



## **A Review of Methods to Assess Parental Feeding Practices and Preschool Children's Eating Behavior: The Need for Further Development of Tools.**

Blandine de Lauzon-Guillain, Andreia Oliveira, Marie A. Charles, Evangelia Grammatikaki, Louise Jones, Natalie Rigal, Carla Lopes, Yannis Manios, Pedro Moreira, Pauline Emmett, et al.

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# Author's page

## Title

A review of methods to assess parental feeding practices and preschool child's eating behavior: the need for further development of tools.

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## **Abstract**

### **Title**

A review of methods to assess parental feeding practices and preschool child's eating behavior: the need for further development of tools.

### **Unstructured Abstract**

The aim of the present study was to review existing tools from both observational and experimental studies in humans developed to measure parental feeding practices, child's eating behavior and child's food intake or preferences in 0 to 5 year-olds. Two electronic literature databases (Medline, Psycinfo) were used to search for documents. The selected papers for the review were those presenting tools with data on internal consistency and/or test-retest reliability and/or construct validity. A total of 3,445 documents were retrieved and further searching of reference lists and contact with experts produced an additional 18 papers. We identified three tools on the qualitative dimension of child's eating behavior, two tools on food intake or preferences, and one tool on parental feeding practices with rigorous testing of internal consistency, construct validity and test-retest reliability. All other tools presented in this review need further evaluation of their validity or reliability. As major gaps, we highlighted the need for more tools on parental attention to child's hunger and satiety cues, and to evaluate the degree of control allowed to children younger than 2y in feeding events. Food avoidance (behaviors or strategies to take away and to reject food) and food approach (attractivity for food stimuli) have not been assessed in children aged 12-24 months. Food preference tests based on sensory aspects rather than nutritional quality might be worth investigating. We emphasized the need for further evaluation of quality, especially test-retest reliability and construct validity, for most tools developed in 0 to 5-year old children.

## Manuscript text

### Title

A review of methods to assess parental feeding practices and preschool child's eating behavior: the need for further development of tools.

### Introduction and purpose

Evidence indicates that dietary habits acquired in early childhood persist through to adulthood<sup>1</sup>, highlighting the need for rigorous investigations of the determinants of child's eating behaviors in the first years of life. Child's eating behaviors are multidimensional and can be characterized by answering questions on "how", "how much" and "what to eat". In the present paper, these behaviors have been conceptualized in terms of both qualitative and quantitative dimensions of eating.

The qualitative dimensions of children's eating behaviors have been explored in many studies. Some dimensions may lead to overeating: Food responsiveness (tendency of the child to respond to environmental food cues rather than satiety), Enjoyment of food (general responsiveness to food and interest in eating) and Emotional overeating (child's tendency to eat more in reaction to negative emotions)<sup>2-5</sup>, whereas other dimensions may lead to undereating: Slowness in eating (reduction in eating rate as a consequence of lack of enjoyment and interest in food), Satiety responsiveness (degree to which the child ceases eating or chooses not to initiate eating based on their perceived fullness), Emotional undereating (child's tendency to eat less in reaction to negative emotions), Fussiness (child eating a limited variety of foods due to rejection of a substantial amount of familiar as well as 'new' foods), and Neophobia (systematic refusal of novel foods)<sup>5-8</sup>. For example, links between the qualitative dimensions of eating behavior and child's obesity/overweight have been established<sup>9</sup>. Other dimensions of children's eating behavior have been shown to contribute to low vegetable intake: food neophobia (reluctance to eating or avoidance of new foods) and pickiness (resistance to eating familiar foods)<sup>10</sup>.

The question of 'what to eat' have been investigated in several studies including a quantitative dimension and mainly using Food Frequency Questionnaires<sup>11-13</sup> or Food Preference Questionnaires<sup>14-17</sup>. Most of these studies highlight that children's diets do not meet nutritional guidelines. Young children are highly dependent on parents and caregivers in terms of the type and amount of food offered. They are also impacted by the parental feeding practices or styles used, i.e. specific behavioral strategies employed by parents to promote or discourage their child in relation to eating or a parents' involvement with the feeding of their child<sup>18</sup>. Parental feeding styles can be characterized in four dimensions: *authoritarian* (telling their children exactly what to eat), *permissive* (allowing their children to eat whatever and whenever they wish), *authoritative* (providing rules and guidance on eating without being overbearing) and *neglectful* (disregarding the children's eating, and focusing on other interests)<sup>19-22</sup>. Parental feeding practices and styles have been shown to impact on both children's eating behavior and their weight status. For example, food neophobia in children was found to be positively associated with parental use of coercion or monitoring<sup>23, 24</sup>, rewards and contingency<sup>25, 26</sup>, and preparation of special dishes to encourage him/her to eat<sup>25, 26</sup>. Additionally, parental control of child feeding was found to decrease a child's ability to respond to internal cues of hunger and satiety<sup>27</sup> and to be positively related to their weight status<sup>28-30</sup>. Again, links have been found between on one hand parental feeding styles and on the other hand children's food intake<sup>21, 22</sup>, children's eating behavior<sup>26</sup> or children's weight/BMI<sup>19, 31-33</sup>.

In general, children's intake of healthy foods such as fruit and vegetables remains below recommendations, and the prevalence of overweight/obesity has increased in most developed countries<sup>34, 35</sup>. Therefore, the need to influence children's food choices is paramount. However this demands an understanding of the developmental factors that impede the

acceptance and consumption of healthy foods. Although studies examining links between parental influence and childhood eating and weight status have increased dramatically in recent years, we do not yet have a definitive answer. Experimental designs are of great importance in highlighting the mechanisms for developing healthy food habits. However, longitudinal epidemiological studies, conducted on large samples based on the general population, are also needed to understand the development of eating behavior and food habits throughout infancy and early childhood. These allow the study of critical periods and critical factors in this development, and the identification of early eating behaviors or food habits that are related to later unhealthy eating habits or later risk of nutritionally related diseases. In order to implement such studies, researchers need to use validated tools suitable for large population-based epidemiological studies.

The scope of the current work was to review tools designed to assess, on one hand, child's eating behaviors, that encompass quantitative and qualitative dimensions of eating, and on the other hand, parental feeding practices and styles. Given the importance of early childhood in establishing healthy eating habits<sup>1,36</sup>, this review focused on the period from the beginning of life until the age of 5.

The specific objectives of the present review were 1/ to identify existing tools assessing preschool child's eating behaviors, parental feeding practices and styles with at least one aspect of measurement quality tested and usable in large-scale studies; 2/ to summarize data available for each tool to assess its effectiveness; 3/ to discuss gaps in tools to assess parental feeding practices and child's eating behaviors in infants and preschool children. The present review will help researchers in their choice of tools, and highlight needs for further methodological developments, in particular the development of new tools when gaps were identified or further assessment of quality in existing tools.

## **Material and Methods**

### *Search strategy*

In the first step, two electronic literature databases (Medline and Psycinfo) were selected to search for documents in any language from the year of database inception until March 17, 2010. The search syntax included two key elements: terms for methodology (questionnaire, test, tool, experiment, assessment, measure, instrument, scale) and terms for parental feeding practices (feeding behavior, feeding practices) or for eating behavior (eating behavior, appetite, satiation, satiety, neophobia, fussiness, fussy eating, choosiness, picky, pickiness, selective eating, selectivity) or for food habits and preferences (food preferences, food diversity, food variety, food habits, meal frequency, food intake). The filter for studies in humans and among all infants (birth-23 months) and preschool children (2-5 years) was activated. In the second step, reference lists for retrieved documents were searched for additional documents of interest. An additional paper<sup>37</sup> was also included in the review, even though it was published on March 26, 2010 because it filled an important gap in the assessment of child's eating behavior. Finally, one additional paper<sup>38</sup> was included through contact with experts.

### *Inclusion criteria*

Papers selected for the review were those presenting tools for infant or preschool children (0-5y) with at least one aspect of tool validity or reliability tested, such as internal consistency (a measure of the extent to which items in a questionnaire (sub)scale are correlated (homogeneous)), test-retest reliability (the degree to which repeated measurements in stable persons provide similar results), construct validity (correlation with another measurement of the same or similar constructs).

### *Exclusion criteria*

The exclusion criteria were defined and discussed between five review centers. The discussion on exclusion criteria was based on a subsample of 30 documents. Each review

center selected separately the relevant papers. Discrepancies across review centers were found for 7 papers. For these papers, documents were re-examined during a workshop and disagreement was resolved by discussion and further precision in exclusion criteria.

