



CLINICAL RESEARCH ARTICLE

Age-based norm-reference values for the Pediatric Eating Assessment Tool

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BACKGROUND AND OBJECTIVES: Differentiating problematic feeding from variations of typical behavior is a challenge for pediatric providers. The Pediatric Eating Assessment Tool (PediEAT) is a parent-report measure of symptoms of problematic feeding in children 6 months to 7 years old with evidence of reliability and validity. This study aimed to determine age-based, norm-referenced values for the PediEAT.

METHODS: Parents of children between 6 months and 7 years old ($n = 1110$) completed the PediEAT. Descriptive statistics were calculated for subscale and total scores of the PediEAT within 11 age groups.

RESULTS: The PediEAT total scores followed a general downward trajectory with increasing age. *Physiologic Symptoms* were relatively steady from 6 to 15 months, and then rapidly declined in 15–18 month olds and continued to decline thereafter. Problematic Mealtime Behaviors increased from 6 to 9 months to a peak in 24–30 month olds and then declined with increasing age. Selective/Restrictive Eating increased from 6 to 9 months to a peak at 12–15 months and then decreased over time thereafter. Symptoms of difficulty with Oral Processing were highest in 6–9 month olds and decreased with age.

CONCLUSIONS: The PediEAT now has age-based norm-reference values to guide score interpretation and clinical decision-making.

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INTRODUCTION

Young children, even healthy, typically developing children, often experience some degree of difficulty with eating.^{1,2} For children with developmental disabilities or medical complexity, it is reported that 80–85% of children experience problematic eating.^{3,4} Problematic eating is defined, for the purposes of this paper, as a child being unable or unwilling, despite availability of food, to eat and/or drink enough volume or variety of age-appropriate food to support appropriate growth, development, and hydration.^{5,6} Parental concerns about nutrition, intake, and weight gain are common concerns brought to the pediatric primary care provider, particularly in the infant through preschool years. In many cases, these concerns resolve with time, but in about 3–10% of cases of children across diagnostic categories, including otherwise healthy children, problematic feeding becomes a chronic problem,⁷ requiring long-term, expensive treatment that is burdensome on the family and the healthcare system.

Differentiating the child with feeding difficulty that falls within the range of typical development from the child with a pediatric feeding disorder is a significant challenge for pediatric primary care providers. Children with feeding disorders are, on average, not diagnosed until 2.4 years of age,⁸ but parents express that symptoms of the problem were present long before diagnosis, often since birth.⁹ Early identification and initiation of treatment is critical to optimize nutrition during the rapid period of neurodevelopment in the first 2 years of life¹⁰ and to set the foundation for positive parent–child interactions and child experiences with mealtime.

The Pediatric Eating Assessment Tool (PediEAT) is a new valid and reliable parent-report assessment of symptoms of

problematic feeding in infants and young children 6 months to 7 years old.^{11,12} The PediEAT can be used in clinical practice to facilitate early identification and treatment of children with problematic feeding, monitor response to interventions, and in research to study feeding in infants and young children. The purpose of this study was to establish age-based norm-reference values for the PediEAT to guide interpretation of PediEAT scores and clinical decision-making.

METHODS

The Institutional Review Board at the University of North Carolina at Chapel Hill approved this study prior to commencement. This was a cross-sectional, descriptive study conducted using a web-based survey platform (Qualtrics, LLC). This study was not registered as a clinical trial because it did not meet the definition of a clinical trial (i.e., there were no control and comparison groups and no intervention was implemented). Parents or primary caregivers, referred to hereafter as “parents,” were eligible to participate in the study if they had a healthy, typically developing, and typically eating child between 6 months and 7 years of age who was being offered solid food (i.e., something other than liquids) to eat by mouth. Parents of children who had any of the following were excluded from the study: speech-language delay, developmental delay, hearing or vision impairment, significant medical diagnoses (e.g., congenital heart disease, autism spectrum disorder, cerebral palsy), history of premature birth prior to 37 weeks post-menstrual age, structural anomalies of the face, mouth, or gastrointestinal tract, any limitation in doing activities other children their age were able to do, or problematic feeding. For the purposes of this study, problematic feeding was defined as

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a parent-identified feeding problem, a diagnosed feeding problem, or need for tube feeding. In addition, to participate, parents had to be over 18 years old, have access to the internet, and self-report as being able to read and write English.

