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General parenting and mothers' snack giving behavior to their children aged 2–7



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ABSTRACT

The increasing intake of energy-dense snacks among children is one of the contributing factors to childhood overweight. To understand children's snacking habits, snack choices of parents are essential to take into account. General parenting is one of the important factors that can influence the development of healthy eating patterns and weight status among children. Therefore, this study aims to explore how the key constructs of general parenting (nurturance, structure, behavioral control, overprotection and coercive control) relate to mothers' snack choice for their children aged 2–7 years. The Dutch version of the validated Comprehensive General Parenting Questionnaire (CGPQ) was used to assess the key constructs of general parenting. An extensive, 13-day diary study with 136 Dutch mothers was used to measure the snacks mothers provided their children aged 2–4 years and 5–7 years. For both groups of mothers in our sample, differences were found on the scores of coercive control and overprotection. No differences between the mothers were present on the key constructs behavioral control, nurturance, and structure. Results give a first indication that more mothers who scored relatively higher on coercive control provided unhealthy products, like candy and cookies, and fewer mothers provided vegetables, compared to mothers who scored lower on coercive control. A higher score on coercive control combined with a higher score on overprotection was associated with fewer mothers providing unhealthy products like cookies and candies.

1. Introduction

Childhood obesity is an increasing public health-problem (Boots, Tiggemann, Corsini, & Mattiske, 2015; Ogden, Carroll, Kit, & Flegal, 2014; Wijnhoven et al., 2014) and has a tendency to persist into adulthood (Nicklaus, 2016; Singh, Mulder, Twisk, Van Mechelen, & Chinapaw, 2008), which can lead to health-related problems over the course of life (Daniels, 2009; Flodmark, 2018; Reilly & Kelly, 2011). The increasing intake of energy-dense snacks among children is one of the contributing factors to childhood obesity (Boots et al., 2015; Piernas & Popkin, 2010; Vereecken, Keukelier, & Maes, 2004), which can represent a significant proportion of children's daily energy intake (Fisher et al., 2015).

To understand children's snacking habits, the snack choices of parents for their children are essential to take into account (Boots et al., 2015; Fisher et al., 2015). Parents influence the food intake of their children through their interaction with their children, as well as by the

availability of foods at home (Horst & Sleddens, 2017). In addition, the educational level of the mother is of influence on their food choice for their children (Chen et al., 2019; Craig, McNeill, Macdiarmid, Masson, & Holmes, 2010; Damen, Luning, Fogliano, & Steenbekkers, 2019b; Velde et al., 2019). Also the family structure, including the presence of siblings has been shown to influence eating habits of children (Haines et al., 2019; Damen, Steenbekkers, Fogliano, & Luning, 2020b).

Parents are very important for developing healthy eating patterns among their children and for their children's weight status (Golan & Crow, 2004; Sleddens et al., 2014a) through their general parenting (Gevers, van Assema, Sleddens, de Vries, & Kremers, 2015a). General parenting consists of attitudes, beliefs, and behaviors, by which parents influence their children's behavior through creating a family emotional climate to raise their children in (Sleddens et al., 2014b; Wang et al., 2017). General parenting entails both parenting styles and practices, which have different effects on children's behaviors (Langer, Seburg, JaKa, Sherwood, & Levy, 2017; Rhee et al., 2015; Vaughn et al., 2015).

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Parenting styles encompass the general aspects of parenting behaviors, which are more static characteristics of parenting, that do not vary in response to child behaviors and characteristics (Langer et al., 2017; Rhee et al., 2015; Vaughn et al., 2015). Parenting practices are more dynamic and content-specific parenting strategies (Langer et al., 2017; Sleddens et al., 2014b) to influence the child's attitudes, behaviors, or beliefs. Gevers, Kremers, de Vries, and van Assema (2015b) who investigated the clustering of parents on food parenting practices, reported that children of Dutch parents, who belonged to the 'high involvement and supportive' group, more likely consumed less energy-dense snack foods compared to children of parents of the other groups. Parenting styles and practices may thus influence the dietary behaviors of children (e.g. Sleddens et al., 2014a; Gerards & Kremers, 2015; Davison et al., 2015) by determining the foods children eat (Boots et al., 2015; Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2012; Sleddens et al., 2014b), the portion sizes, the eating frequency (Boots et al., 2015), the moment of eating (Gevers et al., 2015c) and by modelling dietary behaviors (Davison et al., 2015). However, the study of Kong, Eiden, and Paluch (2019) found no associations between mother and child feeding interactions and the BMI of the children. This can be explained by the fact that the BMI can be seen as a longterm effect and is thus further away in the casual chain as compared to nutritional intake. The influence of parenting styles and practices is therefore important to consider when exploring the dietary behaviors of children (Sleddens, Gerards, Thijs, De Vries, & Kremers, 2011), and related to that the snack provision behavior of mothers to their children.

