Universiteit Utrecht

Mechanisms of social capital and overweight and obesity inequalities within low educated groups

Mechanisms of social capital in the explanation of lower overweight and obesity levels among low educated with bridging social capital, compared to low educated with bonding social capital

Master thesis

Student:	Celine Oomen
Student ID:	6599877
Supervisor:	dr. C.B.M. Kamphuis
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Abstract

Background: Low educated with bonding social capital (having friends with the same educational level) are more likely to be overweight or obese, than low educated with bridging social capital (having friends with a higher educational level). This study aimed to investigate whether mechanisms of social capital; modelling, social norms and social support, explain lower overweight and obesity levels among low educated with bridging social capital. **Methods:** Survey data from low educated citizens (25 – 75 years) of Eindhoven that participated in the fifth wave follow up of the GLOBE study (N = 377) was used for this study. Binary logistic regression models were created to demonstrate the association between bridging social capital and overweight or obesity. It was studied whether modelling, social norms and social support functioned as mediating factors within this association. Odds ratio's (OR) were obtained en reported to draw conclusions. **Results:** The results show that modelling and social norms do not function as a mediator between bridging social capital and overweight and obesity. Social support for a healthy diet possibly functions as a mediator in the relationship between bridging social capital and obesity, because social support has a significant effect on both of the variables. **Conclusions:** The results indicate that modelling and social norms do not explain lower overweight and obesity levels among low educated with bridging social capital. Low educated with bonding social capital are more likely to model and experience social support and social norms for healthy behaviour. Besides, social support for physical activity and a healthy diet leads to higher obesity levels. It is recommended to investigate the strength of ties and individual characteristics to understand how mechanisms of the social network, in relation to overweight or obesity, work.

Keywords: Social network mechanisms, bonding/ bridging social capital, overweight and obesity.

Introduction

In the past decades, overweight and obesity have become a global pandemic (WHO, 2015). 39% of the world's population have been found overweight and 13% have been found obese. Especially rapid changes in nutrition combined with increasingly sedentary lifestyles is, according to the WHO, a global point for action (WHO, 2004). Overweight and obesity is more prominent among disadvantaged socio-economic (SES) groups than among advantaged SES groups in society (Mackenbach, et al., 2015) and we see in the Netherlands that low educated show higher levels of overweight and obesity, than higher educated (Groeniger, van Lenthe, Beenackers, & Kamphuis, 2017; Kamphuis, Oude Groeniger, Mackenbach, & Beenackers, 2019).

SES differences are not only observed for overweight and obesity, but for many health outcomes. Inequalities in health are determined by a number of factors (Spence & Lee, 2003). Those levels of influence include intrapersonal factors (individual characteristics that influence behavior), interpersonal factors (family, friends, peers, that provide social identity, support and role definition), community factors (social networks and norms), organizational (or institutional) factors and public policies (McLeroy, Bibeau, Steckler, & Glanz, 1988). Looking at social capital and its influence on health outcomes, important determinants are interpersonal and community factors, which are key influences in regular physical activity and healthy eating (Dunn, et al., 2006).

Social capital defines the access to (health)resources within the social network and is an important determinant of physical behavior, dietary intake and healthy weight loss (Kawachi & Berkman, 2000). Individuals with higher levels of network social capital show lower levels of overweight and obesity (Moore, Daniel, Paquet, Dubé, & Gauvin, 2009).

People seem to adopt behavior from individuals within their social network who they know well and trust (Berten & Van Rossem, 2011). Earlier research showed that low educated people with *bridging social capital* (having friends with a higher educational level) are more likely to adopt healthy behavior than low educated people with *bonding social capital* (having friends with the same educational level) (Moore & Kawachi, 2017). A recent study even concluded that low educated people with bonding social capital are more likely to be overweight or obese than low educated people with bridging social capital (Kamphuis , Groeniger, Poelman, Beenackers, & van Lenthe, 2019).

Although we know that low educated people with bridging social capital are less likely be overweight or obese than low educated people with a bonding social capital (Moore &

Kawachi, 2017), no research has been done into which mechanisms of the social network explain this. These facts stretch the relevance to delve deeper in the mechanism which possibly explain lower BMI levels among low educated people with a bridging social capital. For instance, it could be the case that low educated with bridging social capital experience more social support within their network to eat healthy and therefore show lower overweight and obesity levels, than low educated with bonding social capital. The outcomes of this study are useful for public health professionals and medical professionals in understanding barriers and enabling factors for certain SES groups to lose weight. Besides, the outcomes can be helpful for sociology professionals to get more insight in why segregation of different SES groups can lead to worse health outcomes. Therefore, this study will examine to what extent mechanisms of social capital explain lower overweight and obesity levels among low educated with bridging social capital. Different elements as social modelling, social norms and social support will be investigated.

Existing research & Theoretical approach

Obesity, a global pandemic

In the past decades, overweight and obesity have become a global pandemic. According to the World Health Organization (WHO), nearly 1.9 billion people (or 39% of the total adult population of the world) are considered to be overweight and 13% of the world adult population are currently classified as obese (WHO, 2015). Overweight and obesity are indicated by the Body Mass Index (BMI) and are results of imbalance between energy intake and energy expenditure. In addition, overweight and obesity are known for its health consequences that increase morbidity, like coronary heart diseases, type 2 diabetes and some types of cancer (NHLBI, 2015). In modern societies overweight numbers increases through sedentary lifestyle, lack of physical exercise, widespread consumption of high-calorie food, increasing general stress and environmental pollution (Meydan, et al., 2013). Especially rapid changes in nutrition combined with increasingly sedentary lifestyles is, according to the WHO, a global point for action (WHO, 2004).

Obesity and socio-economic status

An important indicator of overweight and obesity is socio-economic status (SES), which refers to socio-economic standing in society educational level measured by educational level, occupational level or income (Duncan, Daly, McDonough, & Williams, 2002). Existing research shows that unhealthy lifestyles tend to be more present in lower socioeconomic groups, resulting in socio-economic health inequalities as an important societal challenge (Mackenbach, et al., 2015). Therefore, differences in dietary intake or physical activity are expected to contribute to the socioeconomic inequalities in overweight and obesity.

Also, health-related behaviours differ remarkably when comparing low and high educated groups, even more than when comparing income or occupational groups (Groeniger, Kamphuis, Mackenbach, & van Lenthe, 2017). A study of Böckerman, et al. (2017) shows that highly educated have a significantly lower BMI than low educated. The results of this study also indicate that education could be a protective factor against obesity in advanced countries. Linking this to nutrition and physical activity (PA), low educated are less likely to be physical active in leisure time (e.g. walking, cycling or sports participation) than high educated (van Wijk, Groeniger, van Lenthe, & Kamphuis, 2017) and De Irala-Estevez, et al. (2000) found a positive association between a higher level of education and a greater consumption of both fruit and vegetables.

The influence of social capital on overweight/obesity

SES differences are not only observed for overweight and obesity, but for many health outcomes. SES inequalities in health are determined by a number of factors. Many studies have identified these factors by using the socio- ecological model (SEM) (Spence & Lee, 2003). The SEM recognizes that there are multi-levels of influence to health behavior and health outcomes. Those levels of influence include intrapersonal factors (individual characteristics that influence behavior), interpersonal factors (family, friends, peers, that provide social identity, support and role definition), community (social networks and norms), organizational factors (or institutional) and public policies (McLeroy, Bibeau, Steckler, & Glanz, 1988). Looking at social capital and its influence on health outcomes, important determinants are interpersonal and community factors, which are key influences in PA and a healthy diet (HD) (Dunn, et al., 2006).