The target sample for this study was a diverse sample of 100 healthy children from across the United States in each of the following 11 age groups based on the American Academy of Pediatric periodicity schedule:¹³ 6–9 months, 9–12 months, 12–15 months, 15–18 months, 18–24 months, 24–30 months, 30–36 months, 3–4 years, 4–5 years, 5–6 years, and 6–7 years. In recognition of the increased variability in development in younger children, age groups were intentionally chosen with shorter age ranges in the younger age groups and with increasingly longer age ranges for the older children. A variety of recruitment methods were used to gather a geographically, racially, and socioeconomically diverse sample from across the United States. Parents were recruited from ResearchMatch, a national health volunteer registry supported by the National Institutes of Health as part of the Clinical Translational Science Award (CTSA); Join the Conquest, a volunteer registry supported by the CTSA at the University of North Carolina; a registry of parents interested in participating in feeding-related research maintained by the investigative team; web-based parent support groups; Qualtrics panels; listserv announcements to faculty, staff, and students at the University of North Carolina at Chapel Hill; and through the primary care clinic at North Carolina Children’s Hospital. Parents living outside the United States were also welcome to participate if they met the eligibility criteria. Eligible parents were asked to complete a web-based survey that included the PediEAT. Parents who had more than one child were able to complete the survey for each eligible child. Participants were offered a US\$10 gift card per completed survey for participation.

Pediatric Eating Assessment Tool

The PediEAT is a 78-item parent-report measure of symptoms of problematic feeding intended for children between 6 months and 7 years of age who are eating at least some solid foods.^{11,12} There are four subscales of the PediEAT: Physiologic Symptoms, Problematic Mealtime Behaviors, Selective/Restrictive Eating, and Oral Processing. The Physiologic Symptoms subscale contains 27 items that assess symptoms of swallowing dysfunction (e.g., coughing, wet voice quality, gagging), difficulty coordinating eating and breathing or maintaining physiologic stability (e.g., breathing faster or harder, sweating, fatigue), and gastrointestinal tract dysfunction (e.g., arching, vomiting, difficulty passing stool). Problematic Mealtime Behaviors is a 23-item subscale that assesses food acceptance and refusal behaviors (e.g., refusing to eat, throwing food), stress behaviors during eating (e.g., whining, crying, tantrums), and food preferences (e.g., insisting food is presenting in a certain way or by certain person). The Selective/Restrictive Eating subscale contains 15 items that assess symptoms of preferences for food textures and temperatures. Finally, the Oral Processing subscale contains 13 items that assess symptoms of oral processing dysfunction, such as pocketing of food in cheek, needing reminders to chew food, needing to use fingers to move food in mouth, and chewing food for a long time or not swallowing the food.

The PediEAT was developed and content validated with professionals caring for children with feeding difficulty as well as with parents of children with and without feeding problems.¹¹ The PediEAT has acceptable internal consistency reliability for all subscales (Cronbach’s $\alpha = .83-.92$) as well as the total scale (Cronbach’s $\alpha = .95$), acceptable test–retest reliability between scores taken 2 weeks apart ($r = .87, p < .001$), and construct validity with the Mealtime Behavior Questionnaire ($r = .77, p < .001$).^{12,14} In a known-groups analysis, children across all age categories between 6 months and 7 years with diagnosed feeding problems were found to have significantly higher scores on the

Table 1. Age and Sex distribution of target children

| Age group | Female (n) | Male (n) | Total (n) |
|-----------------------|-------------|-------------|-----------|
| 6–9 months | 50 | 50 | 100 |
| 9–12 months | 48 | 47 | 95 |
| 12–15 months | 51 | 49 | 100 |
| 15–18 months | 51 | 50 | 101 |
| 18–24 months | 50 | 49 | 99 |
| 2–2.5 years | 59 | 45 | 104 |
| 2.5–3 years | 49 | 50 | 99 |
| 3–4 years | 54 | 54 | 108 |
| 4–5 years | 54 | 48 | 102 |
| 5–6 years | 48 | 52 | 100 |
| 6–7 years | 50 | 52 | 102 |
| Total: n (% of total) | 564 (50.8%) | 546 (49.2%) | 1110 |

