WAGENINGEN
UNIVERSITY & RESEARCH

Supervised by:
Ellen van Kleef
Second reader:
Betina Piqueras Fiszman

The impact of student's beliefs about key causes of weight gain on their motivation to eat healthy and exercise regularly

Differences between vocational school students and academic students

BACHELOR THESIS

May 17, 2017
Authored by: Fabian Stoldt
Student Number: 970129807010
Course Code: YSS-82312

Abstract

Obesity has been quite the problem in recent years. Following in the footsteps of McFerran & Mukhopadhyay, who have linked certain lay-theories to a higher BMI, the aim of this research was to see if the belief in a certain lay-theory of obesity had an influence on student's motivation to either exercise or follow a proper diet. A total of 222 participants completed the survey, 90 of which were vocational students and 132 were academic. The results obtained in this survey were used in multiple regression analyses. There were several positive significant relationships, the most important ones implying that believing a proper diet is more important in weight management leads to more motivation to exercise and diet properly. A mediator was also found, implying that motivation is mediated by self-efficacy. Differences between the two educational groups were not found. The results from this research imply that when targeting young people, the beliefs they hold about obesity must be considered in order to target them effectively.

Table of Contents

Introduction 1

Theoretical Background 4

Beliefs 4

Lay-theories 4

Lay-theories in obesity 4

Motivation to manage bodyweight 6

Mediating factor: Self-Efficacy 7

Moderating Factor: Educational level 8

Conceptual model 8

Methodology 9

Respondents 9

Procedure and Measures 9

Data analysis 11

Descriptives 12

Results 13

Descriptives 13

Belief in exercise theory and its effect on motivation to exercise (H1) 13

Belief in diet theory and its effect on motivation to diet properly (H2) 14

Mediator of self-efficacy 15

Moderator of educational level 17

Conclusion & Discussion 20

Interpretation of results 20

Limitations to research 21

Further research 22

Implications of research 22

Appendix 24

Questionnaire 24

List of references 29

Beliefs of people about key causes of weight gain and impact on motivation to eat healthy and exercise regularly; differences between vocational school students and academic students

Introduction

Obesity, which is defined as 'excessive fat accumulation that may impair health' by the WHO (2016), has been proven to increase the risk of contracting a host of different diseases such as multiple types of cancer, osteoarthritis and cardiovascular diseases (Carroll, Flegal, Johnson & Kuzmarskci 1998; WHO, 2016; Hu, Li, Van Dam & Zhang, 2008). The increase in obesity is not a recent problem and had already been noticed by Garn et. All (1976) and the trend continued from there (Popkin & Doak, 1998). This means that obesity is not a new problem, but it has increased in gravity in recent years (NIDDK, 2012). Karnik and Kanekar (2015) even call the recent increase in childhood obesity a 'Global public health crisis', expressing the importance and intensity of this matter.

The implications of this statement are demonstrated by Lobstein, Baur & Uauy (2004), who claim that the current childhood obesity rates will lead to increased healthcare costs in the future. A whole generation of increased child obesity would lead to an almost equally large generation of obese adults, as only 20% of the people who attempt weight loss maintain it in the long-term (Phelan & Wing, 2005). The burden on national health services are not the only cost of childhood obesity though. Lobstein, Baur & Uauy claim that it also has psychosocial consequences, such as bullying or lower self-esteem (Dettmer, McCrindle, Hamilton & Walpole, 2011).

Welker, Lott & Story (2016) prove once more that the school food environment is particularly important when it comes to influencing children's diets. Children however consider buying unhealthy food outside of the school environment for several reasons, such as affordability and social status, and thus the effectiveness of school interventions is limited (Caraher, Lloyd, Mansfield, Alp, Brewster & Gresham, 2016).

Despite efforts by the Dutch government to combat the gaining of weight and to support and advise people trying to lose weight, obesity is still on the rise. At this moment alone there are 28 campaigns which are officially

supported by the Nederlands Jeugd Instituut (2016), as well as efforts by schools to improve their cafeterias in the field of healthy choices (Rijksinstituut voor Volksgezondheid en Milieu, 2016). Yet there only seems to be little improvement, or even retrogression (Centraal Bureau voor Statistiek, 2015)!

The behavior of human beings is guided by things they believe in, whether they are scientifically substantiated or not (Perloff, 2014). Then why don't these interventions seem to work? Surely people believe that being healthy is important? The key to understanding why might be found in 'lay theories', which are "important because they guide actual goal-directed behaviours" (McFerran & Mukhopadhyay, 2012). They can be described as the beliefs ordinary people hold about anything, regardless of the fact if they are supported by facts or not. Dweck (2000) has found that the effect of these 'naïve beliefs' on actual behavior is strong. There are plenty of examples of lay-theories having predictive value, such as the research done by Neel & Shapiro (2012) which proved that Lay-theories held by Caucasian people had an effect on the way they decided to act when encountering an interracial interaction.

Research has also demonstrated that people have different beliefs about the causes of being overweight or obese. More specifically, in a series of studies Mcferran & Mukhopadhyay (2012) have proven that these lay-theories about the causes of obesity predict Body Mass Index (BMI). Three different lay-theories were measured; exercise and dietary changes were found to be the most important factors. Genetics was also mentioned but turned out to be insignificant. The studies show that people who consider exercise to be the most important factor are usually fatter and that those who believe a diet is the wat forward usually have a lower, self-reported BMI. The authors argue that their findings can be explained by the fact that lay theories impact actual food choices. People who believe that diet isn't the cause therefore eat more calories and become fatter.

When people feel that their body weight is fixed or under limited personal control, it is likely that they are less motivated to change their eating behavior. The influence of lay theories of obesity on the motivation to eat healthy and exercise has not been studied before, even though motivation has been shown to be essential in sustaining a healthy lifestyle (West et al., 2010; Tigay et al., 2016). Many effective weight loss programs aim to build on an enhanced intrinsic motivation to eat healthy and exercise,

which is the motivation from within the person (Richard et al, 1997;Ryan & Deci, 2000). Interestingly, there is no literature concerning the specific combination of the lay-theories and the motivation to manage weight amongst the younger generation. Yet both of the theories have proven to be of influence on a healthy lifestyle. The aim of this study is to understand the relation between lay theories and the motivation to eat healthy and exercise. I expect that there must be a connection between these two factors and I will try to create a model which can be used to explain the behavior of our younger generation.

