

# Towards the development of a Dutch screening instrument for the detection of feeding problems in young children

Feeding problems are common in young children and have clear negative consequences. Recently, Ramsay, Martel, Porporino and Zygmuntowicz (2011) developed the Montreal Children's Hospital Feeding Scale for a rapid identification of feeding problems. This study aims at analysing the psychometric properties of the Dutch translation of this instrument (Screeningslijst Eetgedrag Peuters, or SEP). A normative sample of 1448 Dutch caretakers of children (aged 6 months to 4 years,  $M = 103.3$  weeks,  $SD = 58.6$  weeks) participated in the study by completing the SEP and relevant background questions. The results of the psychometric analyses provide support for the SEP. Furthermore, clear differences were found between the scores of parents who had sought help for feeding difficulties and those who had not. There was an increase in difficulties with the child's age. Further research aims at providing standardised norms for the Dutch population and to make these available for professionals working with this group.

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Most popular parenting books dedicate at least one chapter to feeding difficulties in early childhood and how to deal with them as a caretaker. This is no surprise considering the fact that feeding problems are very common among young children. Drinking and eating are primary needs in life, and not being able to provide a healthy intake pattern to a child can be a frustrating experience for parents (Van den Engel-Hoek, 2006). Estimations in the literature suggest that 10% to 33% of all parents report problems when feeding their infant or child (Lindberg, Bohlin, & Hagekull, 1991; McDermott, Mamun, Najman, Williams, O'Callaghan, & Bor, 2008; Reau, Senturia, Lebailly, & Christoffel, 1996). Severe problems are reported to exist in 3-10% of all children (Corbett & Drewett, 2004; Ramsay, Martel, Porporino, & Zygmuntowicz, 2011). As there is no universally accepted definition for feeding

problems, different terms have been used by authors to describe the overt behaviours (or symptoms) of feeding problems. Overt behaviours that are most frequently described are food refusal (Lindberg et al., 1991), irregular eating (McDermot et al., 2008), non-compliance during mealtime (Sanders, Patel, Le Grice, & Shepherd, 1993) and 'mealtime negativity' (Johnson & Harris, 2004). Although some feeding problems are mild and transient, there is a striking continuity in early feeding difficulties and difficulties later on in childhood and even adolescence (McDermott et al., 2008; Marchi & Cohen, 1990; Dahl & Sundelin, 1992). Feeding problems have a clear negative impact on the development of the child, ranging from increased parenting difficulties and mealtime stress to poor growth and delayed cognitive development (Lindberg, Bohlin, Hagekull, & Thunstrom, 1994).

## Factors contributing to feeding problems in young children

Today, feeding problems in early childhood are explained by a ‘biopsychosocial’ model, meaning that they are considered to be the result of a complex interplay between physiological and psychosocial factors (Johnson & Harris, 2004; Rommel, De Meyer, Feenstra, & Veereman-Wauters, 2003). Food refusal – which is one of the main symptoms – is conceived to be a complex feeding problem in which many interacting factors are involved (Williams, Field, & Seiverling, 2010). Physiological factors contributing to feeding difficulties may be skill based (oral sensory-motor) and/or motivation based (inherent or acquired). These influence the feeding interactions between parent and child negatively, which results in stress. As a result, parents feel the need to pressure their child to eat more, which may subsequently lead to an exacerbation of the feeding problems (e.g. Rommel et al., 2003; Lindberg, Bohlin, & Hagekull, 1991; Field, Garland, & Williams, 2003; Ramsay et al., 2011). The interactions described above illustrate how negative patterns can develop over time and create a vicious cycle that is difficult for parents and children to break. In a previous publication (Van Dijk, Hunnius, & Van Geert, 2009), we argued that feeding can be described as a process of co-regulation of consensual frames (Fogel, 1993). Various vulnerabilities may influence the quality of this co-regulation process. These vulnerabilities may consist of biological preconditions such as illness, low appetite, oral sensory motor difficulties (Ramsay, Gisel, & Boutry, 1993; Wright & Birks, 2000; Field et al., 2003), and temperament (Pliner & Loewen, 1997) but may also consist of psychological variables such as on-going poor mother-child relationships (Feldman, Keren, Gross-Rozval, & Tyano, 2004) and familial eating problems (Stapleton, Fielder & Kirkham, 2008). In addition, medical factors such as prematurity (Burklow, McGrath, Valerius, & Rudolph, 2002; Samara, Johnson, Lamberts, Marlow, & Wolke, 2010) have been shown to play an important role in the development of feeding problems.