Table 2. Demographic characteristics of sample

| Variable of interest | n (%) |
|--|-------------|
| <i>Respondent’s relationship to child (n = 1090)</i> | |
| Mother | 953 (87.4%) |
| Father | 122 (11.2%) |
| Other primary caregiver | 15 (1.4%) |
| <i>Family type (n = 1090)</i> | |
| Two parent | 949 (87.1%) |
| One parent | 111 (10.2%) |
| Other family type | 30 (2.7%) |
| <i>Family income (n = 1085)</i> | |
| <US\$20,000 | 111 (10.2%) |
| US\$20,000–39,999 | 195 (18%) |
| US\$40,000–59,999 | 195 (18%) |
| US\$60,000–79,999 | 177 (16.3%) |
| US\$80,000–99,999 | 120 (11.1%) |
| >US\$100,000 | 287 (26.4%) |
| <i>Parent education completed (n = 1090)</i> | |
| High school or less | 294 (27%) |
| Technical school/community college | 169 (15.5%) |
| College/University or higher education | 627 (57.5%) |
| <i>Child’s race (n = 1110)</i> | |
| American Indian or Alaskan Native | 3 (0.3%) |
| Asian | 22 (2%) |
| Black or African American | 65 (5.9%) |
| Hispanic or Latino | 49 (4.4%) |
| Native Hawaiian or Pacific Islander | 2 (0.2%) |
| White | 778 (70%) |
| More than one race | 184 (16.6%) |
| Other | 7 (0.6%) |

Note: Parents of multiple children could report on each of their children. Parent and family demographic variables are reported for unique parent respondents (n = 1090 parents), while child variables are reported by child included in the sample (n = 1110)

PediEAT (M = 135.3, SD = 38.4) when compared to children without feeding problems (M = 72.7, SD = 26.5; $p < .001$).¹² Parents completing the PediEAT were asked to rate each item on a 6-point scale (i.e., Never, Almost Never, Sometimes, Often,