Social capital is an important determinant of health because social contacts affect the behaviour of individuals and groups (Kawachi & Berkman, 2000). There are two conceptualizations of social capital within research. Putman conceptualizes social capital on the collective level (community factors), as the resources available to members of a community such as trust, or exercise of sanctions (Lochner, Kawachi, & Kennedy, 1999). Bourdieu conceptualizes social capital on the individual level (interpersonal factors), i.e. as the resources that are embedded within an individual's social network, e.g. social support and norms (Bourdieu, 1986).

In relation to overweight and obesity, a study found that individuals with higher levels of network social capital were less likely to be overweight or obese than those with lower levels of social capital (Moore, Daniel, Paquet, Dubé, & Gauvin, 2009). Besides, results of an exploratory study suggests that greater levels of social capital are even protective against obesity and diabetes (Holtgrave & Crosby, 2006).

The social capital theory support the finding that greater social capital is linked to positive outcomes in health and lack of social capital is related to poorer health outcomes (Kawachi, Subramanian, & Kim, Social capital and health, 2008). According to Hayden (2017), the social capital theory enhances that in relation to health inequality, the characteristics of social networks (network resources), can be important. Within social networks a distinction can be made in people with bonding social capital and bridging social capital (Murayama, et al., 2013). Bonding social capital refers to connections between members of a network who are similar to each other (for example with respect to ethnicity, age, or social class), which strengthens access to internal resources. Bridging social capital, by

contrast, refers to connections between members of a network who are dissimilar to each other, and thus to ties between heterogeneous groups, and may strengthen access to external resources (Villalonga-Olives & Kawachi, 2015). Moreover, earlier research has proved that educational bridging social capital (having friends with a higher educational level) has an protective effect on overweight and obesity among low educated (Kamphuis , Groeniger, Poelman, Beenackers, & van Lenthe, 2019).

The influence modelling, social support and social norms within social capital on health behaviour

The social network theory

There are diverse theories that explain how specific forms of social influence, who are related to social capital, can explain the relationship between social capital and health outcomes or health behaviour. One of these is The Social Network Theory (SNT) (Heaney & Israel, 2008). The Social Network Theory entails that being part of supportive social networks can have positive effects on health status and healthy behavior. *Modelling* and *Social support* are important concepts in the SNT. Modelling is the tendency to copy behavior from people that surround you. Modelling occurs when the norm is set by another present person, but in also when the model is not present, such as when the norm is communicated by environmental cues (e.g. by leaving empty wrappers of unhealthy food). Evidence shows that a major determinant of human eating behavior is social modelling, whereby people use others' eating as a guide for what and how much to eat (Cruwys, Bevelander, & Hermans, 2015). Social support is defined as 'support that people receive from others' (Cohen & Wills, 1985). Social support appears to be an important determinant of success in changing health habits and has been linked to a number of health outcomes (Wallston, Alagna, DeVellis, & DeVellis, 1983). There is evidence that suggest that exercisers with a supportive network are more likely to continue their exercise programs (Dishman, Sallis, & Orenstein, 1985). Besides, social support appears to be important for different nutrition behaviours, especially in youth, (Brug, 2008) and several weight-loss studies indicate that social support enhances weight loss (Brownell, Heckerman, Westlake, Hayes, & Monti, 1878).

Theory of planned behaviour

Another theory, that can explain why specific forms of social capital, can explain inequalities in health outcomes and health behaviour, is the Theory of Planned Behavior (TPB). The TPB

explains that the tendency to perform a particular act is the function that the act will be followed by certain consequences and the value of those consequences. An important concept of the theory of planned behavior is the subjective *social norm*. The subjective norm is the perceived social pressure to engage or not engage in the behaviour (Ajzen, 1985). For many health behaviours social pressure comes from close friends, parents, partners, role models etcetera. In relation to overweight/obesity, we can confirm this by the evidence that social norms for healthy behaviours can affect healthy eating and weight loss attempts (Leahey, LaRose, Fava, & Wing, 2011). In addition, the adoption of normative eating patterns that promote overeating, could explain clustering of obesity in social networks (Brown, Hole, & Roberts, 2014).

Social support, modelling and social norms in lower SES groups

In relation to SES, a study found that the perceived social support from friends for a HD and regular PA increased with increasing income (Jeffery & French, 1996) and lower SES groups in general, report to receive lower social support for healthy behavior (Inglis, Ball, & Crawford, 2005). Besides, lower SES groups experience weaker social norms towards healthy behavior (De Vries, 1995). In addition, social norms and modelling can be used to explain when members of the (lower) SES group become heavier, individuals may change their perception of an 'ideal' weight, causing their weight to increase as well (Brown, Hole, & Roberts, 2014).

Interactions between low and high educated groups

Moreover, interactions between different SES groups have declined over time (Clark, 2015). In the Netherlands it has been shown that low and high educated people increasingly live separate lives, with different preferences and different lifestyles (van de Werfhorst, 2015). Because of less interactions, it is not expected that low SES groups get in contact with positive attitudes towards healthy behaviour of higher SES groups. Also, (un)healthy lifestyles within lower or higher SES- networks can strengthen each other (Kawachi & Berkman, 2000). This possibly means that low educated people have a smaller chance to adopt regular PA and HD habits, because they show higher levels of overweight and obesity.

Importance of the research

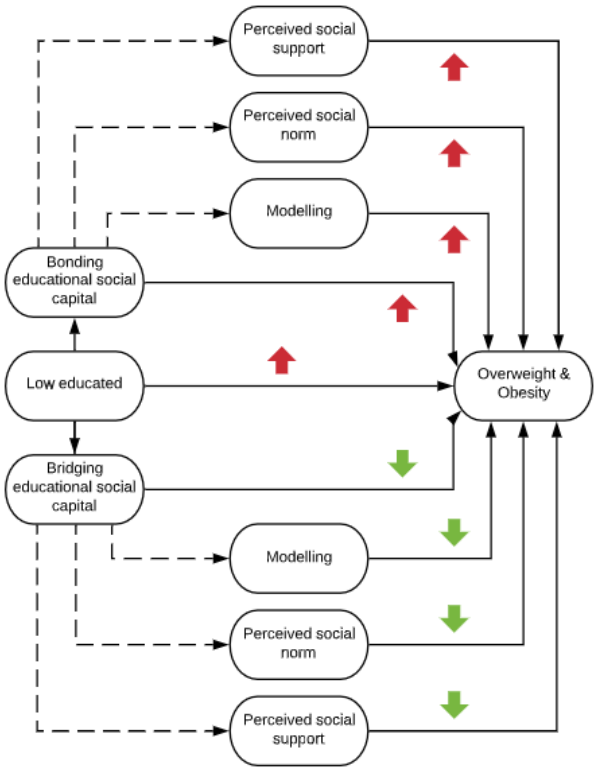
To conclude, we found that social capital is an important indicator of health behavior and health outcomes and the SNT and the TPB explains that modelling, social norms, and social support can contribute a healthier diet and regular PA, and eventually can lead to lower overweight and obesity levels. However, lower SES groups, especially low educated people, tend to show higher overweight and obesity levels. The SCT explains that low educated with educational bridging social capital (having higher educated friends) have more access to external health resources. Moreover, earlier research has proved that educational bridging social capital has an protective effect on overweight and obesity among low educated (Kamphuis , Groeniger, Poelman, Beenackers, & van Lenthe, 2019). These findings might be concerning because interactions between low and high educated decline over time. This possibly means that low educated have a smaller chance to adopt healthy lifestyles.

