

# Application of the Child Eating Behavior Questionnaire in Hungary.

*A gyermekétkezési viselkedés-kérdőív alkalmazása Magyarországon*

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## **Absztrakt**

Jelen tanulmány célja, a magyar óvodáskorú gyermekek táplálkozási viselkedésének összehasonlítása egy Angliában végzett kutatással, a gyermekek étkezési viselkedés-kérdőív segítségével, melyet Wardle et. al. 2001-ben hozott létre. A kérdőív jelentleg az egyik legátfogóbb gyermekétkezési viselkedésértékelési eszköz. A kérdőív magyar változatát 365, 3 és 7 év közötti gyermek szülője töltötte ki az interneten. A tanulmány elemzési módszere kissé eltér az eredeti kutatás módszerétől. Míg az eredeti kérdőív, főkomponens-elemzés használatával nyolc komponenszt generált, a jelenlegi kutatás többdimenziós skálázást is alkalmazott a főkomponens-elemzésen túl. Az elemzés kimutatta, hogy csupán három komponenszt szükséges megtartani. A tanulmány továbbá, megvitatja az eltérő étkezési viselkedés-minták lehetséges okait.

*Kulcsszavak: táplálkozási viselkedés, fogyasztói magatartás, óvodáskorú gyermek, CEBQ*

## **Abstract in English**

The present study aims to compare and contrast the eating behaviours of preschool aged children in Hungary with that of the and the Children's Eating Behaviour Questionnaire conducted by Wardle et. al. in 2001 in the United Kingdom. The questionnaire is regarded as one of the most comprehensive instruments in assessing children's eating behaviour. The Hungarian version of the survey was conducted online with parents whose children were between 3 and 7 years old with a sample of N=365. Conversely, the analysis method slightly differed from the original paper where the questionnaire was developed. Whilst the original questionnaire was developed with 35-item instruments with eight scales, using Principal Component Analysis, the current paper used the multidimensional scaling approach as well as the principal component analysis. The analysis showed that ideally only 3 components need to be kept. Furthermore, the paper also focuses on highlighting possible reasons different eating behaviour patterns might arise in preschool age children.

*Keywords: Eating behaviour, consumer behaviour, preschool children, CEBQ*

## **1. Introduction**

In the past, a number of psychometric instruments have been developed in order to assess the eating behaviour in children, including the Children's Eating Behavior Inventory (Archer, Rosenbaum and Streiner 1991) the Bob and Tom's Method of Assessing Nutrition (Babbitt et. al. 1995) and the Children's Eating Behaviour Questionnaire (Wardle et. al., 2001). Of which the later is generally regarded as one of the most comprehensive instruments in assessing children's eating behaviour. The questionnaire was developed and validated in the United Kingdom. It has been used for different research purposes; to examine the relationship between obesity and eating behaviours (Carnell and Wardle, 2007; Rodgers et. al 2013), the relationship with the body mass index (Powers et. al., 2006; Viana, Sinde, Saxton, 2008) to discover continuity in children's eating behaviours across time (Ashcroft, 2007) and to examine the relations between children's maternal feeding practices (Tomomi and Rie, 2011; Blissett, Haycraft and Farrow, 2010).

The Children's Eating Behaviour Questionnaire consists of eight scales. The scales food fussiness (FF) is defined as refusal of a considerable amount of acquainted foods as well as non-familiar foods. The scales emotional overeating (EOE) and emotional undereating (EUE) are considered as either an increase or a decrease of food intake due to a variety of negative emotions. While the scales food responsiveness (FR) and enjoyment of food (EF) stand for food intake in response to environmental food cues. Desire to drink (DD) mirrors the longing of children to have drinks. While satiety responsiveness (SR) represents the capability of a child to reduce food intake after eating in order to control their energy intake and the scale slowness in eating (SE) is characterised by a decrease in eating rate due to the of lack of satisfaction and interest in food. Principal Components Analyses showed that each scale had a single factor, that explained 50–84% of the variance, while an overall factor analysis verified the hypothesized scales (Wardle et. al. 2001).

The present study aims to compare and contrast the eating behaviours of preschool aged children in Hungary with that of the original study conducted in Britain. The paper also focuses on highlighting possible reasons the different eating behaviour patterns that might arise in preschool age children.