Finally, it was agreed to exclude from the review the following papers that did not met the inclusion criteria: a) those purely focused on breastfeeding (i.e. the promotion of breastfeeding, issues with breastfeeding); b) papers on the assessment of feeding practices by breastfeeding duration or age of introduction of specific food groups; c) papers on diversity or quality scores which were not considered as specific tools; d) papers on assessment of children's taste preferences rather than food preferences; e) papers using a tool without providing new reliability data; f) papers with validity data only among children older than 5y. We also agreed to exclude papers on preterm infants before hospital discharge, on infants or mothers with HIV/AIDS, on infants with malnutrition or specific illness, given that potential determinants of infant feeding and behavior might differ in these contexts, and papers describing tools based on videotaping of meals, given that their use might be difficult in large-scale studies;

Papers in English, Spanish and French were considered. Four papers in Japanese, one in Chinese, one in Italian and one in German were not considered due to the lack of skills of any of the reviewers in these languages.

#### *Papers' selection*

Documents identified were divided between five review centers, with a total of 8 reviewers (BdLG, AO, EG, SMP, NR, LJ, PM, CL) for further evaluation, first using the titles, then using the abstract and finally using the full text.

#### *Data extraction*

The data were extracted separately in three fields: parental feeding practices (NR, SMP, EG), qualitative aspects of child's eating behavior (BdLG) and more quantitative aspects of child's eating behavior, i.e. child's food intake/preferences, (LJ, AO, CL, PM). Data extracted included: country of origin, sample characteristics, mode of tools' administration, list of items and scales, scoring method, internal consistency, test-retest reliability and/or construct validity data. BdLG checked the exhaustiveness in the extraction process.

#### *Quality Assessment.*

All tools were assessed against three quality criteria (definitions provided in the inclusion criteria section):

- Assessment of internal consistency: Cronbach's  $\alpha \geq 0.7$
- Assessment of test-retest reliability: correlation's coefficient  $\geq 0.7$
- Assessment of construct validity: correlation's coefficient  $\geq 0.4$

Tools were classified as C, when only one of the criteria was achieved and validity was tested in only one sample, C- when at least one criterion was tested but none achieved, C+ when only one of the criteria was achieved and validity was tested in at least two samples, B when two criteria were achieved and validity was tested in only one sample, B- when two criteria were tested but none achieved, B+ when two criteria were achieved and validity was tested in at least two samples, A when all criteria were achieved and validity was tested in only one sample, A+ when all criteria were achieved and validity was tested in at least two samples.

Literature coming from one research group was handled together and not counted separately, unless a new sample was used to replicate findings.

Tools with a quality rating labelled A or A+ were considered as having established validity and reliability. Other tools were considered as needing a more complete internal testing and assessment of reliability and validity.

An important aspect relating to the use of these tools in large-scale epidemiological studies is the length of each questionnaire which will add to subject burden and cost. The number of questions in each part of the tool is included in the tables.



## Results

A total of 3,445 documents were retrieved from the electronic database search, of which 166 met the inclusion criteria. Sixteen additional papers, identified through reference lists of retrieved documents, and two additional papers<sup>37, 38</sup> identified through contact with experts were also included in the review.

Ninety-one papers described tools or their reliability or validity, some of them describing more than one tool: 41 papers described a total of 21 tools on parental feeding practices published between 1983 and 2010, 29 papers described a total of 14 tools on child eating behavior published between 1991 and 2010 and 29 papers described a total 19 tools to assess food habits or preferences in children aged 0-5y.

### *Tools to assess qualitative aspects of child's eating behavior*

Three tools designed to assess the qualitative dimension of eating behavior in children aged 0-5y had a complete internal testing and assessment of test-retest reliability and construct validity: the *Children's Eating Behavior Questionnaire*<sup>5</sup>, the QENA<sup>39</sup>, and the *Lifestyle Behavior Checklist*<sup>40</sup>. These tools, as well as data available on reliability assessment, are described in Table 1.

Eleven additional tools, briefly presented in Table 2, had been developed but need further evaluation before use. All these tools had been tested in at least one sample of children and details of data available on validity or reliability analyses are summarized in the Supplementary table. For all these tools on the qualitative dimension of child's eating behavior, **internal consistency**, assessed by Cronbach's  $\alpha$ , was satisfactory (within the 0.70-0.90 limits), but **test-retest reliability** had been assessed for only four and **construct validity** had been assessed for only three .

The number of items per questionnaire ranged from one for the *Satiety scale*<sup>41</sup> to 40 for the *Child Eating Behavior Inventory*<sup>42</sup>. The number of scales ranged from one in the *Children Food Neophobia Scale*<sup>43</sup>, the *Food Neophobia scale* from Nicklaus<sup>44</sup>, the *Feeding Problem Score* from Dahl<sup>45</sup>, the modified *Dietary Restraint scale of the Dutch Eating Behavior Questionnaire*<sup>46</sup> and the questionnaire from Galler<sup>47</sup> to eight in the *Child Eating Behavior Inventory*<sup>42</sup>, with a median number of 5 items per scale.

### *Tools to assess quantitative aspects of child's eating behavior (food intake/preferences)*

Most studies used common nutritional epidemiological tools (food frequency questionnaires, 24-h recalls, food records or diet histories) to assess child's food intake. We present here only tools specifically designed for and tested in children aged 0-5y.

Only one food frequency questionnaire, designed to estimate specific intakes of healthy foods<sup>11</sup> in children aged 5y or above, and one preference test (58) had complete internal testing and assessment of test-retest reliability and construct validity and are described in Table 1.

Eight additional food frequency questionnaires, one food record, one web assessment of food intake, three preferences' tests and four food preferences questionnaires had been developed to assess the quantitative aspects of eating behavior in children aged 0-5y but need further evaluation before use. These tools are briefly presented in Table 2. All these questionnaires were tested in at least one sample of children and details of data available on validity or reliability analyses are summarized in the Supplementary table.

### *Tools to assess parental feeding practices*

One tool designed to assess the parental feeding practices for children aged 0-5y had complete internal testing and assessment of test-retest reliability and construct validity: the *Child Feeding Questionnaire*<sup>20</sup>. This tool, as well as data available on reliability assessment, is described in Table 1.

Nineteen additional tools, briefly presented in Table 2, had been developed to assess the parental feeding practices for children aged 0-5y but need further evaluation before use. All these tools had been tested in at least one sample of children and details of data available on

validity or reliability analyses are summarized in the Supplementary table. For most tools, **internal consistency**, assessed by Cronbach's  $\alpha$ , was satisfactory (within the 0.70-0.90 limits), but only four tools presented data on **test-retest reliability**, and the **construct validity** had been assessed only in one.

The number of items ranged from 5 for the *Response To Food Refusal* questionnaire<sup>48</sup> to 105 items for the *Infant Feeding Style Questionnaire*<sup>49</sup>. The number of scales ranged from 1 in the *Restricted-Access Questionnaire*<sup>50</sup>, the *Maternal Feeding Attitude* questionnaire<sup>51</sup>, the *Response To Food Refusal* questionnaire<sup>48</sup> and the *Parental Control Index*<sup>24</sup> to 12 in the *Comprehensive Feeding Practices Questionnaire*<sup>52</sup>, with a median number of 6 items per scale.

## Discussion:

Only six tools achieved all validation criteria, with testing of internal consistency, test-retest reliability and construct validity in more than one sample of children aged 0-5y: for child's eating behavior (n=3), child's food intake or preferences (n=2), and parental feeding practices (n=1). No tool had been designed for children younger than 18 months.

### *Summary of tools with achieved validity and reliability criteria*

In the qualitative aspects of child's eating behavior, the *QENA*<sup>39</sup>, focusing on food neophobia, achieved all validity and reliability criteria in more than one sample. However, it was designed for children aged at least 5y. The *Children's Eating Behavior Questionnaire* from Wardle<sup>5</sup>, designed for children aged 2y and more, also had extensive validity and reliability data described but all criteria were achieved only for the enjoyment of food scale. In particular, construct validity had not been tested for several scales. The *Lifestyle Behavior Checklist*<sup>40</sup> also achieved all validity and reliability criteria but only in one sample, therefore these results need to be reproduced in another sample before it can be used with confidence.

In the child's food intake or preferences field, all validity and reliability criteria were achieved in one sample by the Magarey's *Children's Dietary Questionnaire*<sup>11</sup>, focusing on intake of healthy foods in children aged 5y and more, and by the *Food Preferences test* from Calfas<sup>53</sup>. These results need to be reproduced in another sample.

Finally, in the parental feeding practices field, the *Child Feeding Questionnaire* by Birch<sup>20</sup> was the only tool with rigorous assessment of internal consistency, test-retest reliability and construct validity, in different samples. It was designed for children from 5 years but had also been used among children aged 1.5 to 4 years. However, even for this tool, construct validity had been tested only on a subset of scales: restriction, pressure and monitoring; and test-retest reliability had been examined only for: restriction, monitoring pressure to eat and food as reward. The criteria for construct validity had not been achieved for both monitoring and food as reward scales. The use of the additional tools covered in this review should be preceded by further validity and reliability tests.