Research question and hypothesises

These finding stretch the relevance to delve deeper in the characteristics which possibly explain lower BMI levels among low educated people with bridging social capital. In this study we combine the insights of the above mentioned theories, in which we expect that modelling, social norms and social support explain the relationship between educational bridging social capital and lower levels of overweight/obesity levels among lower educated. For this reason the following research question has been drawn up: '***To what extent explain modelling, social norms and social support lower overweight and obesity levels among low educated with bridging social capital?'*** Based on previous research and expectations, three hypotheses have been formulated:

- Low educated people with bridging social capital show in comparison with low educated with bonding social capital lower overweight and obesity levels because of *modelling* healthy behaviour in their social network. (Böckerman, et al., 2017; Ajzen, 1985; Vartanian, Spanos, Herman, & Polivy, 2015; Kamphuis, Groeniger, Poelman, Beenackers, & van Lenthe, 2019).
- Low educated people with bridging social capital show in comparison with low educated with bonding social capital lower overweight and obesity levels because the *social norm*s in their social network are more positive towards healthy behaviour (Böckerman, et al., 2017; Ajzen, 1985; Leahey, LaRose, Fava, & Wing, 2011; Kamphuis, Groeniger, Poelman, Beenackers, & van Lenthe, 2019).

- Low educated people with bridging social capital show in comparison with low educated with bonding social capital lower overweight and obesity levels because of the *social support* for healthy behaviour in their social network (Böckerman, et al., 2017; Heaney & Israel, 2008; Brownell, Heckerman, Westlake, Hayes, & Monti, 1978; Kamphuis, Groeniger, Poelman, Beenackers, & van Lenthe, 2019).



Model 1: The theoretical framework: the expected relationship between bonding/bridging social capital and overweight/obesity, mediated by; modelling, perceived social norms and perceived social support

Research methods

Design and procedure

This research has a quantitative research design and data of the "The Gezondheid en Levens Omstandigheden Bevolking Eindhoven en omstreken" (Globe Study, 2015) study is used. The GLOBE study is carried out by the department of Public Health at the Erasmus MC in close collaboration with the Municipal Health Service of Brabant South-East. The study is supported by grants from the Netherlands Organization for Health Research and Development (ZonMW).

For the purposes of this study, cross-sectional data from the fifth wave (2014) of the GLOBE study were used. Data is collected by means of a large-scale postal survey which was sent out to 10,668 persons, comprising 4,886 participants of the existing GLOBE cohort, supplemented with a random sample of 5782 newly selected persons from the municipality register of the city of Eindhoven. The response rate of the study was 45.5%.

Participants were sent a postal survey to their home address with a hard copy of the questionnaire. The letter also contained a link to the online version of the questionnaire. The participants could choose whether they wanted to complete the questionnaire hard copy or online. All participants signed an informed consent.

Participants and sampling

A cross-sectional stratified sample of the 25–75 years old population in the city of Eindhoven is used in the analyses. Participants from below 25 and above 75 were excluded of the study. From this sample (N= 4851), only low educated participants (primary education and lower secondary education (ISCED 0–2)) were selected for analysis. The final sample was 377 (N=377) participants.

Data collection and operationalization

Data collection instruments

The fifth wave questionnaire consists of 100 questions. Information on the reliability and validity of the questions is to be found elsewhere (Van Lenthe et al., 2014). The answers are coded partially following the coding scheme of an earlier study that included these variables (Duijster et al., 2018). Some adjustments were made to fit the coding scheme to this study.

Independent variable

Survey participants reported their highest attained educational level, which was classified according to the International Standard Classification of Education (ISCED): 1– high education (tertiary education (ISCED 5–7)); 2– mid education (upper secondary education (ISCED 3–4)); 3– low education (primary education and lower secondary education (ISCED 0–2)). Education-specific bridging social capital was measured with the question: "How many of your close friends have the same educational level as you have?", with five answering options: all, most of them, about half, some, and none. Bridging social capital is coded as '1 = bridging' for those who answered 'about half', 'some', or 'none of my friends', and '0 = bonding' for those who answered 'all' or 'most of my friends'. Bridging/bonding social capital was used as the independent variable in the analysis.

Explanatory variables

Three different possible explanators for lower overweight and obesity were used. The mechanisms modelling, social norms and social support for regular physical activity (PA) and a healthy diet (HD) were tested for bonding and bridging social capital and its effect on overweight and obesity. The mechanisms modelling, social norms and social support represented six statements from the questionnaire. These statements were measured on a 5 point Likert-scale with five answering options: totally agree, agree, not agree/not disagree, disagree, totally disagree.

Modelling was measured with the statements: 1) "Most people who are important to me are regularly physical active" 2) "Most people who are important to me eat healthy". Perceived social norms were measured with the statements: 1) "Most people who are important to me think that you should be regularly physical active." 2) "Most people who are important to me think that you should eat healthy." Perceived social support was measured with the statements: 1) "Most people who are important to me support me to be regularly physical active". 2) "Most people who are important to me support me to eat healthy".

For both statements (PA and HD), which represent the categories modelling, social norms and social support, totally agree and agree was coded as '1 = Healthy modelling/Healthy social norms/Healthy social support'. Not agree/not disagree, disagree and totally disagree was coded and '0 = No healthy modelling/No healthy social norms/ No healthy social support'.

Outcome variable

Two outcome variables were used: overweight and obesity. First, body mass index (BMI) was calculated by self-reported height and weight with the formula: weight / (hight x hight) = BMI. Participants with a BMI higher than 25 were categorized as overweight (and BMI < 25 as no overweight, reference group). A BMI higher than 30 was categorized as obesity (and BMI < 30 as no obesity, reference group). Overweight was coded as '1= Overweight' and no overweight as '0= No overweight' and obesity as "1= Obese' and '0= Not obese'. Overweight and obesity were applied as outcomes since these are related to two types of health behaviour: healthy diet (HD) and physical activity (PA).

Confounders

Potential confounders were included in the analyses: sex (male, female), age (in 10-year age groups), country of birth (Netherlands, other), living together with a partner (yes, no), children living in your household (yes, no), employment status (employed, unemployed, retired, or other (e.g. homemaker, student)). In the outcome tables only sex and gender were included as confounders, because they had been found significant in the descriptive table.

Data management and data analysis

The Statistical software SPSS V.25 was used to perform analyses on the data. The analysis was conducted in several steps. The analyses were performed with a weighing factor in order to control over or under reporting for certain groups. For an overview of the characteristics of the sample population, crosstabs to bridging/bonding social capital with percentages were made (Table 1). Significance within the variables that were tested on bridging/bonding social capital, were reported as *=$p<0.05$ (significant) and **=$p<0.01$ (very significant). To investigate the correlation between the characteristics of the sample population and overweight and obesity, binary logistic regression analysis were performed, in which the Odds ratio (OR) indicated whether there is a smaller of bigger chance to be overweight or obese, compared to the reference group (=1) of the variable (Table 1). A coincidence level of 95% CI was used in all analyses.

Next, crosstabs were made to show possible correlations between the mechanisms of the social capital: modelling, social norms and social support on bonding/bridging social (*=$p<0.05$ and **=$p<0.01$) (Table 2). Also, with binary logistic regression analysis the Odds ratios for overweight and obesity were calculated for each of the mechanisms: modelling,

social norms and social support. Besides, within the analyses on the three mechanisms, for each mechanism, a distinction between regular physical activity (PA) and a healthy diet (HD) were made. (Table 2). The significant confounders in table 1 were included in these analysis.

Lastly, the hypothesis were tested independently on overweight (Table 3) and obesity (Table 4) by multivariate logistic regression analysis. Significant confounders sex and age were included in the analysis. For both outcome variables (overweight and obesity) five regression models were created. Model 1 includes the main relation; the effect of bonding/bridging social capital on overweight and obesity. Model 2 includes the main relation and the mediator modelling (PA & HD). Model 3 includes the main relation and the mediator social norms (PA & HD). Model 4 includes the main relation as well as the mediator social support (PA & HD). The final model, Model 5, includes all variables. Odds ratios were obtained and reported. OR of models 1, 2, 3, 4 and 5 were compared to draw conclusions. For all models, possible mediation effects were investigated. When the OR of the main relation got closer to 1.00, when adding the mediators to the model, this was interpreted as a possible mediation effect. All data has been stored safely on a secured server and deleted once the research was conducted.