## Early detection of feeding problems

Because of the prevalence and negative consequences of feeding problems in young children, clinicians working with the parents of these children need access to a valid and reliable screening instrument that can quickly verify parental complaints about their child’s feeding difficulties (Ramsay et al., pp. 148). This will ensure early referrals to specialists. Although the literature provides several reliable and valid instruments, none of them are suited for a quick identification of these problems in a clinical setting. Most recent

scales, such as the *Children’s Eating Behaviour Inventory* (Archer, Rosenbaum, & Streiner, 1991), the *Behavioral Pediatrics Feeding Assessment Scale* (Crist, McDonnell, Beck, Gillespie, Barrett, & Mathews, 1994) and the *Children’s Eating Behavior Questionnaire* (Wardle, Guthrie, Sanderson, & Rapoport, 2001), consist of a few dozen items (between 35 and 40 each) and work with different subscales. As a result, they are more suitable for scientific than for clinical purposes. There are also several clinical scales available in the field of the speech-language pathology, such as the *Pre Speech Assessment Scale* (Morris, 1982), the *Oral-Motor and Feeding Assessment Inventory* (Herman, 1991), the *Neonatal Oral-Motor Assessment Scale* (Palmer, Crawley, & Blanco, 1993), and the *Observation Scale Oral-Sensory Feeding Disorders* (Palmer & Heymans, 1993). However, these instruments are often qualitative and extensive in nature, and clinicians may need additional training before they can be used properly. For this reason, Ramsay et al. (2011) developed the *Montreal Children’s Hospital Feeding Scale* (MCH-FS) as an easily administrable scale with its primary aim to quickly identify feeding problems during a short consultation session. The scale is based on the conceptualisation that causes of feeding difficulties are skill based and these physiological factors alter mealtime behaviours.

The MCH-FS consists of 14 items on overt symptoms of feeding problems in the following domains: oral sensory/motor symptoms, appetite, parental concerns, mealtime behaviours, compensatory strategies and family reactions. The primary feeder is asked to rate each of the 14 items on a seven-point Likert scale. The scale has explicit anchor points on either side, but no labels for values between 2 and 6 (for instance, item 2 ‘How worried are you about your child’s eating?’ goes from ‘not worried’ at value 1 to ‘very worried’ at value 7). In roughly 10 minutes the clinician can get an impression of the severity of the symptoms by mirroring the responses to half of the items, summing up the total score and comparing it with a norm table.

The validity and reliability were tested by the original developers in a sample of 372 children aged 0;6 to 6;11 years (as reported in Ramsay et al., 2011), consisting of a clinical sample of 174 (children visiting the feeding clinic of the Montreal Children’s Hospital) and a control sample of 198 (recruited from community paediatricians’ offices). Clear differences were shown to exist between the two groups ( $M = 60.43 / SD = 13.06$  versus  $M = 32.65 / SD = 12.73$ ). Test-retest reliability (the interval between the two administrations was 7-10 days) was also good ( $r = .92$  for the clinical sample and  $.85$  for non-clinical sample). A factor analysis

(principal component analysis (PCA)) revealed one single factor that accounted for 48% of the variance, suggesting that the total score can be used as a measure of feeding problems. The results indicated that children in the clinical group display the same feeding behaviours as reported by the MCH-FS as children in the control group but at a higher frequency or severity.

In order to see whether a Dutch screening list can be developed based on the MCH-FS, a cross-sectional pilot study was carried out among 355 children from the normal population (174 boys and 181 girls, aged 6 months to 6 years<sup>1</sup>). We conducted this small study in collaboration with the original developers. The scale was translated into Dutch and renamed the *Screeninglijst Eetgedrag Peuters* (short: SEP, translated as Screening List Eating Behavior Toddlers). The results showed a reasonable reliability for the Dutch version of the scale ( $\alpha = .82$ ) (Van Dijk, Laansma, & Stevens, 2010). The mean total score was 28.49 ( $SD = 9.89$ ), which is lower than in the Canadian sample. In contrast to the study of the original developers, the Dutch pilot showed that – on average – caretakers of older children reported somewhat more feeding problems ( $t(348) = -5.30; p < .01$ ) than those of younger children. Furthermore, unlike in the Canadian sample where one single factor accounted for 48% of the variance, our sample exploratory factor analysis (PCA) suggested two underlying factors that correspond well in 12 of 14 items of the MCH-FS (explaining 43% of the variance in total). These results call for further research before constructing norms for the Dutch population.

