overweight and obesity versus normal weight females. Participants were intentionally misguided by telling them that they participated in a study about gender differences in the use of emergency services and that their task was to review and evaluate some website screenshots and stories about a new emergency phone number introduced in the Netherlands for the reporting of animal cruelty. Meanwhile the ultimate goal was to see if the pictures of normal weight, overweight and obese ordinary 'average' females displayed on the website screenshots had a significant influence on the participants' current weight perception, their self-esteem, their indulgent food consumption and exercise and dieting intentions.

For each participant, the experiment started with a welcome. After a short introduction they were instructed to take place behind a computer. The manipulation part of the experiment consisted of a website evaluation task by which participants were either exposed to pictures of females varying from overweight to obesity (experimental condition) or a control condition with pictures of females having a normal weight, similar to the procedure used by Papies and Nicolaije (2011). The experimental condition counted four pictures of overweight females (figure 2-A) and two pictures of obese females (figure 3-A). Naturally, the control condition counted six pictures of normal weight females (figure 2-B and 3-B). Instead of websites about health, body weight or other things related to appearance, websites were selected about animal cruelty and such to distract attention from the body size of the females on the pictures (figure 4). To minimize the noise, the pictures of the overweight and obese females were adjusted from the normal weight pictures with the use of Adobe Photoshop. So, the same women were either depicted as normal weight individuals or as overweight

or obese individuals. The total experiment took about 20 minutes time and the amount of time that the participants were exposed to the manipulation was on average ten minutes.



Figure 2: Pictures of the overweight (A) and normal weight (B) females used for the conditions

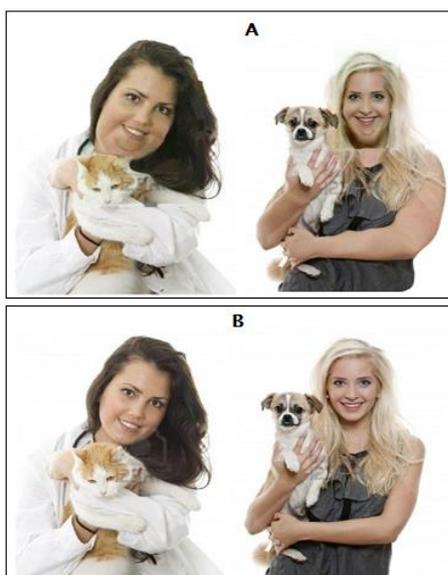


Figure 3: Pictures of the obese (A) and normal weight (B) females used for the conditions



Figure 4: Pictures of a website screenshot for the overweight (A) and normal weight (B) condition

To shield the purpose of the weight manipulation, the evaluation of the websites was presented as a study about gender differences in the use of emergency services. To support this cover story, after each website screenshot, participants had to rate the websites on various attributes (e.g. visibility). They also had been given the task to choose between several actions on how they would react on the stories about animal cruelty some websites contained.

After the manipulation, the participants had to fill in a questionnaire by which the constructs that are relevant for this study were measured. Afterwards, they were reimbursed for their participation and asked to give their permission to weigh them with their shoes off. This was done at the end of the experiment in the back of the room so that it had no influence on the completing of the questionnaire and on the participants who were still doing the experiment. The scale was placed underneath a blanket so that the participants did not know on beforehand that they were going to be weighed. In total there were two participants who did not want to be weighed. Their weight scores were treated as missing values.

During the whole experiment, participants were given the opportunity to eat snacks. Gingernuts were selected because they are seen as indulgent calorie rich food and they are widely eaten in the Netherlands in this time of year. Under the guise of some leftovers of Sinterklaas from the department Management and Consumer Behavior, the participants were told to eat as much gingernuts as they would like to. While they were directed to a computer, each participant was given a bowl with a pre-measured amount of 125 grams of gingernuts. After the participants finished the experiment, the bowl was taken away and weighed out of sight of the participants or at a moment when there were no participants in the room. The total amount of gingernuts eaten by each participant was calculated by subtracting the amount of grams of the leftovers after the experiment from the 125 grams that was given before the experiment. This way of measuring has already been performed by McFerran et al. (2010a). The amount eaten ranged from 0 to 88 grams with a mean of 19.1 grams (SD = 18.9).

3.3. Post-manipulation questionnaire

Following from the manipulation, the participants filled out a questionnaire with items related to their appetite during the experiment (on a scale ranging from 1 (not hungry at all) to 7 (very hungry)), their height in centimeters and their current weight in kilograms.

With the use of the Figure Rating Scale (FRS), it was measured how participants consider their current weight to be. The scale consists of nine female silhouettes numbered from 1 to 9, ranging from very thin to very obese (Stunkard et al., 1983). The participants were asked to choose one figure that they perceive as representing their current body shape. Earlier research has shown that silhouettes effectively can be used for the identification of both thin and obese individuals (Bulik et al., 2001). In addition to the FRS, the questions; 'What is your current body weight in kilograms?' and 'How do you consider your own body weight?' were asked whereby people for this latter question had to choose between the answers; underweight, normal weight, slightly overweight, overweight or obese.

Self-esteem was measured separately on a one-item scale. Participants were asked to rate the item 'I have high self-esteem' on a scale ranging from 1 (strongly disagree) to 7 (strongly agree). This Single-Item Self-Esteem Scale (SISE) is developed by Robins et al. (2001), and shows a strong convergent validity for adult samples.

As explained in the procedure, the consumption of indulgent food was measured by weighing the amount of gingersnaps consumed during the experiment. Because the liking of the gingersnaps is likely to have an influence on the amount of gingersnaps consumed, the participants were asked to rate their liking of the gingersnaps on a scale ranging from 1 (not tasteful) to 7 (very tasteful). The variables covered in this study by the concept of weight management behavior, are participants' exercise intentions and dieting behavior. Exercise intentions were assessed with a four-item scale based on the scales used by Rhodes and Matheson (2005) to measure the intentions, expectations and commitment to exercise. An example of an item is 'I intend to exercise regularly over the next 2 weeks', that had to be rated on a scale ranging from 1 (strongly disagree) to 7 (strongly agree). The scale showed a high reliability of $\alpha = 0.96$. The assessment of physical activity habits was included in the questionnaire because it might have an influence on ones' exercise intentions. To measure this, the Godin Leisure Time Exercise Questionnaire (GLTEQ) of Godin and Shephard (1985) was used. The questionnaire included three items to assess the weekly frequencies of strenuous, moderate and light activities for at least 15 minutes. The total weekly leisure activity score is calculated by summing up the products of the separate components as follows: Total weekly leisure activity = (frequency of light activity x 3) + (frequency of moderate activity x 5) + (frequency of strenuous activity x 9). The GLTEQ has been found to have a good two-week test-retest reliability and construct validity (Sallis et al., 1993). Participants' dieting behavior was assessed by a modified version of the scale used by Andreyeva et al. (2010) to measure self-reported attempts to lose weight and diet strategies. The modified scale used in this study consisted of five items such as 'I plan to actively prevent weight gain' that had to be rated on a 7-point scale ranging from 1 (not likely) to 7 (very likely). The scale showed a reliability of $\alpha = 0.87$. Because restrained eating behavior might be a personal characteristic that can influence peoples' dieting behavior, restrained eating was assessed with the use of the Restrained Eating Scale (van Strien et al., 1986). A five-point Likert response format

ranging from 'never' to 'very often' was used for all 10 items. The reliability of the scale in this study was $\alpha = 0.88$.

