Development and preliminary validation of the Adolescent Food Parenting Questionnaire: Parent and adolescent version

Maaike Koning a, b, * , Jacqueline Vink b , Natascha Notten a , Dorus Gevers c , Rob Eisinga b , Junilla Larsen b, **

a Department of Healthy Society, Knowledge Centre for Health and Social Work, Windesheim University of Applied Sciences, Zwolle, the Netherlands  
b Behavioural Science Institute, Radboud University, Nijmegen, the Netherlands  
c Maastricht University, Maastricht, the Netherlands

ARTICLE INFO

Keywords:
Food parenting practices  
Adolescent diet  
Questionnaire development  
Validation

ABSTRACT

Suitable instruments for measuring Food Parenting Practices (FPP) among adolescents and their parents that also measure the perception of adolescents about their parent’s FPP are rare. The current study describes the development and preliminary testing of a short 16-item Adolescent Food Parenting Questionnaire (AFPQ) for parents (AFPQ-p) and adolescents (AFPQ-a) that may enable future large-scale research on potentially eminent parent-child FPP discrepancy. Participants included 381 parents (73.8 % mothers; M age 45.9, 26.2 % fathers; M age 49.1) and their adolescent children (aged 12–16) who participated in the Dutch “G(FOOD)D together” study. Most parents finished higher professional education (mothers: 44.3 %; fathers: 34.4 %) and performed a paid job of 32 h per week or more (mothers: 22.1 %; fathers: 60.0 %). The theoretical framework of Vaughn (2016) was leading in the development of the AFPQ. Exploratory factor analysis (EFA) was performed on a random split sample of parent-adolescent dyads and confirmatory factor analysis (CFA) was performed on the other half. The EFA in both parent and adolescent samples resulted in a clear 5 factor solution explaining 61.6 % (AFPQ-p) and 64.2 % (AFPQ-a) of the variance respectively, representing the factors Autonomy Support ( α = 0.79/82), Coercive Control ( α = 0.85/83), Snack Structure ( α = 0.79/75), Healthy Structure ( α = 0.78/74) and Modelling ( α = 0.69/85). CFA confirmed good model fit for the AFPQ-p and the AFPQ-a. Associations with adolescent self-reported food intake were in the expected direction, confirming the preliminary convergent validity of the instrument among a moderate to highly educated group of parent-adolescent dyads. Although the AFPQ provides a promising short instrument, future research in more diverse samples is needed to build evidence on the instrument’s psychometric characteristics in other groups.

1. Introduction

Parents play a decisive role in the development of children’s eating behaviors (Agras et al., 2012; Daniels et al., 2014), food consumption (Fisher & Birch, 1999; Hughes et al., 2007; Loth, Friend, Horning, Neumark-Sztainer, & Fulkerson, 2016), weight status and weight gain trajectories (Clark, Goyder, Bissell, Blank, & Peters, 2007; Rolls, Loken, Savage, & Birch, 2014). They serve as providers, models and regulators of the food environment (Birch & Fisher, 1998), exerting their influence through food parenting practices (FPP). FPP are defined as context-specific acts of parenting concerning food and eating to socialize children toward certain behaviour (D. W. Gevers, Kremers, de Vries, & van Assema, 2014; Vaughn et al., 2016). Most studies on FPP have been conducted among (young) children and their parents, however FPP may...
also be important during adolescence.

Adolescence is one of the most dynamic and complex transitions in the lifespan. The physical, developmental, and social changes that occur during adolescence can affect eating behaviors and nutritional health, making it a vulnerable period for the development of overweight, a pressing public health issue (Dietz, 1994; Ferreira, Twisk, van Mechelen, Kemper, & Stehouwer, 2005; Lytle, Seifert, Greenstein, & McGovern, 2000; Mann et al., 2017; Martens, van Assema, & Brug, 2005; Nelson, Neumark-Staiziner, Hannan, Sirard, & Story, 2006; Nielsen & Popkin, 2004; Ogden et al., 2016). Adolescents’ relationships with parents go through a period of redefinition in which adolescents become more autonomous, and make use of more independent decision-making (Albert, 2011). Further, parent-adolescent relationships are at a critical period given that adolescents, more so than younger children, may be more critical of parents’ behaviors and parental rules (De Goede, Branje, & Meeus, 2009), and certain aspects of parenting, such as distal monitoring and behavioral control (by making rules), become more relevant (Laird, Criss, Pettit, Bates, & Dodge, 2009). Although adolescents may have acquired greater autonomy in relation to food consumption and lifestyle choices, they are, in many cases, still dependent on their parents routines for acquiring and preparing food. As such, adolescents’ dietary behavior choices may still be sensitive to the family food environment, including food availability, setting limits and modelling of behaviors by parents (Birch & Fisher, 1998; Ferris, Babskie, & Metzger, 2017; Story, Neumark-Staiziner, & French, 2002). In-depth interviews showed that parents reported structured practices, including setting rules and using availability or accessibility, as the most common practices used to influence early adolescents food intake (Gunter et al., 2019). However, adolescents’ perceptions of food parenting might differ from parent’s perceptions. Whereas a parent might for instance take great pains to model vegetable eating, the adolescent child might pay greater attention to the snacks parents consume while watching a movie. Parents and children often have different views on food-related behaviours and family functioning (Koning et al., 2018; Rebholz et al., 2014; van Assema, Glanz, Martens, & Brug, 2007; Zhang et al., 2020), and these different views may yield interesting information in link with (weight-related) outcome measures (Lebron et al., 2018; Patrick, Hennessy, McSpadden, & Oh, 2013). As such, it is important to gain insight into both parents’ and adolescents’ views regarding food parenting.

However, previous research has focused almost entirely on single parent or adolescent report. There are two recent exceptions of studies describing the development of new measures assessing food-related and energy-balance-related parenting respectively among both parents and adolescent children. Specifically, one elaborate 31 item (adolescent version) or 35 item (parental version) survey questionnaire focused on six different food parenting practices, covering three higher-order food parenting constructs (i.e., structure, autonomy support and coercive control), aimed at independent eating occasions when parents are not around (Reicks et al., 2020). The other survey questionnaire (40 items) with a parent and adolescent version focused on assessing structured practices regarding energy-balance-related behaviors, including physical activity (Zhang et al., 2020). These recent studies show the increasing interest in food and broader energy-balance-related parenting as measured by different reporters. However, so far, there is not a concise and short instrument measuring food parenting in the family, such as food restriction, pressure, and instrumental/emotional feeding) (Afonso et al., 2016; Hughes et al., 2013; Larsen et al., 2015; Webber, Cooke, Hill, & Wardle, 2010; Webber, Hill, Cooke, Carnell, & Wardle, 2010), whereas ‘structure-related’ (i.e., the use of noncoercive forms of control, such as rules and routines) and ‘autonomy supportive’ (the facilitation of children’s independence, for instance through responsive feeding and praise) food parenting practices have received less attention, probably also because, until recently, no validated measures have been available for assessing these food parenting constructs (Beckers, Karssen, Vink, Burk, & Larsen, 2021; Vaughn et al., 2016).

