Parental feeding practices in families with children aged 2-13 years: Psychometric properties and child age-specific norms of the German version of the Child Feeding Questionnaire (CFQ)

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Abstract

The Child Feeding Questionnaire (CFQ) is a self-report questionnaire for assessing parental attitudes to child weight and parental feeding practices. Previous evaluations of its psychometric properties were conducted primarily with small- to medium-sized samples (N < 500) and a small range of children's age. The present study aims to analyze the psychometric properties of the CFQ in a large German community sample and, for the first time, to establish normative data. Within the population-based LIFE Child study, the CFQ was administered to N = 982 mothers of 2- to 13-year-old children. Psychometric analyses on item statistics and internal consistency were conducted. Using structural equation modeling, four empirically-based factorial models of the CFQ were evaluated, and measurement invariance across child age groups and sex was examined. Age-specific norms for the CFQ subscales were computed. Item statistics were highly favorable for the majority of items, but floor and ceiling effects were found for 14 of 31 items. Internal consistency of the CFQ subscales ranged from acceptable to excellent ($.71 \leq \alpha \leq .91$), except for the subscale Perceived Responsibility ($\alpha = .65$). Regarding factorial validity, an eight-factor model with the newly created Reward subscale provided the best fit to the data. This model was factorial invariant across child sex and adjacent age groups. Maternal and child weight status showed large effects on CFQ subscale scores. The analyses established good psychometric properties for the German version of the CFQ and confirmed an eight-factor model. The provided norms allow for the comparison of individual parental feeding practices and change over time. The CFQ's sensitivity to change and longitudinal associations of parental feeding practices and child weight status warrant further research.

Introduction

Converging evidence indicates that controlling feeding practices by parents are important in relation to the development and maintenance of child overweight and disordered eating across a wide age range (e.g., Faith et al., 2004; Fisher & Birch, 2002; Jansen et al., 2012; Matheson et al., 2015; Matton, Goossens, Braet, & van Durme, 2013; Shloim, Edelson, Martin, & Hetherington, 2015). Specifically, cross-sectional studies in child ages 2 to 12 years reliably revealed that parents who use restrictive feeding (i.e., restrict their children's access to foods, particularly unhealthy foods) were likely to have children with a higher than lower body mass index (BMI, kg/m^2; Faith et al., 2004; Shloim et al., 2015). Conversely, parental pressure to eat (i.e., the extent to which parents pressure their children to eat more food, typically at mealtimes) was predominately found in children with a lower than higher BMI (Shloim et al., 2015). Parental use of monitoring (i.e., the extent to which parents oversee their child's eating) was not associated with child's BMI in most studies (Shloim et al., 2015), but was found to negatively correlate with eating disturbances in children up to 5 years (Jani, Mallon, & Daniels, 2015; Jansen et al., 2012). The comparatively few longitudinal evidence that is currently available leaves ambiguity yet about the direction of causal inferences between parental feeding practices and child weight status (e.g., Faith et al., 2004; Matton et al., 2013; Mulder, Kain, Uauy, & Seidell, 2009; Rhee et al., 2009; Shloim et al., 2015; Ventura & Birch, 2008).

For more than 15 years, most research into parental feeding practices relied on the Child Feeding Questionnaire (CFQ, Birch et al., 2001; de Lauzon-Guillain et al., 2012; Vaughn, Tabak, Bryant, & Ward, 2013). Conceptually, the 31-item CFQ assesses parental perceptions and concerns related to their child's weight status, their responsibility for child's food intake, as well as parental use of restriction, monitoring, and pressure to eat. The majority of studies evaluating the psychometric properties of the CFQ were conducted in the

US (Anderson, Hughes, Fisher, & Nicklas, 2005; Birch et al., 2001; Boles et al., 2010; Kaur et al., 2006, Kong, Vijayasiri, Fitzgibbon, Schiffer, & Campbell, 2015), while other studies examined the CFQ's validity of its Japanese (Geng et al., 2009), Chinese (Liu, Mallan, Mihrshahi, & Daniels, 2014), Australian (Corsini, Danthiir, Kettler, & Wilson, 2008), Turkish (Camci, Bas, & Buyukkaragoz, 2014; Polat & Erci, 2001), Swedish (Nowicka, Sorjonen, Pietrobelli, Flodmark, & Faith, 2014) and Spanish (Canals-Sans et al., 2016) versions. The CFQ was originally designed for use in parents of pre-school children (Johnson & Birch, 1994); however, subsequent validation studies extended its use to parents of children in early and even late adolescence. The majority of these studies examined specific age groups, for example, child age ranges 2 to 5 years (Anderson et al., 2005; Boles et al., 2010; Corsini et al., 2008; Kong et al., 2015; Liu et al., 2014; Nowicka et al., 2014) or 6 to 11 years (Birch et al., 2001; Camci et al., 2014; Canals-Sans et al., 2016; Geng et al., 2009) with the exception of Polat and Erci (2001) and Kaur et al. (2006) who examined parents of children and adolescents aged 2 to 11 years and 10 to 19 years, respectively. Generally, psychometric analyses of the CFQ involve complex (i.e., a large number of estimated parameters) and highly skewed data (Kong et al., 2015), but only few validation studies included large sample sizes with more than 500 participants (Canals-Sans et al., 2016; Geng et al., 2009; Kong et al., 2015; Nowicka et al., 2014) leaving concerns about the stability of obtained parameter estimates (Schreiber, Nora, Stage, Barlow, & King, 2006).

Overall, previous psychometric studies of the CFQ revealed inconsistent results with respect to the subscales' internal consistencies and its factorial validity. While most subscales of the CFQ were found to be reliable indicated by Cronbach's $\alpha \geq .70$, the subscales Restriction (Boles et al., 2010; Kong et al., 2015; Liu et al., 2014; Nowicka et al., 2014; Polat & Erci, 2001) and Pressure to Eat (Boles et al., 2010; Kong et al., 2015; Liu et al., 2014; Polat & Erci, 2001) often showed questionable internal consistency ($\alpha < .70$) suggesting a lack of stability of these constructs, particularly in samples including younger children. Likewise, the subscale Perceived Parental Weight did not prove reliable (Canals-Sans et al., 2016; Corsini et al., 2008; Geng et al., 2009; Nowicka et al., 2014; Polat & Erci, 2001); however, this is likely due to fact that this subscale documents parental weight status across the life span, which is expected to vary over time. Regarding factorial validity, Birch et al. (2001) originally proposed a 7-factor structure presenting the CFQ subscales, although this model did not prove factorially valid in most studies. In order to improve the fit of 7-factor model to their data, previous studies created composite scores (e.g., for items of the Restriction subscale; Birch et al., 2001; Corsini et al., 2008), included error covariances (e.g., for items of the Perceived Parent Weight subscale; Birch et al., 2001; Canals-Sans et al., 2016; Geng et al., 2009; Kaur et al., 2006), removed specific items (e.g., items of the Restriction subscale; Anderson et al., 2005; Kong et al., 2015; Nowicka et al., 2014), or included an additional factor (Corsini et al., 2008). In their sample of 203, 4- to 5-year old children Corsini et al. (2008) revealed an 8-factor solution to show the best model fit. The eighth factor was defined as food as reward and composed by two items from the Restriction subscale. While this factor could be replicated in subsequent studies including a similar age range (Kong et al., 2015; Liu et al., 2014), another study failed replication (Nowicka et al., 2014).