Parenting styles and practices influence especially younger children. Therefore, parents mostly influence the development of children's dietary habits at a young age (Peters, Sinn, Campbell, & Lynch, 2012). Besides, children younger than 8 years do not see the difference between foods and snacks (Contento, 1981). They mostly do not pick their snacks themselves, but get them from their caregiver, which are often the mothers (Blissett, Meyer, & Haycraft, 2006; Damen et al., 2019a; Rosenkranz & Dzewaltowski, 2008; Walsh, Meagher-Stewart, & Macdonald, 2015). Therefore, parenting styles and practices as used by mothers are important to consider when focusing on young children's dietary and snacking behavior. In addition, a mother's choice to provide a snack is less determined beforehand compared to choices concerning main meals, since a snack is mostly chosen on the eating moment itself (Damen et al., 2019b), while the main meal is often planned before (Fay et al., 2011; Wilkinson, Hinton, Fay, Rogers, & Brunstrom, 2013). Therefore, the provision of snacks could be determined by parenting strategies and parental choices to a greater extent than to main meals. As a result, choosing a snack could be sometimes experienced as a difficult moment for mothers (Damen, Luning, Hofstede, Fogliano, & Steenbekkers, 2020a).

Sleddens et al. (2014b) developed the comprehensive general parenting questionnaire (CGPQ) to measure general parenting. This questionnaire is based on five key parenting constructs: nurturance, structure, behavioral control, overprotection, and coercive control. Previous research has shown that the five key parenting constructs can affect children's weight status. The use of nurturance, structure, or behavioral control has been associated with a lower BMI in children (Sleddens et al., 2014a, 2014b). On the contrary, coercive control and overprotection have been associated with a higher BMI in children (Demir & Bektas, 2017; Kelleher, Pallan, Lancashire, & Adab, 2015; Sleddens et al., 2014a, 2014b). As the consumption of energy-dense snacks could contribute to childhood obesity (Boots et al., 2015; Piernas & Popkin, 2010; Vereecken et al., 2004) and the consumption of healthy snacks could help in developing a more healthy eating pattern (Deming et al., 2017; Kachurak, Bailey, Davey, Dabritz, & Fisher, 2019; Xue et al., 2019), it is of interest to investigate possible associations between the types of snacks provided by mothers to their children and general parenting.

Therefore, the aim of this study was to gain insight into the type of snacks given by mothers, who differ in general parenting, to their

children aged 2–4 years and 5–7 years. The CGPQ was developed to investigate how parenting influences children's weight-related behaviors. In the current study, data from the CGPQ was combined with data from extensive diary research on mothers' snack giving behavior to their children aged 2–7 years (Damen et al., 2019b) to investigate possible associations.

2. Methods

2.1. Study design

This study on the possible relation between general parenting practices and mothers' snack giving behavior was conducted with 136 Dutch mothers of young children aged 2–7 years. Diaries were used to collect data on mothers' snack provision according to previous research (Bolger, Davis, & Rafaeli, 2003; Patterson, 2005), using a grounded theory approach (Dew, 2007; Harris et al., 2009). The Comprehensive General Parenting Questionnaire (CGPQ) (Sleddens et al., 2014b) was used to gather data on mothers' general key constructs of parenting. The participants kept the diary in January 2017, for the duration of 13 days, on the last day participants completed the CGPQ.

2.2. Recruitment, selection, and grouping of participants

Participants were recruited on social media platforms (Facebook, Linked-in) and through advertising with flyers at schools and day-care centers in several cities in the Netherlands. Additionally, the snowball sampling technique (Barros da Silva, Barbieri-Figueiredo, & Van Riper, 2018; Bogart, Castro, & Cohen, 2019) was used to gather potential participants. Potential participants were approached in person as well as by email. Potential participants ($n = 180$) were asked to fill in a selection questionnaire to determine their fit for the study according to the set criteria for the target group. These criteria were that mothers had at least one child in the 2–7 years age group, and the intention to keep a diary for 13 days. Mothers whose child had a severe food allergy or suffered from chronic diseases (e.g. diabetes) were not included in the research. The selection questionnaire contained questions regarding the number and age of the children, educational attainment of the mother, and general practices in snack giving behavior. Participants were purposively included (Draper & Swift, 2011; Harris et al., 2009) to differ in educational level, order of the child in the household, and age of the children as previous research showed differences in snack giving behavior of mothers differing concerning those characteristics (Damen et al., 2020b, 2019b). For educational attainment, the demarcation was set at Bachelor's degree, with all mothers having a Bachelor's degree or higher, belonging to the higher educated group. Due to the overrepresentation of mothers with children aged 2–3 years, and mothers not belonging to the target group, 41 mothers were not included in the study. In total, 139 Dutch mothers were selected and contacted for participation. Two of the participants did not complete the study and one participant did not fill in the diary according to the set definition of snacking, which resulted in a final sample size of 136 participants.

Ethical approval was obtained for the study at the Social Science Ethics Committee of Wageningen University. Before the study started, participants received a letter explaining the duration and set-up of the research. This letter also explicitly stated that the results would be handled anonymously and that all personal data would be kept confidential. In addition, mothers had the possibility to withdraw from participation at any moment. Each participant was compensated with a €40 gift voucher for completing the study.

2.3. Diary study

Every morning, for 13 days, the mothers received an email with a Qualtrics survey link (www.qualtrics.com, 2017) to the diary for registering their snack giving behavior (Damen et al., 2019b). Snacking

was described for the mothers as “any food given by the mother herself to the child that is not part of breakfast, lunch, or dinner”. Mothers reported every snack they provided to their child in the morning, afternoon and evening. They could also report in the diary if they were not with their child that day, or did not provide any snacks. They were instructed to report only the type of snack (e.g. fruit or candy) and the overall amount or number of snacks (e.g. a bowl of grapes or two candies). They did not have to weigh the given snacks. Mothers could report the snacks they provided either immediately after giving it, or at the end of the day. If they had not completed the diary at 21:00 in the evening, they received a reminder email. Most mothers (84%) reported the provided snacks the same day; a few others the day after. The mothers had the possibility to stop with the diaries at any time, for example, when they felt keeping the diary was too much work. The diary study was piloted with 3 mothers who were not involved in the study. Some minor changes were made according to the pilot study to the set-up of the diary study.