Therefore, the overall aim of the current study was to develop a novel and relatively short food parenting measure (i.e., the Adolescent Food Parenting Questionnaire; AFPQ) for parents (AFPQ-p), including both mothers and fathers, and adolescents (AFPQ-a) that can be easily included in future large-scale survey studies, representing a range of FPP that may be relevant to child dietary outcomes. We included both mothers and fathers in our study, given that fathers are also involved in food parenting nowadays (Davison, Haines, Garcia, Douglas, & McBride, 2020). We mainly used the Comprehensive Snack Parenting Questionnaire (CSPQ), measuring all three sorts of food parenting practices (i.e., structure, autonomy support, coercive control) around snacking among Dutch parents of children (Gevers, Kremers, de Bries, & van Assema, 2018) as an initial example for constructing questions for (parents of) adolescents. In addition, we also checked other existing international FPP item banks (Masse et al., 2020; O’Connor et al., 2016; Vaughn, Tabak, Bryant, & Ward, 2013). Our current study has two specific aims. The first is to develop and test the factor structure and internal consistency of this new AFPQ measure to assess food parenting practices in both parents and adolescents. The second is to explore preliminary convergent validity by examining the links between parental and adolescent FPP with healthy and unhealthy adolescent food intake through correlations and regressions. It was hypothesized that the more ‘structure-related’ and ‘autonomy supportive’ FPP would be positively associated with healthier, and negatively associated with unhealthier, dietary intake, whereas more coercive control would be positively associated with unhealthier dietary intake specifically.

2. Methods

2.1. Participants and procedure

The participants (i.e., both parents and their children) in the present study were part of the “GF(FOOD) together” research project, a longitudinal study on Dutch adolescents’ and their parents’ health behavior. Data for the first three waves were collected in fall 2017, spring 2018, and spring 2019. Adolescents and their parents were recruited through secondary schools. We randomly invited 40 secondary schools in the South and the East of the Netherlands to participate in the cohort study. Six secondary schools agreed to participate in wave 1, and all adolescents attending the first and second grade and their parents were invited to participate in this study by means of an active parental consent procedure. Mothers or fathers provided consent for themselves and their adolescents to participate in the study. Parental consent was provided for 777 parents themselves and for 718 adolescents, of which 593 parents (76.3 %) and 667 adolescents (92.9 %) participated in the first wave, 586 parents and 737 adolescents took part in Wave 2 (in which an extra school was recruited), and 467 parents and 674 adolescents in wave 3. Further details on the study design can be found elsewhere (van den Broek, Larsen, Verhagen, Burk, & Vink, 2020).

Parents provided written consent for themselves and their adolescents, who also gave written assent, to participate in the study. A letter describing the four-wave study was mailed to parents and they were asked to return a (paper or online) consent form indicating whether they agreed to their child participating in the study and whether (or not) they agreed to participate in the study themselves. If at least one parents’ forms was returned, children were rewarded with a small incentive, regardless whether permission was given or not. Adolescents were informed at school and gave written assent themselves. Before participation, adolescents and parents were informed that participation was voluntary, that they could withdraw from the study at any time and that their answers would be processed anonymously. Inclusion criteria for
adolescents were being enrolled in a high school, being in the first and second grade of this high school, being proficient in the Dutch language and parents and children both having given active informed consent. Exclusion criteria for participants were not being proficient in the Dutch language.

Adolescents completed an online survey at school during one class hour (approximately 45 min), and height and weight were measured outside the classroom by trained research assistants. Parents completed an online survey, which took approximately 20 min to complete. The questionnaires were administered through Qualtrics Survey Software (Qualtrics, Provo, UT, USA). Children received a small present after completing the survey, and several prizes were raffled.

Table 1

| Construct | Item parent | Item adolescent | Item source | F1 | F2 | F3 | F4 | F5 | F6 | F7 |
|-----------|-------------|-----------------|-------------|----|----|----|----|----|----|----|
| AS | | | | | | | | | | |
| AS P: | 1. I discuss why it is important to eat fruits and vegetables with my child. | 1. My parents discuss why it is important to eat fruits and vegetables with me. | Author developed | .85 | .61 | .06 | .03 | .04 | .08 | .01 | .08 | .02 | .08 |
| AS A: | 2. I explain why I have certain rules about eating to my child. | 2. My parents explain why they have certain rules about eating to me. | Author developed | .70 | .62 | -.03 | -.04 | -.12 | .16 | .02 | .07 | .04 | .07 |
| CC | | | | | | | | | | |
| CC P: | 3. I explain why I have certain rules about eating to my child. | 3. My parents explain why they have certain rules about eating to me. | Child Feeding Practices Questionnaire (D. Musher-Eizenman et al., 2018). | .63 | .86 | -.04 | -.03 | -.04 | -.06 | .08 | -.10 | .15 | .11 |
| CC A: | 4. I give my child feedback related to their eating habits. For example if my child eats too quickly or doesn’t eat enough vegetables. | 4. My parents give me feedback related to my eating habits, for example if I eat too quickly or don’t eat enough vegetables. | CSPQ | .43 | .60 | -.10 | -.01 | -.05 | -.03 | .15 | .03 | .28 | .29 |
| SS | | | | | | | | | | |
| SS P: | 5. I sometimes give my child something to eat as a reward. | 5. My parents sometimes give me something to eat as a reward. | Author developed | -.04 | -.01 | .80 | .87 | -.01 | .12 | .05 | .11 | .06 | .06 |
| SS A: | 6. I sometimes give my child a small snack as comfort. | 6. My parents sometimes give me a small snack as comfort. | Author developed | .10 | -.06 | .74 | .59 | .03 | .13 | -.10 | .06 | -.05 | .05 |
| HS | | | | | | | | | | |
| HS P: | 7. I explain why I have certain rules about eating to my child. | 7. My parents explain why they have certain rules about eating to me. | Author developed | -.03 | .10 | .72 | .69 | .04 | -.12 | .07 | .13 | -.02 | -.17 |
| HS A: | 8. I sometimes give my child something to eat at a distraction. | 8. My parents sometimes give me something to eat at a distraction. | Author developed | .02 | .21 | .01 | .01 | -.75 | .69 | .04 | .06 | .04 | .08 |
| Mod | | | | | | | | | | |
| Mod P: | 9. I consciously do not eat sweets or snacks when my child is around. | 9. My parents consciously do not eat sweets or snacks when I am around. | Author developed | .03 | .08 | .04 | -.15 | -.05 | -.02 | .03 | -.15 | .82 | .76 |
| Mod A: | 10. I try to consciously set a good example when it comes to eating fruit and vegetables. | 10. My parents try to consciously set a good example when it comes to eating fruit and vegetables. | Author developed | .12 | .06 | .06 | .03 | -.06 | .00 | .02 | .08 | .47 | .75 |
| Abbreviations: AS: Autonomy Support; CC: Coercive Control; HS: Healthy Structure; SS: Snack Structure. CSPQ: Comprehensive Snack Parenting Questionnaire (D. W. M. Gevers et al., 2018). CFPPQ: Comprehensive Feeding Practices Questionnaire (D. Musher-Eizenman & Holub, 2007). P: Parent. A: Adolescent. Cronbach’s alpha’s for parent and adolescent factors. Item dropped after further analyses (also marked in grey).
among participating parents. The Institutional Review Board of the Faculty of Social Sciences of the Radboud University, Nijmegen, The Netherlands approved the study protocol (reference number ECSW20170805-516) in 2017.