### Aim

The present study aims at analysing the psychometric properties of the SEP on a large normative sample from the Dutch population. The original developers of the scale have included items that cover seven domains of symptoms (with some overlap between domains). These are: oral motor, oral sensory, appetite, parental concerns about feeding, mealtime behaviours, compensatory strategies used and family reactions to their child's feeding. Whereas the Canadian data showed evidence for the existence of a single general underlying factor, the Dutch pilot study suggested a two-factor solution. In the present study, we first evaluate the psychometric properties of the SEP. That is, we examine how many meaningful factors can be differentiated in a large normative sample, and to what degree these correspond with the theoretical domains that were described. We also consider the quality of the individual items, and the reliability of the total (sub)scale(s). Further, we consider the important question whether the SEP is able to differentiate between scores of

parents who have sought help for feeding difficulties and those who have not. If the scale has any potential as a screening instrument in clinical settings, it should be able to detect differences between these two groups.

Finally, we address the empirical question whether the total scores reflect age differences. Whereas the normative study of Ramsay and co-authors (2011) did not show significant differences between age groups, small but significant differences were found in the Dutch pilot study (toddlers and preschoolers had higher scores compared with infants). This is in line with the suggestion that parents of toddlers report a higher incidence of feeding problems because this age group often shows a fear of new foods and oppositional behaviour (Wright, Parkinson, Shipton, & Drewett, 2007, pp. e1017). It is the aim of the present study to analyse these possible age differences in greater detail.

### Research questions

1. What are the psychometric properties of the SEP?
2. Does the SEP differentiate between parents who seek help and those who do not?
3. Are there age-related differences in the SEP scores?

### Method

#### Participants

A normative sample of 1448 caretakers of children living in the province of Groningen, the Netherlands, ((sub)urban and rural area) participated in the study when visiting the local Child Health Centre (*Consultatiebureau*) for a routine check-up. Children were all aged between 6 months and 4 years (mean age = 103.3 weeks,  $SD = 58.6$  weeks). The sample consisted of 724 boys and 718 girls (in 6 cases, 'gender' was left blank).

#### Material

The questionnaire consisted of the *Screeninglijst Eetgedrag Peuters* (SEP), the Dutch translation of the *MCH-FS* (2011). In addition, the mothers were given a background questionnaire (including the age of the child, gender, city of residence, current weight and length, birth history and weight, and whether the family had sought professional advice in relation to the feeding of the child).

#### Procedure

In collaboration with the *Gemeentelijke Gezondheidsdienst Groningen* (the regional healthcare institution also responsible for the execution of the national vaccination program), 10,000 questionnaires were distributed among all parents who visited their local Child Health Centre in the first three months of 2011. Caretakers were also given a flyer explaining the aim of the study and

<sup>1</sup> A relatively large proportion (49.6%) of this sample consisted of 9-month-old infants, because it was collected within another study on observed oral hypersensitivity in infants.

stating that participation was on a voluntary basis. The entire questionnaire was filled in anonymously and sent back to the Department of Developmental Psychology of the University of Groningen by means of a postage-free envelope. Parents could either fill in the questionnaire while they were waiting for their appointment, put it in the envelope and give it back to the assistant of the Child Health Centre, or take it home and send it back later. A total of 1621 were completed and returned, resulting in a response rate of roughly 16%. After removal of incomplete SEPs, the sample size was 1448. All questionnaires were entered manually in SPSS version 18 (IBM SPSS,

2009) with the help of bachelor/master students. Items 1, 3, 4, 8, 10, 12 and 13 were mirrored prior to obtaining the total scores. Data analyses consisted of descriptive analysis, factor analyses and analyses of variance.

## Results

### Scale description

Though there were clear differences between items, the average scores were relatively low (ranging between 1.47 and 3.12, where the scale goes from 1 to 7 for all items, see Table 1), and were consistent with the Canadian normative item scores. Descriptive analyses also show that the distribution of scores was clearly right skewed, not only for the total score, but also for all individual item scores.