Results

Sample characteristics

The results within the low educated bridging social capital, most were women (57.6%), belonged to the oldest age group (36.5%) and were married (69.1%). However, within the respondents who indicated to have bonding social capital, even more woman (67.6%), people in the oldest age group (41.4%) and married respondents (73.4%) were represented. The variables gender, age groups and marital status correlated therefore significantly with having bonding or bridging social capital. Moreover, people with bridging social capital were less likely to be overweight (57%) or obese (17%) than the respondents with bonding social capital. The variables overweight and obese therefore correlated significantly with having bridging or bonding social capital (Table 1). The logistic regression test on overweight and obesity indicated that the respondents with bridging social capital had a significantly lower chance to be overweight (OR 0.46, 95% CI 0.29-0.71) to or obese (OR 0.54, 95% CI 0.36-0.88**)** than the respondents with bonding social capital.

Table 1: Sample descriptions

		Educ. bridging or bonding social capital						
	Low educated:	**0-Bonding**	**1-Bridging**	**P-value**	**Overweight**		**Obese**	
Total:	(N= 377) % 100	(N=173) % 45.9	(N=204) % 54.1		OR	(CI=95%)	OR	(CI=95%)
Gender				**.046***				
Man	37.8	32.4	42.4		1		1	
Woman	62.2	67.6	57.6		0.80	0.54-1.21	**1.79****	**1.10-2.90**
Age groups				**.021***				
25-34 years	9.0	5.2	12.3		1		1	
35-44 years	8.8	5.7	11.3		1.93	0.76-4.94	1.20	0.40-3.60
45-54 years	15.1	18.4	12.3		2.18	0.93-5.09	1.26	0.46-3.40
55-64 years	28.4	29.3	27.6		1.70	0.79-3.65	0.55	0.21-1.46
65-75 years	38.7	41.4	36.5		**2.65****	**1.26-5.59**	1.43	0.59-3.47
Living together with partner				.189				
No	75.7	78.9	73.0		1		1	
Yes	24.3	21.1	27.0		0.89	0.56-1.43	0.89	0.56-1.43
Country of birth				.140				
Netherlands	86.2	89.0	83.7		1		1	
Else	13.8	11.0	16.3		0.70	0.41-1.22	0.54	0.26-1.14
Marital status				**.042***				

Married/partnership	71.1	73.4	69.1		1		1	
Unmarried	9.5	5.2	13.2		0.60	0.31-1.16	0.63	0.26-1.52
Divorced	14.1	14.5	13.7		0.85	0.48-1.51	0.77	0.39-1.54
Widowed	5.3	6.9	3.9		1.35	0.49-3.67	2.31	0.93-5.77
Children Living at home				.920				
No	73.7	74.0	73.5		1		1	
Yes	26.3	26.0	26.5		0.85	0.54-1.34	0.85	0.50-1.45
Employment status				.917				
Employed	65.4	33.5	36.5		1		1	
Unemployed	7.6	15.2	15.5		0.94	0.51-1.74	1.55	0.76-3.17
Retired	19.2	34.1	33.0		0.99	0.61-1.62	**1.97****	**1.12-3.47**
Homemaker, student, other	7.9	17.1	15.0		0.83	0.45-1.53	0.88	0.40-1.97
Overweight				**.001****	X		X	
No	35.0	25.7	43.0					
Yes	65.0	74.3	57.0					
Obese				**.015***	X		X	
No	78.2	72.5	83.0					
Yes	21.8	27.5	17.0					
Bonding/Bridging sc.		X	X					
Bonding	45.9				1		1	
Bridging	54.1				**0.46 ****	**0.29-0.71**	**0.54****	**0.36-0.88**

Notes: the frequencies (N) in table represent the number of low educated participants in the dataset. The percentages (%) are weighted to reflect the low educated people of the population of Eindhoven, based on a random sample of the municipal registry of Eindhoven. P-values indicate whether there are significant differences between having bridging or bonding social capital on the variable. The Odds ratio (OR) indicates whether there is a smaller of bigger chance to be overweight or obese, compared to the reference group (=1) of the variable.
* =p<0.05, **=p<0.01

The effect of mechanisms of social capital on overweight and obesity

Hypothesis 1

We found that modelling does not have a significant correlation with overweight or obesity (Table 2). The analysis show that with addition of the modelling variables to model 1 (Table 3), the odds to be overweight is still significantly lower for low educated with bridging social capital (OR 0.43 CI 95% 0.30-0.80), compared to low educated with bonding social capital. With addition of the modelling variables to model 1 for obesity (Table 4), the odds to be obese is not significantly lower for low educated with bridging social capital (OR 0.60 CI 95% 0.34-1.06), than for low educated with bonding social capital. Therefore, there is a partial mediation effect in the relation between modelling and obesity,

Hypothesis 2

The analysis show that social norms does not have a significant relationship with bonding/bridging social capital and therefore does not explain the relationship between bridging social capital and overweight/obesity (Table 2). The odds to be obese increased

significantly with experiencing social norms towards regular physical activity (OR 1.90, 95% CI 1.04-3.47) (Table 2). With addition of the social norms variables to model 2 (Table 3), the odds to be overweight is still significantly lower for low educated with bridging social capital (OR 0.49, 95%CI 0.30-0.80), compared to low educated with bonding social capital. Also, with addition of the social norms variables to model 2 for obesity (Table 4), the odds to be obese is still significantly lower for low educated with bridging social capital (OR 0.56, 95%CI 0.32-0.99), compared to low educated with bonding social capital. Therefore, the social norms variables do not explain lower overweight and obesity for low educated with bridging social capital.

Hypothesis 3

The analysis show that social support for a healthy diet (HD) can possibly explain the relationship between bridging social capital and overweight/obesity (Table 2). Social support for a healthy diet has a significant relationship with bridging/bonding social and with overweight/obesity (Table 2). However, the correlation between those variables is different than expected. Low educated with bonding social capital experience more social support towards a healthy diet, than to low educated with bridging social capital. Besides, the odds to be obese is bigger for people who experience social support for a HD (OR 1.91, 95%CI 1.09-3.33) compared to people who not experience social support (Table 2). Therefore, the variable social support has a small mediation-effect in the relation between bridging social capital and obesity.

After addition of the social support variables to model 3 (Table 3), low educated with bridging social capital still have a significantly lower chance to be overweight (OR 0.53, CI95% 0.31-0.90), than low educated with bonding social capital. However, after addition of the social support variables to model 3 for obese (Table 4), low educated with bridging social capital do not have a significantly lower chance to be obese (OR 0.67, CI95% 0.73-2.66), compared to low educated with bonding social capital. Therefore, the variable social support has a partial mediation effect between bridging social capital

Model 5 shows the same results. With addition of all of the variables to the main model, we see that these variables contribute to smaller overweight (OR 0.54, CI95% 0.96-3.10) (Table 3) and obesity (OR 0.73, CI 95% 0.38-1.40) (Table 4) differences between low educated with bridging social capital and low educated with bonding social capital. Addition of all variables

to the main model for obesity (Table 4), causes a partial mediation effect in the relation between bridging social capital and obesity.

Table 2: Mechanisms of social capital on bridging/bonding and overweight and obesity.