For calculating participants' BMI, they were asked to report their body height and -weight. Due to several factors there can exist biases between ones' actual and self-perceived weight. Therefore the actual weight was obtained in the end of the experiment by the use of a weigh scale. A correction on measured weight was done because a difference with self-reported weight could be influenced by the weight of the clothes worn. For the correction, one kilogram was diminished of the measured weight of each participant. The size of the correction was determined by the measuring of how much kilograms one pair of jeans, a pair of socks, a thin sweater, underwear and a watch weigh.

3.4. Data analysis

To examine whether the randomization was successful, analyses of variance (ANOVAs) were performed. Therefore it was checked whether there were differences in age, restrained eating, liking of the gingernuts and appetite of the participants between the four groups (2*condition x 2*BMI). As sort of manipulation check, the last question of the questionnaire was if they could guess what the aim of the study was. There were three participants who knew what it was about. An ANOVA was used to check whether the outcomes were different if those three participants were excluded from the experiment. Results showed no differences that influenced the outcomes.

ANOVA's were also used to check if the exposure condition for the low-BMI and high-BMI group had a significant effect on their weight management behavior in terms of dieting and exercise commitment and on the amount of gingernuts eaten. Sometimes covariates were used because they were expected to have an influence on the outcomes. Finally mediation analyses were performed for the significant outcomes of the ANOVA, to examine the expected mediating effect of self-esteem on weight management behavior and amount of gingernuts eaten for the BMI-groups.

For creating a low-BMI and high-BMI group, the variable BMI with the measured objective weight in kilograms was being split afterwards, based on a cut-off of a BMI of 23. Two unequal groups arose whereby the low-BMI group contained 55 participants and the high-BMI group contained 23 participants. Due to two missing values for the measurement of objective weight, not all 80 participants could be divided into a BMI group.

To provide a better insight into the division of all the variables used for answering the hypotheses and the covariates used for correcting the scores, a short overview is given in table 1.

Table 1: overview of the dependent variables used for measuring the hypotheses

Dependent variables	Hypothesis	Covariate
Gap self-perceived minus objective weight Kilograms BMI	1	
Consumption of indulgent food Amount of gingernuts eaten	2	<i>Liking of the gingernuts</i>
Exercise intentions Intention physical activity (PA)	3	<i>Weekly frequencies of strenuous, moderate and light physical activities (GLTEQ variable)</i>
Dieting behavior	3	<i>Restrained eating behavior</i>
Self-esteem Self-esteem scale	2 and 3	

4. Results

In this chapter, the results of the experiment will be presented. Based on the outcomes the hypotheses will be either supported or rejected.

4.1. Randomization checks

The average age of the total sample was 20.4 years (SD = 1.8) and a mean measured BMI of 21.7 kg/m² (SD = 2.7). Between the four groups, no differences occurred for age. There was also no difference for the liking of the gingersnuts, just as there were no differences in appetite and the weekly frequencies of strenuous, moderate and light physical activities (GLTEQ) (all Fs < 2.8). Though, a marginal difference did show up for the restrained eating behavior. Further, when looked at the two groups created after the BMI-split, some significant differences occurred for age, restrained eating behavior and the liking of the gingersnuts (table 2). It indicates that compared to low-BMI participants, the participants with a BMI of 23 and higher, were younger ($F(1,74) = 3.94, p = 0.05$), scored higher on the restrained eating scale ($F(1,74) = 9.00, p = 0.00$) and liked the gingersnuts better ($F(1,74) = 4.44, p = 0.04$).

Table 2: mean (SD) of randomization check

	Normal weight exposure condition (n=38)		Overweight exposure condition (n=40)		p-value of exposure condition	p-value of BMI split	p-value of interaction condition X BMI
	BMI<23 (n=28)	BMI>=23 (n=10)	BMI<23 (n=27)	BMI>=23 (n=13)			
Randomization check							
Age	20.6 (1.9)	19.3 (1.2)	20.7 (1.4)	20.2 (2.4)	0.24	0.05	0.34
Restrained eating behavior	2.4 (0.6)	2.6 (0.8)	2.0 (0.6)	2.7 (0.5)	0.45	0.00	0.10
Liking of the gingersnuts	5.2 (1.0)	5.6 (1.3)	4.9 (1.6)	5.9 (1.1)	0.99	0.04	0.44
Appetite	2.6 (1.6)	3.7 (1.8)	3.3 (1.6)	3.1 (1.8)	0.99	0.29	0.14
GLTEQ*	41.9 (23.5)	39.2 (26.4)	25.9 (18.4)	38.6 (24.6)	0.15	0.39	0.18

*Due to four outliers treated as missing values, the distribution of the participants between the four groups was different than for the other variables; normal weight exposure <23 (n=27), normal weight exposure >=23 (n=10), overweight exposure <23 (n=25) and overweight exposure >=23 (n=12).

4.2. Manipulation effect of pictures on perception of weight status

The first hypothesis 'compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to a higher bias of own weight perception' was tested with the use of an ANOVA. Therefore the gap between the self-perceived weight status and the objective weight status in both BMI and kilograms were used as dependent variables. The significant outcome ($F(1,74) = 4.74, p = 0.03$) indicates that there is a difference between the four groups (table 3).