In addition, this paper will study two different groups; one will be the vocational students and the other will be academic students. Overall the vocational students are considered a more vulnerable group, as shown by Van Houtte, Demanet & Stevens (2012). They demonstrate that academic students have higher self-esteem than vocational students, which in turn means that they are less likely to be overweight and more likely to have a healthier lifestyle (French, Story & Perry, 1995). That is why the difference between the two groups is also an interesting factor that could suggest different approaches should be used for nudging each group into a healthier lifestyle.

The serious threat that obesity poses to our future generations seems self-evident. In this war against one of the greatest threats to our future generations, knowledge is our greatest weapon. It has been proven that lay theories and intrinsic motivation have an effect on the proficiency which people have in managing their weight. There is however a gap between these two pillars which this paper will try to bridge. It is not yet clear whether the beliefs held about obesity by someone have an influence on their motivation to manage weight. At the end of this paper there will be some clarity about the relation between these two factors and how this relationship works in the world-leading generation over the coming three decades.

Theoretical Background

Beliefs

Behavior is partially guided by beliefs. Beliefs are ”cognitions about the world – subjective probabilities that an object has a particular attribute or that an action will lead to a particular outcome” (Fishbein & Ajzen, 1975) and mostly underlie a value, “Overarching goals that people strive to obtain” (Maio & Olson, 1998). These beliefs can be split up into two different types of beliefs; descriptive beliefs are beliefs about how the world works, prescriptive beliefs are beliefs about how the world should work (Perloff, 2014). These beliefs need not be factually supported. In order to better understand why these theories guide behavior, a field of research has opened up concerning how beliefs influence behavior of ordinary people, or laymen.

Lay-theories

The behavior which is demonstrated by people around the world can be explained in two different ways. One would be the scientific way, in which the factual cause is researched and problems which can be solved to solve the whole puzzle are found, examples of this would be poverty or crime. The other would be the one of interest here, in which the beliefs of common people guide behavior, also called implicit or non-scientific research (Argyle, 2013).

Ross & Nisbett (1991) define lay-theories as “what ordinary men and women believe about the existence and power of individual differences in personality”. This definition is one which best sums up the definition of lay-theories which this paper will adhere to. Lay theories are commonly scientifically unsubstantiated and therefore the term is often interchanged with the term ‘naïve-beliefs’, like in the research done by Van Boven, Dunning & Loewenstein (2000) concerning the endowment effect.

Lay-theories in obesity

Research done by Burnette (2010) has shown that the so-called implicit theories held by respondents predicted dieting success and the subsequent self-regulatory strategies. These theories consisted of either incremental or entity theorists, which means that people believe something is fixed and cannot be changed (entity) or that they are responsible (incremental).

Burnette (2010) conducted 3 studies in which he tested and confirmed the hypothesis that the entity theorists were especially unlikely to self-regulate after a setback, contrary to the incremental theorists. Furthermore the entity theorists were more likely to cope by avoiding, which means they chose to ignore the entire problem. Crum & Langer (2007) showed that the idea people held about the intensity of their daily work had an effect on weight loss, suggesting a placebo-effect for exercise. This research was done by using 84 female workers at a hotel; telling half of them that their work was highly intensive and the other group nothing. This resulted in self-reported higher activity even though there was no actual change in behavior. More fascinating however is that they actually became healthier. This and more research (Lee, 2003; Lee & Ha, 2003; Ryu & Toon, 1998) proves that the mind has a strong effect on weight and the regulation of it. That is why results from McFerran and Mukhopadhyay (2013), showing that people who held the belief that exercise was more important than a healthy diet tended to have a higher BMI, are hardly surprising when considering their argumentation that people will then still consume too many calories. As this is the only study specifically researching this and it will be partially reproduced within this study, the details of it will be discussed.

McFerran and his colleague found overwhelming evidence that what people believe influences their lives significantly (Wyer, 2004; Robins & Pals, 2002; Dweck, 2000). They wondered whether this would hold true for obesity as well, so they conducted six different studies in order to prove the existence and effect of these ‘lay theories of obesity’. These six studies are all summarized shortly in Table 1 below.

McFerran and Mukopadhyay discuss the fact that there is enough supporting evidence to conclude that there is a relationship between the two, but that there is not enough to prove that one causes the other. Whether the belief causes obesity or if obesity causes the belief as a coping mechanism cannot be inferred from this research. This leads to another interesting point though, one that will be addressed in this study.

Table 1 – McFerran & Mukhopadhyay (2013) summary

Study 1 Pretests already confirmed that people most commonly ascribe obesity to one of 3 factors; Exercise, diet or genetics. 301 Koreans were asked to indicate which of these 3 factors was most important. Diet (50.4%) and exercise (41.3%) were deemed most important, genetics accounted for 8.3%. It also showed that people who believe exercise was the most important factor were fatter.	**Study 2** As there were not control variables in Study 1, they were added here. Amongst 84. US residents variables such as sleep deprivation or stress, which are also known to cause obesity, were controlled for. Still the effect of belief in exercise and a higher BMI stayed significant, supporting the findings in study 1.	**Study 3** Study 2 was replicated amongst 303 French participants with several additional control variables such as tobacco-use or self-esteem. The strength between the dietary belief and lower BMI was measured in two different ways and both still reported a significant result.
Study 4 To make sure that priming did not affect the results of the study, 251 US respondents were asked to do an open-ended questionnaire about obesity. Once again, the exercise group had a significantly higher BMI than the dietary group. The groups which cited both beliefs were at the approximate midpoint between the two.	**Study 5** In order to test if people who believe exercise is more important are more likely to have a high caloric intake, 172 students from the US were asked to do a questionnaire. They were allowed to snack during the process. It turned out that people who believed exercise was the more important factor ate significantly more candies.	**Study 6** 93 students from Honk Kong were asked to read a theory about either exercise or diet being the main factor in obesity. Like in study 5 there was 'left-over candy from the previous study', which was free to consume. It turned out that people who were primed with the exercise theory ate significantly more candy.

Motivation to manage bodyweight

Motivation is a term that needs to be clarified. In order to do this a basic division can be made; It consists of two parts; Intrinsic and extrinsic. The difference is obvious, whereas intrinsic motivation is the motivation to do something solely for the purpose of doing it, extrinsic motivation is the motivation which is there to achieve any goal which lays outside of the self (Ryan & Deci, 2000). There is however a middle ground, which is called internalized extrinsic motivation (Gagné & Deci, 2005). In this form of motivation, the values and goals of the extrinsic motivation are internalized which transforms extrinsic into intrinsic motivation.