		Educ. bridging or bonding social capital				
	Low educated:	**0-Bonding**	**1-Bridging**	**P-value**	**Overweight**	**Obese**
Total:	(N= 377) % 100	(N=173) % 45.9	(N=204) % 54.1		OR (CI=95%)	OR (CI=95%)
Modelling						
Regular PA						
No	31.4	24.0	37.9	**.007****	1	1
Yes	68.6	76.0	62.1		0.87 0.54-1.39	1.33 0.75-2.35
Healthy Diet						
No	32.4	25.2	38.4	**.010****	1	1
Yes	67.6	74.8	61.6		0.74 0.46-1.19	1.06 0.61-1.85
Social norms						
Regular PA						
No	31.5	28.8	33.9	.315	1	1
Yes	68.5	71.2	66.1		1.22 0.76-1.96	**1.90*** **1.04-3.47**
Healthy Diet				.120		
No	30.1	25.8	33.7		1	1
Yes	69.9	74.2	66.3		1.11 0.69-1.79	1.48 0.83-2.64
Social support						
Regular PA						
No	51.3	47.1	54.8	.183	1	1
Yes	48.7	52.9	45.2		1.15 0.73-1.82	**1.92*** **1.12-3.30**
Healthy Diet						
No	44.7	37.4	50.9	**.019****	1	1
Yes	55.3	62.6	49.2		0.98 0.62-1.57	**1.91*** **1.09-3.33**

Notes: the linear regression analyses on overweight and obesity are corrected with the confounders: sex and age. * =p<0.05, **=p<0.01

Table 3. Odds ratio for the mechanisms of bridging and bonding social capital on overweight

	Model 1: Bonding/ bridging capital	**Model 2: Modelling model**	**Model 3: Social norms model**	**Model 4: Social support model**	**Model 5: Full model**
	OR (95% CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Bonding/Bridging					
Bonding	1	1	1	1	1
Bridging	0.45** (0.29- 0.72)	0.43** (0.26-0.71)	0.49** (0.30-0.80)	0.53* (0.31-0.90)	0.54* (0.96-3.10)
Modelling PA					
No		1			1
Yes		1.06 (0.56-1.99)			1.10 (0.52-2.36)
Modelling HD					
No		1			1
Yes		0.55 (0.29-1.06)			0.51 (0.23-1.12)
Social norms PA					
No			1		1
Yes			1.56 (0.77-3.16)		1.66 (0.26-1.41)
Social norms HD					
No			1		1
Yes			0.75 (0.36-1.54)		0.74 (0.32-1.70)
Social support PA					
No				1	1
Yes				1.27 (0.57-2.79)	1.72 (0.72-4.13)
Social support HD					
No				1	1
Yes				0.83 (0.37-1.85)	0.71 (0.28-1.77)

Notes: the logistic regression analyses are weighted and corrected with the confounders sex and age. *=p<0.05, **=p<0.01

Table 4. Odds ratio for the mechanisms of bridging and bonding social capital on obesity

	Model 1: Bonding/ bridging capital	**Model 2: Modelling model**	**Model 3: Social norms model**	**Model 4: Social support model**	**Model 5: Full model**
	OR (95% CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Bonding/Bridging					
Bonding	1	1	1	1	1
Bridging	0.56* (0.33-0.93)	0.60 (0.34-1.06)	0.56* (0.32-0.99)	0.67 (0.73-2.66)	0.73 (0.38-1.40)
Modelling PA					
No		1			1
Yes		1.19 (0.57-2.49)			0.72 (0.29-1.79)
Modelling HD					
No		1			1
Yes		0.99 (0.47-2.08)			1.12 (0.45-2.79)
Social norms PA					
No			1		1
Yes			2.15 (0.89-5.21)		1.41 (0.48-4.11)
Social norms HD					
No			1		1
Yes			0.89 (0.37-2.12)		1.06 (0.37-3.02)
Social support PA					
No				1	1
Yes				1.84 (0.69-4.92)	1.71 (0.57-5.16)
Social support HD					
No				1	1
Yes				1.42 (0.51-3.97)	1.24 (0.39-3.99)

Notes: the logistic regression analyses are weighted and corrected with the confounders sex and age. *=p<0.05, **=p<0.01

Discussion

This study aimed to investigate to what extent the mechanisms of the social network; modelling, social norms and social support explain lower overweight and obesity levels among low educated with bridging social capital, compared to low educated with bonding social capital. The results of this study indicate that modelling and social norms do not explain lower overweight and obesity levels for low educated with bridging social capital. With addition of all variables to the main relation for obesity (model 5), there is a partial mediation effect within the relation of bridging social capital and obesity. This means that low educated with bridging social capital were no longer significantly less likely to be obese, than low educated with bonding social capital. The variable social support has a small mediation-effect in the relation between bridging social capital and obesity.

Hypothesis 1

The results show that modelling does not explain lower overweight and obesity levels among low educated with bridging social capital. Evidence shows that a major determinant of human eating behavior is social modelling, whereby people use others' eating as a guide for what and how much to eat (Cruwys, Bevelander, & Hermans, 2015). The Social Network Theory supports (Heaney & Israel, 2008) these expectations, by indicating that characteristics of the social network are important determinants of behaviour. Therefore, we would expect that low educated with high educated friends, would be exposed to role models performing healthy behaviour.

However, we found that low educated with bonding social capital, who show higher overweight and obesity levels, are more likely be exposed to good health habits. This can be explained by earlier research. Several studies indicate that modelling only appears when individuals are similar in terms of sex (Conger, Conger, Costanzo, Wright, & Matter, 1980) weight (Herman & Polivy, 2008) or age (Hendy & Raudenbush, 2000). This means that individuals only see other people as a reference point, when they are categorized as similar to the self on dimensions that are contextually relevant. This notion was confirmed in a study by Cruwys, et al. (2012) which found that, when participants self-categorized in terms of their university student identity, they modelled confederates who identified themselves as students of the same university but did not model confederates who identified themselves as students of another university. Similarly, Stok, De Ridder, De Vet, & De Wit (2012) found that participants modelled the eating behavior of majority group members (with same

characteristics) and did not modelled from the behavior of minority group members. Therefore, we may conclude that perceived similarity is an important moderator of modelling effects. For this study, this could mean that low educated who have bridging social capital, did not see their social environment as a reference point, and therefore were not likely to model their behaviour.

Hypothesis 2

The results show that social norms do not explain lower overweight and obesity levels among low educated with bridging social capital. Besides, we found that perceived social norms for PA increases the chance to be obese, instead of decreases. This is the opposite than we expected.

These findings can be explained in the light of previous research. Earlier research indicated that members of homogeneous social networks have a bigger chance to become heavier, than members of heterogeneous network groups, because of similar characteristics (Brown, Hole, & Roberts, 2014). Individual characteristics such as health, socioeconomic status and healthy or unhealthy lifestyle characteristics tend to cluster in individuals (Jones, 2014). Social influence changes attitudes towards healthy behaviour and shared environment explains similar access to health resources (Egger & Swinburn, 1997). However, when low educated in bonding networks see other people in their network behave healthy, they may chance their lifestyle too, because of the similar characteristics within the network. Therefore, the results of this research can also be explained by the study of Brown, Hole & Roberts (2014).

Also, the rejection of the hypothesis could be explained by another possible cause. Attending to shared group membership can also explains why in some circumstances participants might react against an eating norm provided by others. Berger & Heath (2008) found that individuals were more likely to eat healthily when an undesirable out-group (individuals with dissimilar characteristics) provided a norm for unhealthy eating. This in in line with another study who found that individuals were less likely to eat healthily when they were reminded that out-group members had a healthy eating norm (Oyserman, Fryberg, & Yoder, 2007). So, low educated people with bonding social capital might therefore do not seek to for anyone to affiliate with and may wish to distance themselves from out-group members, the higher educated network.

Hypothesis 3

The results indicate that social support has a possible mediation effect in the relation between bridging social capital and obesity. We expected that low educated with bridging social capital would receive social support for healthy behaviour and therefore have lower overweight and obesity levels, than low educated with bonding social capital. We based our expectations on the Social Network theory, which entails that being part of a supportive social network has a positive effect on health status and health behaviour (Heaney & Israel, 2008).