Table 3: mean (SD) of perception weight status

	Normal weight exposure condition (n=38)		Overweight exposure condition (n=40)		p-value of exposure condition	p-value of BMI split	p-value of interaction condition X BMI
	BMI<23 (n=28)	BMI>=23 (n=10)	BMI<23 (n=27)	BMI>=23 (n=13)			
Gap perceived minus objective weight							
Kilograms	-0.5 (1.5)	-3.7 (3.2)	-0.6 (1.1)	-2.0 (1.4)	0.09	0.00	0.03
BMI	-0.1 (0.5)	-1.2 (1.1)	-0.2 (0.4)	-0.7 (0.5)	0.09	0.00	0.03

Within the total sample, participants underestimated their current weight status. After correcting for their clothing, they report on average that they weigh 1.2 kilogram less than they actually do. This equals an underestimation of 0.4 BMI points. However when looking at the four separate groups, the results show that regardless of the exposure condition, the participants with a BMI below 23 had a smaller bias between their perceived and their objective weight than the participants with a BMI of 23 and higher. Further, the participants with a BMI below 23 that were exposed to the normal weight condition had a smaller gap between their perceived and their objective weight compared to the participants with a BMI below 23 that were exposed to the overweight / obese condition. On the contrary, the participants with a BMI of 23 and higher that were exposed to the normal weight condition had a bigger gap between their perceived and their objective weight compared to the participants with a BMI of 23 and higher that were exposed to the overweight / obese condition (figure 5).

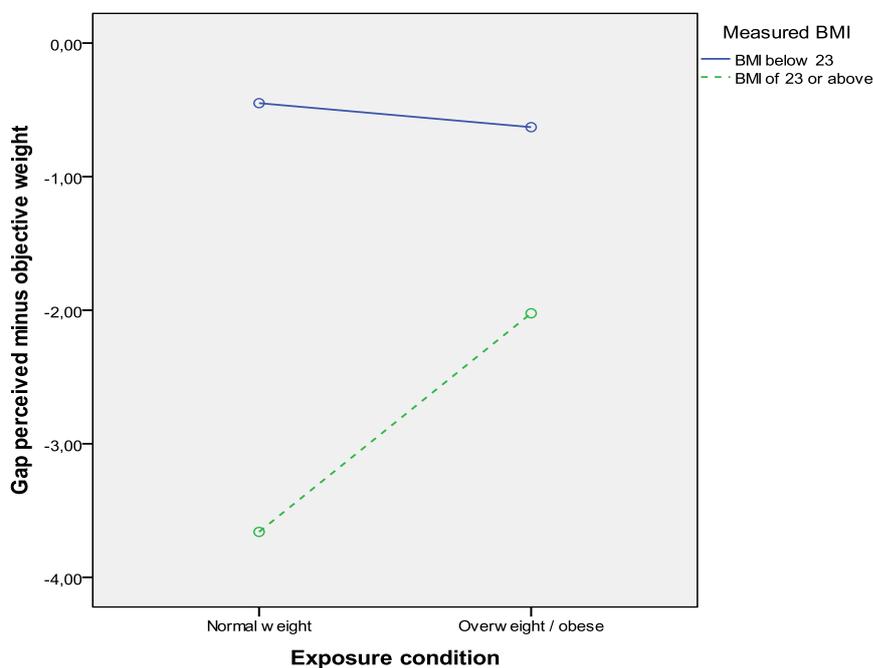


Figure 5: Effect of condition and BMI on the gap between the perceived and objective weight status

To see for which BMI-group the effect of the exposure condition on the weight gap was the biggest, a regression analysis was conducted for both BMI-groups. The outcomes, who were not significant, may imply that compared to the effect on the low-BMI group ($\beta = -0.18$, $p = 0.61$), the effect of the exposure condition on the high-BMI group ($\beta = 1.64$, $p = 0.11$) was bigger.

Despite the significant outcome that high-BMI participants have a higher bias of own weight perception compared to low-BMI participants, exposure to the overweight / obese condition caused the opposite effect of what we had hypothesized. For the low-BMI participants, the bias increased while for the high-BMI participants, the bias decreased after being exposed to overweight and obesity. So we were not able to prove that compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to a higher bias of own weight perception. Therefore hypothesis 1 is **rejected**.

4.3. Manipulation effect of pictures on consumption of indulgent food

For the second hypothesis ‘*compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to more consumption of indulgent food, due to higher self-esteem*’, the direct effect was tested with the use of an ANOVA. Therefore the amount of gingernuts eaten during the experiment was used as dependent variable. The liking of the gingernuts was included as covariate because it was expected to have an influence on the amount eaten and because the randomization showed a difference between both BMI groups for this variable (table 2).

The outcome showed that there were no significant differences between the four groups ($F(1,73) = 0.10, p = 0.76$) (table 4). However, the covariate did have an influence on the amount of gingernuts eaten ($F(1,73) = 33.21, p = 0.00$), showing that the better the participants liked the gingernuts, the more they ate ($r = 0.56, p = 0.00$). Because of the non-presence of a significant direct effect between the exposure condition, the BMI-split and the amount of gingernuts eaten, there was no need to perform a mediator analysis to see if the effect of the exposure condition for separate BMI-groups was mediated by the amount of self-esteem.

Table 4: mean (SD) of consumption of indulgent food

	Normal weight exposure condition (n=38)		Overweight exposure condition (n=40)		p-value of exposure condition	p-value of BMI split	p-value of interaction condition X BMI
	BMI<23 (n=28)	BMI>=23 (n=10)	BMI<23 (n=27)	BMI>=23 (n=13)			
Consumption of indulgent food							
Amount of gingernuts eaten	20.2 (20.6)	28.0 (25.0)	13.5 (14.0)	23.0 (18.6)	0.14	0.44	0.76

Due to the non-significant outcome for the direct effect, we were not able to prove that compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to more consumption of indulgent food, due to a higher self-esteem. Therefore hypothesis 2 is **rejected**.

4.4. Manipulation effect of pictures on dieting behavior and exercise intentions

The last hypothesis, consisting of two parts is formulated as ‘*compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to (a) less dieting behavior and (b) less exercise intentions, due to higher self-esteem*’. To test the direct effect for both parts, an ANOVA was conducted.

For part (a) as dependent variable, the dieting behavior scale ranging from 1 (not likely) to 7 (very likely) was used. It was corrected by the participants’ restrained eating behavior because that was expected to have an influence on the dieting behavior and because the randomization showed a difference between both BMI groups for this variable (table 2). The significant outcome ($F(1,73) = 5.83, p = 0.02$) indicates that there is a difference between the four groups (table 5). Further, the covariate also had a significant influence on the participants’ dieting behavior ($F(1,73) = 70.42, p = 0.00$). A significant positive Pearson correlation coefficient between these two variables represents that the more the participants engage in restrained eating behavior, the more they engage in dieting behavior and vice versa ($r = 0.76, p = 0.00$).