## **2. Literature review**

The literature review section of the paper mainly focuses on past studies using the Child Eating Behaviour Questionnaire as well as other relevant papers regarding the eating behaviour of preschool aged children. Amongst others, the role of parents has been researched concerning the eating behaviours of pre-school children. Pérez et. al (2017) found that children who had parents with no formal or only primary school education, displayed a significantly higher consumption of soft drinks containing sugar and potato chips and other salty snacks, and a significantly lower consumption of fresh fruit, vegetables and cheese (Pérez et. al 2017). While parents often report using a wide range of child-feeding behaviours, including monitoring, pressure to eat as well as restriction. Restriction of children's eating has most frequently and consistently been associated with child weight gain. Furthermore, there is substantial evidence for a causal relationship between parental restriction and childhood overweight (Clark et. al, 2007).

One reason why it is important to understand the eating behaviors of children, is that certain eating behavioral patterns can lead to early child obesity while others to the underweight of children. As it is agreed that the energy intake of obese children exceeds their energy outflow, the specific behaviours involved are yet to be determined. A study by Webber et. al. (2009) underlines that satiety responsiveness and slowness in eating and food fussiness showed a graded negative association with weight, whereas food responsiveness, enjoyment of food, emotional overeating and desire to drink were positively associated. Approach-related and

avoidance-related appetitive traits are systematically (and oppositely) related to adiposity, and not exclusively associated with obesity (Webber et. al, 2009). While short sleep duration has also been found to be positively linked with obesity in preschool children, and short nighttime sleep duration is significantly related to bedtime and co-sleeping with caregivers (Jiang et. al, 2009).

Longitudinal research also determined that there is a direct relationship between the time spent watching television and obesity (Crespo et. al 2001; Proctor et. al 2003; Cox et. al 2012 and Twarog, 2015), furthermore Gortmaker et. al (1996) found that every additional hour spent watching television increased obesity by 2%. In addition, exposure to food advertising increased food intake in all children. This finding was later replicated in 5–7 year old children (Halford et al., 2007). While a further study demonstrated that, this increase in intake was largest in the obese children (Halford et al., 2008). Additionally, watching TV has been found to decrease children's awareness of food consumption (often resulting in greater food intake) and encourages the development of non-hungry eating habits (Francis and Birch, 2006). While Francis and Birch (2006) found that children ate significantly less snack and lunch in the TV condition compared with the no TV condition. Children who reportedly watched more daily hours of TV and who had a higher frequency of meals eaten in front of the TV at home ate more lunch in the TV condition (Francis and Birch, 2006). At this point, it also has to be noted, that children who are exposed to television are also vastly influenced as consumers. Research has shown that children under the age of 8 do not understand the sales intention of advertisements (Roberts, 1981). To examine whether televised food commercials influence preschool children's food preferences. Children exposed to the videotape with embedded commercials were significantly more likely to choose the advertised items than children who saw the same videotape without commercials (Borzekowski, and Robinson, 2001). Thus, children have become an important market of influencers; they give direction to daily household purchases, such as snacks, sweets, and breakfast products. Thus, it is vital, to research preschool children behaviour but also their paths as consumers as they are a future market and are known to develop brand loyalty at an early age, and that favorable attitudes toward brands last well into adulthood (McNeal, 1992).

The current paper primarily focuses on the Child Eating Behaviour Questionnaire developed by Wardle et. al. (2001) which is an instrument to assess eight dimensions of eating style in children; the responsiveness to food, enjoyment of food, satiety responsiveness, slowness in eating, fussiness, emotional overeating, emotional undereating, and desire for drinks (Wardle et. al. 2001). Several studies have incorporated this instrument or parts of it such as the study by Tomomi and Rie (2011) who aimed to explore associations between children's appetites and maternal feeding practices. Children's appetite patterns were associated with parental feeding practices, particularly snacking behaviour (Tomomi and Rie, 2011). Another study explored associations between child eating behaviors and maternal feeding practices, specifically testing the hypotheses that maternal "restriction" is associated with having a child with stronger food approach tendencies (such as over responsiveness to food), and maternal pressure to eat is associated with having a child with food avoidant tendencies (satiety responsiveness). Children who were more food responsive had mothers who were more likely to restrict their intake of unhealthy foods. Children who enjoyed food less, were fussier, or ate more slowly, had mothers who were more likely to use pressure strategies (Webber et. al., 2010). Apart from these several other papers incorporated the Child Eating Behaviour Questionnaire, usually in connotation with measuring obesity, BMI, differences between siblings in terms of eating behaviour and maternal feeding practices (Carnell and Wardle, 2007; Farro, Galloway and Fraser, 2009; Rodgers et. al 2013 and Blissett, Haycraft and Farrow, 2010). The desire to drink has also been tested using the Child Eating Behaviour Questionnaire but mostly in relation to soft drink consumption (Sweetman, Wardle and

Cooke, 2008). Whilst country specific comparisons have also been made in Portugal (Viana, Sinde and Saxton, 2008), Australia (Mallan et. al., 2013) and Dutch (Sleddens, Kremers and Thijs, 2008) regions.