The relevance of this to my paper is that motivation has been proven to be an important factor in weight-loss & weight-management (Williams et al., 1996), healthier dieting (De Ridder, De Wit & Adriaanse, 2009) and in exercising (Thøgersen-Ntoumani & Ntoumanis, 2006). McFerran and his colleague have proven that there is a direct correlation between BMI and a lay person's beliefs. With both of these factors being scientifically

proven to have an effect on the same thing, it is the goal of this research to confirm that and to see if there is a relation between these factors.

H1: *The belief that a lack of exercise is the main cause of obesity has a significant positive effect on the motivation to exercise in order to positively affect weight.*

H2: *The belief that a lack of proper diet is the main cause of obesity has a significant positive effect on the motivation to eat healthy in order to positively affect weight.*

Mediating factor: Self-Efficacy

There are several factors which could possibly explain why lay theories impact the motivation to manage bodyweight. These factors are called mediating factors, an important possible mediator in this respect could be self-efficacy. Self-efficacy or 'the extent and strength of the beliefs in their own ability to complete tasks' (Ormrod, 2006) is one of the most important factors which influences behaviour change directly. It has been subject to a lot of research. Lubans, Foster & Biddle (2008), which will be called **Study 1**, have reviewed multiple studies which concerned the promotion of physical activity amongst school-going children. The point of this review was to find whether or not there were any mediators which had a significant impact on the result in multiple studies and thus could be considered factual. Another study done by Lewis et al (2002) **(Study 2)** did the same thing, but they also considered adults. The results from these meta-studies will be where this part is based upon.

Study 1 found that roughly 57% (4/7) had self-efficacy as a significant mediator, 70% (7/10) of the studies in Study 2 found the same thing. It is not strange to think that the extent to which one believes that there is something that can be done directly affects their willingness to try. This factor might influence this study due to the fact that if people believe that exercise is the more important factor but their self-efficacy is low regarding it, then they might say that they are more inclined to try a new diet. Thus it is important that not only the answer is measured, but also the underlying attitudes, beliefs and assumptions.

H3: *Self-efficacy has a mediating effect on the effects between the beliefs held about obesity and the motivation to change behaviour.*

Moderating Factor: Educational level

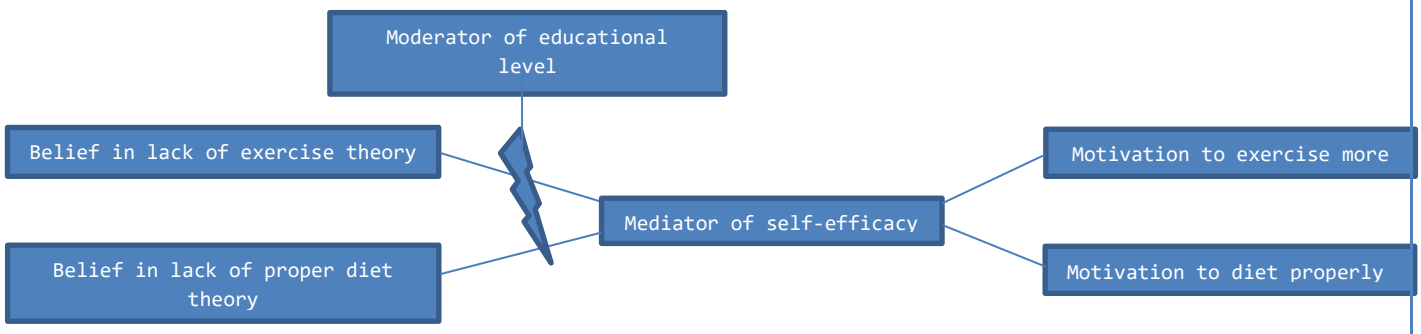
The study will concern two different groups of people. As discussed in the introduction not only academic students, but also vocational students will be the focus of this research. This is because I assume that these groups represent two different societal layers. We have come to this assumption by looking up statistics about vocational students which end up with an academic degree and coming up with some meagre results. Thus we assume that these two groups rarely mingle.

The difference between these groups, as Brown, Multon & Lent (1991) proved, is that self-efficacy is directly correlated with academic performance, which is why we assume that it is lower for the vocational students than the academic students. This could have a profound effect on the results, as it is one of the two mediators.

Molarius and colleagues (2000) provide us with another reason for making the difference. According to their research a lower educational level is directly linked to a higher BMI. This might have to do with the tendency for people of a lower socio-economic class, who have less money to spend, to have less concern for a more expensive, healthier diet (Darmen & Drewnoski, 2008).

H4: *There is an interaction effect between lay theories and educational level in that for vocational students, the hypothesized relationship is stronger.*

Conceptual model



Methodology

The setup of this research was a survey to examine the relationships displayed in the conceptual model. Respondents were asked to complete a questionnaire. It must be mentioned that part of the questionnaire and data collection were done in cooperation with Krüger (2017).

Respondents

For the two target groups, 'academic' and 'vocational', there were different approaches to recruit participants. The academic students required less effort, as there was a lot of access to a huge pool of possible respondents. I believe that academic students are more willing to fill in a questionnaire, which called for a more direct approach on vocational students. Thus the academic respondents were reached by spreading the questionnaire out through social media and the vocational students were reached by direct approach.

Procedure and Measures

In order to get academic respondents the questionnaire was distributed using Facebook; pages like the 'Wageningen Student Plaza' and several other groups in which students can be found, were used. Whatsapp was also used to distribute the questionnaire amongst friends and colleagues.

To be able to reach the vocational students, Krüger (2017) and I positioned ourselves in a vocational school's cafeteria and actively engaged these students. This was done on Tuesday March 21, 2017 at the Vakschool Rijnijssel Wageningen between 11:00 and 14:00. Tom Krüger and I walked around the school cafeteria with 2 iPhones and an iPad for people to fill out the questionnaire with. We introduced ourselves and asked them if they were prepared to fill in the questionnaire to help us with our research. This resulted in a total of 92 completed surveys.