However we found that low educated with bonding social capital experience more social support towards a HD, than to low educated with bridging social capital. Also, social support for a HD leads to higher obesity levels. This might be explained by the strength of heterogeneous ties. In earlier research we found that interactions between SES groups decline over time (Clark, 2015) and in the Netherlands it has been shown that low and high educated increasingly lives separate lives with different lifestyles (van de Werfhorst, 2015). Weaker ties with out-groups could have its effect on receiving social support. Haslam, Jetten, O'Brien, & Jacobs (2004) found that when students were given informational support that encouraged them to do a task, this only had a positive effect if it was provided by an in-group rather than an outgroup member. Sharing identity with other members of those groups is a basis both for receiving social support and engaging in collective action. This possibly explains why low educated with bridging social capital experience more social support for healthy behavior, than low educated with bridging social capital. Because low educated with bridging social capital have weaker ties with out-group members, they will possibly experience less social support for healthy behaviour, than low educated with bonding social capital.

Strengths & limitations

In this study, there are a few potential limitations and several strengths. First of all, the anonymity was guaranteed and questionnaires were filled in at home, which minimized social influence. Furthermore, the use of a cross-sectional data makes the data valid and reliable. The quantitative nature of this study provided an opportunity to analyse multiple possible explanations for overweight and obesity levels for a certain network groups, in a limited period of time. Lastly, no previous research has been done into the possible explanators of lower overweight and obesity levels among low educated with bridging social capital.

However, the sample of low educated people of the population of Eindhoven (2014) is relatively small, which makes it hard to generalize to the low educated population in the

Netherlands. Therefore, we would advise to do further research into mechanisms of the social capital and health behaviour on a larger scale. Besides, because of limited time it was impossible to include more possible explanators (trust, strength of ties, the intensity of the contact etc.) of health behaviour within social networks. Also, we did not look at individual other characteristics, like income, personal motivation, living or environmental characteristics. We would advise to take these mechanisms into account in further research.

Implications for further research

There are possible implications that arise from the results. The first implication is a suggestion to conduct further research into why low educated with bonding social capital are more likely to model healthy behavior, experience healthy social norms and receive social support for healthy behaviour from their network. To understand why homogenic peers have more influence on our behaviour, than heterogenic peers, it is recommended to study more aspects of the social network. Interactions between low and high educated decline over time (Clark, 2015). Therefore, it would be interesting to delve into the strength of ties within bonding and bridging social networks and its influence on health behaviour and overweight/obesity. Besides, it is recommended to look at how intensity of the contact within social networks can influence behaviour of individuals. Because of weaker social ties between SES groups (van de Werfhorst, 2015) it is expected that intensity of the contact in heterogenetic groups plays a role in the influence from network characteristics in health behaviour. The strength and intensity of the contact can have its influence on trust within social networks (Moibus & Quoc-Anh, 2004). Therefore, it is also recommended to study how trust plays a role in the mechanisms of the social network and what the effect is on health behaviour and/or health outcomes.

Furthermore, it's recommended to study the characteristics of individuals in the social network. In this study we investigated how network characteristics can influence health behaviour and its effect on health outcomes. However, we did not look at other characteristics as income, personal motivation, access to health resources and living environment characteristics. Earlier research indicated that similar characteristics play a role in whether individuals model healthy behaviour (Stok, de Ridder, de Vet, and de Wit, 2012) and sharing identity indicates whether individuals are willing to receive social support from network members (Haslam, Jetten, O'Brien, & Jacobs, 2004). In this study we looked at educational bridging/bonding social capital and we concluded that educational bonding networks work more positive on health behaviour. For further research it is recommended to investigate how

heterogeneous and homogeneous network mechanisms work in the perspective of differences or inequalities in income, personal motivation, access to health recourses and living environment characteristics.

Also, this research can be useful for sociologists or policymakers. We suggested that dissimilar characteristics possibly explain why low educated with bridging social capital do not model behaviour or experience social support (Stok, de Ridder, de Vet, and de Wit, 2012). Therefore, it is recommended for policymakers and sociologists who are involved in the demographics of neighbourhoods, not only focus on diversity of inhabitants with different (SES)backgrounds in neighbourhoods, to improve health, but to focus on equal chances. It is important to focus on creating connection, strengthen ties and making access to health resources available for all inhabitants. Low educated with poorer health, may than be more likely to copy healthy behaviours from their bridging network.

Conclusions

The results of this study indicate that modelling and social norms do not explain lower overweight and obesity levels for low educated with bridging social capital. With addition of all variables to the main relation for obesity (model 5), low educated with bridging social capital were no longer significantly less likely to be obese, than low educated with bonding social capital. This means that there is a partial mediation effect within the relation of bridging social capital and obesity. On top of that, we found that people with bonding social capital are more likely to be exposed to healthy behaviour (modelling) and experience social support for healthy behaviour, than low educated with bridging social capital. Besides, social norms for PA and social support for PA & HD leads to higher obesity levels. The analysis show that social support for a HD possibly explains the relationship between bridging social capital and obesity, because social support has a significant effect on both of the variables. Therefore, the variable social support has a small mediation-effect in the relation between bridging social capital and obesity. It is recommended to investigate more aspects of the social capital, as the strength of ties and trust, and to look at individual characteristics when studying mechanisms of the social network in relation to overweight or obesity. Therefore, it is recommended for policymakers and sociologists who are involved in the demographics of neighbourhoods, not only focus on diversity of inhabitants with different (SES)backgrounds in neighbourhoods to improve health, but to focus on equal chances.

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Appendix

Appendix A) Survey Questions

Gezondheid en Leefomstandigheden

De eerste vragen gaan over uzelf en uw familie

1. Bent u:	☐ vrouw ☐ man
2. Wat is uw leeftijd	☐☐☐ jaar
3. Hoeveel weegt u? (zonder kleren)	☐☐☐ kilo
4. Wat is uw lengte? (zonder schoenen)	☐☐☐ centimeter
5. Wat is uw burgerlijke staat?	☐ gehuwd of geregistreerd partnerschap ☐ ongehuwd (en nooit gehuwd geweest) ☐ gescheiden ☐ weduwe/weduwnaar
6. Woont u momenteel samen met uw partner of echtgenoot?	☐ ja ☐ nee

7. Wilt u voor de genoemde personen aangeven in welk land hij/zij geboren is?

	a. u zelf ↓
Nederland	☐
Turkije	☐
Marokko	☐
Nederlandse Antillen/Aruba	☐
Suriname	☐
elders, namelijk	☐
Niet van toepassing/weet ik niet	☐

8. Wilt u voor de genoemde personen aankruisen wat de hoogste opleiding is die hij/zij met een diploma heeft afgerond?

	a. u zelf ↓	b. uw partner ↓	c. uw vader ↓	d. uw moeder ↓
geen opleiding	☐	☐	☐	☐
lager onderwijs/basisonderwijs	☐	☐	☐	☐
lager beroepsonderwijs (bijv. VMBO, LTS, LHNO, huishoudschool, LEAO)	☐	☐	☐	☐
middelbaar algemeen onderwijs (bijv. LAVO, MULO/MAVO, 3-jaar HBS)	☐	☐	☐	☐
middelbaar beroepsonderwijs, MBO (bijv. MTS, MEAO)	☐	☐	☐	☐
voortgezet algemeen onderwijs (bijv. HAVO, VWO, HBS, MMS)	☐	☐	☐	☐
hoger beroepsonderwijs, HBO (bijv. HTS, HEAO, MO)	☐	☐	☐	☐
wetenschappelijk onderwijs, WO (bijv. universiteit)	☐	☐	☐	☐
anders, namelijk	☐	☐	☐	☐
Niet van toepassing/weet ik niet	☐	☐	☐	☐