### 3. Method

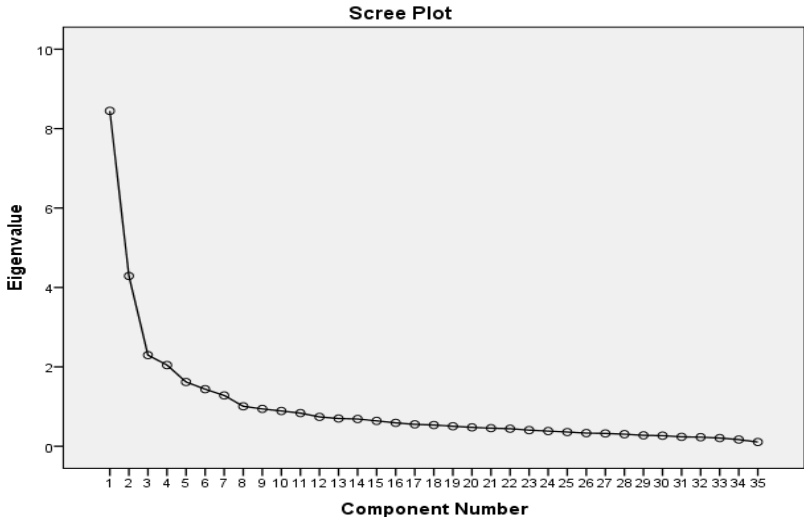
2001 Wardle et. al developed a Children's Eating Behaviour Questionnaire with 35-item instruments with eight scales, the primary aim of the questionnaire is analyze the differences in eating styles of children. This survey was taken as a basis for the current study. The survey was first translated into Hungarian and then back to English, to make sure the translations were appropriate. Prior to the online survey, a pilot version of the survey was tested, and unclear questions were altered when necessary. The final version of the survey was conducted online in 2016 with parents whose children were between 3 and 7 years old. The sample of N=365 was then analyzed. Conversely, the analysis method slightly differed from the original paper where the questionnaire was developed.

Firstly, the KMO measure of sampling obtained was 0.875 and Bartlett's test of sphericity was significant at 595 degrees of freedom. Indicating that the sample is big enough for factor analysis. Secondly, the Cronbach alpha was obtained, the result was acceptable at 0,734, indicating that a factor analysis is suitable. Thus following the approach of the original paper, a Principal Component Analysis was conducted. Principal Component Analysis is a widely used method for factor extraction. Factor weights are computed in order to extract the maximum possible variance, with successive factoring continuing until there is no further meaningful variance left. The factor model is then rotated for analysis (Ngure, Kihoro and Waititu, 2015). Interestingly the analysis resulted in nine components with a larger eigenvalue than 1. However, the scree plot (figure 1) made clear that only the first seven components could be considered. According to a more in-depth analysis, ideally only three components need to be kept, as from the fourth component onwards, there is no significant difference. The main reason why this solution is more acceptable than relying solely on the eigenvalues, is due to the properties of the likert scale. As the likert scale incorporates a systematic error, which originates from the extreme response style of the respondents. The tendency of respondents to favour or avoid using the endpoints of a rating scale, thus a systematic preference occurs. (De Jong, Steenkamp, Fox and Baumgartner, 2008) This systematic error can also be removed by right centering. However, instead of this type of transformation, the multidimensional scaling methods were used, as the systematic error does not affect the results of the configuration of the items. The results below will also demonstrate that the MDS model is the adequate method for exploring the structure of the 35 items.

