

Parenting adolescents:

The association between parenting style and eating behaviour and BMI

Master's Thesis

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Name:	Marjet van Wageningen
Studentnumber:	4034015
Supervising lecturer:	Prof. Dr. John de Wit
Second assessor:	Dr. Michèlle Bal
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Abstract

Background: The rates of overweight among children and adolescents have been increasing rapidly on a global level. Being overweight in childhood is associated with a lot of serious health problems. Associations between parenting style and the eating behaviour and BMI of children have been reported in earlier research. However, limited attention has been paid to the influence of parenting styles on eating behaviour and BMI in adolescence. The current study will examine the influence of parenting style on eating behaviour and BMI among adolescents and whether there is a difference between boys and girls. **Method:** Cross-sectional survey data from 598 Dutch adolescents between the age of 10 and 17 years was used. A multiple logistic regressions analysis and multiple linear regressions analyses were used to test the hypotheses. **Results:** A significant positive relation was found between the neglectful parenting style and BMI. Furthermore, neglectful and authoritarian parenting were significantly, negatively related to healthy eating. No differences were found for unhealthy eating. There was no empirical backup for the moderating role of gender on eating behaviour and BMI. **Conclusions:** Results confirm that parenting style has an influence on adolescents eating behaviour and BMI. Based on the outcomes of this study, interventions should target the quality of the relationship between parents and their adolescent children to influence adolescents eating behaviour and BMI. Those interventions should aim to provide information on the principles of effective parenting and the avoidance of adolescents growing up in households with low warmth and control. The results of this study add to the existing research evidence that parenting style still contributes to health outcomes when children reach adolescence.

Keywords: adolescents, eating behaviour, overweight, parenting style

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Introduction

In the last decades, the issue of obesity has evolved into one of the most serious problems in the field of public health in our society. The rates of overweight and obesity have been increasing rapidly on a global level (World Health Organization [WHO], 2017a). Worldwide, obesity has nearly tripled since 1975. Overweight is not only becoming more common among adults but is also forming an increasing problem for children. Among children and adolescents aged 5 to 19 years old, over 340 million were overweight or obese in 2016 (WHO, 2017b). In the Netherlands, overweight among children is also of frequent occurrence. Despite stabilisation over the last years, the percentage of Dutch children who were being overweight (body mass index > 25) was still 13% in 2016, of which nearly 3% were obese (body mass index > 30) (CBS, 2016).

Being overweight in childhood is associated with a lot of serious health problems. Furthermore, being overweight in childhood leads to an increased risk of premature onset of several illnesses, among others type II diabetes and cardiovascular disease (Branca, Nikogosian, & Lobstein, 2007). This risk of health problems continues into adulthood and includes earlier mortality (Dagevos & Munnichs, 2007). The continuing of illnesses into adulthood will lead to an increased need for medical treatment and loss of productivity and income. The WHO has estimated that adult overweight and obesity were responsible for up to six percent of health care expenses in the European Region in 2007 (Branca et al., 2007). Being overweight or obese in adulthood originates mainly in childhood (Rhee, 2008). However, being overweight and being obese in childhood are largely preventable, which will also lower the change of being overweight or obese in adulthood (WHO, 2017a). Therefore, it is of importance to look for possible interventions aimed at preventing being overweight and being obese among young people.

An important factor close to the child are the parents. The Ministry of Health, Welfare and Sport (VWS, 2013) is stating in their health policy that parents are the main responsible source of health for their children. Because parents provide the contextual environment of their children, they should be considered key players in interventions aimed at the prevention or treatment of problems related to being overweight. Parents serve as an example and set influential limits. Thus, parents are assigned a crucial role by the government in influencing the eating behaviour of their children.

Parents not only shape and reinforce specific behaviours but create a socioemotional environment in the home through specific parenting styles. Parenting style is the emotional environment in which the interactions between parents and their children occur (Patrick,

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Hennessy, McSpadden, & Oh, 2013). Subsequently, these different parenting styles can affect a child's weight. Associations between parenting style and the eating behaviour and BMI of children has been reported in earlier research (Rhee, 2008; Fisher & Birch, 2002). However, these studies focused mainly on children of preschool age and children in elementary school. Less attention has been paid to the influence of parenting styles in adolescence. Moreover, it is unclear whether there are differences between boys and girls.

Differences between young children and adolescents are expected because adolescence is a complex period in which individuals experience changes in social influences (Pearson, Biddle, & Gorely, 2009). Therefore, this research will examine the influence of parenting style on eating behaviour and BMI among adolescents between the age of 10 and 17 years old. Furthermore, it will be examined whether the influence of parenting style differs among boys and girls. This research can provide more insight into how health professionals can target practices for change to increase the effectiveness of interventions. If the influence of parenting style is still large in adolescence, interventions aimed at the family are recommended. Otherwise, it is more effective to focus on other possible agents of change, for example the school.

Body Mass Index and eating behaviour

Overweight develops when a person's energy intake is higher than the body is using, which leads to an imbalance. Body Mass Index (BMI) is a standard index for the weight of a person in relation to his or her height. A person's BMI can be calculated by dividing his or her weight in kilograms by the square of his or her height (kg/m^2). BMI is considered the most useful measure at population level of being overweight and being obese, because it is the same for both sexes and a division in age groups can be made (WHO, 2017b). BMI is affected by lifestyle factors such as eating behaviour and physical activity (Thomas, Hypponen, & Power, 2008).