The questionnaire consisted of three stages. In the first stage it started off with the signing of an informed consent. Following that some **demographical questions** were asked, to make sure the right group could be filtered out. These questions were about gender, age, academic level, weight and height. This had to be done because especially the social media platforms could get some non-qualified respondents. Subsequently, questions were asked in order to determine which belief these respondents held. Two

of the three items were on a 7-point Likert scales ranging from completely disagree to completely agree. The first items being about the construct **belief in lack of exercise theory** ('Too little exercise is the main cause of obesity' and 'exercise is the most important when it comes to maintaining a healthy weight'[1]) and the second about **belief in lack of proper diet theory** ('A bad diet is the main cause of obesity' and 'A healthy diet is the most important when it comes to maintaining a healthy weight'). The last item was a slider, where the respondent could slide between 'Bad diet' on one side and 'lack of exercise' on the other. These questions were loosely based on the few questions that McFerran and Mukhopadhyay (2012) have published in their research. This was done to divide the respondents into two useable groups. The choice of belief does not further influence the trajectory of the questionnaire. All respondents answered the same questions in the same order.

In the second stage questions were asked about the mediator (**self-efficacy**) which was chosen. These questions were all on a 7-Likert-Scale and were in the same format as the ones in Muris' (2001) guide for measuring self-efficacy among youths. Three items were used to measure self-efficacy, in order to not make the questionnaire too long. These questions were 'I can motivate myself well to exercise', 'I can motivate myself well to eat healthy' and 'I can motivate myself well to work on my weight'.

In the third and last stage questions were asked about motivation. In order to measure this construct questions were borrowed from Markland & Ingledew (1997), who have researched motivation to exercise before. There were two sets of three questions, one about **motivation to exercise** and one about **motivation to diet properly**. The first set concerned exercise ('I exercise to get/keep a healthy body', 'I exercise to get/keep a healthy weight' and 'I exercise to burn calories') and the second set concerned food ('I eat healthy to get/keep a healthy body', 'I eat healthy to get/keep a healthy weight' and 'I eat healthy to become/stay healthy')

The questionnaire also partially consisted of questions about constructs which Krüger (2017) was measuring. Finally, gender, age, and educational level were asked.

[1] All questions translated from Dutch

In order to see if the questionnaire measured what was aimed for and thus to see if the results of the research can be trusted, a Cronbach's Alpha test was done. Cronbach's Alpha is a test which tells if the scales that have been used are internally consistent.

Table 2 - Cronbach's Alpha

Item	Cronbach's Alpha
Belief in exercise theory	.695
Belief in proper diet theory	.596
Self-efficacy	.705
Motivation to exercise	.822
Motivation to diet properly	.796

We can see that the Cronbach's alpha is overall good, the only exception being 'Belief in proper diet theory'. The Cronbach's alpha scale which is mostly used defines alpha's between 0.5 and 0.6 as Poor, .596 is however on the border to 'Questionable'. With a lack of resources to re-do this, the scale will be used. The results concerning this specific variable should always be looked at through a critical lense. For most of the scales, which were constructed from only two questions, it was pointless to do an 'Alpha if item deleted'. For the scales with three or more questions, the alpha if deleted didn't offer an improvement so they were not included.

Data analysis

In order to ensure good working conditions, the dataset was cleaned up. The exported data was first rid of all the useless information such as the Latitude, IP address and duration. Then the 232 respondents were sorted using the 'Progress' variable, so all invalid respondents could be filtered out. Out of the 232 people, 10 did not finish the questionnaire. Five of these stopped before they even started, only having clicked the informed consent. The other five were all from the 'academic' group and there were two 19-year olds and three 20-year olds. Everyone was checked on the informed consent and all of the 222 had approved. To finish off the organising, the now rendered useless variables such as informed consent and whether or not they had finished were also deleted.

Descriptives

The data was subjected to the recoding of 2 variables and the computation of another. The educational level of the respondents was recoded into a new variable; 1-4 became 1, which contained VMBO, HAVO, VWO and MBO and is the vocational group. 5-6 became 2, which contained HBO & WO and is considered the academic group. The division is based upon the division made by the CBS. Then another variable was computed, BMI. The following formula was used: BMI = (Weight in kilograms/((height in centimeters)/100)*(height in centimeters)/100))). The results of this computation where then recoded into the 4 different health groups determined by the WHO: 'Underweight 0-18.49 (1)', 'Normal 18.50-24.99 (2)', 'Overweight 25.00-29.99 (3)' en 'Obese 30> (4)'.

After having done this the group looked as follows, calculated using the descriptive statistics. 30.6% males and 69.4% females, of which 40.5% was vocational and 59.5% were academic students. The average age was 19.8 and the average BMI was 22.9, which is healthy.

Results

Descriptives

The difference between the vocational and academic groups can be seen in Table 2 below. To see if the samples were significantly different from each other they went into an Independent sample T-test, testing for the difference in age (significant with a p<.001), male/female ratio (not significant with a chi-square statistic of .016 and a p=.898) and BMI (not significant with a p=.987). All in all one could say that there are hardly any differences between the two groups, except for the fact that the academic group is significantly older.

Table 3 - Descriptives

Subject	Vocational	Academic	P-value
Age - Average	18.5	20.7	<.001
Males - Count	28	40	
Males - Percentage	31.1	30.3	
Females - Count	62	92	
Females - Percentage	68.9	69.7	.898
BMI - Average	22.9	22.9	.987
BMI - Underweight	7	15	
BMI - Normal	62	92	
BMI - Overweight	17	20	
BMI - Obese	4	5	

Belief in exercise theory and its effect on motivation to exercise (H1)

The first hypothesis assumes that there is a positive significant relationship between the belief in the theory of exercise and the motivation to exercise. Other factors were also included in the analysis, such as the demographics and the belief in proper diet theory. Weight has been measured using BMI, because otherwise it would not be a good indication of 'fatness'.

Table 4 – Regression H1

Independent variables	Motivation to exercise		
Psychological factors	*Beta*	*t-value*	*p-value*
Belief in exercise theory	.092	1.317	.189
Belief in proper diet theory	.239	3.446	.001
Demographical factors			
Educational level	.034	.427	.670
Age	-.083	-.1.032	.304
Gender	.142	1.593	.113
Weight	.139	2.040	.043
Adjusted R2	.096		

H1: *The belief that a lack of exercise is the main cause of obesity has a significant positive effect on the motivation to exercise in order to positively affect weight.*

This hypothesis cannot be confirmed. The belief in lack of exercise has a non-significant p-value (p=.189 > α=.05), which means that there is **no significant relationship between the belief in lack of exercise** and the **motivation to exercise.** However, there is a significant relationship for 'belief in proper diet theory' (p=.001 < α=.05) and for weight (p=.043 < α=.05), implying that people who believe a proper diet is the way to go are more inclined to exercise, just as heavier people are.

Belief in diet theory and its effect on motivation to diet properly (H2)

The second hypothesis assumes a positive, significant relationship between the belief in proper diet theory and its effect on motivation to diet properly. To make sure the results are proper, I controlled for the demographic factors age, gender and educational level as well as for the belief in exercise theory.