To verify these results the principal axis factoring method was applied as well. This method restricts the variance that is common among variables. It does not redistribute the variance that is unique to any one variable (Ngure, Kihoro and Waititu, 2015). As Kaiser's rule suggests to retain as many Principle Components whose variance is larger than the average variance. According to this criterion, the number of Principle Components that have a variance (eigen values) larger than 1 shall be retained. In this case the results were first similar to the results of Wardle et. al, (2001), namely that 8 factors could be selected as their eigenvalue is greater than 1. However, the greatest change in slope in the scree plot occurs at component three (figure 1.). Therefore, it could be argued based on the basis of the scree plot that the first three components should be retained. Thus, as the determinant was zero, the analysis was re-run using the principal axis factoring method, furthermore the rotation method was added in order to get easier interpretable results, keeping only 3, of the factor components. The results once again indicated that two factors would be sufficient for further analysis instead of three as the results will be even easier interpretable using the Component plot.

This paper will continue the analysis using only three factors instead of eight as indicated by Wardle et. al, (2001). Following the Factor analysis, the Multidimensional scaling approach was used to categorize the items.

1. Figure

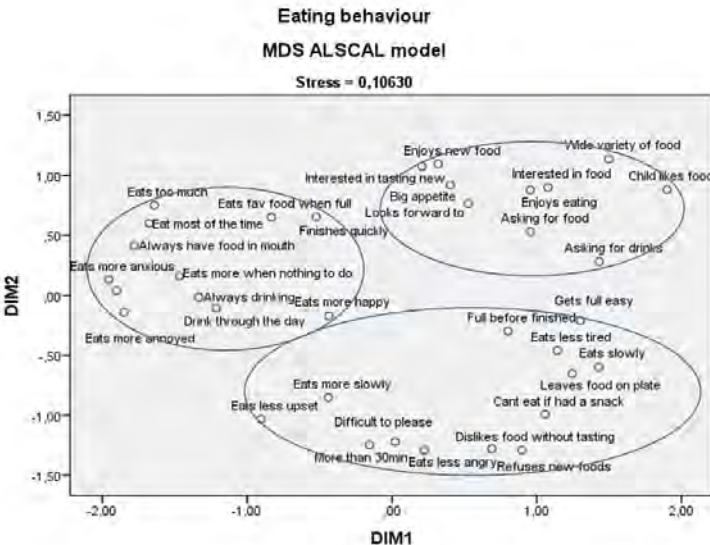


Source: Own construction, created with SPSS.

4. Results

Using the Alscal approach, the Stress level was 0,10630 while the squared correlation (RSQ) was 0,94090 indicating a very good goodness of fit. One of the main reasons this approach is more sufficient than the one used by the original paper is the fact that in Wardle et. al’s (2001) approach all items have a positive loading after conducting the Principal Components Analysis, indicating that everything correlates together. This is not the case with our results; the correlations are bipolar, which indicates that these results measure the actual motivation of the children. The results of the Multidimensional scaling approach are presented in the figure below:

2. Figure



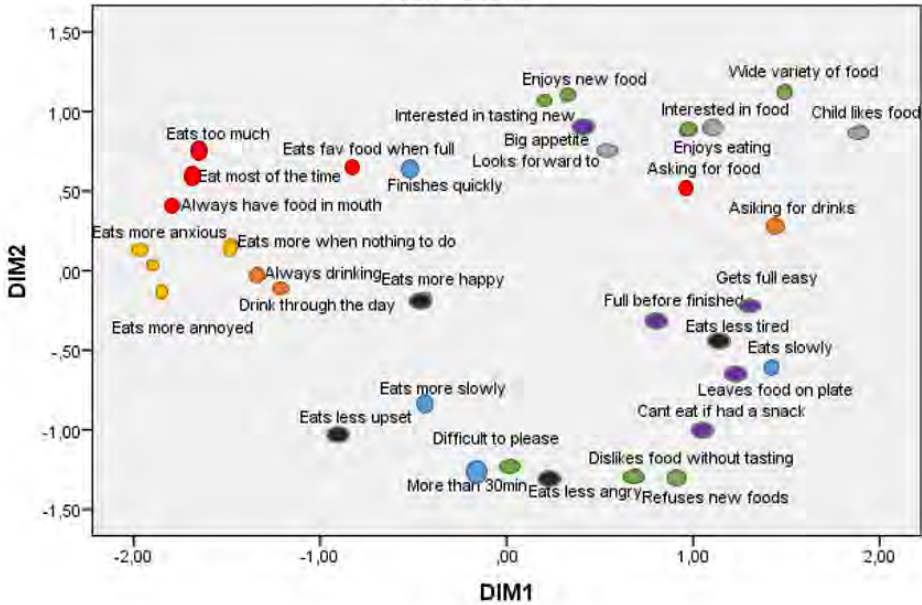
Source: Own construction, created with SPSS.