2.4. Comprehensive General Parenting Questionnaire (CGPQ)

The Dutch version of the validated Comprehensive General Parenting Questionnaire (CGPQ) as developed by [Sleddens et al. \(2014b\)](#) was used to assess the five general parenting practices nurturance (NUR), structure (STR), behavioral control (BEC), overprotection (OVP) and coercive control (COC) of the participating mothers. Parents scoring high on nurturance foster and recognize individuality and self-assertion, by being supportive and responsive to their child's needs, showing interest in the child's activities, spending time with their child, praising their child for good behavior, and expressing affection and care. Parents scoring high on structure act in a dependable and predictable manner with clear and consistent guidelines to help their child to achieve goals, solve problems, and perform tasks independently. Characteristics of behavioral control are supervising and managing the child's activities, providing clear explanations for behavior, and using disciplinary approaches in a non-intrusive way. Typical for overprotection is the excessive involvement or monitoring of the child's activities, more than what is considered appropriate for the child's age and the risks to which the child is exposed. Parents scoring high on coercive control use pressure, intrusion, domination, and discouragement of a child's independence and individuality ([Sleddens et al., 2014b](#)).

The CGPQ allows evaluating the presence and characteristics of clusters on parenting, as well as the effects of different parenting constructs ([Horst & Sleddens, 2017](#)). The questionnaire items were reviewed, and the wording of one question was formulated less strongly (regarding physical punishment, sub-construct of coercive control) in order to prevent expected reluctance from the participating mothers to fill in the question. Two versions of the CGPQ were distributed that were appropriate for the specific age group of the child. One version of the CGPQ was distributed to mothers with children aged 2–4 years, and contained fewer questionnaire items (69 items) than the version of the CGPQ distributed to mothers with children aged 5–7 years (85 items). The version for mothers with children aged 2–4 years entailed 18 items for nurturance, 17 items for structure, 15 items for behavioral control, 7 items for overprotection and 12 items for coercive control. The version for mothers with children aged 5–7 years had 20 items for nurturance, 20 items for structure, 20 items for behavioral control, 10 items for overprotection and 15 items for coercive control. The participating mothers had to rate their agreement with the questionnaire items on a 5-point Likert scale, ranging from 1 ('strongly disagree') to 5 ('strongly agree').

2.5. Data analysis

The data from the diaries were transcribed and imported into software program MAXQDA (version 12), to electronically organize and

code the qualitative data. The reported snack products were grouped in 9 product categories: fruits, cookies, candy, crisps, rice crackers breadsticks and raisins, bread products, savory snacks, vegetables and pie and pastry, see [Damen et al. \(2019b\)](#) for all details.

Per respondent, the score for each construct was as a sum scale calculated by averaging the scores on the contributing scale questions. The psychometric performance of each sum scale was assessed by Cronbach's alpha, using a cut-off value of 0.60 which [Sim and Wright \(2000\)](#) consider sufficient for newly developed measures.

By applying cluster analyses –separately for the two age groups–, mothers were grouped based on their scores on the five general parenting practices. A hierarchical cluster analysis was executed using Ward's method and Squared Euclidean Distance. The dendrogram and the agglomeration coefficients graph were analysed to determine the number of clusters. The optimal number of clusters was chosen qualitatively on the basis of visual inspection of the dendrogram. In order to test whether the clusters differed meaningfully with respect to the observed scores on the general parenting practices, between cluster ANOVA was applied, using the Tukey-method for testing of significant differences of means between clusters, using conventional levels of significance (5%).

An overview of the clusters and their scores on the practices was made. The clusters of the group of mothers of younger children aged 2–4 years started their names with 'MY-cluster' (mothers of younger children cluster); the names of the clusters of the group of mothers of the older children aged 5–7 years started with 'MO-cluster' (mothers of older children cluster). The clusters on general parenting were connected to the snack giving data resulting from the diaries. Per snack-type, it was counted how many mothers per cluster did provide that snack during the test period, to see whether differences exist in the numbers of mothers per cluster, giving snacks divided over different categories. As far as sample size allowed for quantitative analysis, Pearson's goodness-of-fit chi-squared statistics were calculated to determine possible association between snack and cluster membership for each of the two age groups, using conventional levels of significance (5%). When the number of observations was too low for a meaningful statistical test, we relied on the reporting of descriptive statistics only, as is common in the field of qualitative research.

3. Results

3.1. Sample characteristics

The participating mothers were aged between 24 and 47 years, with an average age of 33.9 years (SD = 4.4). The majority of the mothers had two children (n = 90; 66%), 21% (n = 28) of the mothers had three children, 8% (n = 11) had one child, and 5% (n = 7) had four children. Most mothers had a paid job (n = 114; 84%), with an average workweek of 24.3 h (SD = 6.5). The distribution of mothers over children's age groups (2–4 years: n = 71, 5–7 years: n = 65) and mother's educational level (lower educated: n = 71, higher educated: n = 65) was quite similar. Likewise, mothers who kept the diary for their first child (n = 68) and mothers who kept the diary for their child who was not the first child (n = 68) were also equally divided ([Damen et al., 2019b](#)).