Eating behaviour is central to an adolescent's weight and is determined by a wide range of factors, including sociodemographic characteristics and familial factors. In the last decades, a change in dietary patterns, including an increased consumption of candy and soft drinks and a decreased consumption of fruits and vegetables has taken place. According to the Dutch National Food Consumption Survey 2007-2010, the consumption of fruit and vegetables among children is far below recommendation. Furthermore, the eating behaviour of adolescents is becoming increasingly influenced by the obesogenic environment in which we live. This is a society in which energy dense food is easy to access (Dagevos & Munnichs,

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2007). According to the Netherlands Nutrition Centre, the obesogenic environment is an important contributor to the increase in being overweight in childhood (Voedingscentrum, 2015). The role of family factors on eating behaviour and BMI will be explored more thoroughly in the following paragraphs.

Theoretical exploration

The role of parenting

The family as the direct social environment has a large role in the socialization process of adolescents, including the acquiring of the applicable norms and values (Darling & Steinberg, 1993). Parents are essential when it comes to motivating healthy behaviour of their children. In addition, parents are also able to create an environment that facilitates the healthier choice as the easiest choice (Patrick et al., 2013). Hence, the kind of parenting children receive may influence downstream outcomes, like a child's health behaviour and BMI (Lenne et al., 2017).

Parenting styles

Research on the effects of parenting on the development of children began in the 1920's (Patrick et al., 2013). Initial efforts to assess parenting style focused on three components, namely the parents' behaviours and practices, the emotional relationship between parents and their children and the belief systems of the parent (Baumrind, 1991). Early researchers emphasized different processes through which parents influence their children, because they had different theoretical perspectives (Darling & Steinberg, 1993).

Socialization researchers who were working from a psychodynamic perspective focused on the emotional relationship between parents and their children and its influence on the psychosocial and personality development of the child. According to the psychodynamic model, differences in the emotional relationships between parents and their offspring is a result from discrepancies in parental attitudes. Assessing parental attitudes would capture the emotional sphere in the family which determines the relationship between parents and their children and influences child's development (Baldwin, 1948).

Researchers who approached parenting style from a social learning or behaviourist perspective focused on parental practices rather than attitudes. Developmental differences in children were thought to reflect the differences in the learning environment to which they had been exposed (Whiting & Child, 1953).

Baumrind (1966) was the first to develop a theoretical model that incorporated the emotional and behavioural processes that underlay the two earlier models of socialization. Baumrind (1966) looked at how parents differed on multiple dimensions to classify parents

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into various parenting styles. She identified the overall dimensions along which parents differed in their behaviour toward their children. In her conceptualization of parenting style naturally patterns of practices and values are occurring based on the beliefs parents hold about the nature of children and their role as parents (Darling & Steinberg, 1993).

Baumrind (1966) based her typology on two dimensions, namely responsiveness and demandingness. Responsiveness refers to the extent to which parents display emotional involvement, acceptance and warmth. Demandingness refers to the extent to which parents display control and supervision over their child (Maccoby & Martin, 1983). A four-fold classification of parenting style can be described based on these two dimensions, namely authoritative, authoritarian, permissive and neglectful. Subsequently, these four different parenting styles all have their own effect on a child's eating behaviour and weight.

Authoritative parenting

The parenting style that is regarded as the most ideal, is the authoritative parenting style. This parenting style is defined by high displays of emotional warmth, sensitivity and involvement by the parents as well as high expectations and demands for self-control and independence from the child (Lenne et al, 2017). The authoritative parenting style has been associated with positive childhood outcomes, such as emotional stability and higher academic achievement. Furthermore, the authoritative parenting style is associated with positive health outcomes among children (Rhee et al., 2016; Patrick et al., 2013). Authoritative parenting has been positively associated with having a lower weight in childhood. In addition, children from authoritative parents are found to have a higher intake of fruit (Vereecken, Royner, & Maes, 2010; Kremers, Brug, de Vries, & Engels, 2003) and a lower BMI than children from parents with other parenting styles (Rhee et al., 2016). However, these studies focused mainly on children of pre-school age and children in elementary school.

Authoritarian parenting

The authoritarian parenting style is defined by low responsiveness but high demandingness and is characterized by restrictive, power assertive and punitive behaviour. Authoritarian parents are detached and unreceptive to their children's needs (Hughes, Power, Fisher, Mueller, & Nicklas, 2005). Authoritarian parents show low levels of trust toward their child and establish rules without explaining them and expect these rules to be obeyed without question (Lenne et al, 2017). Authoritarian parenting has been associated with poorer child outcomes, for example lower grades in school, compared with authoritative parenting (Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987). Rhee et al. (2016) found that

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children from mothers with an authoritarian parenting style were significantly more likely to be overweight in first grade than children with mothers with an authoritative parenting style. In another study Rhee (2008) even found an almost fivefold increase in odds of having overweight among children in first grade than authoritative parents. An explanation may be that a parent who displays more warmth and consideration of the child's developmental abilities may foster a greater capacity in the child for regulating their eating behaviour. In contrast, when parents do not care about the development and emotional needs of their child a structure in which the child learns to eat on external cues may be imposed, which leads to the child overeating (Birch, Fisher, & Davison, 2003). However, Agras et al., (2004) found no association between having an authoritarian parenting style and child weight.

Permissive parenting

The permissive parenting style is characterized by low expectations for discipline and self-control, but high levels of respect, sensitivity and warmth (Lenne et al., 2017). Children from parents with a permissive parenting style are generally more confident about their selves, but often show lower levels of self-control than children with authoritative or authoritarian parents. Although a less strict environment allows children the freedom to develop self-regulatory skills, a parent who does not set limits may not afford children the kind of guidance and incentive needed to develop effective self-regulation of eating behaviors (Rhee et al., 2006). Because of this lack of self-regulation, children from permissive parents are more likely to be overweight than children from authoritative parents.