For the current study we used data from wave 3. We excluded non-biological parents for this study (n = 6), adolescents that were absent during the measurements (n = 24) and in case two caregivers participated (n = 49), we included the fathers to ensure the largest possible sample of fathers in the study sample (n = 100). Our final sample consisted of 281 biological mothers and 100 biological fathers (n = 381 parents). We used adolescent data from those adolescents of whom parents also had filled out questionnaires, to create parent-child dyads, resulting in a total of 381 parent child dyads.

Almost all mothers (97.0 %) and fathers (97.6 %) were born in the Netherlands. Mean age of mothers was 45.9 years (SDage = 4.1; age range = 31.2 to 55.7). Fathers mean age was 49.1 years (SDage = 4.4; age range = 39.2 to 62.8). Most parents finished higher professional education (mothers: 44.3 %; fathers: 34.4 %) or secondary vocational education (mothers: 34.9 %; fathers: 38.8 %) and performed a paid job of less than 32 h per week (mothers: 52.8 %; fathers: 31.8 %) or 32 h per week or more (mothers: 22.1 %; fathers: 60.0 %).

Almost all adolescents were born in the Netherlands (97.5 %) and boys (n = 187) and girls (n = 194) were approximately equally represented. All participants attended regular secondary education and were in their second or third year (Mage = 14.3 years; SDage = 0.6; age range = 12.7 to 16.3). More than half of the adolescent participants (52.0 %) were in pre-university education, 10.0 % of the participants was in higher general secondary education, and 38.0 % of the participants was in pre-vocational education.

2.2. Measures

2.2.1. Food parenting practices

2.2.1.1. Adolescent Food Parenting Questionnaire (AFPQ). Parent version (AFPQ-p). We started the AFPQ development with a couple of test items during the first and second wave of the “G(i)OOD together” research project among parents only (i.e., these test items were not included in the questionnaires for adolescents). We calculated preliminary factor analyses which resulted in 12 items presenting 5 factors (rather similar to the final 5 factors of the AFPQ – see Results section). The number of questions was too limited to develop reliable factor structures. Therefore, we added similar sort of questions with the overall aim to develop more ‘robust’ factor structures. At wave 3 we started with a total of 20 items. These items are presented in Table 1. In total, 11 items were based on previous questionnaires (D. W. M. Gevers, Kremers, de Vries, & van Assema, 2018; D. Mush-Meizeman & Holub, 2007) and adapted for parents of adolescents, whereas 9 items were developed during expert sessions with experts on FPP, (authors JL, RE) and consulting literature regarding FPP (Masse et al., 2020; O’Connor et al., 2016; Vauughn et al., 2013). We took care to include items from all three higher-order constructs of food parenting (i.e. structure, coercive control, and autonomy support), and put more emphasis on the structure-based items, given that parents reported structured practices, including setting rules and using availability or accessibility, as the most common practices used to influence early adolescents food intake (Gunter et al., 2019). We made this deliberate selection for the following reasons: (a) some sub categories were not considered very useful for the adolescent situation and (b) we aimed at developing a particularly short survey instrument that could be used in large-scale research. We thus left out subconstructs that appeared to be more suitable for younger children (e.g., praising children for trying to eat vegetables). In addition, we also left out items on food pressure and restriction because (1) there are existing questionnaires available for measuring these constructs and (2) among adolescent populations these constructs mostly appear to be the consequence of, rather than the cause of, child eating and weight outcomes (Beckers et al., 2021). We thus only included instrumental/emotional ‘coercive’ feeding items. For each item, answers could be given on a 5-point Likert scale ranging from ‘strongly disagree’ (score 1) to ‘strongly agree’ (score 5). Adolescent version (AFPQ-a) Adolescents were asked about their parents’ food parenting practices for the first time at wave 3. We adjusted the 20 item AFPQ-p for adolescents (i.e., AFPQ-a). Table 1 also provides an overview of all items for adolescents, which were similar to those for parents. For each item, answers could be given on a 5-point Likert scale ranging from ‘strongly disagree’ (score 1) to ‘strongly agree’ (score 5).

2.2.2. Convergent validity and associations with adolescents’ food intake

To assess adolescents’, intake of sugar sweetened beverages (SSB), sweet snacks, savory snacks, and fruit and vegetables, participants were asked to complete a food frequency questionnaire (FFQ). The items to assess sweet and savory snack intake were adapted from a validated Dutch FFQ on fat intake in adolescent and adult populations (i.e., Fat list; (van Assema, Brug, Ronda, & Steenhuis, 2001). As also explained in our previous work (van den Broek et al., 2020). This FFQ has shown the expected associations with demographic variables in a previous adolescent population (Wouters, Larsen, Kremer, Dagnelie, & Geenen, 2010). However, as a decade has passed, insights on the beneficial effects of certain foods have changed and we therefore made some modifications to the items used to assess savory snacks. Given that the Dutch Nutrition Centre now states that (low-fat) cheese and (unsalted) nuts are part of a healthy diet, we decided to disregard previously included items on “nuts and peanuts” and on “potato chips, pieces of cheese and sausage” for inclusion in our unhealthy, savory snacks measures. With regard to the fruit and vegetables intake, we used all validated items from a Dutch FFQ on fruit and vegetables (i.e., Fruit and Vegetables list; (van Assema, Brug, Ronda, Steenhuis, & Oenema, 2002). We only disregarded the item on fruit juice, given that the Netherlands Nutrition Centre does not consider the consumption of fruit juices to be healthy, as it contains less dietary nutrients and fibers than whole fruits. Specifically, the FFQ assessed participants’ intake of 1) soft drinks (sparkling and non-sparkling drinks with sugar; diet, energy and yoghurt drinks excluded; e.g., cola or lemonade); 2) cake, pastry, and large cookies (e.g., donut or muffin); 3) candy bars (e.g., chocolate-covered bars or confectons); 4) chocolate (e.g., chocolate bars or pralines); 5) warm, fried snacks (e.g., sausage roll or pastry, pizza slice, french fries, deep fried breadroll, spring roll, corn dog, bapao sandwich); 6) fruit (e.g., apple or banana); 7) salad and raw vegetables (e.g., cherry tomatoes or cucumber); and 8) heated vegetables (i.e., cooked, baked, steamed or otherwise heated; e.g., broccoli or green beans). We provided pictures of the foods and drinks and text to provide more information on types of foods and drinks.