3.2. Comprehensive general parenting questionnaire (CGPQ)

Table 1 shows the mean scores and significance on the five general parenting practices of all mothers per age group of the child. Mothers' scores on structure, behavioral control, and coercive control were comparable for the two different age groups. However, mothers of children aged 2–4 years scored higher on nurturance and lower on overprotection compared to mothers of children aged 5–7 years.

Table 1
 Mean scores (SD) and significance (Tukey-test of differences of means) on the key constructs of general parenting (measured on 5-point scales), division of educational attainment and division of first vs not-first child, of all mothers per age group of the child and per cluster.

Cluster	Key parental construct (1–5)					Educational level			Mother of first vs not-first child	
	Behavioral control	Coercive control	Nurturance	Overprotection	Structure	Higher educated	Lower educated	Mother of first child	Mother of not-first child	
Mothers of younger children 2–4 years (n = 71)	All (n = 71)	3.9 (0.2)	2.3 (0.6)	4.5 (0.3)	1.9 (0.4)	4.1 (0.3)	36 (51%)	33 (46%)	38 (54%)	
	MY-cluster 1 (n = 36)	3.9 (0.2)	2.8 (0.5)	4.5 (0.4)	1.8 (0.3)	4.1 (0.2)	18 (50%)	18 (50%)	18 (50%)	
	● MY-cluster 1a (n = 12)	3.8 (0.2)	3.3 (0.3) ^a	4.4 (0.2)	2.0 (0.3) ^a	4.1 (0.2)	4 (33%)	5 (42%)	7 (58%)	
	● MY-cluster 1b (n = 24)	3.9 (0.2)	2.5 (0.2) ^b	4.6 (0.3)	1.7 (0.3) ^b	4.1 (0.2)	14 (58%)	13 (54%)	11 (46%)	
	MY-cluster 2 (n = 35)	3.8 (0.3)	1.8 (0.3)	4.5 (0.3)	1.9 (0.4)	4.0 (0.3)	17 (49%)	15 (43%)	20 (57%)	
	● MY-cluster 2a (n = 8)	3.7 (0.3)	1.4 (0.3) ^c	4.7 (0.4)	1.4 (0.2) ^c	4.0 (0.3)	4 (50%)	3 (38%)	5 (62%)	
	● MY-cluster 2b (n = 27)	3.9 (0.2)	1.9 (0.2) ^d	4.5 (0.2)	2.1 (0.4) ^a	4.0 (0.3)	13 (48%)	14 (52%)	15 (56%)	
	F	2.2	145.3	2.4	15.3	0.5	$\chi^2 = 2.59, df = 3, p = 0.460$	$\chi^2 = 0.99, df = 3, p = 0.805$		
	df ₁ ,df ₂	3:67	3:67	3:67	3:67	3:67				
	p	0.102	< 0.001	0.077	< 0.001	0.659				
Mothers of older children 5–7 years (n = 65)	All (n = 65)	4.0 (0.3)	2.1 (0.5)	3.6 (0.3)	2.8 (0.5)	4.0 (0.3)	30 (46%)	35 (54%)	30 (46%)	
	MO-cluster 1 (n = 24)	4.0 (0.3)	2.6 (0.4)	3.6 (0.3)	3.2 (0.4)	4.1 (0.4)	10 (42%)	14 (58%)	11 (46%)	
	● MO-cluster 1a (n = 14)	4.1 (0.3) ^a	2.3 (0.3) ^a	3.6 (0.2) ^{ab}	3.4 (0.3) ^a	4.2 (0.3) ^a	6 (43%)	8 (57%)	7 (50%)	
	● MO-cluster 1b (n = 10)	4.0 (0.3) ^{ab}	2.9 (0.5) ^b	3.6 (0.4) ^a	2.9 (0.5) ^b	3.9 (0.4) ^{ab}	4 (40%)	6 (60%)	4 (40%)	
	MO-cluster 2 (n = 41)	3.9 (0.3)	1.9 (0.4)	3.6 (0.2)	2.6 (0.5)	4.0 (0.3)	20 (49%)	21 (51%)	19 (46%)	
	● MO-cluster 2a (n = 25)	4.0 (0.2) ^{ab}	1.9 (0.4) ^c	3.7 (0.2) ^b	2.8 (0.3) ^b	4.1 (0.3) ^{ab}	10 (40%)	15 (60%)	12 (48%)	
	● MO-cluster 2b (n = 16)	3.8 (0.3) ^b	1.9 (0.4) ^c	3.5 (0.2) ^a	2.2 (0.4) ^c	3.9 (0.4) ^b	10 (63%)	6 (37%)	7 (44%)	
	F	3.2	32.5	4.7	27.5	4.660	$\chi^2 = 1.58, df = 3, p = 0.665$	$\chi^2 = 0.31, df = 3, p = 0.959$		
	df ₁ ,df ₂	3:61	3:61	3:61	3:61	3:61				
	p	0.029	< 0.001	0.005	< 0.001	0.022				

^{abc}Different letter within a construct means significant different from each other.

Table 2
Cluster division for mothers of younger children aged 2–4 years.