Table 5: mean (SD) of dieting behavior

	Normal weight exposure condition (n=38)		Overweight exposure condition (n=40)		p-value of exposure condition	p-value of BMI split	p-value of interaction condition X BMI
	BMI<23 (n=28)	BMI>=23 (n=10)	BMI<23 (n=27)	BMI>=23 (n=13)			
Dieting behavior							
Dieting behavior scale	3.9 (1.1)	4.5 (1.0)	2.9 (1.4)	5.2 (0.9)	0.93	0.00	0.02

When looking more closely to the differences between the four groups, the results show that regardless of the exposure condition, the participants with a BMI below 23 engaged less in dieting behavior than the participants with a BMI of 23 and higher. Further, the participants with a BMI below 23 that were exposed to the normal weight condition engaged more in dieting behavior compared to the participants with a BMI below 23 that were exposed to the overweight / obese condition. On the contrary, the participants with a BMI of 23 and higher that were exposed to the normal weight condition engaged less in dieting behavior compared to the participants with a BMI of 23 and higher that were exposed to the overweight / obese condition (figure 6).

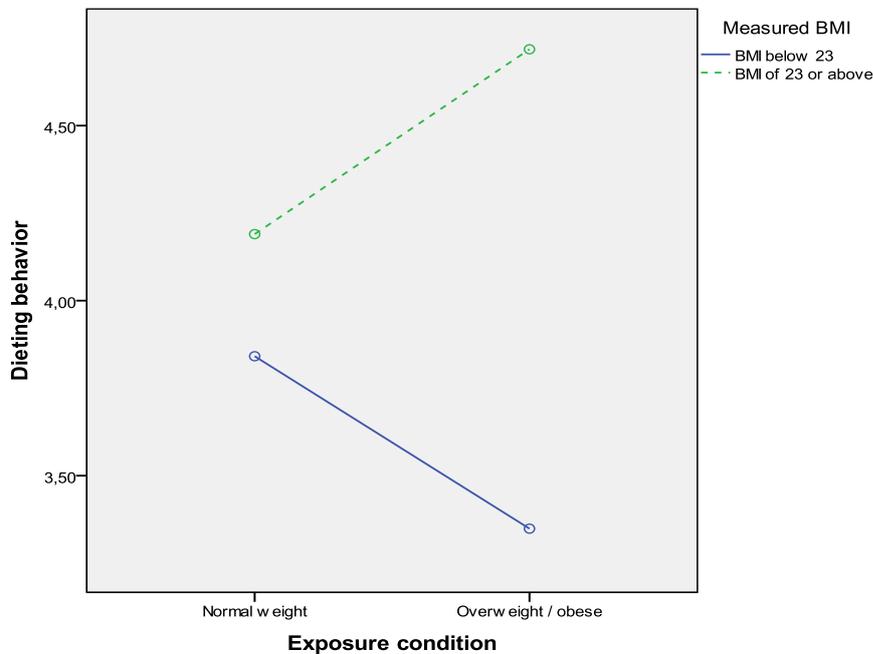


Figure 6: Effect of condition and BMI on dieting behavior

The results from the ANOVA are the opposite of what was hypothesized. Nevertheless we conducted a mediation analysis to see if the effect of the exposure condition for both low-BMI participants and high-BMI participants on the dieting behavior was mediated by the amount of self-esteem.

For the low-BMI group, a first regression analysis showed that the effect of the exposure condition on self-esteem was not significant ($\beta = -0.11$, $p = 0.74$). A second regression analysis showed that the exposure condition was a significant predictor of dieting behavior ($\beta = -0.98$, $p = 0.00$). A third regression analysis showed a non-significant effect of the amount of self-esteem on dieting behavior ($\beta = -0.12$, $p = 0.42$). Because not all the routes towards dieting behavior were significant, we were not able to perform a Sobel test to check if for the low-BMI participants, the effect of the exposure condition on dieting behavior was mediated by the amount of self-esteem.

For the high-BMI group, we conducted the same analysis. A first regression analysis showed that the effect of the exposure condition on self-esteem was not significant ($\beta = -0.69$, $p = 0.33$). A second regression analysis showed that the exposure condition was a marginal significant predictor of dieting behavior ($\beta = 0.71$, $p = 0.10$). A third regression analysis showed a non-significant effect of the amount of self-esteem on dieting behavior ($\beta = -0.14$, $p = 0.29$). Because not all the routes towards dieting behavior were significant, we were not able to perform a Sobel test to confirm that for the high-BMI participants, the effect of the exposure condition on dieting behavior was mediated by the amount of self-esteem.

By comparing the coefficients following from the regression analysis, we were able to see for which BMI-group the effect of the exposure condition on the dieting behavior was the biggest. The outcomes, who were partly significant, may imply that compared to the effect on the low-BMI group ($\beta = -0.98$, $p = 0.00$), the effect of the exposure condition on the high-BMI group ($\beta = 0.71$, $p = 0.10$) was smaller.

Due to the absence of a mediating effect of self-esteem on dieting behavior we were not able to prove that compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to less dieting behavior, due to a higher self-esteem. Therefore part (a) of hypothesis 3 is **rejected**.

For part (b) as dependent variable, the exercise intention scale ranging from 1 (strongly disagree) to 7 (strongly agree) was used. It was corrected by the participants' weekly frequencies of strenuous, moderate and light physical activities (score on the GLTEQ variable) because that was expected to have an influence on the exercise intentions. For the GLTEQ variable, there were four outliers for the total group of participants. As a result these four outliers were treated as missing values for this analysis. The significant outcome ($F(1,69) = 5.81$, $p = 0.02$) indicates that there is a difference between the four groups (table 6). Further, the covariate also had a significant influence on the participants' exercise intentions ($F(1,69) = 5.05$, $p = 0.03$). A significant positive Pearson correlation coefficient between these two variables, represents that the higher ones' GLTEQ score is, the higher the intention to engage in physical activities is ($r = 0.24$, $p = 0.04$).

Table 6: mean (SD) of exercise intentions

	Normal weight exposure condition (n=37)		Overweight exposure condition (n=37)		p-value of exposure condition	p-value of BMI split	p-value of interaction condition X BMI
	BMI<23 (n=27)	BMI>=23 (n=10)	BMI<23 (n=25)	BMI>=23 (n=12)			
Exercise intentions							
Intention physical activity (PA)	4.8 (1.8)	5.7 (1.3)	4.9 (1.8)	4.0 (1.9)	0.15	0.84	0.02

When taking a closer look to the differences between the four groups, the results show that the participants with a BMI below 23 that were exposed to the normal weight condition had a lower intention to exercise compared to the participants with a BMI below 23 that were exposed to the overweight / obese condition. On the contrary, the participants with a BMI of 23 and higher that were exposed to the normal weight condition had a higher intention to exercise compared to the

participants with a BMI of 23 and higher that were exposed to the overweight / obese condition (figure 7).