10. Hoeveel thuiswonende kinderen heeft u? ☐☐ kinderen

12. Welke werksituatie is voor u het meest van toepassing?

- ☐ betaald werk, fulltime (36 uur of meer)
- ☐ betaald werk, parttime
- ☐ betaald werk, op oproepbasis
- ☐ werkloos, werkzoekend
- ☐ gepensioneerd (AOW, VUT, vroegpensioen)
- ☐ arbeidsongeschikt (WAO, WIA)
- ☐ huisvrouw, huisman
- ☐ scholier, student
- ☐ anders, namelijk ____

51. Hoeveel van deze goede vrienden hebben ongeveer hetzelfde opleidingsniveau als u?

- ☐ Allemaal
- ☐ De meeste
- ☐ Ongeveer de helft
- ☐ Enkele
- ☐ Geen

62. In hoeverre bent u het eens met de onderstaande stellingen over de mensen die belangrijk voor u zijn?	helemaal mee eens ↓	mee eens ↓	niet mee eens / niet mee oneens ↓	mee oneens ↓	helemaal mee oneens ↓	n.v.t. ↓
De meeste mensen die belangrijk voor mij zijn…						
a. bewegen regelmatig	☐	☐	☐	☐	☐	☐
b. eten gezond	☐	☐	☐	☐	☐	☐
c. drinken niet te veel alcohol	☐	☐	☐	☐	☐	☐
d. roken niet	☐	☐	☐	☐	☐	☐
e. vinden dat je regelmatig moet bewegen	☐	☐	☐	☐	☐	☐
f. vinden dat je gezond moet eten	☐	☐	☐	☐	☐	☐
g. vinden dat je niet te veel alcohol moet drinken	☐	☐	☐	☐	☐	☐
h. vinden dat je niet moet roken	☐	☐	☐	☐	☐	☐
i. stimuleren mij om regelmatig te bewegen	☐	☐	☐	☐	☐	☐
j. stimuleren mij om gezond te eten	☐	☐	☐	☐	☐	☐
k. stimuleren mij om niet te veel alcohol te drinken	☐	☐	☐	☐	☐	☐
l. stimuleren mij om niet te roken	☐	☐	☐	☐	☐	☐

Appendix B) SPSS Syntax

```
* Encoding: UTF-8.

* 1.Variabelen aanmaken en filteren*
**Educationsklassen obv ISCED categorieen maken met: 1 = High; 2 = Middle; 3 = High**
RECODE G14v8_opl1 (1 thru 4=3) (5 thru 6=2) (7 thru 8=1) (ELSE=SYSMIS) INTO
Education_ISCED.
VARIABLE LABELS  Education_ISCED 'Education ISCED categories'.
value labels Education_ISCED 3 'Low' 2 'Middle' 1 'High'.
EXECUTE.

** Geslacht**
recode G14v1 (1=1) (2=0) (else=sysmis) into Sex.
variable labels  Sex 'Sex: reference=men'.
value labels Sex 0 'Men' 1 'Women'.
execute.

**Leeftijd**
RECODE
  G14v2
  (ELSE=Copy)  INTO  Age .
VARIABLE LABELS Age 'Age'.
EXECUTE .

** 10-jaars leeftijdscategorieen**

recode G14v2 (25 thru 34=1) (35 thru 44=2) (45 thru 54=3) (55 thru 64=4) (65 thru 75=5)
into Age_groups.
variable labels Age_groups '10 year age groups'.
value labels Age_groups 1 '25-34' 2 '35-44' 3 '45-54' 4 '55-64' 5 '65-75'.
```

```
execute.
** Burgerlijke staat**
recode G14v5 (1=1) (2=2) (3=3) (4=4) (else=sysmis) into Marital_status.
variable labels  Marital_status 'Marital status'.
value labels Marital_status 1 'Married/partnership' 2 'Unmarried' 3 'Divorced' 4 'Widowed'.
execute.

** Samenwonen**
recode G14v6 (1=0) (2=1) (else=sysmis) into Living_together.
variable labels  Living_together 'Living together: reference=yes'.
value labels Living_together 0 'Yes' 1 'No'.
execute.

** Geboorteland **
recode G14v7_gbl1 (1=0) (2 thru 6=1) (else=sysmis) into Birthcountry.
variable labels  Birthcountry 'Birthcountry: reference=Netherlands'.
value labels Birthcountry 0 'Netherlands' 1 'Else'.
execute.

** Thuiswonende kinderen **
recode G14v10 (1 thru highest=1) (else=0) into Children.
variable labels Children 'Children living at home: reference=no'.
value labels Children 0 'No' 1 'Yes'.
execute.

** Employement **
recode G14v12 (1 thru 3=1) (4=2) (5=3) (6=2) (7 thru 9=4) (10=1) into Employement.
variable labels Employement 'Employement'.
value labels Employement 1 'Employed' 2 'Unemployed' 3 'Retired' 4 'Nonemployed'.
execute.
```

```
**BMI**
COMPUTE BMI=G14v3 / (G14v4 * G14v4 / 10000).
VARIABLE LABELS  BMI 'Body Mass Indexx'.
EXECUTE.
**BMI gesorteerd in 4 categoriën: ondergewicht, gezond gewicht, overgewicht en obese**
RECODE BMI (0 thru 18.49=1) (18.50 thru 24.99=2) (25.00 thru 29.99=3) (30.00 thru
Highest=4) INTO
   BMI_sorted.
EXECUTE.

**Overweight and obese dummy variable**
RECODE BMI_sorted (1=0) (2=0) (3=1) (4=1) INTO Overweight_dummy.
EXECUTE.
RECODE BMI_sorted (1=0) (2=0) (3=0) (4=1) INTO Obese_dummy.
EXECUTE.
**Bonding and bridging social capital
RECODE  bondbridge_opleiding (1 =1) ( 2=2) (ELSE=SYSMIS) INTO
bondbridge_opleiding2.
VARIABLE LABELS  bondbridge_opleiding2  'Bonding or bridging soc capital o.b.v.
opleiding, 1= bonding, 2=bridging (else=sysmis)'.
value labels bondbridge_opleiding2 1 'bonding' 2 'bridging' .
EXECUTE.

**Modelling PA dummy**
DATASET ACTIVATE DataSet1.
RECODE G14v62_a (1 thru 2=1) (3 thru 5=0) INTO ModellingPA_Dummy.
EXECUTE.

**Modelling HE dummy**
RECODE G14v62_b (1 thru 2=1) (3 thru 5=0) INTO ModellingHE_Dummy.
EXECUTE.
```

** Social norms PA dummy**

RECODE G14v62_e (1 thru 2=1) (3 thru 5=0) INTO SocialnormPA_Dummy.

EXECUTE.

Social norms HE dummy

RECODE G14v62_f (1 thru 2=1) (3 thru 5=0) INTO SocialnormsHE_Dummy.

EXECUTE.

Social support PA dummy

RECODE G14v62_i (1 thru 2=1) (3 thru 5=0) INTO SocialsupportPA_Dummy.

EXECUTE.

Social support HE dummy

RECODE G14v62_j (1 thru 2=1) (3 thru 5=0) INTO SocialsupportHE_Dummy.

EXECUTE.

Laagopgeleiden geselecteerd

USE ALL.

COMPUTE filter_$=(G14v8_opl1 < 4).

VARIABLE LABELS filter_$ 'G14v8_opl1 < 4 (FILTER)'.

VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.

FORMATS filter_$ (f1.0).

FILTER BY filter_$.

EXECUTE.

FILTER OFF.

USE ALL.

EXECUTE.

2. Analyses

WEIGHT BY Weegfactor.