### *Selection of tools depending on the purpose of the study*

In the choice of a particular tool, researchers should keep in mind that each tool was developed in a specific context. In general, certain parental feeding practices scales, such as restriction, pressure to eat, use of food as reward, or emotion regulation, had been developed to examine more deeply the links between parental feeding practices and childhood obesity or obesity proneness, whereas other dimensions such as food availability, verbal praise, encouragement, teaching nutrition, modeling or child's involvement, had mainly been developed to identify feeding practices that potentially influence child's diet variety or food preferences. Ogden et al<sup>54</sup> underlined the relevance of focusing on separate forms of parental control in relation to child's eating: overt control (which can be detected by the child), and covert control (which can't be detected by him/her), since these controls differentially predicted children's snacking behavior. A new development which could be of great

importance in understanding the development of a child's relationship with eating is the assessment of parental state during feeding (e.g. irritability). In the same way, child's eating behavior scales had often been developed to assess relationships between child's eating behavior and either body size or later variety of diet or food preferences. Tools covering dimensions of feeding problems, satiety responsiveness, slowness in eating, food responsiveness, appetite, emotional eating, dietary restraint or pickiness, had been designed to examine relationships between child's eating behavior and body size, growth and obesity proneness, whereas scales covering food neophobia, choosiness or selectivity had been designed to examine relationships between child's eating behavior and later diet variety or fruit and vegetable intake. Despite its statistical validation, one limitation of the *CEBQ*<sup>5</sup> may be its inability to distinguish between pickiness and food neophobia. Another aspect impacting the selection of tools may be the need of comparable assessment of child's eating behavior throughout infancy and early childhood. The *Baby Eating Behavior Questionnaire*<sup>37</sup>, adapted from the *Children's Eating Behavior Questionnaire* from Wardle<sup>5</sup>, could allow similar measurements of eating behavior, at different periods of life, in longitudinal studies. A toddler version of this questionnaire, if developed, would give the opportunity to have a homogenous assessment of child's eating behavior during the whole period from early infancy to 5 years.

#### *Gaps in literature*

The ability to respect physiological cues (hunger and satiation) during feeding events has been identified as important to obesity prevention<sup>55</sup>. Infants and young children are able to regulate food intake due to these cues but this ability decreases with age<sup>56, 57</sup>. Many tools had already been developed to assess parental feeding practices from birth to five years, although most need validation. Most of these tools assess authoritarian practices, such as pressure to eat or restriction of eating, known to be related to children's eating in the absence of hunger later in life, however, few of the tools focus specifically on parental attention to child's hunger and satiety cues throughout infancy and early childhood. Moreover, the degree of control given to children in feeding events had not been assessed among children younger than two years. So, further studies may consider developing tools to assess these dimensions of feeding practice in infants and very young children. Following the same idea, the assessment of infant's or young child's sensitivity to these internal cues, and food avoidance/approach in 12-24 months may be considered. Finally, in the food intake/preferences field, few tools had been specifically validated in children although several food frequency questionnaires had been designed for use in young children, some focused only on specific aspects of food intake (fruit/vegetable, calcium or dietary fat) and not on total intake. Tools designed to assess food preferences had mainly been developed in preschoolers, focusing on preferences for healthy vs. unhealthy foods. It would be of interest to develop a preferences tool based on the sensorial aspects of foods rather than on their nutritional quality. Due to cultural differences in diet across countries, it may be difficult to develop tool covering food intake and preferences that could be widely used across countries. Nevertheless, future research should tackle this gap in the literature since cross-cultural comparisons will allow greater insight into commonalities and differences across countries in the development of food preferences and eating habits of young children.

#### *Strength and limitations of the review*

Some questionnaires, validated in older populations, were not included in this review, as only validity or reliability data within the age range 0-5y were considered. However, we considered adaptation for young children of tools designed for older children or adults, when at least one aspect of validity or reliability of this adaptation had been tested.

We focused on tools that would be easy to implement in large-scale studies, so we excluded video-coding of child's eating behavior or parental feeding practices, as these methods are time-consuming and expensive. However, these methods would be of great importance to assess construct validity of questionnaires. This review highlights the need for further examination of construct validity of numerous tools.

### Conclusion

In this review, we summarized all validity and reliability data on tools to assess parental feeding practices and eating behavior in infants and preschool children that would be usable in large-scale studies. Few tools were identified on parental attention to child's hunger and satiety cues, and none to evaluate the degree of control allowed to children younger than 2y in feeding events. Food avoidance (child's behaviors or strategies to take away and to reject foods, includes dimensions of satiety responsiveness, slowness in eating, emotional undereating and food fussiness) and food approach (child's attractivity for food stimuli, includes dimensions of food responsiveness, enjoyment of food and emotional overeating) had not been assessed in children aged 12-24 months. Only six tools were identified being of good quality regarding all our criteria: internal consistency, construct validity and test-retest reliability. We emphasize the need for further evaluation of quality, especially test-retest reliability and construct validity, for most tools developed for use in 0-5 years-old children. These results will be of great importance for pediatricians or epidemiologists/clinical researchers to select a sound tool highlighting child's eating behaviors or parental feeding practices at ages 0 to 5 years, but also for researchers to identify need for further development of tools and more rigorous assessment of existing instruments.

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758 Table 1. Tools with complete internal testing and assessment of reliability and validity

Name of the tool / Country of origin / Translation	Scales					Description of validity data							
	Age range with validity data (gray filling)					Domains (no. of items): short description	Quality rating <sup>1</sup>	Reference	Study design	Internal consistency <sup>2</sup> : Cronbach's $\alpha$	Construct validity <sup>3</sup>	Test-retest reliability <sup>4</sup>	
	<1y	1y	2y	3y	4y								5y
Children's eating behavior: qualitative dimensions	Children's Eating Behavior Questionnaire							Wardle, 2001 <sup>5</sup>	Observational 2-7y, n=177	FR: 0.80; EF: 0.91; EoE: 0.79; DD: 0.89; SR: 0.74; SE: 0.74; EuE: 0.74; Fu: 0.91			
	Origin: UK Translation: Portuguese						A+		Observational 2-9y, n=222	FR: 0.82; EF: 0.91; EoE: 0.72; DD: 0.90; SR: 0.83; SE: 0.80; EuE: 0.75; Fu: 0.91		Subsample: n=160, 2 weeks later FR: 0.80; EF: 0.87; EoE: 0.52; DD: 0.85; SR: 0.85; SE: 0.83; EuE: 0.64; Fu: 0.87	
							B+	Cooke, 2004 <sup>58</sup>	Observational 2-6y, n=564	EF: 0.88			
							B+	Powers, 2006 <sup>2</sup>	Observational 2-5y, n=296	DD: 0.77; FR: 0.74			
							B+	Carnell, 2007 <sup>3</sup>	Experimental 4-5y, n=149	SR: 0.86; FR: 0.76; EF: 0.89	Association with experimental design: SR-Eating		

Name of the tool / Country of origin / Translation	Scales					Description of validity data			
	Age range with validity data (gray filling)					Reference	Study design	Internal consistency <sup>2</sup> : Cronbach's $\alpha$	Construct validity <sup>3</sup>
	<1y	1y	2y	3y	4y				
									without hunger: -0.33; FR-energy intake: 0.28; EF-energy intake: 0.40
						Ashcroft, 2008 <sup>6</sup>	Observational 4-11y, n=428	at 11y: FR: 0.83; EF: 0.86; EoE: 0.77; SR: 0.79; SE: 0.70; EuE: 0.72; Fu: 0.91	
						Carnell, 2008 <sup>7</sup>	Observational 3-5y, n=572	SR/SE: 0.81; EF: 0.87	
						Viana, 2008 <sup>59</sup>	Observational 3-13y, n=240	FR: 0.88; EF: 0.89; EoE: 0.77; DD: 0.82; SR: 0.79; SE: 0.88; EuE: 0.70; Fu: 0.73	
						Farrow, 2009 <sup>8</sup>	Observational 3-6y, n=80	mean: 0.74 for the 1st child of the family and 0.79 for the 2nd child	
QENA						Rubio, 2008 <sup>39</sup>	Experimental 5-8y, n=166	Neophobia: 0.88	Association with: choice of new foods: -0.41; willingness to try new foods: -0.53
Origin: France Translation: English									Subsample, n=112, 15 days later Neophobia: 0.76