Neglectful parenting

The neglectful parenting style is defined by low levels of both sensitivity and demand for self-control. Neglectful parents are often unaware of or do not care about their children's opinions or needs and they hold low expectations for their children. Neglectful parenting is associated with unfavourable child outcomes, such as poor academic achievement and high rates of depression (Rhee, 2006). Hughes, Shewchuk, Baskin, Nicklas and Qu (2008) found a positive relationship between neglectful parenting and pre-school children's weight in families with low-incomes. Taylor, Kiefe, & Seeman (2005) found that middle-aged adults with a higher metabolic risk profile are more likely to have been growing up in a family where they felt ignored or unloved. Because parents have low expectations for self-control and set few limits, children from parents with a neglectful parenting style are likely to self-regulate their eating behaviour poorly (Dornbusch et al., 1987).

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Peer influence

Adolescent's eating behaviour and BMI cannot be explained by parental influence solely. However, previous research on the influences of parenting style has developed in isolation from research on the influences of peers on eating behaviour and BMI among adolescents (Salvy et al., 2011).

Pearson et al., (2009) state that young children and adolescents need to be understood separately, because they are psychosocially and psychologically at different levels of maturation. In addition, social influences such as peers become increasingly important in adolescence (Bandura, 1969). According to Steinberg and Monahan (2007) the increased influence of peers in adolescence is mainly due to changes in the susceptibility to peer pressure. Adolescents are more likely to go along with the crowd to fit in. According to Steinberg and Silverberg (1986) it is possible that the heightened conformity to peer pressure that develops during adolescence is due to insecurity that arises from becoming emotionally autonomous from the parents. Because of this insecurity, adolescents turn to their peers to feel less insecure. However, it is unlikely that parents lose all their influence when their children reach adolescence (Beyers & Goossens, 2008). According to Eccles et al., (1993) parents remain an important factor for the development of adolescents, even though autonomy of the adolescent increases.

Gender differences

Depending on the gender of the adolescent, parental and peers' influence may be operating in different ways (Salvy et al., 2011). Therefore, it is possible that the influence of parenting style differs among adolescent boys and girls. Studies on parenting style and gender differences among younger children has produced inconsistent outcomes. For example, Vereecken et al., (2010) did not find differences between the consumption of fruit and vegetables among boys and girls. Fisher and Birch (2002) found that parental pressure to eat fruit and vegetables discourages intake among young girls, but not boys.

Adolescence is a period in which sex differences in terms of dieting concerns and body image develop. According to Salvy et al., (2011), female adolescents' behaviours to control their weight are more strongly influenced by the behaviour of their peers. Since dietary concerns are often associated with a desire to be accepted, adolescent girls may be more prone to adjust their intake to convey an image of healthy eating in front of their peers.

Furthermore, Cohn (1991) found in his study on sex differences in personality development that gender differences in personality development in late adolescence are

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moderately large and that girls reach the individual and autonomous stages earlier than boys. The above-mentioned findings would suggest that parental style has a larger influence on boys than on girls in adolescence.

Research question

The main question this research will answer is: *To what extent is parenting style related to the eating behaviour and BMI of adolescents and is there a difference in the strength of association between boys and girls?*

The main hypothesis is that parenting style is related to being overweight and the eating behaviour of adolescents. It is expected that the authoritative parenting style is negatively related to being overweight and unhealthy eating and positively related to healthy eating. Thus, adolescents with parents with an authoritative parenting style have a lower likelihood of being overweight and having an unhealthy eating style, compared to the three other parenting styles. No differences between adolescents living in households with authoritarian, permissive or neglectful parents are expected in the relation between parenting style and eating behaviour and being overweight. In addition, based on the theoretical exploration it is expected that parenting style has a larger effect on eating behaviour and being overweight for adolescent boys than for adolescent girls.

Research method

Sample and procedure

For this research the data of the Temptations to Eat Moderated by Personal and Environmental Self-regulatory Tools (TEMPEST) project has been used.

A total of 2764 adolescents between the ages of 10 and 17 years participated in this study. Data was collected in school in four countries in Europe, namely the Netherlands, United Kingdom, Poland and Portugal. This study will focus on the 586 Dutch adolescents that participated in the study. The descriptive statistics of the sample are shown in Table 1.

Respondents were recruited via primary schools and high schools. Schools were selected based on availability and willingness to participate in the study. However, it was taken into account to select schools from both rural and urban areas as well as higher and lower socioeconomic status areas, in order to ensure a diverse sample.

The data collection protocol complied with the specific human research ethics regulations in each country. Permission from parents was obtained prior to the research. Consent was obtained from the respondents on the day of the study by informing the adolescents that they were free to decide if they wanted to participate in the study or not.

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Participants were asked to complete the questionnaire in one session at school, during class hours and in classroom setting.

Table 1

Descriptive statistics of the sample

Variable	Mean or percentage	Standard deviation
Gender		
Boys	50.1%	
Girls	49.9%	
Age	13.1	2.03
Socioeconomic status		
High	66%	
Low	34%	
Immigrant status		
Native	88.9%	
Immigrant	11.1%	
Urban or rural area		
Urban	35.3%	
Rural	64.7%	

Instruments

The self-reported data was collected by questionnaire. The questionnaire was prepared in English and translated in each country's language by native-speakers and back-translated to check for deficiencies. Where needed, translations were amended. The variables used in this research are parenting style, BMI, eating behaviour and gender.