Mothers of Younger children aged 2–4 years (n = 71)	Cluster explanation
MY-cluster 1 (n = 36) ● MY-cluster 1a (n = 12) ● MY-cluster 1b (n = 24)	Higher in coercive control (mean 2.8) ● Higher in coercive control (mean 3.3) Higher in Overprotection (mean 2.3) ● Lower in coercive control (mean 2.5) Lower in overprotection (mean 2.0)
MY-cluster 2 (n = 35) ● MY-cluster 2a (n = 8) ● MY-cluster 2b (n = 27)	Lower in coercive control (mean 1.8) ● Lower in coercive control (mean 1.4) Lower in overprotection (mean 1.4) ● Higher in coercive control (mean 1.9) Higher in overprotection (mean 2.1)

3.3. Clusters on key constructs of general parenting

Before running cluster analyses, outliers and multi-collinearity were checked. No multi-collinearity was present (VIF = 1.01–2.02, Tolerance: 0.53–0.99). The few outliers that were encountered were not deleted from the dataset, due to their relatively small deviation from the mean (< 1.5 SD). The dendrogram (not printed) based on Ward’s method indicated for both datasets that a solution of 2 or at maximally 4 clusters was adequate to describe the general parenting of the mothers. We choose for both datasets to work with 4 clusters. Table 1 presents the average scores, the standard deviations and the results of the ANOVA for each parental construct per cluster. In addition, per cluster frequencies according to the educational attainment of the mother, and whether or not the child they kept the diary for is their first child or not, are presented in Table 1.

3.3.1. Mothers of children aged 2–4 years

For the youngest children aged 2–4 years, the two main clusters MY-cluster 1 and MY-cluster 2 were further subdivided into MY-cluster 1a, MY-cluster 1b, MY-cluster 2a, and MY-cluster 2b. Table 2 specifies this division.

Table 1 shows that cluster MY-cluster 1 and cluster MY-cluster 2 split based on the difference in coercive control. MY-cluster 1 had a mean score of 2.8 on this general parenting practice, MY-cluster 2 scored lower with a mean score of 1.8. The other parental key constructs, educational attainment, and first versus not-first child, were not different between these clusters.

MY-cluster 1 was further divided into two sub-clusters MY-cluster 1a and MY-cluster 1b, based on differences in coercive control as well as overprotection. MY-cluster 1a scored significantly higher on coercive control (mean score 3.3) compared to MY-cl1b (mean score 2.5). MY-cluster 1a scored significantly higher on overprotection (mean score 2.0) compared to MY-cluster 1b (mean score 1.7). MY-cluster 2 was further divided into two sub-clusters MY-cluster 2a and MY-cluster 2b based on the significant differences on coercive control and overprotection. MY-cluster 2a scored significantly lower on coercive control (mean score 1.4), as well as on overprotection (mean score 1.4), MY-cluster 2b scored significantly higher on these practices (coercive control mean score 1.9, overprotection mean score 2.1), as presented in Table 1. No differences between first and not-first child and educational attainment are present between the sub-clusters.

3.3.2. Mothers of children aged 5–7 years

For the oldest children aged 5–7 years, the two main clusters MO-cluster 1 and MO-cluster 2 were further subdivided into MO-cluster 1a, MO-cluster 1b, MO-cluster 2a and MO-cluster 2b. The mean scores on all general parenting practices per cluster are displayed in Table 1. Table 3 specifies the division of the clusters.

Table 1 shows that MO-cluster 1 and MO-cluster 2 split based on the differences in coercive control as well as overprotection. MO-cluster 1 had lower mean scores on coercive control (2.6), as well as on

Table 3
Cluster division for mothers of older children aged 5–7 years.

Mothers of Older children aged 5–7 years (n = 65)	Cluster explanation
MO-cluster 1 (n = 24) ● MO-cluster 1a (n = 14) ● MO-cluster 1b (n = 10)	Lower in coercive control (mean 2.6) Lower in overprotection (mean 1.9) ● Lower in coercive control (mean 2.3) ● Higher in coercive control (mean 2.9)
MO-cluster 2 (n = 41) ● MO-cluster 2a (n = 25) ● MO-cluster 2b (n = 16)	Higher in coercive control (mean 3.2) Higher in overprotection (mean 2.6) ● Higher in overprotection (mean 2.8) Higher in nurturance (mean 3.7) ● Lower in overprotection (mean 2.2) Lower in nurturance (mean 3.5)

overprotection (1.9). MO-cluster 2 scored higher on coercive control (mean score 3.2) and on overprotection (mean score 2.6). No differences in educational attainment and first vs not-first child were present between the clusters.

MO-cluster 1 was further divided into two sub-clusters MO-cluster 1a and MO-cluster 1b based on differences in coercive control and overprotection. MO-cluster 1a scored significantly lower on coercive control (mean score 2.3) compared to MO-cluster 1b (mean score 2.9). MO-cluster 1a scored significantly higher on overprotection (mean score 3.4) compared to MO-cluster 1b (mean score 2.9). MO-cluster 2 split into two clusters based on the difference in overprotection and nurturance. MO-cluster 2a scored significant higher on overprotection (mean score 2.8) and nurturance (mean score 3.7), compared to MO-cluster 2b (mean score overprotection 2.2, mean score nurturance 3.5). Cluster MO-cluster 2a consisted of more mothers with lower education (60%), compared to cluster MO-cluster 2b (37%).

3.4. Mothers’ snack giving behavior

The 136 mothers gave in total 2415 snacks in a period of 13 days, which is an average of 1.4 snacks given by the mother to her child a day (see for more details, Damen et al., 2019b). The snacks provided by the mothers belong to 10 product categories; ‘fruits’, ‘cookies’, ‘candy’, ‘crisps’, ‘rice cracker, bread sticks and raisins’, ‘bread products’, ‘savory snacks’, ‘vegetables’ and ‘pie and pastry’. Table 4 shows per sub-cluster how many mothers provided a certain type of snack.