Name of the tool / Country of origin / Translation	Scales					Description of validity data						
	Age range with validity data (gray filling)					Domains (no. of items): short description	Quality rating <sup>1</sup>	Reference	Study design	Internal consistency <sup>2</sup> : Cronbach's $\alpha$	Construct validity <sup>3</sup>	Test-retest reliability <sup>4</sup>
	<1y	1y	2y	3y	4y							
									Experimental 5-8y, n=603	Neophobia: 0.84	Association with: choice of new foods: -0.34 (-0.32 at 5y); willingness to try new foods: -0.47 (-0.52 at 5y)	Subsample, n=543, 15 days later Neophobia: 0.74
Lifestyle behavior Checklist  Origin: Australia						Behavior problem (26): parental perception of child problem behaviours relating to eating, physical activity, sedentary activity and weight issues  Parental confidence in managing the problems (26): parenting self-efficacy in managing these problem behaviours	A	West, 2009 <sup>40</sup>	Intervention trial and exploratory study 4-11y, n=182	Problem scale: 0.97; Confidence scale: 0.92	Correlation with Eyeberg Child Behavior Inventory – Problem scale: 0.48	2 weeks later Problem scale: 0.87; Confidence scale: 0.66

Children's eating behavior: quantitative dimensions	Name of the tool / Country of origin / Translation	Scales					Description of validity data							
		Age range with validity data (gray filling)					Domains (no. of items): short description	Quality rating <sup>1</sup>	Reference	Study design	Internal consistency <sup>2</sup> : Cronbach's $\alpha$	Construct validity <sup>3</sup>	Test-retest reliability <sup>4</sup>	
		<1y	1y	2y	3y	4y								5y
	Magarey's Children Dietary Questionnaire						Healthy vs unhealthy food intake	A	Magarey, 2009 <sup>11</sup>	Observational 4-16y, n=540	Fruit and vegetables: 0.76; Fat from dairy: 0.44; Sweetened beverages: 0.13; Non-core foods: 0.56	7-day food checklist, Subsample: n=193	Subsample: n=116	Fruit/vegetables: 0.75; Fat from dairy: 0.51; Sweetened beverages: 0.55; Non-core foods: 0.90
	Origin: Australia											Fruit and vegetables: 0.58; Fat from dairy: 0.60; Sweetened beverages: 0.55; Non-core foods: 0.31		
	Calfas's test						Food preferences	A	Calfas, 1991 <sup>53</sup>	Experimental 3-8y, n=81	Preferences: 0.74	Preference vs actual choice : 66% agreement	1 week later Preferences: 0.70	
	Origin: US													
Parental feeding practices	Child Feeding Questionnaire						Perceived responsibility (3): parental perception of their own responsibility in their child eating	C+	Birch, 2001 <sup>20</sup>	Observational 5-9y, n=394	Responsibility: 0.88; Child weight: 0.71; Concern about weight: 0.83; Restriction: 0.75; Pressure to eat: 0.70; Monitoring: 0.73; Food as reward: 0.92			
	Origin: US													
	Translation: Spanish German													
									Davison, 2001 <sup>60</sup>	Observational 4-6y, n=197	Concern about weight: 0.74 in mothers, 0.77 in fathers; Restriction: 0.78 in mothers, 0.66			

Name of the tool / Country of origin / Translation	Scales						Description of validity data				
	Age range with validity data (gray filling)						Reference	Study design	Internal consistency <sup>2</sup> : Cronbach's $\alpha$	Construct validity <sup>3</sup>	Test-retest reliability <sup>4</sup>
	<1y	1y	2y	3y	4y	5y					
						</					

Name of the tool / Country of origin / Translation	Scales						Description of validity data						
	Age range with validity data (gray filling)						Domains (no. of items): short description	Quality rating <sup>1</sup>	Reference	Study design	Internal consistency <sup>2</sup> : Cronbach's $\alpha$	Construct validity <sup>3</sup>	Test-retest reliability <sup>4</sup>
	<1y	1y	2y	3y	4y	5y							
									Ogden, 2006 <sup>54</sup>	Observational 4-11y, n=125	Restriction: 0.79; Pressure to eat: 0.63; Monitoring: 0.87	Correlation with Overt/Covert control: Restriction-Overt: 0.27; Restriction-Covert: 0.42; Monitoring-Overt: 0.39; Monitoring-Covert: 0.42; Pressure-Overt: 0.46; Pressure-Covert: 0.26	
							Pressure to eat (4): parental attempt to force their child to eat more than it wants	A+	Powers, 2006 <sup>2</sup>	Observational2-5y, n=296	Restriction: 0.64; Pressure to eat: 0.54		
									Carnell, 2007 <sup>66</sup>	Observational 3-5y, n=439	Restriction: 0.78; Pressure to eat: 0.73		
							Monitoring (3): parents keep track of the snack, high fat or	B+	Brown, 2008 <sup>23</sup>	Observational 4-7y, n=518	Restriction: 0.87; Pressure to eat: 0.79		

Name of the tool / Country of origin / Translation	Scales						Description of validity data						
	Age range with validity data (gray filling)						Domains (no. of items): short description	Quality rating <sup>1</sup>	Reference	Study design	Internal consistency <sup>2</sup> : Cronbach's $\alpha$	Construct validity <sup>3</sup>	Test-retest reliability <sup>4</sup>
	<1y	1y	2y	3y	4y	5y							
							sweet foods	C+	Corsini, 2008 <sup>29</sup>	Observational 4-5y, n=216	Responsibility: 0.93; Child weight: 0.83; Parent weight: 0.69; Concern about weight: 0.74; Restriction: 0.83; Pressure to eat: 0.80; Monitoring: 0.92; Food as reward: 0.83		
							Food as reward (2): parental use of food to reward good behaviour or action of their child		Haycraft, 2008 <sup>67</sup>	Observational 1.5-6y, n=23		Correlation with mealtime observations Pressure: r=0.08 in mother and 0.36 in fathers Restriction: r=0.05 in mothers and 0.13 in fathers	
							Kroller, 2008 <sup>32</sup>		Observational 3-6y, n=219	Restriction: 0.75; Monitoring: 0.93; Pressure to eat: 0.84; Food as reward: 0.77		subsample: n=35, 14 days later Restriction: 0.77; Monitoring: 0.41; Pressure to eat: 0.78;	





772 Table 2. Summary of tools that needs further reliability and validity assessment

	Name of the tool / Country of origin / Translation	Scales						References
		Age range with validity data (gray filling)					Domains (no. of items): short description	Quality rating <sup>1</sup>
		<1y	1y	2y	3y	4y	5y	
Children's eating behavior: qualitative dimensions	Children Eating Behavior Inventory Origin: Canada							B Archer, 1991 <sup>42</sup>
	Children Food Neophobia Scale from Pliner Origin: Canada Translation: French, German							C+ Pliner, 1994 <sup>43</sup> Cooke, 2004 <sup>58</sup> Wardle, 2005 <sup>24</sup> Russel, 2008 <sup>68</sup>
	Behavioral Pediatrics Feeding Assessment Scale Origin: Canada							B Crist, 1994 <sup>69</sup> Crist, 2001 <sup>70</sup>
	Questionnaire from Galler Origin: Barbados							C Galler, 1998 <sup>47</sup>
								C- Father helps (4): help of the father and grandmother in taking care of the baby
								C- Feeding intensity (4): intensity of sucking and strong interest in feeding
								C- Relatives help (5): help of relatives in taking care of the baby, baby feeds on demand
								C- Feeding difficulty (3): grandmother help with baby and baby fusses during feeding
	Satiety Scale Origin: US							n/a Faith, 2002 <sup>41</sup>
	Children Food Neophobia Scale from MacNicol Origin: UK							C Brown, 2008 <sup>23</sup>

Name of the tool / Country of origin / Translation	Scales						References		
	Age range with validity data (gray filling)							Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y	5y			
modified Dietary Restraint scale Origin: US							Restraint (10): conscious limitation of the diet to control weight	C-	Shunk, 2004 <sup>46</sup>
Food Neophobia Scale from Nicklaus Origin: France							Neophobia (10): systematic refusal of new foods	C	Nicklaus, 2005 <sup>44</sup>
Questionnaire from Wright Origin: UK							Appetite (1): infant appetite	n/a	Wright, 2006 <sup>48</sup>
							Oromotor dysfunction (4): infant trouble with sucking, swallowing or choking	n/a	
							Avoidant eating behavior (8 at 8mo, 6 at 30mo): infant behavior to avoid eating foods	B	
							Maternal feeding anxiety (2): feeding time perceived as relaxed or stressful event	n/a	
							Response to food refusal (5): parental behaviour if the child does not finish part of a meal	C-	
							Difficulty to feed (4): infant perceived as poor eater, faddy or with bad behaviour at mealtime	n/a	Wright, 2007 <sup>71</sup>
Feeding Problem Questionnaire from de Moor Origin: The Netherlands Translation: English							Pickiness (4): poor and selective eating	C	de Moor, 2007 <sup>72</sup>
							Disturbing mealtime (4): disturbing behaviour during mealtime	C-	
Baby Eating Behavior Questionnaire Origin: UK							Enjoyment of food (4): infant's liking of milk and feeding	C	Llewellyn, 2010 <sup>37</sup>
							Food responsiveness (7): how demanding the infant is with regard to being fed and their responsiveness to feeding cues	C	
							Satiety responsiveness (3): how easily the infants gets full during feeding	C	
							Slowness in eating (4): speed with which the infant	C	