Parenting style

The researchers adapted the items to measure parenting style from the parenting style questionnaire composed by Lamborn, Mounts, Steinberg and Dornbusch (1991).

Parenting style was measured with nine items. Five items were intended to measure warmth. Examples of items measuring warmth are: 'I can count on my parents to help me if I have some kind of problem' and 'If I get a good result in school, my parents praise me'. The Cronbach's alpha for this subscale is 0.83. Four items were intended to measure control. Examples of items measuring control are: 'My parents TRY to know what I do in my free time' and 'My parents REALLY know what I do in my free time'. The Cronbach's alpha for

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this subscale is 0.80. The participants had to answer on a five-point Likert scale, which was ranging from 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree or 5 = strongly agree. The average per subscale was taken in order to divide the parents into the different parenting styles. This resulted in a value between 1 and 5 per factor. The mean per factor was taken to divide the parents into the different parenting styles. A distinction between high and low scores on warmth and control was made based on a cut-off point, which was based on the means of the participants. The mean for warmth was 3.9 and a score of 3.9 or higher was labeled high. The mean for control was 3.7 and a score of 3.7 or higher was labeled high. Participants were divided into one of four different parenting styles. The combination of a high score on warmth and a high score on control was labelled as authoritative; a low score on warmth and a high score on control as authoritarian; a high score on warmth and a low score on control as permissive and finally a low score on warmth and a low score on control as neglectful (Wake, Nicholson, Hardy, & Smith, 2007). For all four items a dummy variable was created.

BMI

For every adolescent the BMI was calculated by dividing his or her weight in kilograms by the square of his or her height (kg/m²). Respondents self-reported their height and weight.

Because BMI is strongly influenced by gender and age in adolescence, a dichotomous weight class variable was created using age- and gender- specific cut-off points based on the IOTF recommended cut-off criteria (underweight or normal weight vs. overweight or obese) (Cole, Bellizzi, Flegal, & Dietz, 2000).

Eating behaviour

Participants' eating behaviour was assessed by asking four questions about their daily intake of fruit (how many servings of fruit do you eat on an average day?), vegetables (how many serving spoons of cooked or raw vegetables do you eat on an average day?), snacks (how many snacks do you eat on an average day?) and soft drinks (how many glasses of soft drinks, lemonade or energy drinks do you drink on an average day?). They had to answer on a six-point scale, which was ranging from 1 = less than 1 a day to 6 = more than 4 a day. Two sum scores were created reflecting healthy eating (fruit and vegetables) and unhealthy eating (unhealthy snacks and soft drinks).

Control variables

Various variables that might influence the correlation between parenting style and eating behaviour and BMI will be controlled for. The factors that are selected for controlling are age,

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socio-economic status (SES), immigrant status and living in an urban or rural area, because previous research has shown that there is a relation between these control variables and eating behaviour and BMI.

The age variable in years was continuous and ranging from 10 till 17 years old. SES was measured with the child-appropriate Family Affluence Scale (FAS) (Currie, Molcho, Boyce, Holstein, Torsheim, & Richter, 2008). Immigrant status (native vs. immigrant) was assessed based on the language respondents reported speaking with their parents. Living in a rural or urban area was based on the location of the school.

Data-analyses

The data were analyzed with the use of the Statistical Package for the Social Sciences (SPSS) to answer the research question. Firstly, the data was checked for missing values and outliers. Missing values were not included in the analyses and there were no noteworthy outliers in the dataset. For the main study variables assumptions were checked. Crosstabs were used to conduct a descriptive analysis of the data, after which the coherence between the variables was examined with the use of a Pearson chi square. As the dependent variable 'being overweight' can only take on the values yes or no, a multiple logistic regression analysis was used to test whether the authoritative parenting style is negatively related to being overweight. Prior to the analysis, the assumptions of absence of multicollinearity and linearity of the logit were checked for and were met.

Multiple linear regressions analyses were conducted to test the association between the different parenting styles and eating behaviour. Multiple linear regression analyses were used because the dependent variables 'healthy or unhealthy eating' were continuous. Although the items regarding the consumption of healthy and unhealthy foods did have the answer option 'more than 4 a day', none of the participants gave that answer. The assumptions of normality, homoscedasticity, linearity and the absence of multicollinearity were checked for and were all met.

By examining the interaction effect between parenting style and gender the expectation that parenting style has a larger effect on adolescent boys than adolescent girls was examined. To control for any effects of age, SES, immigrant status or living in an urban or rural area on the eating behaviour and weight status of adolescents, these variables were added to the analyses.

Results

Descriptive statistics of the main variables are shown in Table 2. Most respondents were not

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overweight. The adolescents ate an average of 4.37 pieces of fruits and serving spoons of vegetables per day and an average of 3.56 snacks and glasses of soft drinks per day. Most adolescents had parents with an authoritative parenting style, followed by the permissive parenting style, next the neglectful parenting style and last the authoritarian parenting style.

Table 2

Descriptive statistics of the main variables

Variable	Mean or percentage	Standard deviation
Weight class		
Not overweight	11.3%	
Overweight	83.6%	
Eating behaviour		
Healthy eating	4.37	.82
Unhealthy eating	3.56	1.14
Parenting style		
Authoritative	40.43%	
Authoritarian	16.13%	
Permissive	21.45%	
Neglectful	21.99%	

Multiple logistic regression analysis of being overweight

To test the main hypotheses that parenting style and BMI are associated a multiple logistic regression analysis was conducted. The results for the model are shown in Table 3. As can be seen in the Table 3 neglectful parenting was significantly related with being overweight (OR = 2.947, 95% CI = 1.125-7.718, $p < .028$, $R^2 = .106$). The other parenting styles were not significantly related with being overweight. This means that children with neglectful parents have a higher change of being overweight than other children. The interaction effect of gender and the different parenting styles was not significant. There is no difference in influence of parenting style on being overweight between boys and girls.