Importantly, studies using the CFQ revealed that the CFQ subscale scores did not only vary with respect to the child’s weight status, but were also associated with child sex (Corsini et al., 2008; Kaur et al., 2006) and age (Cachelin & Thompson, 2013; Kaur et al., 2006), parental weight status (Cachelin & Thompson, 2013; Camci et al., 2014; Canals-Sans et al., 2016; Kaur et al., 2006), socioeconomic status (Cardel et al., 2012; Nowicka et al., 2014), and ethnicity (Anderson et al., 2005; Blisset & Bennet, 2013; Cardel et al., 2012; Kaur et al., 2006). For example, Blissett and Bennett (2013) showed that White German families were characterized by lower levels of Pressure to Eat and Restriction, and higher levels of

Monitoring as compared to Black Afro-Caribbean British families. However, a key concern in identifying sociodemographic correlates and making valid group comparisons is whether the CFQ is invariant, i.e., not biased in measuring the same construct across subgroups. Unless measurement invariance is established, interpretation of group differences in parental feeding practices, for instance across age groups, and longitudinal outcomes are meaningless (Meredith & Teresi, 2006; Schmitt & Kuljanin, 2008). So far, only two studies inspected measurement invariances of the CFQ among diverse ethnical subgroups (Anderson et al., 2005; Kong et al., 2015). Based on comparative model fit indices, the CFQ fit reasonably well for both Black and Hispanic population samples (Anderson et al., 2005; Kong et al., 2015). Nevertheless, it warrants clarification whether the CFQ operates equivalently across child age and sex.

In conclusion, psychometric analyses on the CFQ were mainly conducted in small- to medium-size samples including a narrow range of children ages which did not allow for analyzing measurement invariance across age groups so far. Further, previous studies were predominately conducted in non-European samples, although parental feeding practices appear to vary across cultures. In this context, the present study sought to (i) examine the psychometric properties including the factorial structure of the CFQ in a large German population-based sample of children aged 2 to 13 years, (ii) analyze measurement invariance across child age and sex, and (iii) to provide, for the first time, age-specific norms, allowing for the comparison of CFQ scores between different populations.

Methods

Procedure

The present study is part of the ‘Leipzig Research Centre for Civilization Diseases (LIFE)’ Child study. One aim of this prospective population-based cohort is to identify risk factors of childhood obesity and its comorbidities. Therefore, the LIFE Child study plans to recruit a sample of 10,000 children and adolescents, and their families. Inclusion in the LIFE Child study requires all children and adolescents to live in the area of Leipzig, to have sufficient German language skills, and being able to participate in at least one on-site assessment day. Recruitment started in June 2011 and will continue until 2021. Study participants are recruited via advertisement at different institutions such as university hospitals, local clinics, public health centers, kindergartens, schools, and partner study centers. For a detailed description of the design and procedures of the LIFE study see Poulain et al. (submitted; Quante et al., 2012). Until April 2014, N = 1123 mothers of 2- to 13-year-old children participated in the study and completed the CFQ. Of these, n = 60 (5.3%) mothers had to be excluded because of more than 25% missing data on a CFQ subscale (see Statistical Analysis), and n = 81 (7.2%) because of missing anthropometric data leaving a final sample of N = 982 mother-child dyads. Mothers (n = 17, 2.0%) and children (n = 16, 1.6%) classified as underweight were also excluded from the analyses due to small cell sizes. All mothers provided informed consent. Written assent was also obtained from the children if they were ≥ 12 years of age. The Ethics Committee of the Medical Faculty of the University of Leipzig, Germany, approved the methodological concept for the conduct of the LIFE study including the consent procedure (Reg. No. 264-10-19042010).

Participants

The final child sample consisted of n = 510 (51.9%) boys and n = 472 (48.1%) girls between the ages of 2 and 13 years (M = 8.0 years, SD = 2.9 years). Mothers' mean age was 38.2 years (SD = 5.8 years). The majority of mothers was married (n = 450, 54.8%) and of German nationality (n = 972, 98.9%). To assess the families' social status a modified Winkler Index was used which summarizes information about mothers' or fathers' highest educational degree, professional degree, current profession, and household net income (Lange et al., 2007). Overall, *n* = 147 (18.1%) families were classified as having low social status, *n* = 324 (39.8%) as medium social status, and *n* = 343 (42.1%) as high social status.

BMI for children was calculated from objectively measured weight and height, and for mothers from self-report data, respectively. Children's BMI was transformed into BMI z-score using age- and sex-specific reference data collected in Germany (Schaffrath Rosario, Kurth, Stolzenberg, Ellert, & Neuhauser, 2010). Overweight and obesity in children were classified using the 90^{th} and 97^{th} BMI-percentile as cut-offs, respectively. For children, the mean BMI z-score was 0.2 (*SD* = 1.3, range -1.2 – 5.6), with *n* = 69 (7.1%) children being overweight and *n* = 127 (13.0%) being obese. For mothers, a BMI $\geq$ 25.0 kg/m^2 and < 30 kg/m^2 indicated overweight and BMI $\geq$ 30.0 kg/m^2 obesity, respectively. The mothers' mean BMI was 25.6 kg/m^2 (*SD* = 5.8 kg/m^2, range 18.5 – 49.0 kg/m^2) with *n* = 207 (24.6%) being classified as overweight and *n* = 144 (17.1%) as obese.

Although the study cohort is population-based, several differences from the German general population need to be noted with respect to the representativeness of children's and mothers' weight status and family's social status. Compared to the German general population (8.9% overweight, 5.5% obesity; Kurth & Schaffrath Rosario, 2010), a lower proportion of children with overweight and a higher proportion of children with obesity was included. Likewise, there was a slightly lower proportion of women with overweight and obesity (22.8% overweight, 15.4% obesity; Mensink et al., 2013); a higher rate of families with high social status (27.1%; Lange et al., 2007); and a lower proportion of individuals with immigrant background in the present sample (19.0%; Statistisches Bundesamt, 2011).

Measures

Child Feeding Questionnaire (CFQ). The CFQ was initially developed to assess the parent's view of three child feeding practices and four aspects of perceptions and concerns regarding feeding and weight (31 items total). The three subscales measuring parental feeding practices include (1) Restriction (RST; eight items; e.g., "I intentionally keep some food out of my child's reach."), (2) Pressure to Eat (PE; four items; e.g., "I have to be especially careful to make sure my child eats enough."), and (3) Monitoring (MN; three items; e.g., "How much do you keep track of the sweet things your child eats?"). The four subscales assessing parental perceptions and concerns include (1) Perceived Responsibility (PR; three items; e.g., "How often are you responsible for deciding if your child has eaten the right kind of foods?"), (2) Concern about Child Weight (CN; three items; e.g., "How concerned are you about your child becoming overweight?"), (3) Current and Retrospective Perceived Parental Weight (PPW; four items), and (4) Current and Retrospective Perceived Child Weight (PCW; one to six items; more items with increasing age). For an overview of all items and their abbreviations used in the statistical analysis, see Table 1. Depending on the subscale, all items are rated on a 5-point Likert scale expressing agreement (1 = *disagree* to 5 = *agree*) or frequency (1 = *never* to 5 = *always*). Subscale mean scores are computed. For the present study, the English version of the CFQ was translated based on the guideline issued by the World Health Organization (WHO, 2016). Accordingly, the strategy of translation included the forward-translation into German by the senior author who has specific expertise and cultural knowledge followed by a back-translation by an independent licensed translator who has language expertise and cultural knowledge as well. The back-translation procedure was followed by a congruence check of the back-translated and original version. No discrepancies emerged during the congruence check.