3.4.1. Mothers of children aged 2–4 years

Mothers with children aged 2–4 years mostly provided fruits (97%) and cookies (92%) as snacks, and to a lesser extent candies (75%) and crisps (77%) (Table 4). However, fewer mothers provided candies and crisps to their 2–4 years children, compared to mothers of children aged 5–7. Fewer mothers provided their children aged 2–4 years rice

Table 4
The number of mothers (percentage) that provided a certain type of snack, per age group of the child, per cluster.

Total	Cluster All (n = 136)	Fruits 134 (99%)	Cookies 120 (88%)	Candy 113 (83%)	Crisps 111 (82%)	Rice crackers bread sticks and raisins 68 (50%)	Bread products 71 (52%)	Savory snacks 63 (46%)	Vegetables 43 (32%)	Pie and pastry 59 (43%)
Mothers of younger children 2–4 years	All (n = 71)	69 (97%)	65 (92%)	53 (75%)	45 (63%)	38 (54%)	42 (59%)	35 (49%)	21 (30%)	33 (46%)
	MY-cluster 1 (n = 36)	35 (97%)	34 (94%)	28 (78%)	24 (67%)	20 (56%)	20 (56%)	23 (64%) ^a	7 (19%) ^a	21 (58%) ^a
	• MY-cluster 1a (n = 12)	11 (92%)	11 (92%)	11 (92%)	8 (67%)	7 (58%)	6 (50%)	7 (58%)	2 (17%)	7 (58%)
	• MY-cluster 1b (n = 24)	24 (100%)	23 (96%)	17 (71%)	16 (67%)	13 (54%)	14 (58%)	16 (67%)	5 (21%)	14 (58%)
	MY-cluster 2 (n = 35)	34 (97%)	31 (89%)	25 (71%)	21 (60%)	18 (51%)	22 (63%)	12 (34%) ^b	14 (40%) ^b	12 (34%) ^b
	• MY-cluster 2a (n = 8)	8 (100%)	8 (100%)	8 (100%)	4 (50%)	4 (50%)	7 (88%)	4 (50%)	2 (25%)	2 (25%)
	• MY-cluster 2b (n = 27)	26 (96%)	23 (85%)	17 (63%)	17 (63%)	14 (52%)	15 (56%)	8 (30%)	12 (44%)	10 (37%)
	X ²	0.000	0.001	1.347	0.008	0.016	1.229	6.222	3.600	2.419
	df	1	1	1	1	1	1	1	1	1
	p	0.984	0.971	0.246	0.928	0.899	0.268	0.013	0.058	0.094
Mothers of older children 5–7 years	All (n = 65)	65 (100%)	55 (85%)	60 (92%)	36 (55%)	30 (46%)	29 (45%)	28 (43%)	22 (34%)	26 (40%)
	MO-cluster 1 (n = 24)	24 (100%)	21 (88%)	23 (96%)	16 (67%)	11 (46%)	13 (54%)	8 (33%)	5 (21%) ^a	9 (38%)
	• MO-cluster 1a (n = 14)	14 (100%)	11 (79%)	13 (93%)	9 (64%)	6 (43%)	7 (50%)	4 (29%)	2 (14%)	5 (36%)
	• MO-cluster 1b (n = 10)	10 (100%)	10 (100%)	10 (100%)	7 (70%)	5 (50%)	6 (60%)	4 (40%)	3 (30%)	4 (40%)
	MO-cluster 2 (n = 41)	41 (100%)	34 (83%)	37 (90%)	20 (49%)	19 (46%)	16 (39%)	20 (49%)	17 (41%) ^b	17 (41%)
	• MO-cluster 2a (n = 25)	25 (100%)	20 (80%)	23 (92%)	15 (60%)	10 (40%)	10 (40%)	12 (48%)	10 (40%)	10 (40%)
	• MO-cluster 2b (n = 16)	16 (100%)	14 (88%)	14 (88%)	5 (31%)	9 (56%)	6 (38%)	8 (50%)	7 (44%)	7 (44%)
	X ²	-	0.243	0.666	1.900	0.002	1.405	1.473	2.878	1.900
	df	-	1	1	1	1	1	1	1	1
	p	-	0.622	0.414	0.162	0.968	0.236	0.225	0.90	0.753

^{ab}Different letter within a construct means significant different from each other.

crackers, bread sticks and raisins (54%) as well as bread products (59%), compared to the snacks mentioned before, but more often compared to mothers of children aged 5–7 years.

When comparing the snacks given by the mothers in the two different clusters, we see that significantly more mothers in MY-cluster 1 (higher in coercive control) provided savory snacks (64%), and pie and pastry (58%) than mothers in MY-cluster 2 (savory snacks 34%, pie and pastry 12%). Significantly more mothers in cluster MY-cluster 2 (lower score on coercive control), however, provided vegetables (40%) compared to mothers in MY-cluster 1 (19%).

More mothers in cluster MY-cluster 1a (higher score on coercive control) provided candy (92%) to their children compared to mothers in cluster MY-cluster 1b (candy 71%). More mothers in MY-cluster 2a (lower in coercive control and overprotection) provided cookies (100%), candy (100%) and bread products (88%) compared to mothers in MY-cluster 2b (cookies 85%, candy 63%, bread products 56%). For vegetables it is the other way around; more mothers in MY-cluster 2b provided vegetables (44%) compared to mothers in MY-cluster 2a (vegetables 25%).