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Table 3

Logistic regression analysis associating parenting style and BMI (N =512)

	95% CI for odds ratio		
	<i>LL</i>	Odds Ratio	<i>UL</i>
Control variables			
Gender ^b	.21	.62	1.81
Socioeconomic status	.23	.44	.83
Urban or rural	.33	.63	1.20
Immigration status	1.23*	2.68	5.82*
Parenting style			
Authoritarian ^a	.46	1.54	5.15
Permissive ^a	.67	1.92	5.43
Neglectful ^a	1.13*	2.95	7.72*
Parenting style x gender			
Authoritarian x gender ^b	.16	1.04	6.67
Permissive x gender ^b	.09	.52	3.92
Neglectful x gender ^b	.20	.90	3.91

Note. CI = confidence interval; *LL* = lower limit, *UL* = upper limit; reference category: ^a authoritative, ^bmale; * $p < .05$

Multiple linear regression analyses of eating behaviour

The results for the models associating parenting style and healthy and unhealthy eating are shown in Table 4. The different parenting styles explain 3.71% of the variance in healthy eating, $F(3, 516) = 3.71, p < .01$. As can be seen in the table neglectful parenting ($B = -.269, SE = .094, p = .004$) and authoritarian parenting ($B = -.261, SE = .105, p = .013$) are significantly, negatively associated with healthy eating. Adolescents with neglectful or authoritarian parents are less likely to eat fruit and vegetables than adolescents with authoritative parents. The interaction effect of gender and the different parenting styles was not significant. There is no difference in the effect of parenting style on healthy eating behaviour between boys and girls.

As can be seen in Table 4 none of the parenting styles are significantly associated with unhealthy eating. This means that there are no differences in the amount of unhealthy foods

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eaten daily for adolescents with authoritative parents and adolescents with authoritarian, permissive or neglectful parents. Again, the interaction effect of gender and the different parenting styles was not significant. There is no difference in influence of parenting style on unhealthy eating between boys and girls.

Table 4

Multiple regression models associating parenting style and healthy and unhealthy eating behaviour

	B(S)	β	t	p	95% CI for B	
					LL	UL
Healthy eating						
(N = 529)						
Control variables						
Gender ^b	-.24 (.11)	-.149	-2.18	.03	-.29	-.02
Socioeconomic status	0.09(.05)	.08	1.08	.30	-.07	.25
Urban or rural	.12 (.08)	.08	1.60	.11	-.03	.28
Immigration status	.23 (12)	.12	1.94	.04	-.00	.45
Parenting style						
Authoritarian ^a	-.38 (.15)	-.17	-2.51	.01	-.67	-.08
Permissive ^a	-.22 (.13)	-.11	-1.67	.10	-.48	.04
Neglectful ^a	-.38 (.13)	-.19	-2.85	.00	-.64	-.12
Parenting style x gender						
Authoritarian x gender ^b	.18 (.21)	.06	.85	.39	-.23	.60
Permissive x gender ^b	.06 (.19)	.02	.33	.74	-.31	.44
Neglectful x gender ^b	.21 (.19)	.08	1.12	.26	-.16	.58
Unhealthy eating						
(N = 520)						
Control variables						
Gender ^b	-.20 (.16)	-.09	-1.29	.00	-.50	-.15

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Socioeconomic status	.13 (.12)	.05	1.15	.25	-.09	.35
Urban or rural	-.12 (.11)	-.05	-1.13	.26	-.33	.09
Immigration status	.30 (.16)	.08	1.72	.09	-.04	.60
Parenting style						
Authoritarian ^a	.24 (.21)	.08	1.13	.26	-.18	.65
Permissive ^a	.10 (.18)	.04	.53	.60	-.26	.50
Neglectful ^a	.22 (.18)	.08	1.18	.24	-.14	.57
Parenting style x gender						
Authoritarian x gender ^b	-.30 (.30)	-.07	-1.01	.31	-.86	.27
Permissive x gender ^b	-.34 (.26)	-.09	-1.30	.20	-.85	.18
Neglectful x gender ^b	-.09 (.26)	-.02	-.34	.73	-.60	.42

Note: CI = confidence interval; *LL* = lower limit, *UL* = upper limit; reference category: ^a authoritative, ^b male

Discussion

The current study investigated the relation between parenting style and eating behaviour and BMI and the moderating role of gender in adolescence. Previous research has highlighted the importance of parenting styles for health behaviour of children (Baumrind, 1991; Darling & Steinberg, 1993). However, this prior research focused mainly on parenting style and BMI and health behaviour among pre-school and elementary schoolchildren and has not been extended into adolescence. Most of this previous research found that children growing up in a household with authoritative parents fare better than other children raised by parents with another parenting style (Rhee, 2008; Rhee, Boutelle, Dickstein, Seifer, & Wing, 2016; Wake et al., 2007). Extending research on the effects of parenting style on BMI and eating behaviour in adolescence may fill gaps in the literature and provide a better insight in how parents influence adolescents BMI and eating behaviour.

The current study showed that, against expectations, adolescents living in a household with authoritative parents did not have a significantly lower likelihood of being overweight. The finding that adolescents with authoritative parents do not have a significant lower likelihood of being overweight is in contradict with previous research (Lenne et al., 2017;

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Rhee et al., 2006). However, it was found that adolescents living in households with neglectful parents do have a significant higher likelihood of being overweight than other adolescents, which endorses previous research (Lenne et al. 2017).