=== Please insert Table 1 ===

Statistical Analysis

First, CFQ items were inspected for missing values. If there were 25% or less missing values per subscale, missing values were replaced by the participant's mean of the subscale according to the internal standard of the workgroup. If the proportion of missing values per subscale was higher than 25%, subscale scores were not computed and the participant was excluded from analysis. Item distributions were tested for normality using the Shapiro-Wilks normality test. Floor and ceiling effects were reported in case that ≥ 25% of participants achieved the lowest or highest, respectively, possible score on the item. Pearson's correlations were calculated for corrected item-total correlations (r_{it}) and average inter-item correlation (r_{ii}). Item difficulty (p_m) was estimated as sum of item scores divided by (N * maximal item score). Standardized Cronbach's α was calculated for internal consistency. Following Kline (2005), difficulty indices should range from .20 to .80. Corrected item-total correlations ≥ .30 are described as medium size, and ≥ .50 as high size (Field, 2005). Values for Cronbach's α ≥ .70 are defined as acceptable, ≥ .80 as good, and ≥ .90 as excellent (Cronbach, 1951). All psychometric analyses were performed separately in three different age groups (2-5 years, 6-9 years, and 10-13 years). These groups were based on developmental stages reflecting the German school system (i.e., ages ≤ 5 years: preschool; ages 6-9 years: elementary school; ages ≥ 10 years: secondary school; Kurth et al., 2008).

Confirmatory factor analyses (CFA) were conducted to evaluate the factor structure using maximum likelihood estimation. As Likert-type items can be seen as ordered categorical variables and the assumption of multivariate normality might be violated, all CFAs were additionally conducted using Bayesian Estimation with Markov Chain Monte Carlo simulation (Lee & Tang, 2006). In the first CFA (Model 1), all items were analyzed. In the second model (Model 2), three composite items on the Restriction factor were used as in the original work (Birch et al., 2001). The composite items were computed by averaging items scores (RST1A, RST1B, and RST1C into RST1; RST3A and RST3B into RST3; and RST4A and RST4B into RST4). A third CFA (Model 3) was conducted to evaluate whether an eight-factor model with the additional factor Reward (RW) provided a better fit for the data. The Reward factor consisted of items RST3A and RST3B from the original Restriction subscale as proposed by Corsini et al. (2008). Finally, a fourth CFA (Model 4) improved Model 3 based on modification indices by correlating error terms of items from the subscales Perceived Parent Weight and Perceived Child Weight. For all models, items PCW4 and PCW5 from the subscale Perceived Child Weight were omitted because their completion depends on children's age.

In accordance with Anderson et al. (2005), measurement models were tested with hypothesized non-zero loadings of items on the factor they intended to measure and zero loadings on all other factors. Additionally, the factor covariances were freely estimated and factors were correlated. The adequacy of fit was assessed using χ^2 test, Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and posterior predictive p value. For model comparison χ^2 difference test ($\Delta \chi^2$), Akaike Information Criterion (AIC), and Deviance Information Criterion (DIC) were used. According to Hu and Bentler (1999) and Schermelleh-Engel, Moosbrugger, and Müller (2003), the following cut-offs indicate acceptable model fit: $2 < \chi^2/df \leq 3$, $.90 \leq NFI < .95$, $.90 \leq TLI < .95$, $.95 \leq CFI < .97$, and $.05 < RMSEA \leq .08$, and good model fit: $\chi^2/df \leq 2$, $NFI \geq .95$, $TLI \geq .95$, $CFI \geq .97$, and $RMSEA \leq .05$, respectively. A posterior predictive p value around .5 indicates a plausible model, and values toward the extremes of 0 or 1 indicate that the model is not plausible (Lee & Song, 2003). When comparing two models, a significant χ^2 difference test, smaller χ^2, smaller AIC, and smaller DIC indicate superiority of one model to the comparison model.

In accordance with the sequential strategy developed by Meredith and Teresi (2006), measurement invariance tests were conducted across child sex and age groups (2-5 years vs. 6-9 years vs. 10-13 years). Types of invariance were analyzed in hierarchical multi-group models represented by increasing levels of cross-group constraints imposed on factor pattern (configural model), factor loadings (metric model, indicating weak invariance), item intercepts (scalar model, indicating strong invariance), and residual variances (residual model, indicating strict invariance; Meredith, 1993). As recommended by Chen, Sousa, & West (2005), a change of $\leq -.010$ in CFI, supplemented by a change of RMSEA $\geq .015$, was considered as indicative of non-invariance.

Distributions of subscale scores were examined using Multivariate General Linear Model analyses of Child Sex (boys vs. girls) × Child Age (2-5 years vs. 6-9 years vs. 10-13 years) × Child Weight Status (normal weight vs. overweight vs. obese), controlling for mothers' age and BMI. For all significant multivariate effects, univariate analyses were performed. According to Cohen (1988), partial $\eta^2 = .01$ indicates a small effect, $\eta^2 = .06$ a medium effect, and $\eta^2 = .14$ a large effect.

Finally, percentiles for each subscale of the CFQ were calculated as norms for the three age groups.

All statistical analyses were performed using IBM® SPSS Statistics® version 21.0 and AMOS® version 22.0 with a two-tailed $\alpha < .05$.

Results

Item Analysis

Item characteristics, mean subscale scores, and internal consistency of the CFQ subscales are depicted in Table 2. For all items, percentages of missing data were low (M = 0.4%, SD = 1.0; range 0.0% – 6.8%). Item distributions deviated significantly from normality (all $p \leq .001$). Most items were positively skewed and had a positive kurtosis. Floor effects were present in ten items, with five items being rated with the lowest possible score by 25-50% of participants (RST1C, RST1C, RST2, RST4A, PE3), and five items being rated with the lowest possible score by > 50% of participants (RST3A, RST3B, PE1, PE2, PE4). A total of four items showed a ceiling effect of 25-50%, i.e., participants scoring at the highest possible value (PR1, MN1, MN2, MN3). Difficulty indices were predominantly in the recommended range ($.20 \leq p_m \leq .78$), except for the item PE1 from the Pressure to Eat subscale ($p_m = .14$). Corrected item-total correlations were of medium to large size ($.33 \leq r_{it} \leq .85$). Removing items RST3A and RST3B from the Restriction subscale to create the new Reward subscale (e.g., Corsini et al., 2008) improved corrected item-total correlations for the Restriction subscale ($.60 \leq r_{it} \leq .75$). Mean inter-item correlations as indicators of item homogeneity showed a large range from small to large effects ($.18 \leq r_{ii} \leq .81$), with highest correlations regarding the Concern and Monitoring subscales.

=== Please insert Table 2 ===

Reliability

The subscales showed mostly acceptable to excellent internal consistency with Cronbach's α ranging from .71 to .91 (Table 2). A non-acceptable internal consistency was found for the Perceived Responsibility subscale (Cronbach's α = .65). Calculating three composite items on the Restriction subscale (RST1: average of RST1A, RST1B, and RST1C; RST3: average of RST3A and RST3B; and RST4: average of RST4A and RST4B) according to Birch et al. (2001), reduced the internal consistency of the Restriction subscale (RST all items: Cronbach's α = .83, RST composite items: Cronbach's α = .71). The removal of the items RST3A and RST3B from the Restriction subscale and the creation of the new Reward subscale improved the internal consistency for both the modified Restriction and new Reward (RW) subscale (RST without RW: Cronbach's α = .76, RW: Cronbach's α = .81).