Table 5 - Regression H2

Independent variables	Motivation to diet properly		
Psychological factors	*Beta*	*t-value*	*p-value*
Belief in exercise theory	-.012	-.190	.850
Belief in proper diet theory	.332	5.079	<.001
Demographical factors			
Educational level	.152	2.003	.047
Age	.031	.407	.684
Gender	.141	1.674	.096
Weight	.024	.380	.705
Adjusted R2	.168		

H2: *The belief that a lack of proper diet is the main cause of obesity has a significant positive effect on the motivation to eat healthy in order to positively affect weight.*

We can conclude that this hypothesis is confirmed. The regression analysis proved that there is a **significant, positive effect of belief in proper diet theory** on **the motivation to diet properly** ($p<.001 < \alpha=.05$). There was also a difference in the educational level ($p=.047 < \alpha=.05$), with a more lenient $\alpha=0.10$ gender would have also been significant ($p=.096$). This would have implied that females would have been more motivated to diet properly than males.

Mediator of self-efficacy

Three different methods were used to determine whether there is a significant change in the results when the mediator was added. We start off, however, by determining which factors influence the variable of self-efficacy. This is done to check whether there are things which influence self-efficacy, which could in turn then play their role in self-efficacy's mediating influence.

Table 6 - Regression Self-efficacy

Independent variables	Self-efficacy		
Psychological factors	*Beta*	*t-value*	*p-value*
Belief in exercise theory	.160	2.587	.010
Belief in proper diet theory	.318	3.964	<.001
Demographical factors			
Educational level	.320	1.668	.097
Age	-.051	-1.197	.233
Gender	-.102	-.595	.553
Weight	-.019	-.911	.363
Adjusted R2	.150		

It can be seen that there is no other factor beside the two theories which influences self-efficacy. With a more lenient α=0.10 however, the educational level would significantly influence the self-efficacy.

Now to determine whether self-efficacy is a significant mediator, 3 different methods were used. The r^2-change, which checks if the adding of a mediator significantly changes the r^2, Sobel's test and the new method of bootstrapping. The first table was in regard to check for mediation in **H1**.

Table 7 – Mediation in H1

Independent variables	Self-efficacy		
R^2-change method	*R^2*	*R^2-change*	*Sig. F-change*
Results	.265	.054	.034
Sobel's test	*Effect*	*Z-score*	*P-value*
Results	.088	2.413	.016
Bootstrapping	*Effect*	*L-bound*	*U-bound*
Results	.088	.022	.175
Increase of H1	β=.121	P=.110	Non-significant

From this table we can conclude that **self-efficacy has a mediating effect** when using it in the same regression as in H1. We can conclude that self-efficacy account for roughly 10% of the total model.

Table 8 - Mediation in H2

Independent variables	**Self-efficacy**		
R^2-change method	*R^2*	*R^2-change*	*Sig. F-change*
Results	.350	.139	<.001
Sobel's test	*Effect*	*Z-score*	*P-value*
Results	.174	3.445	.001
Bootstrapping	*Effect*	*L-bound*	*U-bound*
Results	.174	.079	.303
Increase of H2	B=.337	P=.001	Significant

We can conclude that there is also a significant mediating effect to be found in H2. It is even larger than the one to be found in H1, meaning that self-efficacy is more important when it comes to proper dieting. Interestingly, weight is no longer a significant predictor (p=.052).

H3: *Self-efficacy has a mediating effect on the effects between the beliefs held about obesity and the motivation to change behaviour.*

This hypothesis stands proven. The mediating effect is shown consistently by 3 well-known mediator tests. This means that self-efficacy definitely has an effect on the results obtained for H1 & H2.

Moderator of educational level

The centralised educational variable was multiplied with each lay theory in order to get two moderator variables. These interaction term variables were then put in the regression analysis to see whether they are having a significant on the two dependent variables. Results show that this was the case only for exercise on diet (interaction term p=.037, b=.157), the other were not significant. The full results can be seen in table 6 below.

Table 9 - Moderation in H1

Independent variables	Motivation to exercise		
Psychological factors	*Beta*	*t-value*	*p-value*
Belief in exercise theory	.097	1.355	.177
Belief in proper diet theory	.234	3.280	.001
Demographical factors			
Educational level	.051	.208	.835
Age	-.094	-1.174	.242
Gender	.064	.963	.336
Weight	.140	2.004	.046
Moderator of educational level	-.005	-.020	.984
Adjusted R2	.061		

This analysis shows us that there is no moderation effect of educational level. In other words, the analysis shows that the effect of believing in lay theories on the motivation to exercise and eat healthy is not different among high and low educated participants.

Table 10 - Moderation in H2

Independent variables	Motivation to diet properly		
Psychological factors	*Beta*	*t-value*	*p-value*
Belief in exercise theory	-.034	-.513	.609
Belief in proper diet theory	.368	5.007	<.001
Demographical factors			
Educational level	.810	2.330	.021
Age	.027	.358	.720
Gender	.182	2.943	.004
Weight	.035	.542	.589
Moderator of educational level	-.672	-1.956	.052
Adjusted R2	.061		

We can see in this table that our moderator (interaction between educational level and lay theory….) is nearly significant. When checking for the others however, we can see that when the moderator is added into the equation the 'educational level' variable is suddenly significant.

H4: *There is an interaction effect between lay theories and educational level in that for vocational students, the hypothesized relationship is stronger.*

At a significant p-value cut-off at $p<0.05$, results are insignificant. This implies that the results do not differ between the two different groups of educational levels. At $p=.052$, some consider these results marginally significant. Meaning that there is an effect but it is not considered strong.

Conclusion & Discussion

The goal of the research was to answer this question: 'Are there significant relationships to be found between lay-theories of obesity and motivational aspects of weight-management?' I found that amongst young people, a stronger belief in the importance of a proper diet resulted in more motivation to manage weight. Not just motivation to diet properly, which was the hypothesized relationship, but also the motivation to exercise more was positively influenced by the belief. There was however, no positive relationship between belief in the exercise theory and the motivation to exercise. I also found that the effect of beliefs on motivation is mediated by self-efficacy, which is as expected. In contrast to the hypothesis though, there was no difference between the two educational groups.