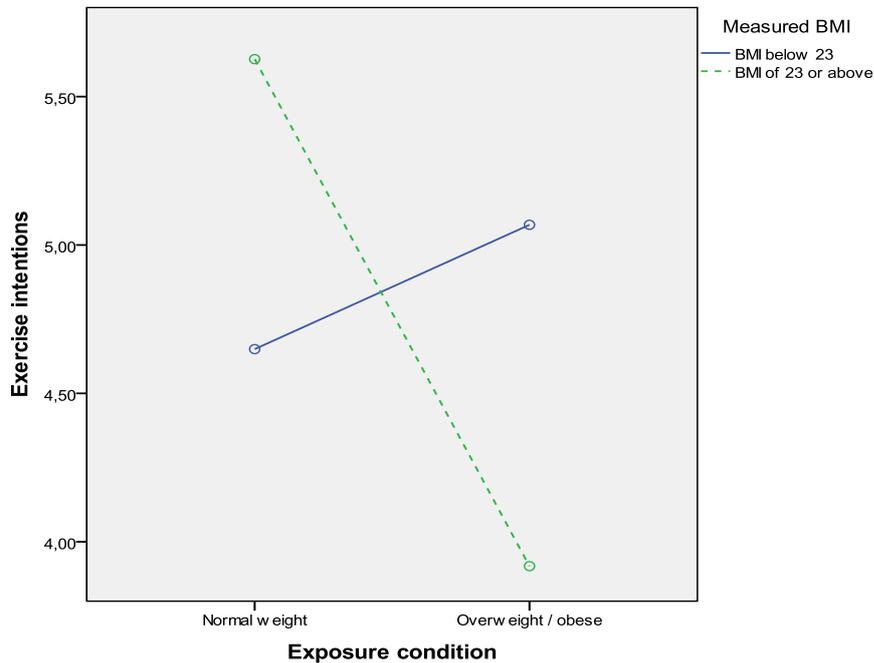


Figure 7: Effect of condition and BMI on exercise intentions

To see if the effect of the exposure condition for both low-BMI participants and high-BMI participants on the exercise intentions was mediated by the amount of self-esteem, a mediation analysis was conducted for both BMI-groups.

For the low-BMI group, a first regression analysis showed that the effect of the exposure condition on self-esteem was not significant ($\beta = -0.11$, $p = 0.74$). A second regression analysis showed that the exposure condition was an insignificant predictor of exercise intentions ($\beta = -0.00$, $p = 1.00$). A third regression analysis showed a non-significant effect of the amount of self-esteem on exercise intentions ($\beta = -0.07$, $p = 0.75$). Because none of the routes towards exercise intentions were significant, we were not able to perform a Sobel test to check if for the low-BMI participants, the effect of the exposure condition on exercise intentions was mediated by the amount of self-esteem.

For the high-BMI group, we conducted the same analysis. A first regression analysis showed that the effect of the exposure condition on self-esteem was not significant ($\beta = -0.69$, $p = 0.33$). A second regression analysis showed that the exposure condition was a significant predictor of exercise intentions ($\beta = -1.49$, $p = 0.05$). A third regression analysis showed a non-significant effect of the amount of self-esteem on exercise intentions ($\beta = 0.23$, $p = 0.34$). Because not all the routes towards exercise intentions were significant, we were not able to perform a Sobel test to confirm that for the high-BMI participants, the effect of the exposure condition on exercise intentions was mediated by the amount of self-esteem.

By comparing the coefficients following from the regression analysis, we were able to see for which BMI-group the effect of the exposure condition on the exercise intentions was the biggest. The

outcomes, who were partly significant, may imply that compared to the effect on the low-BMI group ($\beta = -0.00$, $p = 1.00$), the effect of the exposure condition on the high-BMI group ($\beta = -1.49$, $p = 0.05$) was bigger.

Due to the absence of a mediating effect of self-esteem on exercise intentions we were not able to prove that compared to low-BMI women, for high-BMI women, exposure to overweight or obese people will lead to less exercise intentions, due to a higher self-esteem. Therefore part (b) of hypothesis 3 is **rejected**.

Discussion and Conclusion

This study investigated the effects of exposure to overweight and obese ordinary 'average' people on the commitment to diet and exercise goals and the consumption of indulgent food of people having a high-BMI. Unfortunately we were not able to find proof to support our expectation that the effect of the exposure condition for both BMI-groups on the dieting behavior, exercise intentions and consumption of indulgent food was mediated by the amount of self-esteem. Partly for this reason all hypotheses were rejected. Notwithstanding we found some interesting things.

As expected, misperception of weight status was prevalent among the participants. Hereby their objective weight was higher than their perceived weight. Not only the high-BMI group, but also the participants with a low BMI tended to underestimate their weight. However, regardless of the exposure condition, compared to the low-BMI group, the size of the bias was bigger for the participants with a high BMI. This finding is consistent with previous studies to weight misperception (Danubio et al., 2008). When looking at the differences within both BMI-groups, for the low-BMI group, the participants that were exposed to overweight and obese females had a bigger gap between their objective and perceived weight, compared to the participants that were exposed to the normal weight condition. For the high-BMI group the opposite occurred, the participants that were exposed to overweight and obese females had a smaller gap between their objective and perceived weight, compared to the participants that were exposed to the normal weight condition. Thus for high-BMI participants, the experimental environment consisting of other high-BMI females, did not seem to lead to an underestimation of their weight, they even became more accurate after being exposed to overweight and obesity.

The difference in weight bias between the BMI-groups might be explained by the theory of stereotyping. For the low-BMI group, exposure to overweight and obesity seems to lead to a contrast effect whereby they become inconsistent with the overweight and obese stereotype. An increased accessibility of associations with that stereotype, whereby weight is emphasized the most during the experiment, could make them to underreport their weight to avoid being associated with that negative stereotype (Wheeler and Petty, 2001). A different explanation might be that a bigger difference between the participants' weight and the weight of the females in the exposure condition may blur the value of one kilogram. It is the same principle as comparing your capital with someone who is very rich; it might let you think your capital is less valuable than it actually is, creating a sort of misperception. However, further research should be performed to support this thinking.