Table 3. PediEAT norm-reference values

| Age group | Physiologic symptoms (range 0–135) | Problematic mealtime behaviors (range 0–115) | Selective/restrictive eating (range 0–75) | Oral processing (range 0–65) | Total PediEAT score (range 0–390) |
|----------------------------|---------------------------------------|--|---|---------------------------------|--------------------------------------|
| <i>6–9 mos (n = 100)</i> | | | | | |
| Median (range) | 11 (0–37) | 14 (0–47) | 13.5 (2–36) | 24 (5–44) | 63.5 (17–141) |
| Mean ± SD | 12.6 ± 8.7 | 15.1 ± 11.1 | 14.6 ± 7.4 | 24 ± 9.7 | 66.3 ± 27.2 |
| 90th Percentile | 26.9 | 30 | 25.9 | 36.9 | 100.9 |
| 95th Percentile | 31 | 35.7 | 27 | 42 | 115.7 |
| <i>9–12 mos (n = 95)</i> | | | | | |
| Median (range) | 9 (0–41) | 15 (1–53) | 16 (2–36) | 17 (1–45) | 57 (14–145) |
| Mean ± SD | 11.4 ± 8.8 | 16.9 ± 10.6 | 17.3 ± 7.2 | 18.5 ± 9.3 | 64 ± 27.3 |
| 90th Percentile | 24.4 | 32.2 | 27 | 32.4 | 102.2 |
| 95th Percentile | 31 | 37.8 | 31 | 37 | 123.8 |
| <i>12–15 mos (n = 100)</i> | | | | | |
| Median (range) | 12 (0–55) | 21 (0–49) | 17.5 (1–39) | 17.3 (7–40) | 77.2 (14–155) |
| Mean ± SD | 13.7 ± 10.4 | 21.9 ± 11.6 | 18.2 ± 7.5 | 19.2 ± 8.2 | 72.9 ± 28.9 |
| 90th Percentile | 28.9 | 37.9 | 27.9 | 31 | 106.9 |
| 95th Percentile | 33.9 | 45.9 | 31 | 35 | 125.7 |
| <i>15–18 mos (n = 101)</i> | | | | | |
| Median (range) | 8 (0–38) | 21 (1–48) | 16 (2–38) | 15.9 (0–35) | 61.7 (15–152) |
| Mean ± SD | 8.5 ± 6.4 | 22.4 ± 11.4 | 16.6 ± 6.6 | 16.8 ± 8.2 | 64.2 ± 25.9 |
| 90th Percentile | 17 | 38 | 25.8 | 29 | 97.8 |
| 95th Percentile | 19.9 | 43.9 | 27.7 | 31.9 | 110 |
| <i>18–24 mos (n = 99)</i> | | | | | |
| Median (range) | 6 (0–85) | 24 (0–57) | 15 (0–35) | 16 (1–41) | 65 (3–210.3) |
| Mean ± SD | 8.5 ± 10.3 | 24.8 ± 12.2 | 14.7 ± 6.5 | 16.2 ± 7.2 | 64.1 ± 28 |
| 90th Percentile | 16 | 43 | 22 | 24 | 97 |
| 95th Percentile | 22 | 48 | 27 | 30 | 107 |
| <i>24–30 mos (n = 104)</i> | | | | | |
| Median (range) | 7 (0–26) | 31.5 (0–65) | 15 (0–42) | 16 (2–48) | 70 (8–139) |
| Mean ± SD | 7.9 ± 6.1 | 31.5 ± 12.3 | 14.6 ± 7.5 | 17.4 ± 8.1 | 71.3 ± 27.2 |
| 90th Percentile | 17.5 | 47 | 22.5 | 27 | 106 |
| 95th Percentile | 20.5 | 48 | 27.5 | 32.5 | 119.8 |
| <i>30–36 mos (n = 99)</i> | | | | | |
| Median (range) | 5 (0–36) | 31 (0–68) | 11 (2–35) | 15 (4–34) | 63 (9–141) |
| Mean ± SD | 7.3 ± 7.1 | 31.5 ± 15.6 | 12.6 ± 6.4 | 15.7 ± 6.8 | 67 ± 27.7 |
| 90th Percentile | 15 | 54 | 21 | 26 | 109 |
| 95th Percentile | 22 | 60 | 25 | 29 | 119 |
| <i>3–4 yrs (n = 108)</i> | | | | | |
| Median (range) | 5 (0–28) | 29.5 (3–65) | 11 (0–27) | 15 (0–33) | 64 (7–133) |
| Mean ± SD | 7.1 ± 6.2 | 30.2 ± 14.8 | 11.1 ± 6 | 15.4 ± 7.6 | 63.8 ± 28.5 |
| 90th Percentile | 16.1 | 51.1 | 20 | 27.1 | 106.1 |
| 95th Percentile | 19 | 55.2 | 22 | 28.6 | 111.7 |
| <i>4–5 yrs (n = 102)</i> | | | | | |
| Median (range) | 5 (0–25) | 30.5 (0–70) | 9 (0–26) | 13 (2–32) | 58.5 (4–127) |
| Mean ± SD | 6.7 ± 5.9 | 29.4 ± 15.9 | 9.7 ± 5.6 | 13.8 ± 7.5 | 59.6 ± 29 |
| 90th Percentile | 15.7 | 50.7 | 19.4 | 24 | 101.5 |
| 95th Percentile | 19 | 56.9 | 20.9 | 27 | 113.9 |
| <i>5–6 yrs (n = 100)</i> | | | | | |
| Median (range) | 4 (0–27) | 29 (0–68) | 8 (0–53) | 12.7 (1–35) | 54 (5–121) |
| Mean ± SD | 5.8 ± 5.5 | 28.5 ± 14.3 | 9.6 ± 6.9 | 13 ± 7 | 56.8 ± 25.7 |
| 90th Percentile | 14 | 50.8 | 16 | 21.9 | 95.8 |
| 95th Percentile | 18.9 | 54 | 22 | 26 | 108.9 |

Table 3. continued

| Age group | Physiologic symptoms (range 0–135) | Problematic mealtime behaviors (range 0–115) | Selective/restrictive eating (range 0–75) | Oral processing (range 0–65) | Total PediEAT score (range 0–390) |
|--------------------------|---------------------------------------|--|---|---------------------------------|--------------------------------------|
| <i>6–7 yrs (n = 102)</i> | | | | | |
| Median (range) | 3 (0–51) | 21.5 (1–67) | 8 (0–28) | 11 (1–34) | 46.5 (6–160) |
| Mean ± SD | 5.6 ± 7.1 | 24 ± 13.6 | 8.7 ± 6.2 | 12.5 ± 7.1 | 50.7 ± 27 |
| 90th Percentile | 14 | 41.7 | 18.7 | 23.4 | 81.7 |
| 95th Percentile | 17.7 | 47 | 19.9 | 27.3 | 98.6 |