Interpretation of results

The positive, significant relationship between the belief in proper diet theory and the motivation to diet properly is one that has not been explicitly researched. There are multiple studies which research the effect of knowledge about proper dieting (Miller & Cassady, 2012;Paquette, 2005) and environmental factors (Wechsler, Devereaux, Davis & Collins, 2000; Brug, 2008). I will argue that these studies indicate that an underlying belief guides behaviour, which is what I have attempted to prove. The results of this paper suggest that a persuasive campaign on behalf of proper dieting could actually results in a healthier community. This will only work however, when the persuasive campaign manages to challenge the 'wrong' beliefs and reinforce the 'good' beliefs. The information that people are actually more motivated to eat healthy when they believe that it will benefit their health seems like a dead give-away, however it should be considered invaluable when considering that there is no positive significant relationship between the belief in lack of exercise and the motivation to manage weight (neither exercise more nor diet properly). This information is thus valuable, as it implies that campaigns should be focussed on the dietary side of weight-management rather than the exercise-side.

The fact that a positive relationship between 'belief in lack of exercise' and 'motivation to exercise' hasn't been proven might be explained by the

simple fact that they are generally less motivated. McFerran & Mukhopadhyay (2013) already showed that those who believe in the 'lack of exercise' theory are inclined to have a higher BMI, suggesting that they are not as motivated to do anything about their weight as the group who believe in the 'proper diet theory'.

The mediating effect has been found to play a role in a countless other research, Scholz, Doña, Sud, & Schwarzer (2002) have done a meta-analysis in which they proved it to be consistent over 25 different studies. This it is another important factor to be considered. It suggests that when targeting youths, one should consider trying to boost their targets self-efficacy in order to make the desired effect stronger. This is not revolutionary though, as previous researchers have already found a positive effect of self-efficacy on the motivation to manage weight (Linde, Rothman, Badlwin & Jeffery, 2006; Bernier & Avard, 1986).

The non-significant results of the educational level moderator could be explained by a number of things. First of all there is a significant age difference between the two groups, meaning that differences between these two groups that were compared were significantly different on another factor. Secondly, the idea that academic students are more educated in general might not apply to this specific field. Finally, the two groups might just not be as different as expected.

Limitations to research

There have been some issues in the gathering of data. The most obvious being a lacking access to a pool of respondents, especially when it comes to the vocational students. This is mostly due to a lack of time, resources and reputation, which are all factors which enable a more comprehensive gathering of data.

There was also the issue of having to create a non-intensive questionnaire, as to ensure a willingness to cooperate by the respondents. This is might have influenced the results, as some of the constructs might have benefitted from a greater amount of questions.

The validity of this research is overall decent. Most of the constructs had a Cronbach's Alpha of >.70 or very close to it, indicating that the constructs were internally homogenous. The results obtained for the 'belief in proper diet theory' should be looked at through a more critical lens.

There is another issue with the validity, which stems from the small sample size that was used.

Further research

This research has gone down a unique path, combining lay-theories of obesity, motivation to manage weight and self-efficacy into one model. The implications of this research might have far-reaching consequences, such as a whole new approach to public health management and persuasive campaigns. There are however a few T's to be crossed and I's to be dotted.

The fact that the belief in the exercise theory does not influence one's motivation to exercise is strange. There must be other factors which influence the motivation to do so, such as enjoyment, competition, stress management or appearance (Kilpatrick, Hebert & Bartholomew, 2005). Combining research into those factors with this research might lead to a more comprehensive understanding of what gets people moving in the right direction.

It would also be a good idea to set this research up in an experimental way, to see if participants can be manipulated. A design in which people are persuaded into the opposing lay-theory might give a useful framework from which to design even more effective persuasive campaigns.

I would also advise future researchers to gather more data, so that factors such as a significant age-difference between the two educational levels cannot play a role. The results were also obtained in Wageningen, which is notorious for its focus on health and food. Not only the academic students, but also the vocational students (it was a baking school). A broader sample might create different results.

Implications of research

This research has paved the way to a better understanding of what drives people to be aware of their weight and what influences it. Self-efficacy has once again been shown to be of importance in this process and I hope that this will make policy-makers realize that in order to successfully implement public-health programs; one should not just play with the lay-theories but also recognize psychological factors play an important role. Now I do realize that Rome was not built in a day, but nonetheless half a

loaf is better than none. In order to make sure that the future generations of this planet do not end up like those in Disney Pixar's Wall-E, I advise that the results of this research are taken seriously and that more in-depth research will be done.

Appendix

Questionnaire

Het invullen van de vragenlijst zal ongeveer 5 minuten duren. Als deelnemer aan dit onderzoek blijf je geheel anoniem. Er zijn geen risico's of voordelen verbonden aan het invullen van de vragenlijst. Je kunt op ieder moment beslissen om te stoppen met invullen. Voor eventuele vragen kun je contact opnemen met Fabian Stoldt (Fabian.Stoldt@wur.nl). Door op 'ja' te klikken geef je aan dat je bovenstaande hebt gelezen en ermee instemt;

- ❍ Ja, ik doe mee aan dit onderzoek. (1)

Q1 Ik ben een

- ❍ Man (1)
- ❍ Vrouw (2)

Q2 Welke opleiding volg je?

- ❍ VMBO (1)
- ❍ HAVO (2)
- ❍ VWO (3)
- ❍ MBO (4)
- ❍ HBO (5)
- ❍ WO (6)

Q5 Hoe oud ben je?

_____ Leeftijd (1)

Q6 Wat is je gewicht?

_____ Gewicht (kg) (1)

Q7 Hoe lang ben je?

_____ Lengte (cm) (1)

Q9 De volgende stellingen gaan over sporten. Geef aan in hoeverre je het eens of oneens bent met de stelling.

	Helemaal mee oneens (1)	Mee oneens (2)	Een beetje mee oneens (3)	Neutraal (4)	Een beetje mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Te weinig sporten is de hoofdoorzaak voor overgewicht (1)	❍	❍	❍	❍	❍	❍	❍
Sporten is het allerbelangrijkst om op een gezond gewicht te blijven (2)	❍	❍	❍	❍	❍	❍	❍

Q10 De volgende stellingen gaan over eten. Geef aan in hoeverre je het eens of oneens bent met de stelling

	Helemaal mee oneens (1)	Mee oneens (2)	Een beetje mee oneens (3)	Neutraal (4)	Een beetje mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Ongezond eten is de hoofdoorzaak voor overgewicht (1)	❍	❍	❍	❍	❍	❍	❍
Gezond eten is het allerbelangrijkst om op een gezond gewicht te blijven (2)	❍	❍	❍	❍	❍	❍	❍

Q31 Wat is de oorzaak van overgewicht? Is dat 'te weinig sporten', 'te veel eten' of 'beiden evenveel'? Geef aan op onderstaande balk._____ 1 (1)

Q18 Geef bij de volgende stellingen aan in hoeverre je het er mee eens bent

	Helemaal mee oneens (1)	Mee oneens (2)	Een beetje mee oneens (3)	Neutraal (4)	Een beetje mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Ik kan mezelf goed motiveren om te sporten (1)	❍	❍	❍	❍	❍	❍	❍
Ik kan mezelf goed motiveren om gezond te eten (2)	❍	❍	❍	❍	❍	❍	❍
Ik kan mezelf goed motiveren om aan mijn gewicht te werken (3)	❍	❍	❍	❍	❍	❍	❍

Q16 Deze stellingen gaan over sporten. Geef aan hoeverre je het eens bent met de stelling.