For the high-BMI group, an assimilation effect seems to occur when exposed to overweight and obesity, whereby they become consistent with the overweight and obese stereotype. This may create feelings of equality and a more realistic view of their own weight status. Seeing others in the same situation makes it easier to admit that they are heavier than average. Further, the presence of a higher bias after being exposed to the normal weight condition might be due to the increased accessibility of a normal weight status what can raise the desire to weigh less. This in turn can make them to intentionally underreport their weight, consistent to the findings of previous research (Jeffery, 1996, Gil and Mora, 2011).

Within this experiment, for the high-BMI participants, the effect of stereotyping seems to be stronger than the effect of negative downward social comparison. High-BMI people may see other high-BMI people more as equivalent than as inferiors.

Regarding the consumption of indulgent food, the only significant result was that the high-BMI group liked the gingersnaps better compared to the low-BMI group. This could be a matter of taste, but it also can be due to the higher preference for calorie-rich food that high-BMI people seem to have (Drewnowski et al., 1992).

For dieting behavior, regardless of the exposure condition, compared to the low-BMI group, the participants with a high BMI engaged more in dieting behavior, which is consistent with the findings of Andreyeva and colleagues (2010). This might have to do with a lower level of satisfaction high-BMI participants can experience, what in turn may encourage them to diet in order to reduce the tension. When looking at the differences within both BMI-groups, for the low-BMI group, the participants that were exposed to overweight and obese females engaged less in dieting behavior, compared to the participants that were exposed to the normal weight condition. A comparison of people with a low BMI with people having a higher weight status may reduce, or even take away the necessity for the low-BMI people to engage in dieting behavior because they feel they are less bad off as the overweight and obese females on the pictures. On the contrary, a comparison with people having the same weight may strengthen the need to keep the current weight. For the high-BMI group the opposite occurred, the participants that were exposed to overweight and obese females engaged more in dieting behavior, compared to the participants that were exposed to the normal weight condition. A contrast effect seems to occur whereby the high-BMI group may try to avoid actions that are linked to the overweight and obese stereotype, just because they do not want to be associated with that group. Therefore they behave inconsistent with the stereotype (Campbell and Mohr, 2011). A different, and in our opinion more likely reason might be that exposure to other high-BMI females works as some sort of eye-opener. It gives them a more realistic view on their current situation what creates a higher willingness to change. On the other hand, that realistic view may also create feelings of inability to make meaningful changes in their current weight status, because the weight-gap is too big when being exposed to normal weight females.

Finally, looked at the exercise intentions, there were no differences between the two groups based on the BMI of the participants. Despite that, some differences occurred within the groups when taken the exposure condition into account. For the low-BMI group, the participants that were exposed to overweight and obese females had a higher intention to exercise, compared to the participants that were exposed to the normal weight condition. For the high-BMI group the opposite occurred, the participants that were exposed to overweight and obese females had a lower intention to exercise, compared to the participants that were exposed to the normal weight condition. For all groups, this is the opposite of what happened by dieting behavior.

The low-BMI group had lower intentions to engage in dieting behavior, but higher intentions to exercise after being exposed to overweight and obese females. A reason for this might have to do with a higher likeliness of people to engage in health-promoting behaviors, when being satisfied with their current weight status. This is consistent with the findings of Kruger and colleagues (2008). On the contrary, the high-BMI group had higher intentions to engage in dieting behavior, but lower

intentions to exercise after being exposed to overweight and obese females. A similar explanation as being used for the results of the low-BMI group might be applicable to this finding. Those who are less satisfied with their current weight status were more likely to engage in health-compromising behaviors like unhealthy weight control, and much fewer with health-promoting behaviors like physical activity (Neumark-Sztainer et al., 2006). In addition, high-BMI people may be less likely to engage in physical activity because they can see their weight as some sort of obstacle. This latter is somehow consistent with the findings of Conradt et al. who showed that people can become distressed of being overweight or obese in situations related to physical functioning (Conradt et al., 2008).

A more in depth explanation for the opposite results between exercising and dieting might be that it has to do with a sort of approach-avoidance conflict. Dieting behavior is more seen as a way to reduce weight. Reducing weight, in turn, can be associated with something negative. People with a high BMI often have negative attitudes towards obesity (Crocker et al., 1993), so a likely reason for their preference for dieting above exercising might be that they unconsciously strive for consistency between their (negative) feelings, thoughts and behavior. On the other hand, exercising can be seen as a way to maintain weight, which in turn may be associated with something positive. People with a low BMI and a positive attitude might prefer exercising above dieting to maintain consistency between their (positive) feelings, thoughts and behavior. However, further research should be performed to support this thinking.

This study has some limitations that should be acknowledged. First, we did not really check the manipulation of the exposure condition. However, we did not see it as very necessary to let participants report that they noticed a difference between the normal, overweight and obese females. Although we could have asked the participants to rate the weight status of the females on the pictures, but then too much emphasis was placed on the weight, what in turn might influence the answers of the participants. Anyway, we do offered them the possibility to give comments whereby they could express their doubts and asked them the question what they think that the aim of the study was.

Second, all participants had to answer the question about their thoughts towards the aim of the study. A total of three participants guessed it. A reason for this might be due to just asking the question about it. However because it was asked at the end of the experiment it should not have any influence on the rest of the answers given. This is supported by the outcomes.

Further, the participants used for this experiment were all students from the Wageningen University, a university specialized in life science. Therefore the chance was not very likely that females with an extremely high or low BMI had the chance to participate in our experiment, just because they are not present at the university. This was also the main reason for the biggest limitation that we did not include a lot of participants with an extremely high or low BMI. In order to be able to compare a lower BMI-group with a higher-BMI group, we split the total group based on a BMI of 23. According to the WHO, overweight begins at a BMI of 25. This makes that our split was not realistic because the high-BMI group still contained some normal weight females. Therefore the terms low-BMI and high-BMI were not that appropriate. Further, the groups created after the split differed in size, so we were not able to make a comparison with equal groups.

Implications for further research

This study showed evidence for the presence of different behaviors between females with a lower BMI, compared to those with a higher BMI. Maybe the results would be stronger if the groups contain more extreme cases and if the BMI-split was based on the criteria the WHO uses to determine underweight, normal weight, overweight and obesity. Further, we did the experiment with females, in particular with students in the age category ranging from 18 to 26 years. It would be interesting to examine whether the differences between the separate BMI-groups are also present, or even more present, for a different sample such as housewives, elderly or males.

The priming with overweight and obesity did not have the effect on the participants as expected. Therefore it would be interesting to see if priming with extremely thin people has an effect.