Mos months, *yrs* years

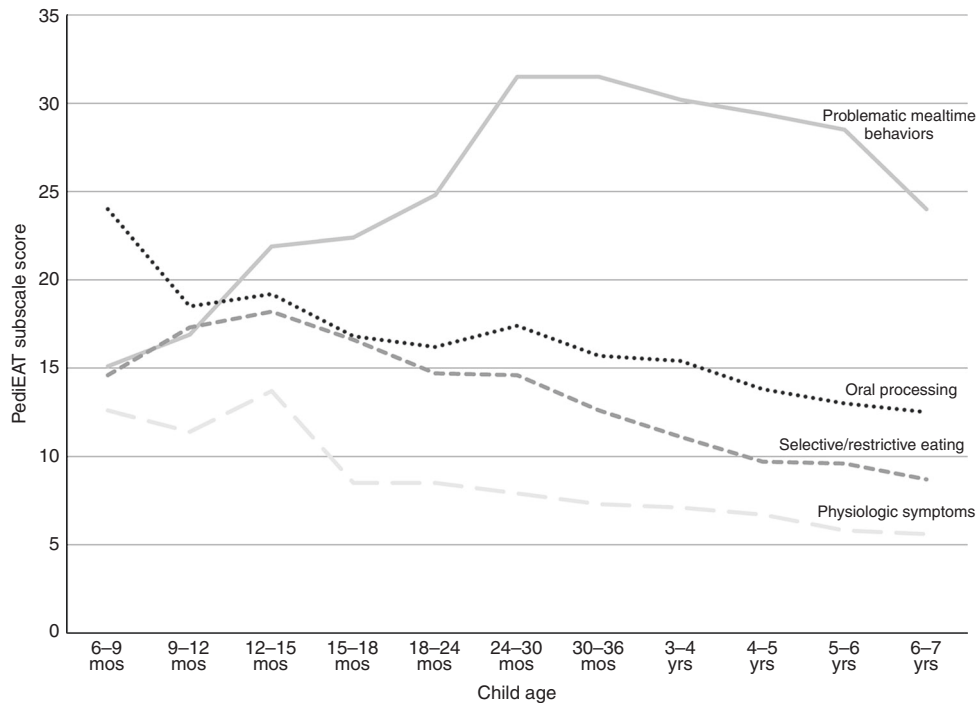


Fig. 1 Pediatric Eating Assessment Tool (PediEAT) subscale scores by age. Mos= months, yrs= years

Almost Always, and Always). Scores were assigned with more symptoms receiving a higher score. The possible range of scores on the PediEAT is from 0 to 390.¹²

Data analysis

Descriptive statistics were calculated for the PediEAT subscale and total scores for each of the 11 age groups described previously. Descriptive statistics included mean, standard deviation, median, range, 90th and 95th percentiles. The 90th and 95th percentiles were calculated to provide cut-off scores for PediEAT subscale and total scores that indicate reason for concern (90–95th percentile) and reason for high concern (>95th percentile). Since missing data would distort the norm-reference scores, the amount and pattern of missing data was assessed. Little’s MCAR test revealed that missing values were not distributed completely at random across cases ($\chi^2 (4939) = 6179.36, p < .001$), but they were rare (<1% of the data). Therefore, the expectation-maximization algorithm (an iterative method to find more precise estimates for impute values) was used to impute missing values.¹⁵

RESULTS

The sample for this analysis included approximately 100 children within each of the 11 age groups ($n = 1110$ total), approximately

evenly distributed between sexes (Table 1). Parents who had multiple children were able to complete a survey for each child within the age range. There were 1090 unique parent respondents for the 1110 children. Respondents were primarily mothers from two-parent households. Additional demographic information about the sample is provided in Table 2. There was geographic diversity in the sample, with respondents from all 50 states and the District of Columbia, as well as from Australia ($n = 1$), Canada ($n = 2$), Malaysia ($n = 1$), New Zealand ($n = 2$), and the United Kingdom of Great Britain and Northern Ireland ($n = 2$).

The full results are available in Table 3. For the Physiologic Symptoms subscale, the scores related to physiologic symptoms were relatively steady from 6 to 15 months, and then rapidly declined in 15 to 18 month olds and continued to decline with increasing age (Fig. 1). Problematic Mealtime Behaviors increased from 6 to 9 months to a peak in 24 to 30 month olds and then declined with increasing age thereafter. Symptoms of Selective/Restrictive Eating increased from 6 to 9 months to a peak at 12 to 15 months and then decreased over time thereafter. Symptoms of difficulty with Oral Processing were highest in 6 to 9 month olds and decreased over time. The total scores of the PediEAT followed a general downward trajectory with increasing age, but there were several age groups where there were increased symptoms of problematic feeding, particularly in 12–15 and 24–30 month olds