Factorial Validity

Results of the CFAs are provided in Table 3 (Models 1 to 4). All four models did not provide optimal fit to the data as indicated by the significant χ^2 statistic. As the χ^2 test is sensitive to sample size, the significance could have resulted from poor model fit or the utilization of a large sample in the present study. Posterior predictive p values were the same for all models. Regarding the fit indices, Model 4 including correlated factors and correlated error terms for items from the Perceived Parent Weight and Perceived Child Weight subscales provided best fit to the data. NFI, CFI, and TLI were acceptable and RMSEA was good (Hu & Bentler, 1999). The $\Delta\chi^2$ statistic, AIC, and DIC as indicators used for model comparison also confirmed Model 4 as being superior to the other models.

=== Please insert Table 3 ===

For all items, factor loadings in the final Model 4 were medium to high. Most correlations between factors were statistically significant and of small to medium size ($-.05 \leq r \leq .45$) with exception for the Restriction and Concern subscales ($r = .70$) showing a large effect.

Measurement Invariance Analyses

Multi-group CFA revealed strict measurement invariance for child sex (boys vs. girls) indicated by a change of < .010 in CFI, supplemented by a change of < .015 in RMSEA across all three levels of invariance (Table 4). Although configural and metric invariance were established across child age groups (2-5 years vs. 6-9 years vs. 10-13 years), the assumption of equal intercepts (strong invariance) and residuals (strict invariance) across age groups did not hold indicated by a change of .020 in CFI. Exploratory analyses revealed that the inequality of parameters was based on non-invariant intercepts and residuals across the age groups 2-5 years vs. 10-13 years, while the CFQ was strongly invariant for the age groups 2-5 years vs. 6-9 years, as well as strictly invariant for the age groups 6-9 years vs. 10-13 years.

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Distribution of Subscale Scores

All subscale score distributions deviated significantly from normality (Table 2; all $p \leq .001$). The subscales Perceived Responsibility, Perceived Child Weight, and Monitoring were negatively skewed. The subscales Perceived Responsibility, Restriction, and Monitoring had a negative kurtosis.

Multivariate analysis of all CFQ subscale scores was conducted with variables showing at least strong multi-group invariance (Little, 1997). As the CFQ did not prove invariant across all three age groups, two MANCOVAs were conducted including two invariant age groups each (2-5 years vs. 6-9 years, 6-9 years vs. 10-13 years). For the MANCOVA including age groups 2-5 years and 6-9 years, the results revealed significant main effects for mothers' BMI, $F(9, 557) = 42.922$, $p < .001$, $\eta^2 = .41$, child weight status, $F(18, 1116) = 11.050$, $p < .001$, $\eta^2 = .15$, and non-significant effects for child age, $F(9, 557) = 1.820$, $p = .062$, $\eta^2 = .03$, child sex, $F(9, 557) = 0.701$, $p = .708$, $\eta^2 = .01$, and mothers' age, $F(9, 557) = 1.454$, $p = .162$, $\eta^2 = .02$. There were no significant interaction effects. The conducted univariate analyses mostly presented small effect sizes. However, three large effects were found for mothers' BMI on Perceived Parent Weight, $F(1, 565) = 47.219$, $p <$

.001, $\eta^2 = .39$, and for child weight status on Perceived Child Weight, $F(2, 564) = 56.718$, $p < .001$, $\eta^2 = .17$, and Concern, $F(2, 564) = 65.055$, $p < .001$, $\eta^2 = .19$. Higher scores on Perceived Parental Weight were found for mothers with higher BMI and higher Perceived Child Weight was associated with higher child weight status (all $p < .001$).

For the MANCOVA including age groups 6-9 years and 10-13 years, significant main effects for mothers' BMI, $F(9, 590) = 45.579$, $p < .001$, $\eta^2 = .41$, child age, $F(9, 590) = 3.759$, $p < .001$, $\eta^2 = .05$, child weight status, $F(18, 1182) = 28.582$, $p < .001$, $\eta^2 = .30$, and non-significant effects for child sex, $F(9, 590) = 1.209$, $p = .286$, $\eta^2 = .02$, and mothers' age, $F(9, 590) = 0.810$, $p = .607$, $\eta^2 = .01$, were obtained. A significant interaction effect emerged for Child Age × Child Weight Status, $F(18, 1182) = 2.133$, $p = .004$, $\eta^2 = .03$. Univariate analyses indicated large effects for mothers' BMI on Perceived Parent Weight, $F(1, 598) = 383.558$, $p < .001$, $\eta^2 = .39$, and for child weight status on Perceived Child Weight, $F(2, 597) = 175.853$, $p < .001$, $\eta^2 = .37$, Concern, $F(2, 597) = 269.734$, $p < .001$, $\eta^2 = .47$, and Restriction, $F(2, 597) = 57.821$, $p < .001$, $\eta^2 = .16$. Medium effects were found for child weight status on Pressure to Eat, $F(2, 597) = 28.333$, $p < .001$, $\eta^2 = .09$, and Monitoring, $F(2, 597) = 18.228$, $p < .001$, $\eta^2 = .06$. Higher scores on Perceived Parental Weight were found for mothers with higher BMI and higher Perceived Child Weight was associated with higher child weight status (all $p < .001$). Higher scores on Concern, Restriction, Pressure to Eat, and Monitoring were found for overweight compared to normal weight children (all $p < .001$) and for obese compared to normal weight children (all $p < .001$), while overweight and obese children did not differ on these subscale scores (all $p > .05$).

Norms

Child age-specific norms for each CFQ subscale are presented in Table 5. Due to the small sample of overweight and obese children, norms were not computed including child weight status. However, for comparative purposes, *M* and *SD* were provided for normal weight, overweight, and obese children separately (Table 6).

=== Please insert Table 5 ===

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Discussion

Within a large German population-based sample of mothers with 2- to 13-year-old children, the present study confirmed good psychometric properties of the CFQ. An eight-factor model including the new Food as Reward subscale showed best model fit. For the first time, measurement invariance across age and sex was analysed, and age-specific norms for all subscales were provided.

Item analysis revealed a low number of missing data (< 1.0%) indicating that the questionnaire was comprehensible and well-accepted by the caregivers. All item distributions differed significantly from normality, with most items on the Concern, Restriction, and Pressure to Eat subscales being positively skewed (long tail on the right, low mean scores), and showing substantial floor effects. In contrast, the Monitoring subscale was negatively skewed (long tail on the left, high mean score) with all items showing ceiling effects throughout. So far, these aspects of content validity have never been directly reported in previous validation studies of the CFQ. The high number of floor and ceiling effects raise concern about the sensitivity of the CFQ in the present population-based sample and its ability to discriminate both between and within participants, i.e., over time. Because ceiling effects are likely to be more present in population-based samples than in clinical samples (e.g., Varni, Limbers, & Burwinkle, 2007), future studies should clarify these item characteristics in treatment seeking overweight and obese samples.