3.4.2. Mothers of children aged 5–7 years

Fruits (100%) and candy (92%) were the snacks provided by most of the mothers with children aged 5–7 years. Cookies (85%) and crisps (86%) were frequently provided snacks too, as presented in Table 4.

When comparing the snacks given by the mothers in the two different clusters, we could see that significantly fewer mothers in MO-cluster 1 (lower in coercive control and overprotection) provided vegetables (21%) as a snack, than mothers in MO-cluster 2 (vegetables 41%). For crisps there was a slight difference noticeable; some more mothers in MO-cluster 1 provided crisps (67%) compared to the number of mothers in MO-cluster 2 (crisps 49%), however this difference was not significant.

MO-cluster 1a (lower coercive control) and MO-cluster 1b (higher coercive control) differed in snacks provided only with regards to cookies. All mothers in MO-cluster 1b provided cookies (100%) compared to 79% of the mothers in MO-cluster 1a. MO-cluster 2a (higher overprotection) and MO-cluster 2b (lower overprotection) differ on crisps provided. More mothers in MO-cluster 2a provided crisps (60%) compared to mothers in MO-cluster 2b (crisps 31%).

4. Discussion

This study described the association between snack giving behavior of mothers to their 2–4 and 5–7 year old children and the key constructs of general parenting (i.e. behavioral control, nurturance, and structure, coercive control, and overprotection). To the best of our knowledge, this is the first study exploring how the key constructs of general parenting cluster for mothers with children aged 2–4 years and 5–7 years and how the snack choice related to these clusters.

On average, mothers provided 1.4 snacks to their child per day. This average seems quite low, which is attributable to the fact that not all mothers provided a snack every day. This was because the mother was not always at home, others provided the snacks (e.g. the father, grandparents), or because the child was not at home and had eaten its snacks somewhere else. Results showed that most mothers of both age groups provided fruits as a snack, followed by cookies, which is in line with the results of the Dutch National Food Consumption Surveys (Ocké et al., 2008; Rossum et al., 2016). More mothers of children aged 5–7 years provided candy compared to mothers of children aged 2–4 years, which is in line with the results from Rangan, Randall, Hector, Gill, & Webb (2008).

The data from the Comprehensive General Parenting Questionnaire (CGPQ) indicated differences in scores on coercive control and overprotection between mothers with children aged 2–4 and 5–7 years. Scores for the other key constructs, behavioral control, nurturance, and structure were not different. Overall, a larger number of mothers who

scored higher on coercive control provided unhealthy products like pie and pastry (MY-cluster 1, children 2–4 years), candy (MY-cluster 1a, children 2–4 years) and cookies (MO-cluster 1b, children 5–7 years) compared to mothers lower in coercive control. In addition, fewer mothers who scored higher on coercive control provided vegetables (MY-cluster 1, children 2–4 years) compared to mothers lower in coercive control. Coercing children to eat has been associated with unhealthy eating, as it directs children away from internal cues to hunger and satiety. This could lead to an increase in the consumption of unhealthy foods and a decrease in the preference for healthy foods by children (Sleddens et al., 2014a). Restrictive feeding is a component of coercive control, which has been associated with a greater intake of unhealthy snacks. Less restrictive feeding has been associated with the intake of more healthy snacks (Boots et al., 2015). Moreover, in a longitudinal study, Boots, Tiggeemann, and Corsini (2019) found that restrictive feeding predicted an increased preference for sweets and salty foods by children aged 4–6 years. Less restrictive feeding was a driver for a higher preference for fruit and vegetables by these children. In addition, Philips, Sioen, Michels, Sleddens, and De Henauw (2014) found a small positive correlation between coercive control of parents and frequency of sweet food consumption of children aged 6–12 years. Pressure, another component of coercive control, has also been associated with a larger intake of unhealthy snacks (Rodenburg, Kremers, Oenema, & van de Mheen, 2014) and a higher BMI (Kelleher et al., 2015). Moreover, children's fruit and vegetable consumption associated negatively with parent's use of pressure (Fisher, Mitchell, Smiciklas-Wright, & Birch, 2002).

In the current study, a higher score on coercive control combined with a higher score on overprotection seemed to be associated with fewer mothers providing unhealthy products like cookies, candies (MY-cluster 2b, children aged 2–4 years) and crisps (MO-cluster 2, children aged 5–7 years). In addition, when a higher score on coercive control was combined with a higher score on overprotection, more mothers provided vegetables as a snack (MY-cluster 2b, children aged 2–4 years). Wang et al. (2017) suggested that control over eating may be associated with the consumption of less unhealthy snacks by children. Scoring higher on overprotection (MO-cluster 2a, 5–7 years) only, compared to scoring lower on overprotection (MO-cluster 2b, 5–7 years), was associated with more mothers providing crisps to their children. However, whether this difference is only caused by the lower score on overprotection is not certain as more mothers in MO-cluster 2a (60%) compared to MO-cluster 2b (37%) were also lower educated. Lower educational attainment of the mothers was in this dataset related to a higher provision of crisps by the mothers to their children (Damen et al., 2019b). Van der Horst and Sleddens (2017) showed that overprotection is of influence on children's dietary behavior. In their study, parents who scored high on overprotection, also scored higher on modelling healthy food intake, which is beneficial for children's dietary behavior. Besides, parents scoring high on overprotection were more likely to use practices which are beneficial for children's eating styles, like monitoring intake of less healthy foods, food availability of healthy foods in the home, encouragement of balances (Van der Horst & Sleddens, 2017) and covert control (Sleddens et al., 2014a). However, parents scoring high on overprotection were also more likely to use practices which have a negative impact on children's eating behavior, like emotional feeding (Sleddens et al., 2014a), pressure to eat, and restriction (Horst & Sleddens, 2017). Furthermore, Philips et al. (2014) found a small negative correlation between fruit and vegetable consumption of children aged 6–12 years and overprotection. Peters, Dollman, Petkov, and Parletta (2013) reported that over-reactiveness, one of the dimensions of overprotection, associated with higher non-core food consumption by children, whereas parents lower in over-reactiveness associated with higher fruit and vegetable intake by children. As not many studies considering overprotection are present (Horst & Sleddens, 2017; Padilla-Walker & Nelson, 2012) the current study is relevant.