The finding that adolescents with parents with an authoritative parenting style do not have a lower likelihood of being overweight could be explained by the increased importance of peers in adolescence. According to Steinberg and Silverberg (1986), adolescents feel an insecurity that arises from becoming emotionally autonomous from the parents and therefore turn to their peers to feel less insecure. Peers provide each other with guidance and advice and serve as models for behaviour and attitudes. However, most adolescents do not wish to withdraw from their relationship with their parents completely but seek for a balance between independence from and connectedness with their parents. According to Hartup (1989), involvement in both peer and parent-child relationships provides the most favourable mix of developmental experiences needed. Therefore, it is possible that the negative health outcomes associated with authoritarian and permissive parenting in childhood found in earlier research (Kremers et al., 2003; Patrick et al., 2013; Rhee, 2008) are mitigated by the peer group in adolescence. The mitigating of parental influences by peers explains the finding that adolescents with an authoritative parenting style do not have a lower likelihood of being overweight than adolescents with authoritarian or permissive parents.

However, children from neglectful parents do not reach this optimal mix of parent-child and peer relationships, because of the detached relationship with their parents. Fuligni and Eccles (1993) have shown that adolescents who do not receive warmth and/or supervision by their parents are more likely to develop a strong peer orientation. However, a very strong attachment to the peer group at the expense of parents may have negative effects for (health) outcomes (Fuligni & Eccles, 1993). Thus, the differences in parent-child and peer relationships may provide an explanation for the finding that adolescents with neglectful parents have a higher likelihood of being overweight than other adolescents.

The expectation that the authoritative parenting style has a positive effect on healthy eating was not supported. However, the current study shows significant, negative associations between the neglectful and authoritarian parenting style and consumption of fruit and vegetables. Previous research on the association between parenting styles and the consumption of fruit and vegetables has yielded mixed results. Vereecken et al. (2010) found that strict parental control decreased the odds of daily consumption of fruit and vegetables. In addition, Fisher and Birch (1999) found that strict monitoring has an adverse effect on the intake of fruits and vegetables. However, De Bourdeaudhuij et al., (2009) found no

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relationships between different parenting styles and consumption of fruit and vegetables. The current study provides more insight in the effect of parenting style on healthy eating and confirms the importance of parenting style on healthy eating behaviour.

In the current study, no differences in parenting style were found for unhealthy eating, meaning that the expectation that parenting style is associated with unhealthy eating was not confirmed. This is in line with earlier research conducted by Ludrosky (2005) and Kim (2006) who both found that snacking was uncorrelated to parenting styles.

In sum, adolescents with neglectful or authoritarian parents were less likely to eat fruit and vegetables than adolescents with authoritative or permissive parents, but there were no differences in the number of snacks and soft drinks consumed. Thus, the higher likelihood of being overweight among children from neglectful parents cannot be explained by the daily number of snacks and soft drinks consumed.

It was also expected that parenting style has a larger effect on being overweight and eating behaviour for adolescent boys than for adolescent girls. Previous research has yielded mixed results. Fisher and Birch (2002) found that an authoritarian parenting style is associated with lower intake of fruit and vegetables among girls, but not boys. According to Salvy et al., (2010) the eating behaviour of adolescent girls is more influenced by their peers than the eating behaviour of boys, suggesting that parenting style has less influence on the eating behaviour of girls than on boys in adolescence. However, the current study shows no significant association of the interaction effect of parenting style and gender with eating behaviour and BMI. The expectation that parenting style would have a larger effect on boys than on girls in adolescence was not supported.

The finding that there are no differences in the effect of parenting style on eating behaviour and BMI for adolescent boys and girls suggests that although there may be differences between boys and girls in the nature of their orientation towards peers, the way in which boys and girls are connected to their parents and peers are similar (Fuligni & Eccles, 1993). Previous research of Gardner and Steinberg (2005) may provide an explanation for the finding that parenting style does not have a larger effect on eating behaviour and BMI for boys than for girls in adolescence. Gardner and Steinberg (2005) suggested that while there may be differences in the levels of particular outcomes between boys and girls, the associations of these outcomes with aspects of the parent-child relationship appear to be the same for boys and girls.

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Strengths and limitations

When considering the findings of this study, both strengths and limitations should be taken into account. A strength of this study was the way in which parenting style is measured. The items that have been used were adapted from an already existing questionnaire with a high reliability. After testing for the adapted items in the current study, this high reliability was showed again. Furthermore, by using data reported by adolescents for measuring parenting style, answers were less subject to misreporting than parental reports on their own behaviour (Cook & Goldstein, 1993). Furthermore, given that the fruit and vegetable consumption reported by the adolescents in the current study are fairly similar to the national averages for the Netherlands, it can be assumed that the participants did not give socially desirable answers or misreport their consumption of fruits and vegetables (RIVM, 2011).

A limitation of the current study is the use of self-reported height and weight to calculate BMI. Adolescents may not know their exact height and weight and therefore misreport these data. It is also possible that adolescents lie about their height and weight because they are ashamed of it, therefore, BMI is subject to misreporting in this age group (Gil & Mora, 2011). The misreporting of BMI may have caused different outcomes of the analysis. A solution for the potential of misreporting may be to measure the height and weight of participants in person. This ensures that no incorrect data are being found. However, measuring height and weight in person is expensive and time consuming, which would have made it difficult to include the same number of participants in the sample as the researchers included using self-reported data.