Participants could indicate their intake for each item on an 8-point scale ranging from ‘0 days a week’ (0) to ‘7 days a week’ (7). Scores for soft drinks (item 1) were used to obtain the measure for SSB. Scores for cake, candy bars, and chocolate (items 2–4) were summed to assess sweet snacks. Scores for warm, fried snacks (item 5) were used to assess savory snacks. Scores for fruit, salad and raw vegetables, and heated vegetables (items 6–8) were summed to obtain the fruit and vegetables measure. A similar procedure has been followed by van den Broek et al. (van den Broek et al., 2020). For each of the 8 food items, adolescents were asked to indicate how often (0–7) they obtained this particular item in four different contexts: 1) taken or received from home, to eat or to drink at home or to take away; 2) bought at school, such as from the canteen or the vending machine; 3) bought somewhere else, such as in the supermarket, snack bar, or sports club; and 4) received somewhere else, such as at their neighbors’, grandparents’, or friends’ place. In the current study, we focused on food intake taken or received from home, eaten or drank at home or taken away from home to eat or drink somewhere else. We aimed to examine the association...
2.2.3. Covariates

Adolescents height and weight were measured according to protocol (Fredricks, van Buuren, Wit, & Verloove-Vanhorick, 2000) by trained students. Body Mass Index (BMI) was calculated as weight in kilograms divided by height in meters squared. BMI standard deviation scores (z-scores) were calculated, adjusting for child age and sex, using a Dutch representative sample of 0-21-year olds as a reference standard (Schonbeck et al., 2011). The zBMI scores were included as covariate. In addition, parental gender (0 = men; 1 = women), parental level of education (1 = lower general secondary education; 2 = secondary vocational education, 3 = higher professional education), parental BMI, adolescents’ level of education (1 = lower general secondary education; 2 = higher general secondary education and pre-university education) and gender of adolescent (0 = boys; 1 = girls) were included as covariates, given that food parenting practices may be dependent on these constructs (D. W. Gevers, van Assema, Sleddens, de Vries, & Kremers, 2015; Khandpur, Blaine, Fisher, & Davison, 2014; Orrell-Valente et al., 2007; Pulley, Galloway, Webb, & Payne, 2014; Thomson, Hennessy, Landry, & Goodman, 2020). Ethnicity was not included as a covariate due to very low variability on this variable (i.e., 98 % of the adolescents was born in the Netherlands). Parents reported their own height and weight based on which we calculated parental BMI.

2.3. Statistical analyses

Exploratory factor analyses (EFA) were conducted using the PASW 20.0 software package and confirmatory analyses with the R software package. The procedures that were followed are in line with the recommendations by Floyd and Widaman (Floyd & W, 1995). Descriptive statistics were used (mean, standard deviation and percentages) to describe the study sample and to investigate population characteristics. We checked normality and distribution assumptions of the food intake variables and zBMI before performing our regression analysis with a scatter plot, QQ plot and the Shapiro-Wilk test. The plots showed no extreme outliers. The Shapiro-Wilk test showed non-normal distributions for food intake; SSB intake (W = 0.89, p = .00), sweet snack intake (W = 0.91, p = .00), savory snack intake (W = 0.72, p = .00), F&V intake (W = 0.98, p = .00) and a normal distribution for zBMI (W = 0.99, p = .20). Because the skewness and kurtosis of the food intake variables were within the acceptable range, we did not transform our variables for the regression analyses. We only included parent-child dyads of which we had all available data on the outcome and independent variables in the analyses (n = 381). There was some missing data in the variables that we used as covariates, but not enough to imply selection bias (bmi parent: 0, 2.5 % missing). We used pairwise deletion of data entries with missing information from the dataset. The lavaan package in R was used in order to perform the procedures that were followed are in line with the recommendations that should be followed by a confirmatory factor analysis (CFA), to assess construct validity. The factor structure resulting from the EFA was consistent of 2 items we used the Spearman Brown formula to correct for attenuation. The factor analysis using an iterated principal factor extraction with oblimin rotation was performed in SPSS on all 20 items in the first random split sample of parents, group 1 (n = 194 parents and adolescents). The following were examined to select the best fitting model: loading values, the scree plot, eigenvalues (>1), and the interpretability of the factor solution. Items that did not achieve a minimum factor loading of 0.4 and factors with 1 item only were removed (Floyd & W, 1995). Internal consistency of all factors was determined using Cronbach’s alpha, and we checked for those subscales with Cronbach’s alpha below 0.70 whether alpha was improved through deletion of items. Factors with a Cronbach’s alpha <0.60 were excluded from further consideration on the basis of poor internal reliability (Taber, 2017). In case of factors consisting of 2 items we used the Spearman Brown formula to correct for this (Eisinga, Grotenhuis, & Pelzer, 2013).

2.3.2. Confirmatory factor analysis

While EFA is used to explore latent constructs underlying a scale, this should be followed by a confirmatory factor analysis (CFA), to assess construct validity. The factor structure resulting from the EFA was examined in group 2 (N = 187 parents and adolescents) by performing a CFA using maximum likelihood estimation in R with the lavaan package. A range of goodness-of-fit indices were used to evaluate model fit and compare alternative models (Schreiber, 2006). Fit indices and their acceptable cut-offs included the normed chi-square (X^2/df; values between 1.0 and 2.0), Comparative Fit index (CFI; >0.90), Root factor analysis) using an iterated principal factor extraction with oblimin rotation was performed in SPSS on all 20 items in the first random split sample of parents, group 1 (n = 194 parents and adolescents). The following were examined to select the best fitting model: loading values, the scree plot, eigenvalues (>1), and the interpretability of the factor solution. Items that did not achieve a minimum factor loading of 0.4 and factors with 1 item only were removed (Floyd & W, 1995). Internal consistency of all factors was determined using Cronbach’s alpha, and we checked for those subscales with Cronbach’s alpha below 0.70 whether alpha was improved through deletion of items. Factors with a Cronbach’s alpha <0.60 were excluded from further consideration on the basis of poor internal reliability (Taber, 2017). In case of factors consisting of 2 items we used the Spearman Brown formula to correct for this (Eisinga, Grotenhuis, & Pelzer, 2013).
Mean-Square Error of Approximation (RMSEA; <0.08), Standardized Root Mean Square Residual (SRMR; < 0.08) and the Akaike Information Criterion (AIC; the smaller the more parsimonious) (Schreiber, 2006). Model fit was seen as achieved if the majority of fit-indices met the acceptable cut-off criteria.

2.3.3. Convergent validity with adolescents’ food intake

Because we wanted to examine both univariate and multivariate associations, correlation and linear regression analyses were performed using the PASW 20.0 software package. As such, preliminary validity was established by performing correlations and linear regression analyses with adolescent food intake at home as the dependent variable and with AFQP factors (FPP) as independent variables, adjusted for covariates (parent’s gender, educational level, BMI; adolescents’ age, educational level, gender, zBMI).