Name of the tool / Country of origin / Translation	Scales						References		
	Age range with validity data (gray filling)							Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y	5y			
							finishes feeding		
New Zealand Children’s Nutrition Survey FFQ Origin: New Zealand							Food intake	B	Metcalf, 2003 <sup>73</sup>
Anderson’s FFQ Origin: Norway							Food intake	C	Anderson, 2003 <sup>74</sup>
Klohe’s FFQ for a tri-ethnic population Origin: US							Food intake	B	Klohe, 2005 <sup>75</sup>
Hammond’s FFQ Origin: UK							Food intake	C	Hammond, 1993 <sup>12</sup>
Campbell’s FFQ Origin; Australia							Food intake	C	Campbell, 2006 <sup>76</sup>
Davies’s Dietary record Origin: UK							Food intake	C	Davies, 1994 <sup>13</sup>
Young Children’s Nutrition Assessment on the Web Origin: Belgium							Food intake	C	Vereecken, 2009 <sup>77</sup>
Saint Louis University for Kids FFQ Origin: US							Fruit and Vegetables intake	B	Linneman, 2004 <sup>78</sup> Haire-Joshu, 2008 <sup>79</sup>
Huybrechts’s FFQ Origin: Belgium							Calcium intake	B	Huybrechts, 2006 <sup>80</sup>
Dietary Fat Questionnaire Origin: US							Dietary fat	C	Dennison, 2000 <sup>81</sup>
Bell’s Qx (3.5y-4.5y) Origin: US							Food preferences	C	Bell, 2006 <sup>14</sup>
Anliker’s Qx							Food preferences	C	Anliker, 1991

	Name of the tool / Country of origin / Translation	Scales						References	
		Age range with validity data (gray filling)							Quality rating <sup>1</sup>
		<1y	1y	2y	3y	4y	5y		
	Origin: US								15
	Cooke’s Qx Origin: UK							Food preferences	C Cooke, 2005 <sup>16</sup>
	Caporale’s Qx Origin: Italy							Food preferences	B Caporale, 2009 <sup>17</sup>
	Perry’s test Origin: US							Food preferences	B Harvey-Berino, 1997 <sup>82</sup>
	Guthrie’s test Origin: UK							Food preferences	C Guthrie, 2000 <sup>83</sup>
	Interactive F&V preference measure Origin: US							Food preferences	B Jaramillo, 2006 <sup>84</sup>
Parental feeding practices	Maternal Feeding Attitude Origin: Canada Translation: Spanish French							Pushier feeding attitude (10): extent to which parents pressure children to consume foods	C Kramer, 1983 <sup>51</sup>
	Restricted-Access Questionnaire Origin: US							Restriction (10 per snack, 10 snacks): parental attempt to control their child's eating by restricting access to foods	B+ Fisher, 1999 <sup>50</sup> Fisher, 2000 <sup>85</sup> Birch, 2000 <sup>28</sup>
	Child’s perception Restricted Access Origin: US							Restriction (3 per snack, 10 snacks): child's perception ofparental attempt to control their child's eating by restricting access to foods	B Fisher, 1999 <sup>50</sup>
	Kid’s Child Feeding Questionnaire Origin: US							Pressure to eat (7): extent to which parents pressure children to consume foods Restriction (7): parental attempt to control their child's eating by restricting access to foods	B Carper, 2000 <sup>86</sup> B-

Name of the tool / Country of origin / Translation	Scales						References		
	Age range with validity data (gray filling)							Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y	5y			
Infant Feeding Questionnaire Origin: US							Concern about under-eating (4): parental worry about infant unde-reating or becoming underweight	C	Baughcum, 2001 <sup>19</sup>
							Concern about hunger (3): parental use or cereal in the bottle for the infant to be full longer	C	
							Awareness of infant’s cues (4): parental and infant sensitivity to infant satiety and hunger cues	C-	
							Concern about overeating (3): parental worry about infant overeating or overweight	C-	
							Feeding on schedule (2): parental control of feeding times	C-	
							Using food to calm (2): use of food to calm infant's fussiness	C-	
							Social interaction during feeding (2): parental attitude during feeding	C-	
Preschool Feeding Questionnaire Origin: US							Difficulty in feeding (6): child perceived as poor or selective eater, or with bad behaviour at mealtime	C+	Baughcum, 2001 <sup>19</sup> Seth, 2007 <sup>87</sup>
							Concern about overeating (7): parental worry about child overeating or overweight	C+	
							Pressure to eat (5): extent to which parents pressure children to consume foods	C	
							Using food to calm (4): use of food to calm child's emotions	C-	
							Concern about underweight (2): parental worry about child undereating or underweight	C-	
							Child’s control (3): child control over its own eating	C-	
							Feeding interactions (3): child's watching TV at mealtimes, mealtime routine, meals with parents	C-	

Name of the tool / Country of origin / Translation	Scales					References		
	Age range with validity data (gray filling)						Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y 5y			
						Age-inappropriate feeding (2): bottle-feeding and parents feeding the child	C-	
Parenting Feeding Style Questionnaire Origin: UK						Control over feeding (9): child control over its own eating	B+	Wardle, 2002 <sup>88</sup>
						Prompting to eat (8): verbal encouragement of the child to eat foods	B	Powers, 2006 <sup>2</sup>
						Emotional feeding (5): use of food to regulate child's emotion	B	Clark, 2008 <sup>89</sup>
						Instrumental Feeding (4): use of food to reward good behaviour	B	
Control over child feeding Origin: Australia						Food rules (2): existence of absolute family rules about eating		Tiggermann, 2002 <sup>90</sup>
						Monitoring (5): monitoring of child's food eating and encouragement of healthy eating	C-	
Food parenting practices Origin: Belgium						Permissiveness/restriction rules (4): child ability to have sweet or soft drinks whenever he wants	C	Vereecken, 2004 <sup>91</sup>
						Pressure (5): extent to which parents pressure children to consume foods	C	
						Encouragement through material reward (3): use of reward to push child to eat	C	
						Verbal praise (2): praise the child if he/she eats fruit or vegetables	C	
						Encouragement through negotiation (5): encourage the child at least to taste the food	C	
						Encouragement fruit through rationale (4): encouragement to eat fruit based on health benefits of fruit	C	

Name of the tool / Country of origin / Translation	Scales					References		
	Age range with validity data (gray filling)						Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y 5y			
						Encouragement vegetables through rationale (4): encouragement to eat vegetables based on health benefits of vegetables	C	
						Discouragement sweets through rationale (5): discouragement to eat sweets based on unhealthy effects of sweets	C	
						Discouragement soft drinks through rationale (5): discouragement to eat soft drinks based on unhealthy effects of soft drinks	C	
						Catering on child's demand (4): take into account child's preferences when cooking	C	
						Avoiding negative modeling behavior (2): limitation of sweets and soft drinks intake in the presence of the child	C	
Caregiver's Feeding Style Questionnaire Origin: US Translation: Spanish German						Demandingness: degree to which parents try to get their child eat, regardless of the type of feeding method they use	B	Hughes, 2005 <sup>21</sup>
						-Parent-centered strategies (12): directives that promote externalization or control of children's eating through external means	B+	Hughes, 2006 <sup>92</sup>
						-Child-centered strategies (7): directives that promote internalization of parental values	B	Hugues, 2007 <sup>93</sup>
						Authoritarian: strict obedience to parent and unresponsive to child's needs	B-	O'Connor, 2010 <sup>94</sup> Hugues, 2008 <sup>31</sup>