No differences are found between mothers' educational attainment or mothers of a first versus a not-first child for the clusters. It seems that there is no connection in the current study between general parenting and these constructs. In a study by Philips et al. (2014) among parents of children aged 6–12 years old, it was found that higher educated parents were more overprotective than lower educated parents. For coercive control this study did not find differences between educational attainment of the parents.

However, the results of the current study must be interpreted with some care because the dataset for the use of the CGPQ is relatively small and a more extensive dataset could have provided more reliable results. However, for the collection of the qualitative data from the diaries, the number of mothers participating, and the duration of data collection was relatively large (Damen et al., 2019b). The duration of data collection for diaries is often shorter and a smaller number of participants is involved (Carnell, Cooke, Cheng, Robbins, & Wardle, 2011; Elliston, Ferguson, & Schüz, 2017). A challenge in keeping a diary is the influence on the behavior of participants, as they are aware that they have to record what they do (Subar et al., 2015). For example, mothers can overreport healthier snacks, report fewer snacks than they actually provide, or decide to give other snacks than they normally do. Because reporting in the diary took place over a relatively long period of time, we expect this effect to be small as mothers get used to the recording of their snack giving behavior. In fact, this effect of self-reporting could also have been of influence while answering the questions of the CGPQ, as the mothers might have reported what they think is social desirable behavior.

Furthermore, the CGPQ, which is a validated questionnaire measuring general parenting, was slightly adapted to make the questionnaire suitable for the current study. We reformulated one question for the scale of coercive control in a less strong way. However, because we reformulated only one word, we expect the effect to be minimal.

While conventional measures such as Chronbach's alpha did not give reason for concern about the quality of the sum scales of the CGPQ, our sample size did not allow to study the psychometric properties (e.g., unidimensionality) of the sum scales in more detail. Factor analytic methods require a minimum in the order of 100 respondents to be meaningful (Mundfrom, Shaw, & Ke, 2005; Tabachnick, Fidell, & Ullman, 2001). A future replication of our study would preferably use a decisively larger sample to allow for such validation study.

This study related mothers' snack giving behavior with general parenting. Recently the Comprehensive Snack Parenting Questionnaire (CSPQ) by Gevers, Kremers, de Vries, and van Assema (2018) and the Parenting around SNacking Questionnaire (P-SNAQ) by Davison et al. (2018) became available. The use of those questionnaires, which specifically focus on snacks, could be also relevant for the topic about snack giving. As our data were gathered in a comprehensive study in January 2017, these questionnaires were not available yet. For future research, it could be of interest to link data of actual snacks provided by mothers to those snack-focused questionnaires as well.

5. Conclusion

The current study provided a first insight into the possible associations between general parenting of mothers with children aged 2–7 years and their snack giving behavior. Focusing on snacks is relevant, as snack choice is more flexible and less planned before compared to main meals, which could imply that the snack moment relies more on the parenting capabilities of the mothers. The current explorative study reveals that the general key constructs of parenting, coercive control and overprotection, associated with the snack choice of mothers. When mothers scored relatively higher on coercive control, more of them provided unhealthy products like candy and cookies, and fewer of them provided vegetables. A higher score on coercive control combined with a higher score on overprotection associated with fewer mothers providing unhealthy products like cookies and candies.

As datasets are relatively small (children 2–4 years, $n = 71$; children aged 5–7 years, $n = 65$), future research could be more extended to provide more reliable statistically underpinned data. Exploring the key constructs of parenting in relation to child snacking is important to understand better parenting influences on snacking (Davison et al., 2015). The preliminary insights from this study could provide useful information for targeting parents of younger children in nutritional education campaigns as well as for interventions to help mothers meet children's dietary requirements.

CRedit authorship contribution statement

Femke W.M. Damen: Conceptualization, Methodology, Resources, Formal analysis, Investigation, Data curation, Writing - original draft, Visualization. **Bea L.P.A. Steenbekkers:** Conceptualization, Methodology, Writing - review & editing, Supervision, Validation. **Marielle T. Vaal:** Formal analysis, Writing - review & editing. **Jarl K. Kampen:** Formal analysis, Writing - review & editing, Validation. **Vincenzo Fogliano:** Writing - review & editing, Funding acquisition, Supervision. **Pieter A. Luning:** Conceptualization, Methodology, Writing - review & editing, Supervision, Validation.

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