Tabel 1

* Bonding/ Bridging social capital per confounder

```
CROSSTABS
  /TABLES=Sex Age_sorted Living_together Birthcountry Marital_status Children
Employement Education_father
    Education_mother Overweight_dummy Obese_dummy BMI_sorted
bondbridge_opleiding2 BY bondbridge_opleiding2
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT COLUMN TOTAL
  /COUNT ROUND CELL.
```

Odds ratio berekend van overweight per confounder

```
WEIGHT BY Weegfactor.
DATASET ACTIVATE DataSet1.
LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER Age_sorted
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER Sex
  /CONTRAST (Sex)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
```

```
  /METHOD=ENTER Living_together
  /CONTRAST (Living_together)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER Marital_status
  /CONTRAST (Marital_status)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER Birthcountry
  /CONTRAST (Birthcountry)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER Children
  /CONTRAST (Children)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER Employement
  /CONTRAST (Employement)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER Education_father
```

```
  /CONTRAST (Education_father)=Indicator
   /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER Education_mother
  /CONTRAST (Education_mother)=Indicator
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER bondbridge_opleiding2
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

**Odss ratio berekent van obese per confounder**

WEIGHT BY Weegfactor.

DATASET ACTIVATE DataSet1.
LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Age_sorted
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Sex
  /CONTRAST (Sex)=Indicator(1)
  /PRINT=CORR CI(95)
```

```
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Living_together
  /CONTRAST (Living_together)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Marital_status
  /CONTRAST (Marital_status)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Birthcountry
  /CONTRAST (Birthcountry)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Children
  /CONTRAST (Children)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Employement
  /CONTRAST (Employement)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
```

```
LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Education_father
  /CONTRAST (Education_father)=Indicator
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER Education_mother
  /CONTRAST (Education_mother)=Indicator
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER bondbridge_opleiding2
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).
```

Tabel 2

```
* Modelling, social norms and social support per bonding bridging

CROSSTABS
  /TABLES=ModellingPA_Dummy ModellingHE_Dummy SocialnormPA_Dummy
SocialnormsHE_Dummy
    SocialsupportPA_Dummy SocialsupportHE_Dummy BY bondbridge_opleiding2
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT COLUMN TOTAL
  /COUNT ROUND CELL.
```

Odds ratio van van overweight per modelling, social norms en social support

```
WEIGHT BY Weegfactor.

DATASET ACTIVATE DataSet1.
LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER ModellingPA_Dummy Sex Age_sorted
  /CONTRAST (ModellingPA_Dummy)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER ModellingHE_Dummy Sex Age_sorted
  /CONTRAST (ModellingHE_Dummy)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER SocialnormPA_Dummy Sex Age_sorted
  /CONTRAST (SocialnormPA_Dummy)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
```

```
  /METHOD=ENTER SocialnormsHE_Dummy Sex Age_sorted
  /CONTRAST (SocialnormsHE_Dummy)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER SocialsupportPA_Dummy Sex Age_sorted
  /CONTRAST (SocialsupportPA_Dummy)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER SocialsupportHE_Dummy Sex Age_sorted
  /CONTRAST (SocialsupportHE_Dummy )=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

**Odds ratio van obese per modelling, social norms en social support**

WEIGHT BY Weegfactor.

DATASET ACTIVATE DataSet1.
LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER ModellingPA_Dummy Sex  Age_sorted
  /CONTRAST (ModellingPA_Dummy)=Indicator(1)
```

```
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER ModellingHE_Dummy Sex Age_sorted
  /CONTRAST (ModellingHE_Dummy)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER SocialnormPA_Dummy Sex Age_sorted
  /CONTRAST (SocialnormPA_Dummy)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER SocialnormsHE_Dummy Sex Age_sorted
  /CONTRAST (SocialnormsHE_Dummy)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER SocialsupportPA_Dummy Sex Age_sorted
```

```
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CONTRAST (SocialsupportPA_Dummy)=Indicator(1)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER SocialsupportHE_Dummy Sex Age_sorted
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /PRINT=CORR CI(95)
  /CONTRAST (SocialsupportPA_Dummy )=Indicator(1)
  /CRITERIA=PIN(.05) POUT(.10) ITERATE(20) CUT(.5).

WEIGHT OFF.
```

Tabel 3

Bridging SC, Overweight, ModellingHE,SocialnormsHE,SocialsupportHE

```
WEIGHT BY Weegfactor.

DATASET ACTIVATE DataSet1.
LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
```

```
LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted ModellingPA_Dummy
ModellingHE_Dummy
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /CONTRAST (ModellingPA_Dummy)=Indicator(1)
  /CONTRAST (ModellingHE_Dummy)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted SocialnormPA_Dummy
SocialnormsHE_Dummy
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
/CONTRAST (SocialnormPA_Dummy)=Indicator(1)
  /CONTRAST (SocialnormsHE_Dummy)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted SocialsupportPA_Dummy
SocialsupportHE_Dummy
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
```

```
  /CONTRAST (SocialsupportPA_Dummy)=Indicator(1)
  /CONTRAST (SocialsupportHE_Dummy)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Overweight_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted  ModellingPA_Dummy
ModellingHE_Dummy SocialnormPA_Dummy SocialnormsHE_Dummy
SocialsupportPA_Dummy SocialsupportHE_Dummy
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /CONTRAST (ModellingPA_Dummy)=Indicator(1)
  /CONTRAST (ModellingHE_Dummy)=Indicator(1)
  /CONTRAST (SocialnormPA_Dummy)=Indicator(1)
  /CONTRAST (SocialnormsHE_Dummy)=Indicator(1)
  /CONTRAST (SocialsupportPA_Dummy)=Indicator(1)
  /CONTRAST (SocialsupportHE_Dummy)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).


**Bridging SC, Obese, ModellingHE,SocialnormsHE,SocialsupportHE**

WEIGHT BY Weegfactor.

DATASET ACTIVATE DataSet1.
LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted
```

```
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted ModellingPA_Dummy
ModellingHE_Dummy
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /CONTRAST (ModellingPA_Dummy)=Indicator(1)
  /CONTRAST (ModellingHE_Dummy)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5)

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted  SocialnormPA_Dummy
SocialnormsHE_Dummy
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
/CONTRAST (SocialnormPA_Dummy)=Indicator(1)
  /CONTRAST (SocialnormsHE_Dummy)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).
```

```
LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted SocialsupportPA_Dummy
SocialsupportHE_Dummy
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /CONTRAST (SocialsupportPA_Dummy)=Indicator(1)
  /CONTRAST (SocialsupportHE_Dummy)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

LOGISTIC REGRESSION VARIABLES Obese_dummy
  /METHOD=ENTER bondbridge_opleiding2 Sex Age_sorted ModellingPA_Dummy
ModellingHE_Dummy SocialnormPA_Dummy SocialnormsHE_Dummy
SocialsupportPA_Dummy SocialsupportHE_Dummy
  /CONTRAST (bondbridge_opleiding2)=Indicator(1)
  /CONTRAST (Sex)=Indicator(1)
  /CONTRAST (Age_sorted)=Indicator(1)
  /CONTRAST (ModellingPA_Dummy)=Indicator(1)
  /CONTRAST (ModellingHE_Dummy)=Indicator(1)
  /CONTRAST (SocialnormPA_Dummy)=Indicator(1)
  /CONTRAST (SocialnormsHE_Dummy)=Indicator(1)
  /CONTRAST (SocialsupportPA_Dummy)=Indicator(1)
  /CONTRAST (SocialsupportHE_Dummy)=Indicator(1)
  /CLASSPLOT
  /PRINT=CORR CI(95)
  /CRITERIA=PIN(0.05) POUT(0.10) ITERATE(20) CUT(0.5).

WEIGHT BY Weegfactor.
```