The results thus showed that a relatively small proportion of mothers reported a frequent use of restriction and pressure to eat as controlling feeding practices. Furthermore, mothers tended to be less concerned about their children’s weight, but reported frequent monitoring of food intake as a cognitive aspect of their restriction. Eventually, the results can be interpreted with regards to the socio-cultural background of the sample. Blissett and Bennett (2013) who applied the CFQ in parents of 2- to 12-year old children from diverse cultural groups found a similar pattern of responding in White German parents: low levels of Restriction and Pressure to Eat coupled with high levels of Monitoring. This pattern of feeding practices was significantly different compared to Black Afro-Caribbean parents who reported higher levels of Restriction and Pressure to Eat, but lower levels of Monitoring (Blissett and Bennett, 2013). The studies by Cachelin and Thompson (2013) and Spruit-Metz et al. (2002) that included White parents of 2- to 11-year and 7- to 14-year old children from the US-population revealed similar levels of Pressure to Eat and Monitoring compared to the present study, but higher levels of Restriction. Although examining parents of 4-year old children, a Swedish study found low levels of Restriction and high levels of Monitoring that were comparable to those in the present study, presumably related to cultural similarities (Nowicka et al., 2014). Other validation studies that included child age ranges between 5 and 12 years from diverse cultural backgrounds documented higher mean scores of the subscales Restriction (3.0 to 4.0), Pressure to Eat (2.5 to 3.4), and Concern (2.3 to 3.1) throughout, while the use of Monitoring was comparable to the present study (Birch et al., 2001; Camci et al., 2014; Canals-Sans et al., 2016; Geng et al., 2009). Lower levels of parental Concern in the present study might be due to a higher proportion of younger children, because parents of children < 5 years were found to be less concerned about their children becoming overweight (Corsini et al., 2008; Liu et al., 2014; Nowicka et al., 2014).

Further, corrected item-total correlations were all of medium to large size, indicating a high homogeneity of items within subscales. With respect to internal consistency, the subscales showed acceptable to excellent values with an exception for the non-acceptable value for the Perceived Responsibility subscale. This low internal consistency might be due to the wide range of child ages: With increasing child’s age, scores on the respective subscale decreased, presumably because children are becoming more independent in their food intake decisions, gain autonomy in cooking activities and financial relations (Gillman et al., 2000). Especially scores on item PR2 of the Perceived Responsibility subscale decreased with an increase in child’s age compared to items PR1 and PR3 which led to smaller inter-item correlations and lower values of internal consistency. Notably, two other studies including children between 2 and 11 years, and 10 to 16 years, respectively, provided evidence for questionable reliability of the Perceived Responsibility subscale (Kaur et al., 2006; Polat & Erci, 2010) suggesting that this subscale is less suited for use in samples capturing a wide age range.

Regarding the factor structure of the CFQ, an eight-factor model provided the best fit to the data. In this model, two items from the Restriction subscale of Birch et al. (2001; items RST3A and RST3B) were used to compute an eighth Reward factor, which was first introduced by Corsini et al. (2008). So far, subsequent studies that compared diverse factorial models of the CFQ provided inconsistent results with respect to the presence (Liu et al., 2014; Kong et al., 2015) or absence (Nowicka et al., 2014) of the Reward factor. However, even validation studies that replicated a 7-factor model (without Reward) showed relatively weak factor loadings for the two reward items on the Restriction subscale (Anderson et al., 2005; Canals-Sans et al., 2016; Kaur et al., 2006; Nowicka et al., 2014). In conjunction with the result that the internal consistency of the Restriction subscale improved after removing the reward items RST3A and RST3B, it might be suggested that these two items are likely to reflect a different component of feeding practice than Restriction only. Further research is warranted to formulate and evaluate additional items for the Reward subscale (for an example see Kröller & Warschburger, 2009), as a scale's reliability increases with the number of items (Peterson, 1994).

In the context of factorial validity, the study uniquely evaluated the level of factorial invariance of the CFQ across child age and sex. Establishing multi-group invariance is deemed the theoretical and statistical basis for conducting meaningful between-group comparisons (Little, 1997) and is an indicator of whether group differences "reflect true group differences and are not contaminated by group-specific attributes that are unrelated to the construct of interest" (p. S79, Gregorich, 2006). Based on the present results, the 8-factor model of the CFQ equivalently measured the factor pattern, factor loadings, item intercepts, and residuals, thus presented strictly invariant across child sex. For child age groups, cross-group analysis showed that CFQ factors and the pattern of factor loadings were equivalently measured suggesting that CFQ subscales have the same meaning across a wide child age range. However, constraining item intercepts to be equal across age groups revealed that the groups systematically differed with respect to their item responses. Exploratory analyses demonstrated that the non-invariance was based on substantial differences between distant age groups (2-5years vs. 10-13 years). Comparing observed CFQ scores across a wide age range from early childhood to early adolescence may thus be contaminated by methodological biases of the measure. Nevertheless, the study provided evidence that the CFQ was at least strongly invariant and thus comparable between child age groups of a more limited age range (e.g., 2-9 years, 6-13 years).

Multivariate analyses of the CFQ subscales revealed that child and maternal weight status had large effects on parental feeding practices across all child ages. Specifically, mothers were more likely to report higher scores on Perceived Parent Weight if they had a higher BMI and higher levels for Perceived Child Weight if their child was overweight or obese. These associations between measured and perceived weight status are consistent with previous research (Anderson et al., 2005; Birch et al., 2001; Camci et al., 2014; Canals-Sans et al., 2016; Corsini et al., 2008; Geng et al., 2009; Kaur et al., 2006; Liu et al., 2014; Mulder et al., 2009; Nowicka et al., 2014) and may serve as an indicator of the scales' criterion validity. In accordance with previous findings (Anderson et al., 2005; Birch et al., 2001; Canals-Sans et al., 2016; Corsini et al., 2008; Geng et al., 2009; Kaur et al., 2006; Kong et al., 2015; Mulder et al., 2009; Nowicka et al., 2014) mothers were more concerned about their child's weight status, when their child was classified as overweight or obese compared to normal weight, possibly realizing current and long-term adverse effects of overweight and obesity on their child's health status. Further, mothers of overweight and obese children used more restrictive feeding and less pressure to eat than mothers of normal weight children, especially in children 6-13 years, for whom larger effects were found compared to younger children, which is consistent with the literature on children in the respective age range (Birch et al., 2001; Camci et al., 2014; Canals-Sans et al., 2016; Cardel et al., 2012; Geng et al., 2009; Kaur et al., 2006; Mulder et al., 2009). Prospective studies, however, did not provide reliable evidence on the causal pathway of the observed associations. While some studies demonstrated that restrictive feeding was predictive of increases in child BMI (e.g., Faith et al., 2004), other studies suggested that mothers adopt controlling feeding in response to child overweight (e.g., Rhee et al., 2009) or concerns about their child's weight status (Webber, Hill, Cooke, Carnell, & Wardle, 2010). The fact that mothers reported higher levels of Monitoring in overweight and obese than normal weight children was especially pronounced in older children (6-13 years). The finding adds to the available literature which provided inconsistent evidence on the association between monitoring child's food intake and child weight status so far, with large-scale studies showing a positive association (Canals-Sans et al., 2016; Geng et al., 2015), in accordance with the present study, while smaller studies did not find any relationship (e.g., Birch, 2001; Camci et al., 2014; Mulder et al., 2009).