Name of the tool / Country of origin / Translation	Scales						References		
	Age range with validity data (gray filling)							Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y	5y			
							Authoritative: encouragement for child to express independence, clear set of boundaries, open communication	B	
							Permissive: few parental boundaries	B-	
Parental Control Index Origin: UK							Parental control (5): parental use of restriction and pressure to eat to control their child's eating	C-	Wardle, 2005 <sup>24</sup>
Family Environment Questionnaire Origin: Australia							Perceived adequacy of child’s eating (6): child's fruit and vegetables intake perceived as sufficient and varied by parents	C	Campbell, 2006 <sup>76</sup>
							Modeling (5): adults and children eat together	C	
							Restriction (6): parental attempt to control their child's eating by restricting access to foods	C	
							Monitoring (2): parents keep track of the snack or high fat foods	C	
							Food availability (4): fresh products easy to buy in the family area	C	
							Pressure to eat (4): extent to which parents pressure children to consume foods	C	
							Confidence in cooking (3): parents confident and enjoy cooking	C	
							Cost and preference for fruit and vegetable (4): parents do not buy fruit or vegetables because of cost or family dislike	C	
							Mealtime interruption (3): use of television or phone at mealtime	C-	
Overt-Covert Control Origin: UK							Overt control (5): controlling food intake in a way that can be detected by the child	B+	Ogden, 2006 <sup>54</sup>

Name of the tool / Country of origin / Translation	Scales						References		
	Age range with validity data (gray filling)							Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y	5y			
							Covert control (5): controlling food intake in a way that can not be detected by the child	B+	Brown, 2008 <sup>23</sup>
Response To Food Refusal Origin: UK							Response to food refusal (5): examine how mothers responded when their child would not eat a meal	C-	Wright, 2006 <sup>48</sup>
Comprehensive Feeding Practices Questionnaire Origin: US Translation: French							Child control (5): B147	C	Musher-Eizenman, 2007 <sup>52</sup> Musher-Eizenman, 2009 <sup>95</sup>
							Emotion regulation (3): use of food to regulate child's emotion	C+	
							Encourage balance/variety (4): encouragement of the child to eat, healthy and varied foods	C	
							Food environment (4): lot of healthy foods and few snack foods or sweets available at home	C	
							Food as reward (3): parental use of food to favorise good behaviour or action of their child	C-	
							Involvement (3): child involed in planning and preparation of meals	C	
							Modeling (4): parent try to model healthy eating	C+	
							Monitoring (4): parents keep track of the snack, high fat or sweet foods	C+	
							Pressure (4): extent to which parents pressure children to consume foods	C	
							Restriction for health (4): parental attempt to control their child's eating by restricting access to foods	C+	
						Restriction for weight (8): parental attempt to control their child's eatingand control weight by restricting access to foods	C+		
						Teaching nutrition (3): parent explain the nutritional value of foods	C-		

Name of the tool / Country of origin / Translation	Scales					References		
	Age range with validity data (gray filling)						Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y 5y			
Feeding Demand Questionnaire Origin: US						Feeding demand full score: extend to which parents endorse demand or control cognitions regarding feeding relations with their children	B	Faith, 2008 <sup>96</sup>
						Food type demandingness (2): demand cognitions with respect to the kind of food eaten	C	
						Food amount demandingness (2): demand cognitions with respect to the amount of food eaten	C	
						Anger/Frustration (4): parent anger or frustration when the child does not eat the kind or amounts of food planned by the parent	C	
Parent Mealtime Action Scale Origin: US						Snack limits (3): parental limitation of child's intake of sweets, sodas and salty snacks	C	Hendy, 2009 <sup>38</sup>
						Positive persuasion (4): parents explain that the food taste good and will make the child healthy	C	
						Daily fruit and vegetable availability (3): the child receive a fruit each day and parents eat fruit and vegetables each day	C	
						Use of rewards (4): parents give rewards to the child for eating and reward good behaviour by offering a favorite food	C-	
						Insistence on eating (3): parents insiste the child eat even if not hungry, not feeling well or emotionally upset	C-	
						Snack modeling (3): parents eat sweets or salty snacks each day	C-	
						Special meals (4): a special meal is prepared for the child, different from the family meal	C-	
						Fat reduction (3): parental limitation of fat intake	C-	

Name of the tool / Country of origin / Translation	Scales						References		
	Age range with validity data (gray filling)							Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y	5y			
							Many food choices (4): child's control over its own eating	C-	
Parental Feeding Dimension Questionnaire Origin: Australia							Supportiveness (10): parent's expression of affection, kindness, enjoyment, regard, and support within the food domain and parent support to her/his child to make good decisions about eating by providing appealing options	C	Joyce, 2009 <sup>97</sup>
							Structure (6): parent provides information to his/her child about expectations for behaviour, maintains consistent guidelines, and sets appropriate limits with regard to eating	C	
							Coerciveness (10): parent's overreactivity, irritability, and communication of negative feelings such as disapproval of her/his child's eating behaviour and the extent to which a parent is extremely restrictive and controlling in the feeding domain	C	
							Chaos (6): inconsistent, unpredictable, arbitrary, and/or undependable parenting in the feeding and eating context	C	
Infant Feeding Style Questionnaire Origin: US							Laissez-faire: parent does not limit infant diet quality or quantity and shows little interaction with the infant during feeding		Thompson, 2009
							-Attention (5)	C	
							-Diet quality (6)	C	
							Pressuring: parent is concerned with increasing the amount of food the infant consumes and uses food to soothe the infant		
							-Finishing (8)	C	
							-Cereal (5)	C	

Name of the tool / Country of origin / Translation	Scales						References		
	Age range with validity data (gray filling)							Quality rating <sup>1</sup>	
	<1y	1y	2y	3y	4y	5y			
							-Soothing (4)	C	
							Restrictive: parent limits the infant to healthful foods and limits the quantity of food consumed		
							-Amount (4)	C	
							-Diet quality (7)	C	
							Responsive: parent is attentive to child hunger and satiety cues and monitors the quality of the child's diet		
							-Satiety (7)	C	
							-Attention (5)	C	
							Indulgence: parent does not set limits on the quantity or quality of food consumed		
							-Permissive (8)	C	
							-Coaxing (8)	C	
							-Soothing (8)	C	
							-Pampering (8)	C	
Parent-Generated Feeding Practices Origin: US							Teachable moments (5): discussion with child about healthy eating	C-	O'Connor, 2010 <sup>94</sup>
							Practical methods (9): parental attempt to increase fruit and vegetables intake	C-	
							Firm discipline (4): making the child guilty for not eating fruit and vegetables, insist to sit at the table, not going to play and not having sweets until fruit and vegetables not finished	C-	
							Restriction of junk foods (5): limiting acces to sweets and junk foods	C_	
							Enhanced availability/accessibility (10): parental attempt to make fruit and vegetables highly accessible to the child	C-	

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<sup>1</sup> Quality rating: All tools were assessed against three quality criteria: 1/ Assessment of internal consistency: Cronbach's  $\alpha \geq 0.7$ ; 2/ Assessment of test-retest reliability: correlation's coefficient  $\geq 0.7$ ; 3/ Assessment of construct validity: correlation with another measurement of the same construct  $\geq 0.4$ . Tools were classified as C, when only one of the criteria was achieved and validity was tested in only one sample, C- when at least one criterion was tested but none achieved, C+ when only one of the criteria was achieved and validity was tested in at least two samples, B when two criteria were achieved and validity was tested in only one sample, B- when two criteria were tested but none achieved, B+ when two criteria were achieved and validity was tested in at least two samples, A when all criteria were achieved and validity was tested in only one sample, A+ when all criteria were achieved and validity was tested in at least two samples.

## 783 Supplementary table 1. Reliability and validity data available for tools that need further testing

Name of the tool		Description of validity data				
		Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
Children's eating behavior: qualitative dimensions	Children Eating Behavior Inventory	Archer, 1991 <sup>42</sup>	Observational 2-12y, n=266	By family composition: 2 parents, $\geq 2$ children: 0.76; 2 parents, 1 child: 0.71; 1 parent, 1 child: 0.76; 1 parent, $\geq 2$ children: 0.58		Subsample, n=38, 4-6 weeks later Total score: 0.87
	Children Food Neophobia Scale from Pliner	Pliner, 1994 <sup>43</sup>	Experimental 5-11y, n=117		Association with willingness ratio to test familiar/unfamiliar foods: 0.38	
		Cooke, 2004 <sup>58</sup> Wardle, 2005 <sup>24</sup>	Observational 2-6y, n=564	Neophobia: 0.84		
		Russell, 2008 <sup>68</sup>	Observational 2-5y, n=371	Neophobia: 0.91		
	Behavioral Pediatrics Feeding Assessment Scale	Crist, 1994 <sup>69</sup>	Observational 1-7y, n=42	Total score: 0.88; Child score: 0.84; Parent score: 0.74		Subsample: n=38, 2-y later Total score: 0.85; Child score: 0.82; Parent score: 0.83
		Crist, 2001 <sup>70</sup>	Observational 9mo-7y, n=345	Total score: 0.76		
	Questionnaire from Galler	Galler, 1998 <sup>47</sup>	Observational 7wk-6mo, n=226	Armor thetas: Preference for breastfeeding: 0.75; Father helps: 0.57; Feeding intensity: 0.45; Relatives help: 0.41; Feeding difficulty: 0.37		

Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
Satiety Scale	Faith, 2002 <sup>41</sup>	Experimental 4-6y, n=20			Test-retest 2 different days Same of adjacent figure hunger situation: 65%; partial situation: 50%; satiety situation: 90%
Children Food Neophobia Scale from MacNicol	Brown, 2008 <sup>23</sup>	Observational 4-7y, n=518	Neophobia: 0.88		
modified Dietary Restraint scale	Shunk, 2004 <sup>46</sup>	Observational 5y, n=153	at 5y: 0.64	Correlation with dieting: 0.12	
Food Neophobia Scale from Nicklaus	Nicklaus, 2005 <sup>44</sup>	Observational 4-22y, n=339	Neophobia: 0.86		
Questionnaire from Wright	Wright, 2006 <sup>48</sup>	Observational 6wk-12mo, n=826	Avoidant eating behavior: 0.75 at 1y; Response to food refusal: 0.38 at 8mo and 0.33 at 1y		
	Wright, 2007 <sup>71</sup>	Observational 30mo, n=455		Avoidant score higher in children with feeding problems (p<0.0001)	
Feeding Problem Questionnaire from de Moor	de Moor, 2007 <sup>72</sup>	Observational 416, n=1.5-3y	Pickiness: 0.78; Disturbing mealtime: 0.61		



Name of the tool		Description of validity data				
		Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
	Baby Eating Behavior Questionnaire	Llewellyn, 2010 <sup>37</sup>	Observational 8mo, n=2402 families	Enjoyment of food: 0.81; Food responsiveness: 0.79; Satiety responsiveness: 0.73; Slowness in eating: 0.76		
Children's eating behavior: quantitative dimensions	New Zealand Children's Nutrition Survey FFQ	Metcalf, 2003 <sup>73</sup>	Observational 1-14y, n=428	Fruit: 0.91; Vegetables: 0.88; Mixed meat dishes: 0.85; Eggs: 0.84; Red meats: 0.90; Chicken: 0.79; Fish: 0.87; Bread: 0.59; Breakfast cereals: 0.75; Rice: 0.87; Spreads: 0.80; Convenience meals: 0.90; Dairy foods: 0.86; Biscuits & cakes: 0.81; Snacks & sweets: 0.84; Milk drinks: 0.82; Non-milk drinks: 0.92		Subsample: n=130, 13 days later Fruit: 0.82; Vegetables: 0.77; Mixed meat dishes: 0.69; Eggs: 0.72; Red meats: 0.81; Chicken: 0.65; Fish: 0.73; Bread: 0.50; Breakfast cereals: 0.70; Rice: 0.77; Spreads: 0.76; Convenience meals: 0.79; Dairy foods: 0.77; Biscuits & cakes: 0.70; Snacks & sweets: 0.79; Milk drinks: 0.71; Non-milk drinks: 0.76
	Anderson's FFQ	Anderson, 2003 <sup>74</sup>	Observational 1y, n=64		7-d weighted food records: Energy: 0.43; Protein: 0.57; Total fat: 0.56; Total carbohydrate: 0.25; Data also available by food groups	

Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
Klohe's FFQ for a tri-ethnic population	Klohe, 2005 <sup>75</sup>	Observational 1-3y, n=52		3-day diet record Bread/Cereals: 0.40; Dairy: 0.51; Fats/Sweets: 0.33; Fruits: 0.40; Meats: 0.33; Soup: 0.36; Beverages: 0.69; Starchy vegetables: 0.10; Other vegetables: 0.57	Subsample: n=25 Bread/cereals: 0.58; Dairy: 0.63; Fats/Sweets: 0.63; Fruits: 0.79; Meats: 0.71; Soup: 0.53; Beverages: 0.74; Starchy vegetables: 0.74; Other vegetables: 0.84
Hammond's FFQ	Hammond, 1993 <sup>12</sup>	Observational 5-11y, n=272		14 daily recalls agreement to within $\pm 1$ day per week between frequencies reported in the two methods ranged from 99.8% to 46.8%	
Campbell's FFQ	Campbell, 2006 <sup>76</sup>	Observational 5-6y, n=560			Subsample: n=54, 3-4 weeks later Energy: >0.80; high-energy fluids: >0.80; sweet snack: >0.80; vegetables: >0.80; Savory snacks: 0.56
Davies's Dietary record	Davies, 1994 <sup>13</sup>	Observational 1-5y, n=93		Correlation with energy expenditure: 0.41	
Young Children's Nutrition Assessment on the Web	Vereecken, 2009 <sup>77</sup>	Observational 3.5y, n=862		Food dairies (n=39) vs Web tool (n=217) No significant differences between both groups for nutrient intake and food groups intakes, except water	

Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
Saint Louis University for Kids FFQ	Linneman, 2004 <sup>78</sup>  Haire-Joshu, 2008 <sup>79</sup>	Observational 2-5y, n=61		Observed intake Lettuce: 0.68; Tomatoes: 0.57; Carrots: 0.81; Broccoli: 0.74; Grapes: 0.65; Peaches: 0.79; Raisins: 0.05; Apple juice: 0.17	Subsample fruit and vegetables intake: 0.82
Huybrechts's FFQ	Huybrechts, 2006 <sup>80</sup>	Observational 2-7y, n=509		3-d diet records Calcium: 0.52	Subsample, n=60, 5 weeks later Calcium: 0.79
Dietary Fat Questionnaire	Dennison, 2000 <sup>81</sup>	Observational 2-5y, n=91	Total fat: 0.43; Saturated fat: 0.59; Dietary cholesterol: 0.66	4-d dietary records Total fat: 0.54; Saturated fat: 0.44; Dietary cholesterol: 0.55	Subsample: n=51 Total fat: 0.41; Saturated fat: 0.66; Dietary cholesterol: 0.64
Bell's Qx (3.5y-4.5y)	Bell, 2006 <sup>14</sup>	Experimental 3.5-4.5y, n=65		Maternal report: Black olives: 0.86; Cucumber: 0.76; Red pepper: 0.43; Carrots: 0.65; Raw broccoli= 0.41	
Anliker's Qx	Anliker, 1991 <sup>15</sup>	Experimental 5-7y, n=34	Each item used twice, correlation between 2 ratings: Cottage cheese: 0.55; Green beans: 0.72; Cabbage: 0.70; Turnip: 0.56; Orange: 0.52		

Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
	Cooke's Qx	Cooke, 2005 <sup>16</sup>	Observational 4-16y, n=1291	Fatty & sugary foods: 0.86; Fruit: 0.88; Starchy staples: 0.75; Meat: 0.77; Processed meat: 0.77; Eggs: 0.86; Fish: 0.63; Dairy foods: 0.75; Vegetables: 0.89	
	Caporale's Qx	Caporale, 2009 <sup>17</sup>	Observational 4-5y; n=71	Parental report of hedonic responses: -0.92	2 months later pasta with tomato: 0.99; potato puree: 0.37; buttered spinach: -1
	Perry's test	Harvey-Berino, 1997 <sup>82</sup>	Experimental 4-9y, n=143	Correlation with children choice: 0.71	other sample: n=100 food preferences: 0.91
	Guthrie's test	Guthrie, 2000 <sup>83</sup>	Experimental 3-5y, n=96		7-14 days later Testing: 0.81; Photographs: 0.75; Plastic: 0.52
	Interactive F&V preference measure	Jaramillo, 2006 <sup>84</sup>	Observational 3-5y, n=50	Fruit and vegetables preferences: 0.87; Fruit preference: 0.77; Fruit juice preference: 0.58; Vegetables preference: 0.82	7 days later Fruit and vegetables preferences: 0.73
Parental feeding practices	Maternal Feeding Attitude	Kramer, 1983 <sup>51</sup>	Observational 3days, n=50		1 day later intra-class r=0.95
	Restricted-Access Questionnaire	Fisher, 1999 <sup>50</sup>	Experimental 3-6y, n=70	Restriction: 0.87	Correlation with child report: 0.02 in boys, 0.58 in girls