3. Results

3.1. Factor analysis

3.1.1. Underlying structure of the AFQP: exploratory factor analysis (EFA)

The EFA in the parent sample identified 6 factors with eigenvalues exceeding 1.0, and an explained variance of 66.7 %. One of the 6 factors had only 1 item and this factor (and corresponding item) was therefore deleted. We removed 4 items due to internal consistency issues (see Table 1). The final AFQP-p model consisted of 16 items loading on 5 factors, explaining 61.6 % of the total variance, as can be seen in Table 1 and in the Appendix. We named the following factors based on interpretability: Factor 1: Autonomy support (4 items), Factor 2: Coercive Control (4 items), Factor 3: Modelling (2 items), Factor 4: Healthy Structure (2 items), and Factor 5: Snack Structure (4 items). Though we excluded items on restriction and pressure to eat, the items of the second factor represent items of the higher order construct Coercive control.

The internal consistency of the five factors is good; Cronbach’s alpha’s: Autonomy support (α = 0.79), Coercive control (α = 0.85), Snack Structure (α = 0.79), Modelling (α = 0.69) and Healthy Structure (α = 0.78). In the adolescent sample the EFA also identified (the same) 5 factors with eigenvalues exceeding 1.0, and they explained 64.2 % of the variance. We removed 4 items due to internal consistency issues. One item loaded on none of the factors and three items were removed after examination of the Cronbach’s alpha’s by listwise deletion of items. The Cronbach’s alpha’s increased by deleting 3 items in two factors. The final AFQP-a resulted in exactly the same factor structure as in the parent sample with 16 items loading on 5 factors. The final model explained 61.4 % of the total variance. The internal consistency of the five factors is good with Cronbach’s alpha’s varying between 0.74 and 0.85.

3.1.2. Verifying the structure of the AFQP: confirmatory factor analysis (CFA)

Confirmatory analyses on the parent and adolescent data showed an acceptable fit, as can be seen in Table 3. Confirmatory analyses on the parental data showed a slightly better fit than CFA on the adolescent data. However, for both parental and adolescent data goodness-of-fit indices of the 5-factor model were acceptable.

3.2. Convergent validity with associations with adolescents’ food intake

3.2.1. Univariate associations between AFQP-a and AFQP-c and adolescent food intake

Pearson correlations between food parenting constructs and adolescent food intake at home or taken from home are shown in Table 4. Autonomy Support reported by parents was negatively associated with SSB (r = -.11), sweet snack (r = -.18) and savory snack intake (r = -.20) and positively associated with fruit and vegetable intake (r = 0.18) of adolescents. The pattern reported by adolescents was the same, with correlations of respectively -.14, -.14, -.23 and 0.24 for the associations mentioned above. Healthy Structure reported by parents was positively associated with fruit and vegetable intake (r = .25) in adolescents. A different pattern was seen in Healthy Structure as reported by adolescents, this was negatively associated with their SSB intake (r = -.11), sweet snack (r = -.10) and savory snack intake (r = -.25). Similarly to the pattern in parents, a positive association was found with their fruit and vegetable intake (r = 0.35). Snack Structure reported by parents was negatively associated with SSB intake (r = -.14) in adolescents. Snack Structure reported by adolescents was also negatively associated with SSB intake (r = -.23), but also with sweet snack (r = -.21) and savory snack intake (r = -.18). Contrary to expectations, food modelling as reported by parents was positively associated with savory snack intake (r = 0.13) in adolescents. Coercive Control reported by adolescents was positively associated with their intake of sweet snacks (r = 0.26).

Correlations between parent and adolescent factors are relatively low, and show a diverse spread of associations between parents and children, as can be seen in Table 4. For the factor Modelling (r = 0.01) the correlation is not significant and very small in size. All the other factors show significant associations, although small in size.

3.2.2. Multivariate associations between AFQP-p and AFQP-a and adolescent food intake

The results of the linear regression analyses, displayed in Table 5, showed negative associations between Autonomy Support as reported by both parents and adolescents and sweet snack intake (parents: β = -.0.23, p = .001, adolescents: β = -.0.13, p = .02) and savory snack intake (parents: β = -.0.20, p = .001, adolescents: β = -.0.13, p = .03). More over, a positive association was found between Autonomy Support and fruit and vegetable intake (β = 0.13, p = .04), after correction for covariates. For adolescent reporters a positive association was found between Coercive Control and sweet snack intake (β = 0.07, p = .00). For parents Healthy Structure was associated with fruit and vegetable intake (β = 0.15, p = .01), whereas for adolescents Healthy Structure was also positively associated with fruit and vegetable intake (β = 0.25, p = .00) but negatively associated with savory snack intake (β = -.0.16, p = .00). For parents and adolescents Snack Structure was negatively associated with SSB intake; parents: (β = -.12, p = .04, adolescents: (β = -.20, p = .00), and for adolescents only negatively associated with sweet snack intake (β = -.15, p = .01). Parents report a positive association between Modelling and savory snack intake (β = 0.17, p = .001).
Results showed a clear 5 factor model based on 16 items explaining in a relatively large sample of parents and their adolescent children. Relationships between AFPQ scores and food intake in the hypothesized confirming the preliminary convergent validity of the instrument. Healthy Structure, and Modelling. Moreover, the patterns of associations with adolescent food intake at home or taken from home were in general FPP (i.e., structure, coercive control, and autonomy support) for an undertaken to construct the short questionnaire and to ensure factors were robust.

This is one of the first instruments measuring all three sorts of general FPP (i.e., structure, coercive control, and autonomy support) for an adolescent population, with both parent and adolescent versions tested in a relatively large sample of parents and their adolescent children. Results showed a clear 5 factor model based on 16 items explaining 61.6%/64.2 % of the variance in parents and adolescents, respectively. The 5 factor model includes the following factors with adequate internal consistency: Autonomy Support, Coercive Control, Snack Structure, Healthy Structure, and Modelling. Moreover, the patterns of associations with adolescent food intake at home or taken from home were in the expected direction and covered all three higher-order constructs of food parenting (i.e., structure, coercive control, and autonomy support), confirming the preliminary convergent validity of the instrument.

Overall, we mostly see small to some moderate effect sizes of the relationships between AFQPQ scores and food intake in the hypothesized directions. However, most links were somewhat smaller than expected. Healthy Structure as reported by both adolescents and parents was consistently associated with more healthy (i.e., fruit and vegetable) food intake. This is conform our expectations. In addition, Healthy Structure as reported by adolescents was also associated with a lower intake of savory snacks. The savory snacks concerned fried or warm snacks, and we speculate that those parents providing a healthy structured home context according to adolescents will probably not be the ones who provide warm or fried snacks. Contrary to our expectations, among parents no association was found between Healthy Structure and savory snack intake. Our findings even showed a positive link between Healthy Structure as reported by parents and the intake of sweet snacks after controlling for covariates and other FPPs. Though speculating, this might be explained by reversed causation, with parents acting on or reporting to act on their adolescents’ sweet snack intake. However, it should be noted that this link was absent in our univariate correlational analysis. When considering the strengths of effects, we might tentatively suggest that stronger and consistent links between Healthy Structure and dietary intake have been found for adolescent than parent FPP reporters, but future research is needed. Moreover, as expected, Snack Structure as reported by both adolescents and parents was associated with the intake of less SSB. This may be explained by the fact that parents can easily have clear rules about the amount of SSB an adolescent is allowed to consume. However, in contrast to our expectations, Snack Structure did not link to healthy dietary intake, suggesting that an explicit focus on healthy structured parenting is needed to see effects on intake of healthy products (i.e., fruits and vegetables).