	Helemaal mee oneens (1)	Mee oneens (2)	Een beetje mee oneens (3)	Neutraal (4)	Een beetje mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Ik sport om een gezond lichaam te krijgen/houden (1)	❍	❍	❍	❍	❍	❍	❍
Ik sport om een gezond gewicht te krijgen/houden (2)	❍	❍	❍	❍	❍	❍	❍
Ik sport om calorieën te verbranden (3)	❍	❍	❍	❍	❍	❍	❍

Q17 Deze stellingen gaan over eten. Geef aan hoeverre je het eens bent met de stelling

	Helemaal mee oneens (1)	Mee oneens (2)	Een beetje mee oneens (3)	Neutraal (4)	Een beetje mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Ik eet gezond om een gezond lichaam te krijgen/houden (1)	❍	❍	❍	❍	❍	❍	❍
Ik eet gezond om mijn gewicht te verlagen/op peil te houden (2)	❍	❍	❍	❍	❍	❍	❍
Ik eet gezond om gezond te blijven/worden (3)	❍	❍	❍	❍	❍	❍	❍

Q20 Deze stellingen gaan over een gezonder voedselaanbod op school. Geef aan hoeverre je het eens bent met de stelling.

	Helemaal mee oneens (1)	Mee oneens (2)	Een beetje mee oneens (3)	Neutraal (4)	Een beetje mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Op school moet minder ongezond eten en drinken te koop zijn (1)	❍	❍	❍	❍	❍	❍	❍
Op school moet meer gezond eten en drinken te koop zijn (2)	❍	❍	❍	❍	❍	❍	❍
Het is heel goed dat scholen minder ongezond eten verkopen (3)	❍	❍	❍	❍	❍	❍	❍

Q24 Als je verder nog opmerkingen hebt voor de onderzoekers, schrijf ze dan hieronder:

Q26 Dit is het einde van de vragenlijst. Als je vaker per e-mail benaderd wilt worden voor online onderzoek van Wageningen Universiteit, schrijf dan hieronder je e-mailadres op. Dit e-mailadres wordt niet aan anderen gegeven. Al je antwoorden worden anoniem verwerkt. Bedankt!

Q28 Hartelijk dank voor je deelname aan het onderzoek! Klik op het pijltje rechts om de vragenlijst in te sturen.

List of references

Ajzen, I., & Fishbein, M. (1975). A Bayesian analysis of attribution processes. *Psychological Bulletin*, *82*(2), 261.

Argyle, M. (Ed.). (2013). *Lay theories: Everyday understanding of problems in the social sciences* (Vol. 17). Elsevier.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, 51(6), 1173.

Benabou, R., & Tirole, J. (2003). Intrinsic and extrinsic motivation. *The Review of Economic Studies*, *70*(3), 489-520.

Bernier, M., & Avard, J. (1986). Self-efficacy, outcome, and attrition in a weight-reduction program. *Cognitive therapy and Research*, *10*(3), 319-338.

Blokstra, A., Vissink, P., Venmans, L. M. A. J., Holleman, P., van der Schouw, Y. T., Smit, H. A., & Verschuren, W. M. M. (2012). Nederland de Maat Genomen, 2009-2010: Monitoring van risicofactoren in de algemene bevolking. *RIVM rapport 260152001*.

Brug, J. (2008). Determinants of healthy eating: motivation, abilities and environmental opportunities. *Family practice*, *25*(suppl 1), i50-i55.

Burnette, J. L. (2010). Implicit theories of body weight: Entity beliefs can weigh you down. *Personality and Social Psychology Bulletin*, *36*(3), 410-422.

Caraher, M., Lloyd, S., Mansfield, M., Alp, C., Brewster, Z., & Gresham, J. (2016). Secondary school pupils' food choices around schools in a London borough: Fast food and walls of crisps. *Appetite*, *103*, 208-220.

Centraal Bureau voor Statistiek. (2015). Gezondheidsmonitor volwassenen.

Centraal Bureau voor Statistiek. (2015). Onderwijsniveau.

Crum, A. J., & Langer, E. J. (2007). Mind-set matters exercise and the placebo effect. *Psychological Science*, *18*(2), 165-171.

Darmon, N., & Drewnowski, A. (2008). Does social class predict diet quality?. *The American journal of clinical nutrition*, *87*(5), 1107-1117.

De Ridder, D., De Wit, J., & Adriaanse, M. A. (2009). Making plans for healthy diet: The role of motivation and action orientation. *European Journal of Social Psychology*, *39*(4), 622-630.

Dienst Uitvoering Onderwijs (2015). Aantallen studenten in verschillende situaties. Geraadpleegd op https://duo.nl/organisatie/pers/aantallen.jsp

Dweck, C. S. (2000). *Self-theories: Their role in motivation, personality, and development*. Psychology Press.

Flegal, K. M., Carroll, M. D., Kuczmarski, R. J., & Johnson, C. L. (1998). Overweight and obesity in the United States: prevalence and trends, 1960–1994. *International journal of obesity*, *22*(1), 39-47.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational behavior*, *26*(4), 331-362.

Garn, S. M., Clark, D. C., Lowe, C. U., Forbes, G., Garn, S., Owen, G. M., ... & Rowe, N. (1976). Trends in fatness and the origins of obesity. *Pediatrics*, *57*(4), 443-456.

Harvey, P., & Martinko, M. J. (2009). Attribution theory and motivation. *Organizational behavior, theory and design in healthcare*, 143-158.

Karnik, S., & Kanekar, A. (2015). Childhood obesity: a global public health crisis. *Int J Prev Med, 2012. 3 (1)*, 1-7.