The specific age range and non-random sampling of participants limits generalizability of findings to all young people. Although, care was taken to sample equal numbers of boys and girls from schools in lower as well as higher SES areas. Another limitation is the fact that the sample consisted of mainly ethnic Dutch adolescents and therefore does not represent the population at large. Of the 586 adolescents included in this study, only 11% had a non-Dutch ethnic background. Research involving samples with greater ethnic diversity has yielded different findings among pre-school and elementary school children. For example, research in the United States has shown that high levels of parental control are related to positive health outcomes in Asian-American children (Chen & Kennedy, 2004). However, only four adolescents who identified themselves as having an Asian ethnicity participated in this study. Therefore, the results cannot be generalized to other ethnic groups and while searching for effective interventions one must be sensitive to these ethnical differences. By including more ethnically diverse samples in further research, any differences in cultural effects can be

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uncovered, which will enlarge the generalizability of the results.

Furthermore, no distinction between mothers and fathers has been made. It is likely that eating behaviour and BMI are influenced by the combined parenting styles of the mother and father, but the interactions between these styles may be complex. In addition, there is some evidence that parenting styles from mothers and fathers may differentially influence their child. For example, in the study from Wake et al., (2007) mothers with an authoritative parenting style were associated with lower BMI in their preschool children, but not fathers. The differences in maternal and paternal parenting styles on adolescent health behaviour and BMI are interesting with regard of the changes in family structures in modern society. Because of the increase in divorces, many children live partly by one parent and partly by the other parent. Therefore, further research should examine both mothers and fathers and their interactions and the issue of co-parenting to capture a more comprehensive overview of the home environment. In addition, parents are not the only adults influencing the behaviour of adolescents. Teachers, school principals, coaches and work supervisors are a few examples of other adults who also have a certain amount of influence over adolescents. Thus, besides the intrapersonal level on which parents influence their children, behaviour of adolescents is shaped by actors on different levels, for example the community level (e.g. school, neighbourhood) (Patrick et al., 2013).

It is also important to keep in mind that parenting style may be a response to the behaviour of the child. For example, a parent may be more controlling when a child is already struggling with being overweight a long time or when a child is gaining weight rapidly (Salvy et al., 2011). Therefore, a longitudinal study that can examine how children's eating behaviour and BMI are predicted by parenting style or vice versa would be of added value.

Furthermore, little research has been conducted on the interplay between parents and the broader social and environmental context. Parents may experience their own environment as restrictive and it is possible that this spills over into how they interact with their children around health behaviour. Parents may, for example, be restricted by time or financial resource limitations. Further research should try to assess precursors to parenting styles.

Implications

The results of the current study are useful to parents and health professionals who want to know whether parenting style continues to influence health outcomes after childhood. The current study adds to the existing research evidence that parenting style still contributes to health outcomes when children reach adolescence. Because parents can potentially influence

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the health behaviour of their adolescent children, research on the association of parenting and adolescents' health behaviour has much potential to inform interventions aimed to prevent and reduce overweight and obesity and the associated negative health and socioeconomic outcomes. Based on the findings of this study, interventions can be targeting both boys and girls in the same way. Furthermore, interventions may not need to directly target an adolescent's health behaviour or beliefs. However, interventions that target the quality of the relationship between parents and their adolescent children have the potential to influence adolescents eating behaviour and BMI. Those interventions should aim to provide information about the principles of effective parenting during adolescence. By providing this information, parents will be better able to adapt to the changing characteristics and needs of their children. Furthermore, parents need an understanding of how their family is changing when their children reach adolescence. In addition, interventions should target relationship quality and the avoidance of adolescents growing up in households with low warmth and control. Health professionals should focus on assisting parents in finding the optimal level of warmth and control for promoting healthful dietary practices in their children.

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References

- Agras, W. S., Hammer, L. D., McNicholas, F., & Kraemer, H. C. (2004). Risk factors for childhood overweight: a prospective study from birth to 9.5 years. *The Journal of pediatrics*, 145(1), 20-25.
- Bandura, A. (1969). Social-learning theory of identificatory processes. *Handbook of socialization theory and research*, 213, 262.
- Baumrind, D. (1966). Effects of authoritative parental control on child behavior. *Child development*, 887-907.
- Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance use. *The Journal of Early Adolescence*, 11(1), 56-95.
- Beyers, W., & Goossens, L. (2008). Dynamics of perceived parenting and identity formation in late adolescence. *Journal of adolescence*, 31(2), 165-184.
- Birch, L. L., Fisher, J. O., & Davison, K. K. (2003). Learning to overeat: maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. *The American journal of clinical nutrition*, 78(2), 215-220.
- Branca, F., Nikogosian, H., & Lobstein, T. (2007). The challenge of obesity in the WHO European Region and the strategies for response: summary. *World Health Organization*.
- CBS (2016). *Gezondheidsenquête/Leefstijlmonitor CBS i.s.m. RIVM en Trimbos-instituut*, 2016.
- Chen, J. L., & Kennedy, C. (2004). Family functioning, parenting style, and Chinese children's weight status. *Journal of Family Nursing*, 10(2), 262-279.
- Cohn, L. D. (1991). Sex differences in the course of personality development: A meta-analysis. *Psychological bulletin*, 109(2), 252.