Moreover, ‘healthy modelling’ as reported by parents, but not by adolescents, was positively associated with adolescents’ savory snack intake. These discrepancies may be explained by reversed associations, namely that adolescent weight and food intake patterns will influence their parent’s FPP, but not FPP as reported by adolescents. Additionally, coercive control reported by adolescents was positively associated with their intake of sweet snacks, but not in parents. This may be explained by differences in interpretability by parents and adolescents. Parents may believe that their intentions of setting a good example may be conveyed to their children, but adolescents might interpret this otherwise. It is also known that parent’s use of control is domain-specific and that parents may implement controlling feeding practices in response to children’s eating behaviors and weight gain, regardless of their general parenting approach (Rollins, Savage, Fisher, & Birch, 2016). Future research should further examine whether and why parent-child FPP discrepancy.

### Table 4

Correlations between parent and adolescent AFQPQ factors and adolescent food intake at home or taken from home in wave 3. N = 381.

| Adolescent Food Intake/zBMI | 1. SSB | 2. Sweet snacks | 3. Savory snacks | 4. FV | 5. zBMI | Parent Factors | 6. Healthy Structure | 7. Coercive Control | 8. Modelling | 9. Healthy Structure | 10. Snack Structure | 11. Autonomy Support | 12. Coercive Control | 13. Modelling | 14. Healthy Structure | 15. Snack Structure |
|---------------------------|-------|----------------|----------------|-------|--------|--------------|---------------------|-------------------|-------------|------------------|------------------|-------------------|-------------------|-------------|------------------|------------------|
| 1. SSB                    | .29** | 1              |                |       |        |              |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 2. Sweet snacks           |     | .30** .39** | 1              |       |        |              |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 3. Savory snacks          | -.14** -.05 -.18** | 1              |       |        |              |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 4. FV                     |     | -.07 -.18** .03 | 1              |       |        |              |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 5. zBMI                   |     | -.07 -.18** .03 | .04 | 1      |              |                     |                   |             |                   |                   |                   |                   |                   |             |                   |                   |
| Parent Factors            |     |               |                |        |        |              |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 6. Healthy Structure      | -.11** -.18** -.20** .18** | .04 | 1      |       |        |              |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 7. Coercive Control       | .003 | .06 -.02 .04 | .04 | .02 | 1       |              |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 8. Modelling              | .06 | .10 .13* .06 | .10* | .14** | .10* | 1            |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 9. Healthy Structure      | .09 | .06 -.07 .25** | -.08 | .33** | -.04 | .02 | 1            |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 10. Snack Structure       | -.14** | -.07 -.07 | -.01 -.02 | .27** | -.01 | .23** | .17** | 1 |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| Child factors             |     |               |                |        |        |              |                     |                   |             |                   |                   |                   |                   |             |                   |                   |
| 11. Autonomy Support      | -.14** | -.14** -.23** | .24** | .01 | .23** | -.08 | .10 | .07 | 1 |                     |                   |             |                   |                   |                   |             |                   |                   |
| 12. Coercive Control      | .09 | .26** .06 | .01 | -.10 | .08 | .18** | .07 | .05 | .02 | .15** | 1 |                     |                   |             |                   |                   |
| 13. Modelling             | .07 | .03 -.06 | .02 | -.05 | .002 | -.06 | .01 | -.03 | .08 | .07 | .19** | 1 |                     |                   |             |                   |                   |
| 14. Healthy Structure     | -.11* | -.10* -.25** | .35** | .01 | .11* | -.05 | -.04 | .13* | -.01 | .45** | -.04 | -.14** | 1 |                     |                   |             |                   |                   |
| 15. Snack Structure       | -.23** | -.21** -.18** | .06 | .02 | .15** | -.12* | .002 | .05 | .34** | .40** | -.06 | .18** | .20** | 1 |                     |                   |             |                   |                   |
| Mean (SD)                | 2.90 | 1.83 1.13 4.54 | .07 (.93) | 3.80 | 2.40 | 1.95 | 4.47 | 3.31 | 4.51 | 2.17 | 2.54 | 4.77 | 3.72 |                     |                   |             |                   |                   |
| Range                    | 0–7 | 0–7 0–7 0–7 0–7 0–7 0–7 0–7 0–7 0–7 0–7 0–7 0–7 0–7 | 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 |}

** significant at the 0.01 level (2-tailed). * significant at the 0.05 level (2-tailed). Abbreviations: SSB: sugar sweetened beverages. F&V: fruit and vegetables.

2013). However, adolescent’s perceptions and both may uniquely predict adolescent’s nutrition behavior (Patrick et al., 2013). This paper describes the development and preliminary psychometric characteristics of the AFQP-p and AFQP-a for parents and adolescents respectively. Multiple steps were undertaken to construct the short questionnaire and to ensure factors were robust.
Table 5

Linear regressions between AFPQ-p factors (upper part of the table) and AFPQ-a factors (lower part of the table) with adolescent food intake at home or taken from home. N = 381.

|                         | Fruit & Vegetable intake | SSB intake | Savory Snack intake | Sweet Snack intake | SSB intake | Savory Snack intake | Sweet Snack intake | SSB intake | Savory Snack intake | Sweet Snack intake |
|-------------------------|--------------------------|------------|---------------------|--------------------|------------|---------------------|--------------------|------------|---------------------|--------------------|
| **Unadjusted analyses** |                          |            |                     |                    |            |                     |                    |            |                     |                    |
| Parent                  | β: -0.019, SE: 0.119     | β: -0.277, SE: 0.149 | β: -0.020, SE: 0.082 | β: -0.030, SE: 0.060 | β: 0.090, SE: 0.079 | β: 0.099, SE: 0.078 | β: 0.076, SE: 0.059 | β: 0.048, SE: 0.048 | β: -0.030, SE: 0.048 | β: -0.030, SE: 0.048 |
| Child                   | β: -0.220, SE: 0.110     | β: -0.450, SE: 0.149 | β: -0.120, SE: 0.082 | β: -0.120, SE: 0.082 | β: -0.210, SE: 0.082 | β: -0.270, SE: 0.082 | β: -0.270, SE: 0.082 | β: -0.270, SE: 0.082 | β: -0.270, SE: 0.082 | β: -0.270, SE: 0.082 |
| **Analyses adjusted for covariates** |                          |            |                     |                    |            |                     |                    |            |                     |                    |
| Parent                  | β: -0.000, SE: 0.019     | β: -0.030, SE: 0.042 | β: -0.000, SE: 0.019 | β: -0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 |
| Child                   | β: -0.000, SE: 0.019     | β: -0.030, SE: 0.042 | β: -0.000, SE: 0.019 | β: -0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 | β: 0.000, SE: 0.019 |

**Significant at the 0.05 level (2-tailed).** **Significant at the 0.01 level (2-tailed).** **Significant at the 0.001 level (2-tailed).**

Notably, the most consistent finding is that Autonomy Support was associated with less unhealthy intake (SSB, sweet snack and savory snack intake at home or taken from home) and more healthy food intake (fruit and vegetable intake at home or taken from home) in both parents and adolescents. Autonomy supportive practices are practices which are used mostly in the home context and, as such, may be perceived as similarly evident for both parents and adolescents. Although correlations between adolescent and parent reported FPP were generally low or lacking, the correlation for Autonomy Support was relatively high compared to other parent-child FPP correlations. We suggest that, given adolescents’ emerging desire to become autonomous individuals, parental autonomy support may be especially important for supporting autonomous food choices during this developmental period.