Based on the multivariate analysis that included the sample with older children (6-13 years), child age showed medium effects on CFQ scores suggesting that parental feeding practices are likely to change during children's transition into early adolescence. Although small-size effects were found, Perceived Responsibility was less pronounced in child ages 10-13 compared to 6-9-year old children, which might be interpreted in the context of children's increasing autonomy, as discussed above, while Concern and Restriction were higher in the older than younger age group. Similar to previous research, it may be hypothesized that mothers limit their child's food intake when they perceive their child as overweight and are thus concerned about their child's weight status (Nowicka et al., 2014; Webber et al., 2010). As the prevalence of overweight and obesity increases with child age (Blüher et al., 2011), this may be particular true for older children. However, based on the study by Kaur et al. (2006) demonstrating decreasing levels of parental Restriction with increasing child age in 10- to 16-year old youths, it warrants further clarification whether there is a turning point in parental controlling feeding practices during adolescence. Regarding child sex the results indicated that CFQ subscale scores were similar for boys and girls in all child ages. Notably, only few studies examined the impact of child sex on parental feeding practices, so far. Similar to the present study, Anderson et al. (2005) and Kaur et al. (2006) did not find any or only marginal sex differences in parental feeding practices. However, evidence suggested that parental feeding practices were differentially associated with child weight status for boys and girls (Corsini et al., 2008; Mulder et al., 2013). For example, Corsini et al. (2008) found that mothers used more restrictive feeding and monitoring with increasing child's BMI in 4- to 5-year old boys, but not in girls.

This is the first validation of the internationally established CFQ in its German version. A major strength of the present study was the assessment of a large population-based sample with a wide child age range allowing for elucidating measurement invariance across child age and sex, which has never been addressed before. Other strengths include the objectively measured height and weight of the children and the inclusion of both boys and girls. To our knowledge, there are no comparable norms for the CFQ across a wide age range available. These norms appear to be useful for researchers as well as clinical practitioners as they enable comparison of individual feeding practices with population-based data. Nevertheless, some biases of the sample need to be taken into account when using the CFQ norms, as discussed below.

As a limitation, while approaching representativeness, the sample deviated from the German population especially in a higher rate of children with obesity, a higher rate of women with high social status, and a lower proportion of individuals with immigrant background. These biases are related to: the enrichment of the sample with obesity in order to facilitate the in-depth examination of diseases within the LIFE Child study (Poulain et al., submitted; Quante et al., 2012); a self-selection bias towards study participation by mothers with high social status, which has been commonly documented in similar cohort studies (e.g., Schlaud, Urschitz, Urschitz-Duprat, & Poets, 2004); and to a low rate of immigrants in Eastern Germany (4.0%; Statistisches Bundesamt, 2011). However, previous validation studies of the CFQ similarly oversampled well-educated parents (Birch et al., 2001; Kaur et al., 2006; Liu et al., 2014; Nowicka et al., 2014) and obese children (Kaur et al., 2006; Nowicka et al., 2014), or, otherwise, intentionally oversampled families with low education or low-income (Anderson et al., 2005; Boles et al., 2010; Kong et al., 2015; Polat & Erci, 2001). Thus, comparison of CFQ scores between studies is complicated by the heterogeneity in child age ranges and weight status, and social and cultural background. The determination of norms based on a large scale population-based sample approaching representativeness for the German-speaking population may thus be a starting point for cross-cultural research.

Despite the preponderance of children with obesity, weight group-specific norms could not be calculated due to small cell sizes. However, for comparison purposes, mean scores were provided separately for weight groups. Additionally, parental feeding practices were assessed only from the mothers' perspectives. Although the paternal perspective would be desirable, previous psychometric evaluations of the CFQ did not find any significant effect regarding parents' gender (e.g., Boles et al., 2010; Camci et al., 2014; Liu et al., 2014). Another limitation is the assessment of mothers' weight status based on self-reported height and weight, which might have led to an underestimation of BMI in this control variable (Connor Gorber, Tremblay, Moher, & Gorber, 2007).

In summary, the present study established good psychometric properties of the CFQ in its German version. Future research is particularly warranted to evaluate the sensitivity to change of the CFQ due to a substantial number of items with floor and ceiling effects. Likewise, it should be further clarified whether the CFQ is able to delineate sufficient nuances in parental feeding practices, especially across a wide age range. To control for effects of social desirability in parental reports and to develop a more objective picture on parental feeding practices, further validation studies should additionally assess children's perceptions of parental controlling feeding practices (Monnery-Patris et al., 2011). Further, it might be valuable to identify the predictive validity of certain patterns of parental feeding practices (i.e., to evaluate combined effects of feeding practices) on children's weight outcome, and not only to focus on single feeding strategies. In this context, a larger number of prospective long-term studies is needed to clarify causal effects within the relationship of parental feeding practices and child weight trajectories. Finally, further large-scale studies are required which include ethnically diverse samples and a larger number of overweight and obese children, as this would facilitate cross-culture comparisons and identification of feeding practices possibly accounting for varying prevalence rates of obesity in children and adolescents across cultures (Caprio et al., 2008).

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

The authors' responsibilities were as follows – Anja Hilbert and Wieland Kiess designed the Life Child Study program, and Ricarda Schmidt, Robert Richter, Anne Brauhardt, and Anja Hilbert developed the protocol. Andreas Hiemisch and Wieland Kiess contributed to data collection, and Ricarda Schmidt and Robert Richter analyzed the data. All authors were involved in writing and gave approval of the submitted and published versions.

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Table 1. Child Feeding Questionnaire Subscales, Abbreviations, Items, and Response Options

Subscale	Abbreviation	Item	Response option
Perceived Responsibility	PR1	Responsibility for feeding at home	1 = never; 2 = seldom; 3 = half of the time; 4 = most of the time; 5 = always
	PR2	Responsibility for deciding about portion size	
	PR3	Responsibility for deciding about right kind of foods	
Perceived Parent Weight	PPW1	Childhood	1 = markedly underweight; 2 = underweight; 3 = normal; 4 = overweight; 5 = markedly overweight
	PPW2	Adolescence	
	PPW3	20s	
	PPW4	At present	
Perceived Child Weight	PCW1	First year of life	1 = markedly underweight; 2 = underweight; 3 = normal; 4 = overweight; 5 = markedly overweight
	PCW2	Toddler	
	PCW3	Preschooler	
	PCW4	Kindergarten through 2nd grade	
	PCW5	3rd through 5th grade	
	PCW6	6th through 8th grade	
Concern about Child Weight	CN1	Concerned about eating too much	1 = unconcerned; 2 = a little concerned; 3 = concerned; 4 = fairly concerned; 5 = very concerned
	CN2	Concerned about having to diet	
	CN3	Concerned about becoming overweight	

Table 1. continued.

Subscale	Abbreviation	Item	Response option
Restriction	RST1A	Restriction of sweets	1 = disagree;
	RST1B	Restriction of high-fat foods	2 = slightly disagree;
	RST1C	Restriction of favorite foods	3 = neutral;
	RST2	Intentionally keep foods out of reach	4 = slightly agree;
	RST3A = RW1	Offer sweets as a reward	5 = agree
	RST3B = RW2	Offer favorite foods for good behavior	
	RST4A	Guide or regulate eating of junk foods	
	RST4B	Guide or regulate eating of favorite foods	
Pressure to Eat	PE1	Pressure to eat all of the food on plate	1 = disagree;
	PE2	Pressure to eat enough	2 = slightly disagree;
	PE3	Pressure to eat despite of lack of hunger	3 = neutral; 4 = slightly agree;
	PE4	Guide or regulate sufficient eating	5 = agree
Monitoring	MN1	Monitoring of sweets	1 = never;
	MN2	Monitoring of snack food	2 = rarely;
	MN3	Monitoring of high fat foods	3 = sometimes;
			4 = mostly;
			5 = always

Note. According to Birch et al. (2001).