Because of the skewed distributions of the responses on the items, we used a common factor analysis based on polychoric correlations, herewith taking into account the polytomous character of the items (e.g., Muthén & Kaplan, 1985). Specifically, we performed a minimum rank factor analysis (MRFA; Ten Berge & Kiers, 1991). To assess the number of factors, we performed a polychoric parallel analysis with a 95% boundary (PA). We considered both a PA based on MRFA and on PCA. The latter is the classical variant of parallel analysis (Horn, 1965). Those two methods performed best to indicate the number of common factors underlying polytomous items (Timmerman & Lorenzo-Seva, 2011). The factor loadings were obliquely rotated using the Promin criterion. The analyses were performed with the FACTOR program (Lorenzo-Seva & Ferrando, 2006).

The two PAs yielded inconclusive results: the PA based on MRFA indicated one factor, and PA based on PCA two factors. The common factor model with one and two factors accounted for 79% and 90% of the common variance, respectively. The Promin rotated loadings yielded an interpretable solution, which can be found in Table 2 (note that the items are reordered in such a way that ‘comparable items’ are clustered). The correlation between both factors is high, namely .69.

As can be deduced from Table 2, the first factor clusters behaviours that concern *Negative mealtime behaviours* (such as ‘difficult meals’ and ‘starting to refuse food in the beginning of the meal’). The second factor covers a broader range of symptoms that are *Negative causes and consequences* of feeding difficulties (e.g. oral motor and sensory symptoms, concerns and family reactions). Two of the three items on compensatory strategies load substantially (around .35) on both factors.

**Table 1** Means and skewness of individual items

Items	Mean	Skewness
1 ('difficult mealtimes')	2.43	0.97
2 ('worries about feeding')	1.95	1.61
3 ('poor appetite')	3.12	0.32
4 ('start refusing food')	3.03	0.69
5 ('long mealtimes')	2.64	1.72
6 ('bad behaviour at table')	2.44	0.87
7 ('gags/spits/vomits')	1.78	1.89
8 ('holding food in mouth')	1.90	1.97
9 ('follow around/distract')	2.05	1.54
10 ('force to eat')	1.98	1.52
11 ('poor chewing abilities')	1.65	2.01
12 ('poor growth')	1.51	2.61
13 ('influence relation')	1.47	2.28
14 ('influence family relations')	1.68	2.30
Average	2.10	1.80

**Table 2** Promin rotated factor loadings in the individual items of the SEP; loadings higher than 0.30 in absolute value are in bold face

Item	Construct	Factor 1	Factor 2
7 ('gags/spits/vomits')	Oral sensory	.08	<b>.71</b>
8 ('holding food in mouth')	Oral motor, oral sensory, mealtime behaviour	.07	<b>.59</b>
11 ('poor chewing abilities')	Oral motor	.21	<b>.82</b>
3 ('poor appetite')	Appetite	<b>-.41</b>	-.01
4 ('start refusing food')	Appetite	<b>-.78</b>	-.22
1 ('difficult mealtimes')	Parental concern	<b>-.75</b>	-.02
2 ('worries about feeding')	Parental concern	-.28	<b>.46</b>
12 ('poor growth')	Parental concern	-.07	<b>.70</b>
6 ('bad behaviour at table')	Mealtime behaviour	<b>-.68</b>	.02
5 ('long mealtimes')	Compensatory strategies	-.15	.19
9 ('follow around/distract')	Compensatory strategies	<b>-.34</b>	<b>.36</b>
10 ('force to eat')	Compensatory strategies	<b>-.45</b>	<b>.33</b>
13 ('influence relation')	Family reactions	-.15	<b>.68</b>
14 ('influence family relations')	Family reactions	-.25	<b>.55</b>

This implies that parents who are reporting those compensatory strategies are also reporting high on *Negative mealtime behaviours* and on *Negative causes and consequences*. One item on compensatory strategies (item 5) does not fit with the factors in this solution.

This factor solution suggests that the primary distinction in feeding problems reported among parents is made on the basis of a single factor. Thus, in our community sample, the severity of feeding problems reported by parents can be indicated on a single scale. The reliability of the total score – which we denote as the SEP score – is .84 (Cronbach’s alpha). However, if a more specific evaluation of the reported feeding problems is desired, a two-scale approach would be more appropriate in order to distinguish between *Negative mealtime behaviours* on the one hand, and *Negative causes and consequences* on the other hand. In our sample, their reliabilities appear adequate (Cronbach’s alphas .82 and .75, respectively). In what follows, we focus on the SEP as a measure of severity of feeding problems.