Name of the tool

Description of validity data

	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
	Fisher, 2000 <sup>85</sup>	Observational 4-6y, n=197	Restriction: 0.81-0.83	Correlation with girl report: 0.18	
	Birch, 2000 <sup>28</sup>				
Child's perception Restricted Access	Fisher, 1999 <sup>50</sup>	Experimental 3-6y, n=70	Restriction: 0.73	Correlation with maternal report: 0.02 in boys, 0.58 in girls	
Kid's Child Feeding Questionnaire	Carper, 2000 <sup>86</sup>	Observational 4-6y, n=197	Pressure to eat: 0.71; Restriction: 0.60	Association with parental report: Pressure: OR=1.5[1.0-2.1]; Restriction: not significant but data not shown	
Infant Feeding Questionnaire	Baughcum, 2001 <sup>19</sup>	Observational 1-2y, n=435	Concern undereating: 0.71; Concern hunger: 0.74; Awareness of cues: 0.65; Concern overeating: 0.55; Feeding on schedule: 0.48; Using food to calm: 0.44; Social interaction: 0.24		
Preschool Feeding Questionnaire	Baughcum, 2001 <sup>19</sup>	Observational 2-5y, n=633	Difficulty in feeding: 0.87; Concern overeating: 0.83; Pressure to eat: 0.70; Using food to calm: 0.68; Concern underweight: 0.69; Child's control: 0.50; Feeding interactions: 0.37; Age-inappropriate feeding: 0.18		

Name of the tool

Description of validity data

	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
	Seth, 2007 <sup>87</sup>	Observational 1-5y, n=235	Concern about weight: 0.87; Difficulty in feeding: 0.80; Concern about overeating: 0.72; Using food to calm: 0.68; Pressure to eat: 0.64; Use of rewards: 0.51; Child's control: 0.40; Unstructured mealtimes: 0.20; Use of bottle: 1 item		
Parenting Feeding Style Questionnaire	Wardle, 2002 <sup>88</sup>	Observational 4-5y, n=214	Control: 0.77; Prompting: 0.69; Emotional feeding: 0.65; Instrumental feeding: 0.85		Subsample: n=166, 2 weeks later Control: 0.83; Prompting: 0.76; Emotional feeding: 0.76; Instrumental feeding: 0.82
	Powers, 2006 <sup>2</sup>	Observational 2-5y, n=296	Control: 0.68		
	Clark, 2008 <sup>89</sup>	Observational 4-11y, n=210	Control: 0.76; Prompting: 0.75; Emotional feeding: 0.77; Instrumental feeding: 0.55		
Control over child feeding	Tiggermann, 2002 <sup>90</sup>	Observational 5-8y, n=89	Monitoring: 0.69		
Food parenting practices	Vereecken, 2004 <sup>91</sup>	Observational 2.5-7y, n=316	Permissiveness: 0.71; Pressure: 0.74; Material reward: 0.75; Verbal praise: 0.94; Negotiation: 0.71; Rationale for fruit: 0.81; Rationale for vegetables: 0.86;		

Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
Caregiver's Feeding Style Questionnaire			Discouragement sweets: 0.80; Discouragement soft drinks: 0.86; Catering on demand: 0.79; Avoiding negative modeling behavior: 0.82		
	Hughes, 2005 <sup>21</sup>	Observational 3-5y, n=213	Demandingness: 0.85; Parent-centered: 0.86; Child-centered: 0.71		Subsample: n=25, 7-14 days later Demandingness: 0.85; Child-centered: 0.82
	Hughes, 2006 <sup>92</sup>				
	Hugues, 2007 <sup>93</sup>	Observational 3-5y, n=718	Child-centered: 0.67; Parent-centered: 0.83		
	O'Connor, 2010 <sup>94</sup>				
	Hugues, 2008 <sup>31</sup>	Observational 3-5y, n=718	Authoritarian: 0.61; Authoritative: 0.72; Permissive: 0.64		Authoritarian: 0.86; Authoritative: 0.82; Permissive: 0.69
Parental Control Index	Wardle, 2005 <sup>24</sup>	Observational 2-6y, n=564	Control: 0.63		

Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
Family Environment Questionnaire	Campbell, 2006 <sup>76</sup>	Observational 5-6y, n=560	Perceived adequacy: 0.89; Modeling: 0.73; Restriction: 0.73; Monitoring: 0.90; Food availability: 0.76; Pressure to eat: 0.75; Confidence in cooking: 0.78; Cost and preference for fruit and vegetable: 0.79; Mealtime interruption: 0.64		
Overt-Covert Control	Ogden, 2006 <sup>54</sup>	Observational 4-11y, n=297	Overt control: 0.71; Covert control: 0.79	Correlation with CFQ: Restriction-Overt: 0.27; Restriction-Covert: 0.42; Monitoring-Overt: 0.39; Monitoring-Covert: 0.42; Pressure-Overt: 0.46; Pressure-Covert: 0.26	
	Brown, 2008 <sup>23</sup>	Observational 4-7y, n=518	Snack-overt control: 0.76; Meal-overt control: 0.68; Snack-covert control: 0.77; Meal-covert control: 0.80		
Response To Food Refusal	Wright, 2006 <sup>48</sup>	Observational 4-12mo, n=749	at 8 mo: 0.38; at 12 mo: 0.33		



Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
Comprehensive Feeding Practices Questionnaire	Musher-Eizenman, 2007 <sup>52</sup>	Observational 3-6y, n=517	Child control: 0.49 (Mothers), 0.70 (Fathers); Emotion regulation: 0.77 (M), 0.78 (F); Encourage balance/variety: 0.60 (M), 0.73 (F); Food as reward: 0.68 (M), 0.66 (F); Modeling: 0.77 (M), 0.84 (F); Monitoring: 0.78 (M), 0.87 (F); Restriction for health: 0.76 (M), 0.69 (F); Restriction for weight: 0.79 (M), 0.82 (F); Teaching nutrition: 0.60 (M), 0.67 (F)		
		Observational 4-8y, n=152	Child control: 0.69; Emotion regulation: 0.74; Encourage balance/variety: 0.58; Food environment: 0.75; Food as reward: 0.69; Involvement: 0.77; Modeling: 0.80; Monitoring: 0.81; Pressure: 0.79; Restriction for health: 0.81; Restriction for weight: 0.70; Teaching nutrition: 0.68		

Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's α	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
	Musher-Eizenman, 2009 <sup>95</sup>	Observational 4-6y, n=122	Child control: 0.67 (M), 0.61 (F); Emotion regulation: 0.53 (M), 0.83 (F); Encourage balance/variety): 0.65 (M), 0.68 (F); Food as reward: 0.57 (M), 0.66 (F); Modeling: 0.74 (M), 0.78 (F); Monitoring: 0.85 (M), 0.85 (F); Restriction for health: 0.71 (M), 0.65 (F); Restriction for weight: 0.85 (M), 0.80 (F); Teaching nutrition: 0.54 (M), 0.56 (F)		
Feeding Demand Questionnaire	Faith, 2008 <sup>96</sup>	Experimental 3-7y, n=85	Full score: 0.81; Food type: 0.70; Food amount: 0.86; Anger/Frustration: 0.86	Correlation of the full score with CFQ: Monitoring: 0.36; Restriction: 0.10; Pressure to eat: 0.53	
Parent Mealtime Action Scale	Hendy, 2009 <sup>38</sup>	Observational preschool to elementary school, n=2549	Snack limits: 0.84; Positive persuasion: 0.75; Daily fruit and vegetable availability: 0.70; Use of rewards: 0.65; Insistence on eating: 0.68; Snack modeling: 0.54; Special meals: 0.45; Fat reduction: 0.59; Many food choices: 0.42		
Parental Feeding Dimension Questionnaire	Joyce, 2009 <sup>97</sup>	Observational 4-8y, n=247	Supportiveness: 0.81; Structure: 0.72; Coerciveness: 0.92, Chaos: 0.80		

Name of the tool	Description of validity data				
	Reference	Study design	Internal consistency <sup>1</sup> : Cronbach's $\alpha$	Construct validity <sup>2</sup>	Test-retest reliability <sup>3</sup>
Infant Feeding Style Questionnaire	Thompson, 2009 <sup>49</sup>	Observational 3-18mo, n=150	H coefficient: Laissez-faire: Attention:0.80; Diet quality: 0.91 Pressuring: Finishing: 0.79; Cereal: 0.78; Soothing: 0.84 Restrictive: Amount: 0.75; Diet quality: 0.85 Responsive: Satiety: 0.92; Attention: 0.84 Indulgence: Permissive: 0.82; Coaxing: 0.89; Soothing: 0.87; Pampering: 0.94		
Parent-Generated Feeding Practices	O'Connor, 2010 <sup>94</sup>	Observational 3-5y, n=755	0.41-0.58		

<sup>1</sup>Internal consistency: a measure of the extent to which items in a questionnaire (sub)scale are correlated

<sup>2</sup>Construct validity: correlation with another measurement of the same or similar constructs

<sup>3</sup>Test-retest reliability: correlation between two assessments 1-4 weeks apart