Kilpatrick, M., Hebert, E., & Bartholomew, J. (2005). College students' motivation for physical activity: differentiating men's and women's motives for sport participation and exercise. *Journal of American college health*, *54*(2), 87-94.

Lee, J. S. (2003). The effects of gender, obesity rate, nutrition knowledge and dietary attitude on the dietary self-efficacy of adolescents. *Korean Journal of Community Nutrition*, *8*(5), 652-657.

Lee, J. S., & Ha, B. J. (2003). A study of the dietary attitude, dietary self-efficacy and nutrient intake among middle school students with different obesity indices in Gyeong-Nam. *Korean Journal of Community Nutrition*, *8*(2), 171-180.

Lewis, B. A., Marcus, B. H., Pate, R. R., & Dunn, A. L. (2002). Psychosocial mediators of physical activity behavior among adults and children. *American journal of preventive medicine*, *23*(2), 26-35.

Lin, Y. G., McKeachie, W. J., & Kim, Y. C. (2001). College student intrinsic and/or extrinsic motivation and learning. *Learning and individual differences*, *13*(3), 251-258.

Linde, J. A., Rothman, A. J., Baldwin, A. S., & Jeffery, R. W. (2006). The impact of self-efficacy on behavior change and weight change among overweight participants in a weight loss trial. *Health Psychology*, *25*(3), 282.

Lobstein, T., Baur, L., & Uauy, R. (2004). Obesity in children and young people: a crisis in public health. *Obesity reviews*, *5*(s1), 4-85.

Lubans, D. R., Foster, C., & Biddle, S. J. (2008). A review of mediators of behavior in interventions to promote physical activity among children and adolescents. *Preventive medicine*, *47*(5), 463-470.

Maio, G. R., & Olson, J. M. (1998). Attitude dissimulation and persuasion. *Journal of Experimental Social Psychology*, *34*(2), 182-201.

Markland, D., & Ingledew, D. K. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised Exercise Motivations Inventory. *British Journal of Health Psychology*, *2*(4), 361-376.

McFerran, B., & Mukhopadhyay, A. (2013). Lay theories of obesity predict actual body mass. *Psychological science*, 0956797612473121.

Miller, L. M. S., & Cassady, D. L. (2012). Making healthy food choices using nutrition facts panels. The roles of knowledge, motivation, dietary modifications goals, and age. *Appetite*, *59*(1), 129-139.

Molarius, A., Seidell, J. C., Sans, S., Tuomilehto, J., & Kuulasmaa, K. (2000). Educational level, relative body weight, and changes in their association over 10 years: an international perspective from the WHO MONICA Project. *American Journal of Public Health*, *90*(8), 1260-1268.

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of counseling psychology*, *38*(1), 30.

Muris, P. (2001). A brief questionnaire for measuring self-efficacy in youths. *Journal of Psychopathology and Behavioral Assessment*, *23*(3), 145-149.

National Institue of Diabetes and Digestive and Kidney Diseases (2012). Overweight and Obesity Statistics.

Nisbett, R., & Ross, L. (1991). The person and the situation. *NY: McGraw Hill*.

Nederlands Jeugdinstituut (2016). Erkende interventies.

Neel, R., & Shapiro, J. R. (2012). Is racial bias malleable? Whites' lay theories of racial bias predict divergent strategies for interracial interactions. *Journal of personality and social psychology*, *103*(1), 101.

Ormrod, J. E. (2006). Educational psychology: Developing learners (5th ed.). Upper Saddle River, N.J.: Pearson/Merrill Prentice Hall.

Paquette, M. C. (2005). Perceptions of healthy eating: state of knowledge and research gaps. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, S15-S19.

Perloff, R. M. (2014). *The dynamics of persuasion: Communication and attitudes in the 21st century*. New York: Routledge.

Popkin, B. M., & Doak, C. M. (1998). The obesity epidemic is a worldwide phenomenon. *Nutrition reviews*, *56*(4), 106-114.

Richard, M., Christina, M. F., DEBORAH, L. S., Rubio, N., & KENNON, M. S. (1997). Intrinsic motivation and exercise adherence. *Int J Sport Psychol*, *28*(4), 335-354.

Rijksinstituut voor Volksgezondheid en Milie (2016).

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary educational psychology*, *25*(1), 54-67.

Ryu, H. K., & Toon, J. S. (1998). Relations of perception of obesity and experiences of weigh control and body image in high school students. *Korean Journal of Community Nutrition*, *3*(2), 202-209.

Scholz, U., Doña, B. G., Sud, S., & Schwarzer, R. (2002). Is general self-efficacy a universal construct? Psychometric findings from 25 countries. *European journal of psychological assessment*, *18*(3), 242.

Thøgersen-Ntoumani, C., & Ntoumanis, N. (2006). The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations. *Journal of sports sciences*, *24*(4), 393-404.

Tigay, J. H., Thompson, M., Sutton, D., & Lesley, M. (2016). Motivation for Weight Loss. *The Journal for Nurse Practitioners*, *12*(4), e169-e173.

Van Boven, L., Dunning, D., & Loewenstein, G. (2000). Egocentric empathy gaps between owners and buyers: misperceptions of the endowment effect. *Journal of personality and social psychology*, *79*(1), 66.

Van Houtte, M., Demanet, J., & Stevens, P. A. (2012). Self-esteem of academic and vocational students: Does within-school tracking sharpen the difference?. *Acta Sociologica*, *55*(1), 73-89.

Wechsler, H., Devereaux, R. S., Davis, M., & Collins, J. (2000). Using the school environment to promote physical activity and healthy eating. *Preventive medicine*, *31*(2), S121-S137.

Welker, E., Lott, M., & Story, M. (2016). The School Food Environment and Obesity Prevention: Progress Over the Last Decade. *Current obesity reports*, *5*(2), 145-155.

West, D. S., Gorin, A. A., Subak, L. L., Foster, G., Bragg, C., Hecht, J., Schembri, M., & Wing, R. R. (2011). A motivation-focused weight loss maintenance program is an effective alternative to a skill-based approach. *International journal of obesity*, *35*(2), 259-269.

Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of personality and social psychology*, *70*(1), 115.

World Health Organization (2016). Obesity and overweight; fact sheet.

Zhang, C., Rexrode, K. M., van Dam, R. M., Li, T. Y., & Hu, F. B. (2008). Abdominal obesity and the risk of all-cause, cardiovascular, and cancer mortality sixteen years of follow-up in US women. *Circulation*, *117*(13), 1658-1667.