Table 2. Item and Subscale Characteristics of the Child Feeding Questionnaire

Items by subscales	*N*	*M*	*SD*	Skewness	Kurtosis	r_{it}	p_m	α
Perceived Responsibility		3.71	0.73					0.65
PR1	982	4.10	0.77	-0.64	0.23	0.36	0.78	
PR2	982	3.14	1.21	-0.18	-1.07	0.46	0.53	
PR3	982	3.88	0.84	-0.59	0.12	0.56	0.72	
Perceived Parent Weight		3.13	0.48					0.74
PPW1	980	2.92	0.61	-0.04	1.95	0.47	0.48	
PPW2	978	2.99	0.61	0.03	2.17	0.58	0.50	
PPW3	980	3.12	0.61	0.77	2.40	0.61	0.53	
PPW4	981	3.47	0.70	0.69	-0.01	0.48	0.62	
Perceived Child Weight[1]		2.94	0.37					0.80
PCW1	979	2.92	0.48	-0.96	4.76	0.48	0.48	
PCW2	981	2.95	0.43	-0.10	3.66	0.67	0.49	
PCW3	915	3.04	0.50	0.50	4.28	0.71	0.51	
PCW4	685	3.19	0.61	0.82	1.74	0.79	0.55	
PCW5	274	3.33	0.70	0.88	0.97	0.62	0.58	
Concern		2.04	1.28					0.91
CN1	982	1.94	1.29	1.14	-0.05	0.79	0.24	
CN2	982	1.88	1.34	1.23	0.01	0.85	0.22	
CN3	982	2.29	1.52	0.73	-1.06	0.84	0.32	
Restriction[2]		2.48	0.95					0.71
RST1A	980	3.17	1.44	-0.26	-1.36	0.66	0.54	
RST1B	980	2.65	1.46	0.29	-1.34	0.70	0.41	
RST1C	978	2.62	1.40	0.28	-1.28	0.72	0.40	

Table 2. continued.

Items by subscales	*N*	*M*	*SD*	Skewness	Kurtosis	r_{it}	p_m	
RST2	980	2.59	1.62	0.36	-1.53	0.55	0.40	
RST3A	982	1.85	1.10	1.19	0.42	0.34	0.21	
RST3B	982	1.81	1.06	1.17	0.46	0.34	0.20	
RST4A	980	2.48	1.38	0.42	-1.19	0.59	0.37	
RST4B	978	2.94	1.39	-0.11	-1.36	0.65	0.49	
Pressure to Eat		1.86	0.92					0.77
PE1	981	1.55	0.94	1.80	2.43	0.36	0.14	
PE2	929	1.91	1.29	1.16	-0.05	0.68	0.23	
PE3	979	2.07	1.25	0.80	-0.73	0.58	0.27	
PE4	978	1.93	1.24	1.12	0.02	0.70	0.23	
Monitoring		3.81	1.01					0.89
MN1	982	3.89	0.98	-0.96	0.64	0.79	0.72	
MN2	982	3.91	1.15	-1.07	0.36	0.84	0.73	
MN3	982	3.62	1.22	-0.78	-0.36	0.73	0.65	

Note. PR = Perceived Responsibility; PPW = Perceived Parent Weight; PCW = Perceived Child Weight; CN = Concern; RST = Restriction; RW = Reward; PE = Pressure to Eat; MN = Monitoring; *M* = mean; *SD* = standard deviation; r_{it} = corrected item-total correlation; p_m = item difficulty; α = Standardized Cronbach's α for standardized items.

[1]Number of items depending on children's age: 2 items if children's age ≤ 3 years, 3 items if children's age ≤ 6 years, 4 items if children's age ≤ 10 years, 5 items if children's age > 10 years. M, SD, and α computed for subscale consisting of items PCW1, PCW2, and PCW3.

[2]M, SD, and Cronbach's α computed for a subscale consisting of the four items RST1 (composite item: average of items RST1A, RST1B, and RST1C), RST2, RST3 (composite

item: average of items RST3A, RST3B), and RST4 (composite item: average of items RST4A, RST4B).

Table 3. Factorial Validity of Child Feeding Questionnaire (N=982)

	df	χ^2	$\Delta\chi^2$	AIC	DIC	NFI	CFI	TLI	RMSEA (90%-CI)	posterior p
Model 1[1]	329	2320***	-	2530	17304	0.828	0.848	0.812	0.079 (0.076 - 0.082)	0.50
Model 2[2]	231	1117***	1203***	1303	12978	0.894	0.913	0.887	0.063 (0.050 - 0.066)	0.50
Model 3[3]	247	1071***	46***	1277	12647	0.904	0.924	0.900	0.058 (0.055 - 0.062)	0.50
Model 4[4]	242	729***	342***	945	12352	0.935	0.955	0.940	0.045 (0.042 - 0.049)	0.50

Note. For all models, items PCW4 and PCW5 from subscale Perceived Child Weight were omitted because their completions is based on children's age and, therefore, could not be completed by all mothers. All factors were correlated.

df = degrees of freedom; χ^2 = Chi-square value; $\Delta\chi^2$ = Change in Chi-square statistic between model and comparison model in the row above; AIC = Akaike Information Criterion; DIC = Deviance Information Criterion; NFI = Normed Fit Index; CFI = Comparative Fit Index; TLI = Tucker-Lewis-Index; RMSEA = Root Mean Square Error of Approximation; posterior p = posterior predictive p value.

[1]All items on Restriction factor. [2]3 Composite items on Restriction factor (RST1: average of items RST1A, RST1B, and RST1C; RST3: average of items RST3A and RST3B; and RST4: average of items RST4A and RST4B) according to Birch et al. (2001). [3]2 composite items on Restriction factor (RST1: average of items RST1A, RST1B, and RST1C; RST4: average of items RST4A and RST4B), additional factor Reward (consisting of items RST3A and RST3B). [4]2 composite items on Restriction factor (RST1: average of items RST1A, RST1B, and RST1C; RST4: average of items

RST4A and RST4B), additional factor Reward (consisting of items RST3A and RST3B) and correlated error terms for items on Perceived Parent Weight and Perceived Child Weight (items PPW1 and PPW2, PPW2 and PPW3, PPW3 and PPW4, PCW1 and PCW2, and PCW2 and PCW3).

*** $p < .001$.

Table 4. Analysis of Factorial Invariance using Multigroup Confirmatory Factor Analysis.