Finally, the possible explanation that a bigger difference may blur the value of the creator of the difference, given for the bigger weight gap of the low-BMI participants that were exposed to overweight and obese females, should be studied. Just as the possible explanation that the presence of an approach-avoidance conflict might be the reason for the opposite results between dieting and exercising for the different BMI-groups.

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Appendix 1 – questionnaire overweight and obese exposure condition

Introduction

At first, thank you for participating this study!

This study examines the opinion of students about the emergency phone number 144 'save an animal' that is open to the public since 15 November 2011. The number is hosted by the National Police Corps (KLPD) and is open seven days a week for 24 hours a day.

Take your time needed to answer the questions.

With the use of the phone number 144, reports of animal cruelty can be better and more effectively be monitored by the police and other emergency workers and enforces. Incoming reports are reviewed by specially trained police officers. When there are reports of acute animal suffering, immediate action is being taken by the relevant regional police force. Other forces such as the new Food Safety Authority (nVWA) and the National Animal Inspection Service (LID) can also be enabled through the hotline. Both services act supervisory and enforcing against animal cruelty. The nVWA focuses primarily on business sectors and the LID is specifically associated with maltreatment of animals kept as a hobby.

Are you familiar with the reporting number '144, save an animal'?

Yes No

Recent research has shown that compared with men, women are more likely to use emergency services. This difference is mainly caused by the fact that women in some stressful situations respond more emotionally than men do. Whether this is also the case if it is about animals, we would like to test during this experiment. We also would like to see if the websites that are currently handled by the different organizations are clear enough or could be improved. Our interest mainly lies in the differences between men and women. Therefore we would like you to view the screenshots and read the stories as carefully as possible and answer the accompanying questions. The loading of some pages may take some time.

Question 1

Central Government has developed a special website for the emergency phone number.
When you view this website, what aspects attract your attention? (Click on maximal 2 zones)

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Postbus 51
Rijksvermord

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144, een nieuw meldnummer voor dieren in nood

144 is een nieuw landelijk meldnummer dat u kunt bellen als u een dier in nood ziet. Het nummer 144 is zeven dagen per week en 24 uur per dag te bereiken tegen lokaal tarief. Uw telefoontje wordt beantwoord door iemand van de politie. Aan de hand van uw beschrijving wordt vervolgens bepaald hoe en door wie het dier het beste geholpen kan worden; de dierenpolitie, een dierenambulance of bijvoorbeeld een inspecteur van de Dierenbescherming.

Een dier in nood: bel 144

Het kan gaan om een ongeluk, dierenverwaarlozing of dierenmishandeling. Bijvoorbeeld een hond opgesloten in een auto, in de felle zon. Een koe die in de sloot is beland en er niet meer uitkomt. Of een verwaarloosd paard op een boerenerf. In zo'n geval belt u 144. Mocht om technische redenen 144 niet bereikbaar zijn, bel dan het politienummer 0900-8844, of voor spoed 1-1-2.

Question 2

Look again at the screenshot below and answer the question.
When you view this website, which aspect would you like to change? (Click on maximal 1 zone)

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Explain your answer briefly:

Question 3

Read the following statements and state to what extent you agree or disagree:

	Totally disagree	Disagree	A little disagree	Neutral	A little agree	Agree	Totally agree
The existence of a emergency number for animals is a good thing							
There should be a clear logo for the emergency number							
I take the term 'Animal Cop' very serious							

Question 4

Read the following story of Anke and her sister and answer the question.

Yes indeed, what now? What would you do if you get in the situation of Anke and her sister?

- Let it go because that is nature
- Call the emergency number 144
- Take home and see what you can do for the seagull
- Otherwise, namely.....

Question 5

The Animal Emergency Foundation can easily be linked to the reporting number 144.

Can you think of three other organizations that can be linked to the reporting number? If yes, fill them in below:

- Organization 1)
- Organization 2)
- Organization 3)

Question 6

Read the following story of Jorinde and answer the question.

The screenshot shows the homepage of 'Dieren Nieuws'. At the top, there is a search bar with the text 'Zoeken: Oehoe...' and a 'Go' button. To the right of the search bar are two promotional banners: one that says 'Blijf relaxed, zelfs als u verliest..' and another that says 'KOO!' with a picture of a dog. Below the search bar is a navigation menu with links for 'Nieuws', 'Winkel', 'Forum', 'Dierenarts', 'DN TV', and 'Diersoorten'. The main content area features a news article titled 'Dierenverhalen'. The article text describes how Jorinde, a woman from Bathmen, helps sheep by riding a bicycle along a waterway to help them stand up. A photo of Jorinde holding a small cat is visible. To the right of the article is a yellow sidebar advertisement for 'Sashas Blend' dog food, featuring a picture of a dog and text that says 'Beter bewegen met Sashas Blend' and 'Info/Bestellen'. The sidebar also mentions a discount on 250g powder and an extra discount on 250g powder + Flexibites.

Does this story of Jorinde sound familiar to you? Figures show that in the Netherlands yearly more than 800 sheep die because they lay on their back or side and are not able to stand up again.

What would you do if you get in the situation of Jorinde?

- Try to get the sheep up again yourself
- Seek for help at the nearest house
- Call the emergency number 144
- Otherwise, namely.....

Question 7

Read the following statements that are related to the website above (with the story of Jorinde) and state to what extent you agree or disagree:

	Totally disagree	Disagree	A little disagree	Neutral	A little agree	Agree	Totally agree
My attention is first drawn by the advertising strip at the right of the webpage							
The advertising strip is too large for the website							
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Question 8

Read the following story and answer the question.

The screenshot shows the website 'STICHTING ZINLOOS GEWELD TEGEN DIEREN' with the tagline 'WIJ GAAN VERDER WAAR ANDEREN STOPPEN!'. The navigation menu includes HOME, STICHTING, ACTUEEL, INFOLEIN, NIEUWSBRIEF, DONATIE, MELDIJN, VRIJWILLIGERS, and CONTACT. The main content area features a 'DOSSIERS' sidebar with links to 'Regeling Agressieve Dieren', 'Inbeslagname Dieren', 'Falom', 'Dossier D', 'Puppyflat', 'Onderzoek mishandelingen pony's', and 'Wissman/mishandeling paarden'. The main article is titled '18 juli 2011 - Ernstige mishandeling merrie Uffelte' and describes an incident where a horse was hit with a blunt object. A photo shows a woman with a brown horse. A sidebar on the right contains a 'STOP DEZE MANIEREN TEGEN DIEREN' sign. At the bottom, there is a 'NIEUWSBRIEF' sign-up box and a 'TWITTER' link.