The categories created using this method also differ slightly from the results of Wardle et. al, (2001). The Multidimensional-scaling model created a total of three scales; overeating, fussy eater and enjoys nourishment. The “overeating” category incorporates all types of excessive food and beverage intake due to emotional reactions as well as low satiety. The second scale “fussy eater” includes reactions linked to a general dislike of food but also due to emotional reactions, which is often reflected in slower food intake than average. While the final scale “enjoys nourishment” gathers all eating habits that reflect a positive relationship to food as well as beverages. Compared to the Children's Eating Behaviour Questionnaire, which had eight scales; responsiveness to food, enjoyment of food, satiety responsiveness, slowness in eating, fussiness, emotional overeating, emotional undereating, and desire for drinks. This approach with only three scales, creates a more simplified version, yet it still incorporated the most important eating behavior categories. The new three scale method thus enables a more abridged approach which could simplify future research on child eating behaviour. Some scales in the original paper were very similar to each other such as food responsiveness and enjoyment of foods. While other scales incorporated items in them that did not fit to the actual scale, such as „my child eats less when s/he is tired”, being a part of the emotional undereating scale. Tiredness is a result of a physiological need and not an emotional reaction and does therefore not fit into this scale. Due to this, incorporating emotional reactions into the three scales overeating, fussy eater and enjoys nutrition is an alternative approach, which also allows for simplification of the scale.

Whilst in direct comparison, with the original eight scales, the Hungarian sample brought vastly different results (see above, figure 2.). Only emotional over-eating from the original scales was similarly grouped by the Hungarian respondents. While a couple of scales such as satiety responsiveness, desire to drink and food responsiveness results were also very similar to the original sample, however each enclosed at least one scale that did not fit into the original grouping. While food fussiness and slowness in eating varied completely.

**3. Figure**

**Eating behaviour  
MDS ALSCAL model  
Stress = 0,10630**



Source: Own construction, created with SPSS.

## 5. Discussion

A possible explanation for the dissimilarities could lie mainly in the differences between the standard of living in Hungary and the United Kingdom, especially regarding eating fussiness. The average household net-adjusted disposable income per capita in Hungary is USD 15 614 a year, compared to USD 26 687 in the United Kingdom (OECD, 2016). As families in the UK can spend more on food than Hungarian households, the UK families can afford to purchase a greater variety of food and also rising the likelihood of more food going to waste. Thus, children in the UK are more likely to be more picky when deciding what to eat. Furthermore, health-conscious consumption cannot be detected amongst a significant section of the Hungarian consumers. Healthy eating and food shopping is not a significant factor for Hungarians, although a small segment was detected who are health-conscious and seek healthy nutrition characteristics. (Dörnyei et. al, 2014), meaning the majority of Hungarian households will initially eat less-healthier options, which are generally more popular with young children, thus Hungarian children have less to be fussier about. Additionally, a study by Szakács et. al. (2010) found that Hungarian manufacturers produce less health-protective food products, as the proportion of health-conscious consumers is extremely low in Hungary. Furthermore, the quality of food and beverages available in CEE countries compared to Western Europe are often of much lower quality as sources confirmed (Köpöncei, 2017). Which also can vastly influence the eating behaviors of families including children.

When comparing television-viewing habits (2015), Hungary is ranked the third amongst all European countries to have the highest television consumption, the United Kingdom only being 22nd (Statista, 2015). The literature review already underlined the numerous effects high exposures can have on the eating behaviours of children. This can also be a possible explanation why the eating speeds of the children vary that much in the two counties analyzed.