	χ^2	*df*	CFI	ΔCFI	RMSEA	ΔRMSEA	Measurement Invariance Test[a]
Age (2-5 years vs. 6-9 years vs. 10-13 years)							
Configural invariance	1269.01	726	.95	-	.028	-	
Weak invariance (equal loadings)	1397.03	770	.94	–.01	.029	.001	✓
Strong invariance (equal loadings + intercepts)	1737.22	820	.92	–.02	.034	.005	-
Strict invariance (equal loadings + intercepts + residuals)	1926.34	866	.90	–.02	.035	.001	-
Gender (boys vs. girls)							
Configural invariance	998.49	484	.95	-	.033	-	
Weak invariance (equal loadings)	1045.96	501	.95	.00	.033	.000	✓
Strong invariance (equal loadings + intercepts)	1080.45	525	.95	.00	.033	.000	✓
Strict invariance (equal loadings + intercepts + residuals)	1152.05	548	.95	.00	.034	.001	✓

Note. CFI=Comparative Fit Index; ΔCFI=differences between models (1 and 2; 2 and 3; 3 and 4); RMSEA=root mean square error of approximation; ΔRMSEA=differences between models (1 and 2; 2 and 3; 3 and 4); [a]ΔCFI ≤ –.010 supplemented by ΔRMSEA ≥ .015 indicates non-invariance. ✓ indicates invariance

Table 5. Norms of the Child Feeding Questionnaire Subscales for Mothers of Children Aged 2 to 13 Years (N = 982).

Subscales	PR			PPW			PCW			CN			RST[1]			RW[2]			PE			MN		
Ages (y)	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13
Percentiles																								
1	2.0	2.1	2.0	1.9	2.0	2.2	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.0	1.0
5	2.7	2.7	2.3	2.5	2.3	2.5	2.0	2.0	2.4	1.0	1.0	1.0	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.7	1.7
10	3.0	3.0	2.7	2.8	2.5	2.8	2.5	2.0	2.6	1.0	1.0	1.0	1.3	1.2	1.2	1.0	1.0	1.0	1.0	1.0	1.0	2.3	2.0	2.0
15	3.0	3.0	2.7	2.8	2.8	2.8	2.7	2.8	3.0	1.0	1.0	1.0	1.5	1.3	1.4	1.0	1.0	1.0	1.0	1.0	1.0	3.0	2.7	2.7
20	3.3	3.0	3.0	2.8	2.8	3.0	3.0	3.0	3.0	1.0	1.0	1.0	1.8	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0
25	3.3	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0	2.0	1.5	1.6	1.0	1.0	1.0	1.0	1.0	1.0	3.3	3.3	3.0
30	3.3	3.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.0	2.0	1.7	1.8	1.0	1.0	1.0	1.3	1.0	1.0	3.7	3.7	3.3
35	3.7	3.3	3.3	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.3	2.3	1.9	2.0	1.5	1.0	1.0	1.3	1.3	1.3	3.7	4.0	3.7
40	3.7	3.7	3.3	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	1.3	2.4	2.0	2.2	1.5	1.0	1.0	1.5	1.3	1.3	4.0	4.0	3.7
45	3.7	3.7	3.3	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.3	1.7	2.5	2.2	2.3	2.0	1.0	1.0	1.8	1.5	1.4	4.0	4.0	4.0
50	4.0	3.7	3.3	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.3	2.0	2.7	2.3	2.4	2.0	1.5	1.5	1.8	1.7	1.5	4.0	4.0	4.0

Table 5.continued.

Subscales	PR			PPW			PCW			CN			RST[1]			RW[2]			PE			MN		
Ages (y)	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13	2-5	6-9	10-13
Percentiles																								
55	4.0	4.0	3.7	3.0	3.0	3.0	3.0	3.0	3.0	1.3	1.7	2.3	2.8	2.5	2.5	2.0	1.5	1.5	2.0	1.8	1.8	4.0	4.0	4.0
60	4.0	4.0	3.7	3.0	3.0	3.3	3.0	3.0	3.0	1.3	2.0	2.7	3.0	2.6	2.8	2.0	2.0	1.5	2.0	1.8	1.8	4.0	4.0	4.0
65	4.0	4.0	3.7	3.3	3.3	3.3	3.0	3.0	3.2	1.3	2.0	3.0	3.1	2.8	3.0	2.5	2.0	2.0	2.3	2.0	2.0	4.3	4.3	4.0
70	4.3	4.0	4.0	3.3	3.3	3.3	3.0	3.0	3.2	1.7	2.7	3.7	3.2	2.9	3.1	2.5	2.0	2.0	2.5	2.3	2.0	4.3	4.3	4.0
75	4.3	4.3	4.0	3.3	3.3	3.3	3.0	3.0	3.3	2.0	3.0	4.0	3.3	3.1	3.3	3.0	2.0	2.0	2.8	2.5	2.3	4.7	4.7	4.3
80	4.7	4.3	4.0	3.5	3.5	3.5	3.0	3.3	3.4	2.0	3.3	4.0	3.5	3.4	3.5	3.0	2.5	2.5	2.8	2.8	2.3	5.0	5.0	4.7
85	4.7	4.7	4.0	3.5	3.5	3.5	3.0	3.3	3.6	2.7	3.7	4.3	3.6	3.6	3.6	3.5	3.0	3.0	3.0	3.0	2.8	5.0	5.0	5.0
90	5.0	4.7	4.3	3.8	3.8	3.8	3.0	3.5	3.6	3.0	4.3	4.7	3.8	3.8	3.8	3.5	3.0	3.0	3.3	3.3	3.0	5.0	5.0	5.0
95	5.0	5.0	4.7	4.0	4.0	4.0	3.5	3.8	3.8	4.0	4.7	5.0	4.0	4.0	4.0	4.0	3.5	3.5	3.7	3.8	3.8	5.0	5.0	5.0
97	5.0	5.0	5.0	4.0	4.3	4.3	4.0	4.0	3.8	4.3	5.0	5.0	4.2	4.3	4.2	5.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	5.0
99	5.0	5.0	5.0	4.3	4.8	4.6	4.0	4.3	4.3	5.0	5.0	5.0	4.5	4.6	4.5	5.0	4.8	4.6	4.6	4.5	4.6	5.0	5.0	5.0

Note. PR = Perceived Responsibility; PPW = Perceived Parent Weight; PCW = Perceived Child Weight; CN = Concern; RST = Restriction; RW = Reward; PE = Pressure to Eat; MN = Monitoring; [1]consisting of RST1 (composite items: average of items RST1A, RST1B, and RST1C), RST2, RST3 (composite item: average of items RST3A, RST3B), and RST4 (composite items: average of items RST4A, RST4B), representing the model of Birch et al. (2001). [2]consisting of items RST3A and RST3B from original Restriction subscale.

Table 6. Means and Standard Deviation Scores of the Child Feeding Questionnaire Subscales as a Function of Child Weight Groups.

	Normal weight			Overweight			Obesity		
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
Perceived Responsibility	767	3.67	0.74	69	3.89	0.72	127	3.82	0.67
Perceived Parent Weight	767	3.05	0.43	69	3.37	0.46	126	3.45	0.57
Perceived Child Weight	766	2.91	0.31	69	3.27	0.40	127	3.61	0.37
Concern	767	1.59	0.91	69	3.38	1.19	127	4.05	0.78
Restriction[1]	767	2.34	0.87	69	3.02	0.85	127	3.32	0.88
Restriction[2]	765	2.51	1.02	69	3.43	1.04	127	3.81	1.03
Food as Reward	767	1.82	0.99	69	1.79	0.90	127	1.87	1.04
Pressure to Eat	767	1.96	0.93	69	1.39	0.65	127	1.44	0.66
Monitoring	767	3.71	1.04	69	4.12	0.82	127	4.32	0.68

Note. [1]All items on Restriction factor. [2]All items on Restriction factor without RST3A and RST3B (additional factor Reward).