When people hear or read stories about abused animals, they are faced with several emotions. *Select the emotions (maximal 2) that best indicate how you feel after reading foregoing story:*

- Joy
- Grief
- Fear
- Rage
- Astonishment
- Horror

Question 9

Did you in the past get confronted with animal cruelty? If so, tell briefly what happened and what action you have taken:

Question 10

Karien Landzaat is for 22 years working in animal rescue. In those 22 years she experienced a lot of nice, but unfortunately also some less nice events. Since 2006 she established her own veterinary practice.

With the use of the website below she attempts to optimally serve her customers.

Check out the website and select the aspects that are most noticeable: (Click on maximal 3 zones)

Question 11

Do you think the practice of Drs Landzaat a suitable place to communicate about the new emergency number? Explain your answer briefly:

Question 12

Read the following story and answer the question.

Het verhaal van Sanne

In de herfst ga ik op zaterdagmorgen vaak met mijn hond in het bos wandelen. Het ruikt er dan altijd zo lekker en alles ziet er mooi uit met die verkleurde bladeren. Laatst ben ik ook weer gegaan. Toen ik de parkeerplaats op kwam gereden stonden er al best veel auto's, logisch want het was schitterend weer. Ik parkeerde mijn auto en haalde mijn Duitse Herder Mischa uit de achterbak. Toen we richting het bospad liepen viel mijn oog op een auto waarvan de ramen helemaal aanbeslagen waren. Toen ik wat dichterbij kwam begon er vanuit de auto een hond agressief te blaffen. Ik besteedde er verder weinig aandacht aan en ben gewoon het bos ingelopen.

Na een wandeling te hebben gemaakt van ongeveer 2 uur en nog een kop thee te hebben gedronken bij de bosherberg, liep ik samen met Mischa weer terug richting de auto. Toen ik de parkeerplaats op liep zag ik dat de auto met de aanbeslagen ramen er nog steeds stond, maar toen ik langs liep gebeurde er niets; geen blaffende hond. Ik kreeg een raar gevoel in mijn onderbuik en legde mijn hoofd tegen het raam van de auto aan zodat ik wat beter naar binnen kon kijken. Ik zag enkel een vage bruine schim liggen op de achterbank, maar door de wazigheid van de ramen wist ik niet zeker of het de hond was of wat anders...



Mistakes are human. Figures from the Central Bureau of Statistics (CBS) show that for the last year, the police had to show up for about 1200 times for false alarms. But should you be on the safe side or haphazardly assume that nothing is going on?

Sanne did choose for the first option and called the emergency number. *How would you have acted?*

- Call the emergency number 144
- Stay and wait for a while until hopefully the owner of the car comes back
- Damage the window of the car
- Otherwise, namely.....

Appendix 2 – questionnaire normal weight exposure condition

Introduction

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Question 6

Read the following story of Jorinde and answer the question.

Dieren Nieuws

Zoeken: Oehoe... Go

Blijf relaxed, zelfs als u verliest...

KOOP!

Nieuws Winkel Forum Dierenarts DN TV Diersoorten

Algemeen

- Redactie/Contact
- NieuwsBrief
- Dossiers/Archief
- Columns
- Nieuw op DN

Service

- DierenInfo
- Verhalen/Jeugd
- Games
- Boeken
- Vacatures
- Links
- Zoeken

Dierenverhalen

Voor haar werk fietst Jorinde elke dag van Bathmen naar Twello, een rit van ruim 14 kilometer langs het water en de weilanden. Zo ook op donderdagmorgen 24 november. Het was grauw en guur en er stond een stevige wind. Op een gegeven moment fietste ze langs een stuk dat redelijk verlaten is omdat er vrijwel geen huizen staan, tot ze een vreemd geluid vanaf het weiland hoorde komen. In eerste instantie wilde ze door fietsen maar kon haar nieuwsgierigheid niet bedwingen en besloot over de sloot heen te springen en het weiland op te lopen in de richting van het geluid.

To haar grote verbazing zag ze dat het geluid werd geproduceerd door een schaap die op zijn zij lag en met zijn poten aan het spartelen was. Nu wist ze gelukkig dat schapen niet zonder hulp weer overeind kunnen komen en voelde zich geroepen om actie te ondernemen.

Beter bewegen met **Sashas Blend**
Info/Bestellen
Voordelig en Effectief!
Korting op 2 of 3 potten 250gr poeder!
Korting op 2 of meer potten **Sashas Flexibites**.
EXTRA korting (10, 15 en 20%) op 250 gr poeder + Flexibites

Does this story of Jorinde sound familiar to you? Figures show that in the Netherlands yearly more than 800 sheep die because they lay on their back or side and are not able to stand up again.

What would you do if you get in the situation of Jorinde?

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- Grief
- Fear
- Rage
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Did you in the past get confronted with animal cruelty? If so, tell briefly what happened and what action you have taken:

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With the use of the website below she attempts to optimally serve her customers.

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Sanne did choose for the first option and called the emergency number. *How would you have acted?*

- Call the emergency number 144
- Stay and wait for a while until hopefully the owner of the car comes back
- Damage the window of the car
- Otherwise, namely.....

Appendix 3 – overview items and scales

Scale	Items	Reliability
Self-esteem	I have high self-esteem	
Dieting behavior	At this moment I try to prevent weight gain	$\alpha = 0.87$
	I plan to actively prevent weight gain	
	For the upcoming holidays I make sure that I do not gain too much weight	
	I exercise to lose weight or to keep weight	
	Are you on a diet at this moment?	
Exercise intentions	I intend to exercise regularly over the next 2 weeks	$\alpha = 0.96$
	I expect to exercise regularly over the next 2 weeks	
	There is no chance that I am going to exercise regularly over the next 2 weeks	
	I am confident that I can fulfill my exercise intentions over the next 2 weeks	
Restrained eating	When you have become a little heavier, do you eat less than you normally do?	$\alpha = 0.88$
	Do you try to eat less at mealtimes than you really want?	
	How often do you refuse to eat or drink because you are afraid of gaining weight?	
	Do you keep an accurate record of what you eat?	
	Do you eat products that help you to intentionally lose weight?	
	When you have eaten too much, do you eat less the following days?	
	Do you intentionally eat less to prevent weight gain?	
	How often do you try not to take snacks because you are watching your weight?	
	How often do you try not to eat at night because you are watching your weight?	
	Do you consider your weight when you eat?	

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