ASSOCIATION BETWEEN PARENTING STYLE AND EATING BEHAVIOUR AND BMI IN ADOLESCENCE

- Cole, T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *Bmj*, *320*(7244), 1240.
- Cook, W. L., & Goldstein, M. J. (1993). Multiple perspectives on family relationships: A latent variables model. *Child Development*, *64*(5), 1377-1388.
- Dagevos, H., & Munnichs, G. (2007). *De obesogene samenleving: Maatschappelijke perspectieven op overgewicht*. Amsterdam University Press.
- Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological bulletin*, *113*(3), 487
- De Bourdeaudhuij, I., Te Velde, S. J., Maes, L., Pérez-Rodrigo, C., de Almeida, M. D., & Brug, J. (2009). General parenting styles are not strongly associated with fruit and vegetable intake and social–environmental correlates among 11-year-old children in four countries in Europe. *Public health nutrition*, *12*(2), 259-266.
- Dornbusch, S. M., Ritter, P. L., Leiderman, P. H., Roberts, D. F., & Fraleigh, M. J. (1987). The relation of parenting style to adolescent school performance. *Child development*, 1244-1257.
- Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C. M., Reuman, D., Flanagan, C., & Mac Iver, D. (1993). Development during adolescence: The impact of stage-environment fit on young adolescents' experiences in schools and in families. *American psychologist*, *48*(2), 90.
- Fisher, J. O., & Birch, L. L. (2002). Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *The American journal of clinical nutrition*, *76*(1), 226-231.
- Gardner, M., & Steinberg, L. (2005). Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: an experimental study. *Developmental psychology*, *41*(4), 625.

ASSOCIATION BETWEEN PARENTING STYLE AND EATING BEHAVIOUR AND BMI IN ADOLESCENCE

- Gil, J., & Mora, T. (2011). The determinants of misreporting weight and height: the role of social norms. *Economics & Human Biology*, 9(1), 78-91.
- Hartup, W. W. (1989). Social relationships and their developmental significance. *American psychologist*, 44(2), 120.
- Hughes, S. O., Shewchuk, R. M., Baskin, M. L., Nicklas, T. A., & Qu, H. (2008). Indulgent feeding style and children's weight status in preschool. *Journal of developmental and behavioral pediatrics: JDBP*, 29(5), 403.
- Kremers, S.P., Brug, J., Vries, H., Engels, R.C.M.E. (2003) Parenting style and adolescent fruit consumption. *Appetite* 41:43-50.
- Lenne, R. L., Joyal-Desmarais, K., Jones, R. E., Huelsnitz, C. O., Panos, M., Auster-Gussman, L., & Simpson, J. (2017). Parenting Styles Moderate How Parent Beliefs Shape Each Other's Eating and Physical Activity: Dyadic Evidence from a Cross-Sectional, US National Survey.
- Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: parent-child interaction. In E. M. Hetherington (Ed.), *Mussen manual of child psychology* (Vol. 4, 4th ed., pp. 1-102). New York: Wiley.
- Ministerie van Volksgezondheid, Welzijn en Sport (2013). *Alles is gezondheid: het Nationaal Programma Preventie 2014-2016*. Ministerie van VWS, Den Haag
- Patrick, H., Hennessy, E., McSpadden, K., & Oh, A. (2013). Parenting styles and practices in children's obesogenic behaviors: Scientific gaps and future research directions. *Childhood obesity*, 9(s1), S-73.
- Pearson, N., Biddle, S. J., & Gorely, T. (2009). Family correlates of fruit and vegetable consumption in children and adolescents: a systematic review. *Public health nutrition*, 12(2), 267-283.
- Rhee, K. (2008). Childhood overweight and the relationship between parent behaviors,

ASSOCIATION BETWEEN PARENTING STYLE AND EATING BEHAVIOUR AND BMI IN ADOLESCENCE

- parenting style, and family functioning. The ANNALS of the American Academy of Political and Social Science, 615(1), 11-37.
- Rhee, K. E., Jelalian, E., Boutelle, K., Dickstein, S., Seifer, R., & Wing, R. (2016). Warm parenting associated with decreasing or stable child BMI during treatment. *Childhood Obesity, 12*(2), 94-102.
- Salvy, S. J., Elmo, A., Nitecki, L. A., Kluczynski, M. A., & Roemmich, J. N. (2010). Influence of parents and friends on children's and adolescents' food intake and food selection. *The American journal of clinical nutrition, 93*(1), 87-92.
- Steinberg, L., & Monahan, K. C. (2007). Age differences in resistance to peer influence. *Developmental psychology, 43*(6), 1531.
- Steinberg, L., & Silverberg, S. B. (1986). The vicissitudes of autonomy in early adolescence. *Child development, 841-851*.
- Thomas, C., Hypponen E, Power, C. (2008) Obesity and type 2 diabetes risk in midadult life: the role of childhood adversity. *Pediatrics. 121*(5):1240–1249.
- Vereecken, C., Rovner, A., & Maes, L. (2010). Associations of parenting styles, parental feeding practices and child characteristics with young children's fruit and vegetable consumption. *Appetite, 55*(3), 589-596.
- Voedingscentrum (2017) Aanbevolen dagelijkse hoeveelheid. Retrieved from <http://www.voedingscentrum.nl/encyclopedie/aanbevolen-dagelijkse-hoeveelheid-adh.aspx>
- Wake, M., Nicholson, J. M., Hardy, P., & Smith, K. (2007). Preschooler obesity and parenting styles of mothers and fathers: Australian national population study. *Pediatrics, 120*(6), e1520-e1527.
- WHO (2017a) Facts and Figures on Childhood Obesity. Retrieved from <http://www.who.int/end-childhood-obesity/facts/en/>

ASSOCIATION BETWEEN PARENTING STYLE AND EATING BEHAVIOUR AND
BMI IN ADOLESCENCE

WHO (2017b) Obesity and overweight. Retrieved from

<http://www.who.int/mediacentre/factsheets/fs311/en/>