Comparing this study to similar studies in the past such as the Dutch comparison also shows interesting insights. The Dutch research also conducted a factor analysis which revealed a seven-factor solution. The items from two scales (EOE and FR) loaded onto the same factor, thus the name 'overeating' was proposed. Most of the scale items loaded as expected and their factor loadings were comparable to those obtained in the original study by Wardle et al. (Sleddens, Kremers and Thijs, 2008). While the Australian paper had a slightly different methodological approach by means of confirmatory factor analysis using structural equation modelling. The results showed that model fit would be significantly improved with the addition of two error co-variances between the errors for the items on the Satiety Responsiveness factor: (i) My child gets full up easily and My child gets full before his/her meal is finished, and (ii) My child leaves food on his/her plate at the end of a meal and My child gets full before his/her meal is finished. Given the obvious overlap in the content/theoretical basis of these two pairs of items. The item My child is difficult to please with meals from the Fussiness factor showed high cross-loading on the Satiety Responsiveness factor. Arguably, a child with higher Satiety Responsiveness – measured here with items such as My child gets full up easily and My child leaves food on his/her pate at the end of a meal – may be perceived as more 'difficult to please with meals' according to the authors (Mallan et. al., 2013).

## 6. Conclusions

All in all the current paper generated a more simplified version of the Child Eating Behaviour Questionnaire with a total of three scales (overeating, fussy eater and enjoys nourishment), compared to the eight in the original paper. Furthermore, an in depth analysis of the relationships of the original scales compared to the current findings showed numerous differences between the current and the UK sample. The current research lays a solid basis for

possible future research in this exciting field as numerous questions regarding the reasons for the specific eating behaviours of preschool aged children remains unanswered.

To conclude, healthcare professionals should increase the awareness on certain techniques parents can use to improve their children's food habits and reduce their energy intake. It is essential to educate the parents of the children as well, primarily by not only showing them the possible negative consequences of certain eating habits but also to coach them on what a healthy diet should consist of and what healthy eating behaviours are ideally. Moreover, public health policy makers should also take specific measures so that the content of food advertisements during children's TV programs promotes healthy food choices. Ideally, advertisements on children's television channels should increasingly be regulated as the majority of preschool aged children are unaware of the persuasive content of advertisements in the media. A further argument for stricter policies lies in the fact that children's brand loyalty already starts evolving at this extremely young age, which later on has an effect on their entire lives, as the media can persuade children to favourite brands of unhealthy foods.

To deepen the understanding of the differences in eating behaviours of preschool children, the study could be combined with a study on the media consumption of these children, as differences in eating habits as well as obesity have all been associated with the media consumption of children in the past literature. Furthermore, this type of study could focus on possible gender differences regarding eating habits. Additionally, the link between different parenting styles and eating behaviour could also be analysed further by extending this study, which also was indicated by literature but still offers room for further analysis, as well as the possible link between any possible food allergies and other intolerances on eating behaviour. Finally, the current studies results could further be validated with numerous types of qualitative studies such as observations and in depth interviews with parents as well as children.

Unfortunately, this paper is also not without limitations. Although the sample size is representative, the sample is rather unbalanced regarding the regional heritage of the respondents. More than half of the results (55,6%) are from the central region of Hungary (including the capital, Budapest). Whilst up to this point, eating habits have hardly been studied in smaller suburbs and villages, thus a greater proportion of results could have brought interesting insights in this specific field.

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**Appendix:**

The 35-item instruments used in the Children's Eating Behaviour Questionnaire (Wardle et. al., 2001):

1. My child loves food
2. My child eats more when worried
3. My child has a big appetite
4. My child finishes his/her meal quickly
5. My child is interested in food
6. My child is always asking for a drink
7. My child refuses new foods at first
8. My child eats slowly
9. My child eats less when angry
10. My child enjoys tasting new foods
11. My child eats less when s/he is tired
12. My child is always asking for food
13. My child eats more when annoyed
14. If allowed to, my child would eat too much
15. My child eats more when anxious
16. My child enjoys a wide variety of foods
17. My child leaves food on his/her plate at the end of a meal
18. My child takes more than 30 minutes to finish a meal
19. Given the choice, my child would eat most of the time
20. My child looks forward to mealtimes
21. My child gets full before his/her meal is finished
22. My child enjoys eating
23. My child eats more when she is happy
24. My child is difficult to please with meals
25. My child eats less when upset
26. My child gets full up easily
27. My child eats more when s/he has nothing else to do
28. Even if my child is full up s/he finds room to eat his/her favourite food
29. If given the chance, my child would drink continuously throughout the day
30. My child cannot eat a meal if s/he has had a snack just before
31. If given the chance, my child would always be having a drink
32. My child is interested in tasting food s/he hasn't tasted before
33. My child decides that s/he doesn't like a food, even without tasting it
34. If given the chance, my child would always have food in his/her mouth
35. My child eats more and more slowly during the course of a meal