**Group differences in SEP scores**

In total, 107 (7.4%) caretakers indicated that they had sought help for the experienced feeding difficulties. This ranged from seeking advice from the nurse of the Child Health Centre (roughly 36%<sup>2</sup>), primary care physician (roughly 7%) or paediatrician (roughly 17%), to referrals to a dietician (roughly 19%), speech language pathologist (roughly 2%), or help from multiple sources and/or multidisciplinary help (roughly 17% in total).

Table 3 indicates that the mean total score of the ‘sought help’ group was higher than that of the group where the parents indicated that they have never sought help for feeding difficulties, with the ‘sought help’ group having a much larger standard deviation.

Table 3 further indicates that with regard to the

Groups	M	SD	N
Help			
Sought help	38.67	14.47	107
Never sought help	28.83	9.48	1337*
Age groups			
0;6 - 1;0 yrs	25.69	8.2	408
1;0 - 2;0 yrs	27.79	9.2	425
2;0 - 3;0 yrs	32.53	10.8	240
3;0 - 4;0 yrs	33.82	10.9	375
<b>Total</b>	<b>29.54</b>	<b>10.3</b>	<b>1448</b>

\* There were 4 missing values

2 Not all parents specified the type of help, the percentages are based on those who did (n = 90).

3 Non-parametric analyses (Wilcoxon Mann-Whitney and Kruskal-Wallis tests) also showed the significant differences between groups.

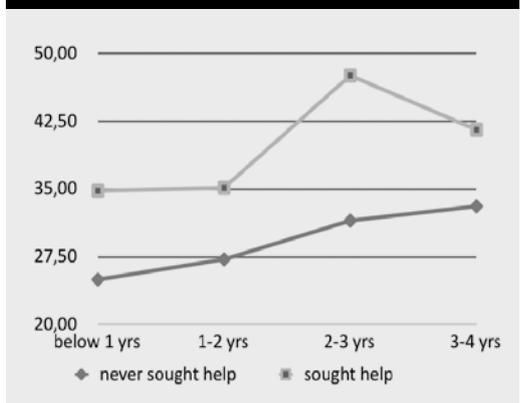
second variable of interest, the means and standard deviations increase with age, suggesting that feeding difficulties are more frequent in older children and the older the children are the greater the inter-individual differences among them.

A two-way ANOVA<sup>3</sup> – with ‘age groups’ and ‘sought help’ as independent variables – revealed a main effect for both variables ( $F(1,7) = 52.407$ ;  $p < .01$ ). The effect of age on the total SEP score was relatively small (partial eta-squared = .04) and the effect of ‘sought help’ was medium sized (partial eta-squared = 0.08). There was a very small but significant interaction effect (partial eta-squared = .01).

Figure 1 shows the mean SEP scores for the ‘sought help’ and ‘never sought help’ groups by age. Both groups display an increase in mean SEP scores with the age of the child. The means of the ‘sought help’ group are higher than that of the ‘never sought help’ group, with the ‘sought help’ group ‘spiking’ between 2 and 3 years of age.

Finally, no differences were found between boys and girls ( $t = -0.357$ ;  $p = .941$ ).

**Figure 1** Mean feeding problems of the four age groups by parents who have sought help for feeding difficulties and parents who have not



**Discussion**

**Summary of results**

The results of the psychometric evaluation of the SEP with a large-scale normative sample provide support for using the screening tool for detecting feeding problems. Cronbach’s alphas for the SEP scale and the two subscales were satisfactory, suggesting a robust internal consistency. Evidence was found for a meaningful latent variable structure with two factors: 1) *Negative mealtime behaviours* and 2) *Negative causes and consequences*. However, the high correlation between these two factors might suggest that a one-factor solution can be used when the primary goal is the rapid identification of feeding difficulties. For a more detailed analysis, a two-scale analysis might provide more information.

The results also suggest that item 5 ('how long do mealtimes take for your child?') is statistically weak; it does not belong to any of the two factors and has a very low item-total correlation. Further research is needed before deciding on the final set of items for screening and clinical purposes.