The reported correlations between the FPP subscales of the AFPQ-p and AFPQ-a are relatively small in size, and may be explained by the fact that the adolescents are relatively young. We expect more discrepancies between young adolescents and parents than between older adolescents and their parents given that different views on parenting decrease when children age, with increasing similarity between parents’ and adolescents’ views during the course of adolescence (De Goede, I., Branje, & Mees, 2009; Keijser, J. G.; Poulin, 2013; McGue, E., Walden, & Iacono, 2005; Shanahan, M., Crouter, & Osgood, 2007; J. G.; Smetana, C., & Campione-Barr, 2005; J. G.; Smetana, 2017); at age 18 parents and adolescents tend to agree more than at age 13 (Mastrothodoros, Van der Graaff, Dekovic, Mees, & Branje, 2019). Thus, possibly the associations will increase in size with age of the adolescents. For the factor Modelling no significant correlation between parent and adolescent report was found. This may be explained by differences in interpretation of Modelling. Parents may believe that they are setting a good example by actively performing or refraining from certain behaviors, but adolescents may interpret this differently, not aware of the active intent behind this behavior. Furthermore, it has been found in previous research that parents may intentionally model healthy food intake (e.g. fruits/vegetables) but unintentionally act as role models for their children’s less healthy, snack food intake (Palfreyman, Haycraft, & Meyer, 2014). While parents intentionally promote their children’s intake of healthy foods the modelling of less healthy snack food intake may be unintended, and, as such, not reported by parents.

4.1. Strengths and limitations

The current study had several strengths and limitations. A strength of our study is that we developed both a parent and an adolescent version of our AFPQ instrument, using an important theoretical food parenting framework (Vaughn, J. et al., 2016). With our instrument, research on FPP as perceived by both parents and adolescents is made possible. Furthermore, our study applied confirmatory methodology, which has unique advantages over exploratory analyses because measurement models are developed on an a priori basis and specific factor structures can be tested and compared to see whether they fit the data. In addition, the study sample was large enough to conduct a split half analysis to examine the fit of the factor structure.

Despite these strengths, some limitations should be acknowledged. A limitation is the cross-sectional design of our study, meaning we were neither able to explore the test-retest reliability of the items as previously mentioned, nor able to say something about the causal order of the links found between food parenting and snack intake in the present study. The use of an FFQ for construct validity is another limitation because it may not be a very reliable measure of actual intake, as it is not a direct measure of parent behavior and dietary reporting bias is possible in self-reported data. This calls for the need for additional measures to assess convergent validity such as established measures of food parenting, general parenting styles, or direct observation. Moreover, although our items to measure food intake were based on validated FFQs, the questionnaire was slightly adapted and should be further reviewed for validity.
validated. Additionally, the use of self-reported weight and height parental data to calculate parental BMI can be seen as a limitation, though bias usually takes place when cut-offs are used (Larsen, Ouwens, Engels, Eisinga, & van Strien, 2008), and we used BMI as a continuous variable. The height and weight of the adolescents were objectively measured and not self-reported, which adds to the strengths of our study.

Moreover, most respondents from our sample were highly educated, resulting in an underrepresentation of low educated parents and adolescents. This could be seen as a weakness of our study, as it reduces the representativeness of the sample. Specifically, groups which are more ethnically diverse and in which more lower educated parents and adolescents are represented could yield different outcomes of our questionnaire as FPP could be conceptualized differently in these groups, also dependent upon child and parent gender. Although we included a diverse gender sample of both mothers and fathers, we did not examine specific population groups, differences between sex of parents and adolescents, ethnicity and income levels, and future research in more diverse samples is necessary to build evidence on the instrument’s validity in other groups. For example, the roles of children, especially in helping mothers with food preparation, may be different for some cultural groups and for boys versus girls. As such, there might be gender-specific differential opportunities to discuss autonomy supportive food parenting practices. Future research should further examine this.

4.2. Possible applications of the AFPQ

The AFPQ adds a new and short instrument covering all three sorts of higher-order food parenting (i.e., structure, autonomy support and coercive control) to the existing measures for food parenting and food parenting literature. Because the questionnaire is relatively short, response burden is likely to be low. Therefore, it is a good measure for use in future longitudinal studies. Having to answer too many questions might prevent respondents from completing the questionnaire or lead to drop-out in longitudinal studies. The inclusion of both a parent and an adolescent version helps to distinguish the perception of parents and their adolescent offspring regarding FPP and the (differential) effects on adolescent food intake. However, as several types of validity and reliability were not assessed in the present study, next steps for data-collection to examine if the AFPQ accurately measures food parenting behavior would be to examine test-retest reliability by administering the AFPQ in the same group, within a reasonable time frame of about two weeks. Reporters are not expected to change over a period of two weeks when it comes to parenting around food and this time frame would be long enough to prevent recall bias. Also to investigate the content validity the questionnaire should be administered in more cultural and SES diverse groups, to see if this results in the same factor structure. Finally, as mentioned, future research should further examine convergent validity, through for instance direct observation measures. To conclude, future research should first examine the psychometric characteristics in more diverse groups as mentioned, and may then further examine whether and how parent-child (dis)agreement regarding food parenting is linked to child dietary outcomes in vulnerable groups, providing potentially new suggestions for weight-related preventive interventions (e.g., focusing on understanding and closing for instance certain disagreement views regarding food parenting).

5. Conclusion

Adolescence is one of the most dynamic and complex transitions in the lifespan, a time when youths develop the skills and characteristics that increase their autonomy, and behavior patterns acquired during this period are likely to influence long-term behaviors. Our study has added a potentially promising new measure of food parenting for (parents of) adolescents that should be further examined in more diverse samples. Further research with longitudinal data is also needed for additional test-retest reliability examination and validation of observations and food intake measures. Finally, a greater use of non-survey measures, such as qualitative research and observational coding, would likely contribute to further validation of the AFPQ. These next steps for data collection are considered particularly important, given that later widespread use of short instruments such as the AFPQ may shed light on possible eminent parent-child discrepancy regarding food parenting.