The results from this large Dutch sample show clear differences between those parents who had sought help for feeding difficulties and those who had not. Although the degree of 'help' was very heterogeneous (from seeking advice from a nurse on a single occasion to participating in a multidisciplinary therapeutic intervention), the differences were robust for all age groups, suggesting at least some degree of sensitivity. An interesting observation was that the 'sought help' group showed the highest mean scores between 2 and 3 years of age, and a somewhat lower score between age 3 and 4. It might be speculated that this decrease is due to the fact that parents indeed received help, which diminished the problems they experienced. Further research targeting clinical groups is the next necessary step to shed light on these properties.

The mean total score found in this study is somewhat lower than the one reported by the Canadian team (29.54 vs. 32.65<sup>4</sup>). However, given that the age range in the present sample was smaller (from 6 months to 4;0 years) than in the Canadian sample (from 6 months to 6;11 years, with 22% of the normative sample over 4 years of age), the total mean was indeed comparable with the Canadian mean. Although one might interpret these results that fewer Dutch children than Canadian children have feeding problems, such interpretations would need further research.

There was a small but significant and consistent increase in reported feeding difficulties with the increasing age of the child. These results reflect the Canadian trend of higher mean total scores for older children; however their mean total scores for age differences were not significant. Given that our sample size was much larger, similar small differences resulted in statistical significance. The range of scores also increased with each age group, indicating that inter-individual differences also increase over time. It has been argued before that feeding problems have the tendency to exacerbate due to the complex interactions between physical, psychological and social factors (e.g. Rommel et al., 2003; Lindberg, Bohlin & Hagekull, 1991; Field et al., 2003). The age effect we have reported may be explained in this light.

A limitation of the study was the low response rate (16%), which can be explained by the set-up of the

study. Parents received the questionnaire and flyer from an assistant while they were in the waiting room of the Child Health Centre with their small child. It might not have been convenient for parents to fill in the list on the spot (in many cases, the child also needed to be undressed during the same time interval). It was made clear to caretakers that participation was voluntary and they were given the opportunity to take the questionnaire home and fill it in and return it later (which is what happened in many cases). This might have led to a lower response than what might have been achieved with a more direct approach. Therefore, we cannot be sure that the parents who filled in the questionnaire were representative of the general population. However, the average score found in this sample was in the same order of magnitude as the one reported in the Canadian sample, where a very different set-up was followed. In the Canadian study, participants were approached directly and asked verbally to participate. The results of the present study also indicate that most children whose parents participated are 'doing fine' (given the low average score and right skewed distribution of scores). Thus, although there are no real indications that the sample is unrepresentative, we cannot be certain that incidence of symptoms is exactly the same as in the general population.

### Future directions

As in many other countries, there is no standardised instrument available for the purpose of a quick identification of feeding problems in the Netherlands. However, healthcare clinicians who are in contact with this population express a clear need for such an instrument. The availability of the MCH-FS and its Dutch counterpart the SEP, with its strong psychometric qualities, provides a unique opportunity to fulfil this need. Further research aims at providing standardised norm tables for the Dutch population aged 6 months to 4 years and to make these available for professional healthcare facilities working with parents of young children (e.g. the local Child Health Centres and family physicians). Strategic additional samples from other regions in the Netherlands have to be collected in order to be able to generalise norms for the country as a whole. However, before the SEP can be made available as a reliable and valid screening instrument for the detection of early feeding problems for the Dutch population, more validation studies are needed. These studies are now being set up with the following aims. The first is to compare the results of the normative sample to two clinical groups. One clinical group will include children whose parents sought help for problematic feeding in their child and the other clinical group will comprise children who were born prematurely and are thus 'at risk'

<sup>4</sup> This difference was significant using a one sample t-test ( $t(1477)=-9.12$ ;  $p < .01$ ).

for developing feeding problems. By comparing the results of the normative sample with those two clinical groups, the sensitivity and specificity of the instrument can be established. The second aim is to investigate the stability and variability of the reported feeding problems by means of repeated administration of the scale with the same participants.

Feeding problems are stressful for parents and children and have been shown to have a clear negative impact on later development. Although some problems may be transient, others have the tendency to form a vicious cycle that is difficult to break. The availability of a short screening instrument might help healthcare workers in

detecting feeding difficulties early in life and contribute to a more efficient referral for specialised help.

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