Author’s contributions

JV and JL were responsible for the study design. JV and JL supervised the data collection. MK was responsible for the statistical analyses and interpretation of the data in agreement with JV, JL, NN, RE and DG. MK wrote the first version of the manuscript and all authors participated in the revisions of the manuscript. All authors read and approved the final manuscript.

Funding

We received no specific grant from any funding agency in public, commercial or non-profit sectors. This study was funded by the Behavioural Science Institute of Radboud University in Nijmegen, the Netherlands. The study received no external funding. The analysis and interpretation of the data and the writing of this manuscript were funded by Windesheim University of Applied Sciences and the Behavioural Science Institute of Radboud University in Nijmegen, the Netherlands.

Ethics statement

The research presented in this manuscript was performed in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board of the Faculty of Social Sciences of the Radboud University, Nijmegen (reference number ECSW20170805-516) in 2017. This information is presented in the Method section of the manuscript.

Declaration of competing interest

None.

Acknowledgments

We would like to thank all the participating schools and families for their contribution to this research project. Moreover, we would like to thank all the student assistants for their help during the data collection of this project. We would like to thank Ms. Shelley Jack and Ms. Lisa Wilderink for translating and back- translating our questionnaires.

Appendix. The Adolescent Food Parenting Questionnaire – parent and adolescent version

Please read the following statements and tick the boxes most appropriate to your child’s eating behaviour.
1. I educate my child about nutrition for example talking about healthy and unhealthy food.

2. I explain why I have certain rules about eating to my child.

3. There are always fruit and vegetables at home for my children to eat.

4. I sometimes give my child something to eat as a distraction.

5. I give my child feedback related to their eating habits, for example if my child eats too quickly or doesn’t eat enough vegetables.

6. At home my child can easily eat vegetables as they are part of our daily meals.

7. I sometimes give my child something to eat as a reward.

8. I let my child snack if he/she wants to.

9. I discuss why it is important to eat fruit and vegetables with my child.

10. I sometimes give my child something to eat when he/she does something right, for example when doing homework.

11. I consciously eat vegetables or fruit when my child is around.

12. I have clear rules about what my children can snack on for example 1 biscuit after school.

13. I make sure my child does not snack just before meals.

14. I sometimes give my child a small snack as comfort.

15. I try to consciously set a good example when it comes to eating fruit and vegetables.

16. I have rules about when my child is allowed to eat snacks and how much.

SCORING OF THE AFQ.

(Disagree = 1, slightly disagree = 2, impartial = 3, slightly agree = 4, Agree = 5).

Autonomy Support = item mean AS.

Coercive Control = item mean CC.

Modelling = item mean Mod.

Healthy structure = item mean HS.

Snack structure = item mean SS.

*Reversed item.

References

Afonso, L., Lopes, C., Severo, M., Santos, S., Reali, H., Durao, C., et al. (2016). Bidirectional association between parental child-feeding practices and body mass index at 4 and 7 y of age. *American Journal of Clinical Nutrition*, 103, 861–867.

Agras, W. S., Hammer, L. D., Huffman, L. C., Muscala, A., Bryson, S. W., & Danaher, C. (2012). Improving healthy eating in families with a toddler at risk for overweight: A cluster randomized controlled trial. *Journal of Developmental and Behavioral Pediatrics*, 23, 529–534.

Albert, D., & Steinberg, L. (2011). Judgment and decision making in adolescence. *Journal of Research on Adolescence*, 21, 211–224.

van Assema, P., Brug, J., Ronda, G., & Steenhuis, I. (2001). The relative validity of a short Dutch questionnaire as a means to categorize adults and adolescents to total and saturated fat intake. *Journal of Human Nutrition and Dietetics*, 14, 377–390.

van Assema, P., Glanz, K., Martens, M., & Brug, J. (2007). Differences between parents’ and adolescents’ perceptions of family food rules and availability. *Journal of Nutrition Education and Behavior*, 39, 84–89.

Beckers, D., Karsen, L. T., Vink, J. M., Burk, W. J., & Larsen, J. K. (2021). Food parenting practices and children’s weight outcomes: A systematic review of prospective studies. *Appetite*, 158, 105010.

Birch, L. L., & Fisher, J. O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics*, 101, 539–549.

van den Broek, N., Larsen, J. K., Verhagen, M., Burk, W. J., & Vink, J. M. (2020). Is fisher advice effective for parents of children with obesity? Evidence from the meta-analysis of randomized controlled trials. *Journal of Public Health*, 29, 132–141.

Clark, H. R., Goyder, E., Bissell, P., Blank, L., & Peters, J. (2007). How do parents’ child-feeding behaviours influence child weight? Implications for childhood obesity policy. *Journal of Public Health*, 29, 132–141.

Daniels, L. A., Mallan, K. M., Bhatti, D., Nicholson, J. M., Meedeniya, J. E., Bayer, K. J., et al. (2014). Child eating behavior outcomes of an early feeding intervention to reduce risk indicators for child obesity: The NOURISH RCT. *Obesity*, 22, E104–E111.

Davison, K. K., Haines, J., Garcia, E. A., Douglas, S., & McBride, B. (2020). Fathers’ food parenting: A scoping review of the literature from 1990 to 2019. *Pediatric Obesity*, 15, e12654.

Dietz, W. H. (1994). Critical periods in childhood for the development of obesity. *American Journal of Clinical Nutrition*, 59, 955–959.

Eisinga, R., Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International Journal of Public Health*, 58, 637–642.

Ferreira, I., Twisk, J. W., van Mechelen, W., Kemper, H. C., & Stehouwer, C. D. (2005). Development of fitness, fitness, and lifestyle from adolescence to the age of 36 years: Determinants of the metabolic syndrome in young adults: The Amsterdam growth and health longitudinal study. *Archives of Internal Medicine*, 165, 42–48.

Ferris, K. A., Babakir, E., & Metzger, A. (2017). Associations between food-related parenting behaviors and adolescents’ engagement in unhealthy eating behaviors: The role of nutrition knowledge. *The International Journal of Aging and Human Development*, 84, 231–246.

Fishier, J. O., & Birch, L. L. (1999). Restricting access to palatable foods affects children’s behavioral response, food selection, and intake. *American Journal of Clinical Nutrition*, 69, 1264–1272.

Floyd, F. J., & W. K. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*, 7, 286–299.

Freedik, A. M., van Buuren, S., Witt, J. M., & Verloove-Vanhorick, S. P. (2000). Body index measurements in 1996-7 compared with 1980. *Archives of Disease in Childhood*, 82, 107–112.

Gevers, D. W. M., Kremers, S. P. J., de Vries, N. K., & van Assema, P. (2014). Clarifying concepts of food parenting practices. *A Delphi study with an application to snacking behavior*. *Appetite*, 79, 51–57.

Gevers, D. W. M., Kremers, S. P. J., de Vries, N. K., & van Assema, P. (2018). The comprehensive snack parenting questionnaire (CSPQ): Development and test-retest reliability. *International Journal of Environmental Research and Public Health*, 15,