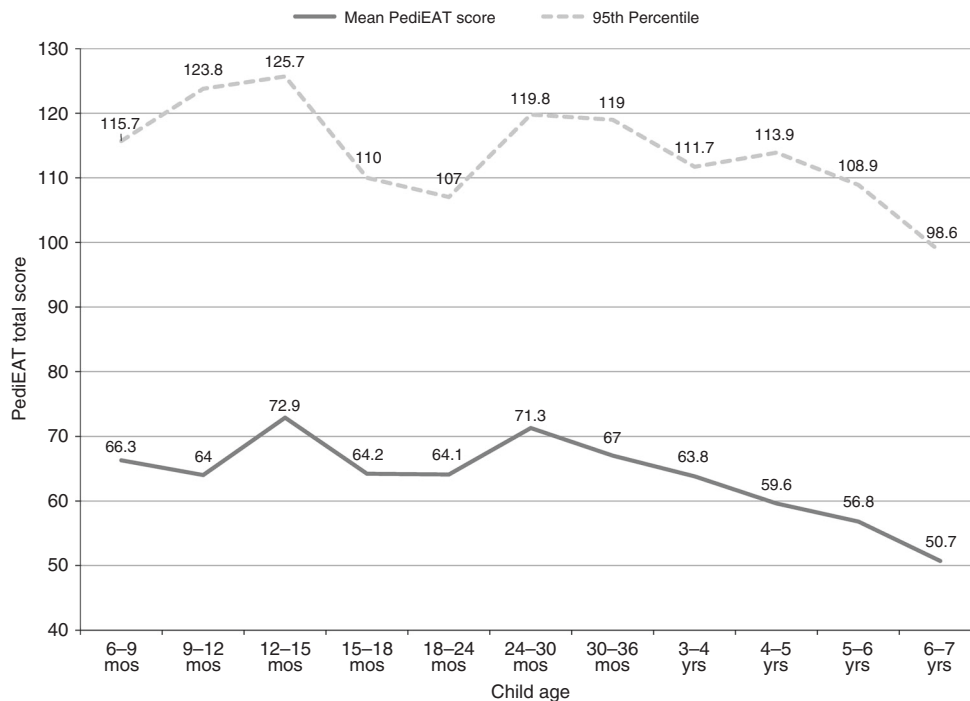


Fig. 2 Pediatric Eating Assessment Tool (PediEAT) total score mean and 95th percentiles by age. Mos= months, yrs= years

(Fig. 2). The 95th percentile for the total score is also provided in Fig. 2 as a reference for when a child's total PediEAT is considered highly concerning for problematic eating.

DISCUSSION

The data presented in this study provide age-based reference values for PediEAT subscale and total scores based on healthy, typically developing, and typically eating children to guide interpretation of PediEAT scores and clinical decision-making. Overall, the patterns seen in the PediEAT subscale and total scores follow expected trajectories with typical child development and introduction of increasingly complex foods in the first several years of life.

The Physiologic Symptoms subscale of the PediEAT includes items related to symptoms of aspiration or residual fluid in the pharyngeal space, difficulty coordinating swallowing and breathing, and gastrointestinal or gastroesophageal dysfunction. In this sample of healthy, typically developing, parents reported relatively few physiologic symptoms. Scores on this subscale were highest between 6 and 15 month olds, which likely reflect some symptoms of swallowing incoordination and gastrointestinal changes that occur with the introduction of solid foods, and then continued introduction of more complex foods requiring chewing. Physiologic Symptoms rapidly declined in 15–18 month olds and continued to decline thereafter, which may reflect the child's improved coordination and ability to handle more complex foods with increased experience. The Physiologic Symptoms subscale also assesses symptoms of gastroesophageal dysfunction. Some healthy 6–12 month olds exhibit symptoms of gastroesophageal reflux; in many cases, these symptoms resolve after 12 months,¹⁶ which may also explain the improvement in scores of this subscale with increasing age.

The Physiologic Symptoms subscale is one of the unique features of the PediEAT that differentiates it from previous feeding assessments. Physiologic symptoms are often the earliest indicators of problematic feeding, particularly symptoms of respiratory compromise, choking, gagging, symptoms of gastroesophageal

reflux, and constipation.^{9,17–20} These data provide reference values that will allow clinicians to identify a child with concerning levels of physiologic symptoms and intervene early with targeted treatment, prior to the child developing strong negative associations with feeding. Prolonged negative associations with food and eating, especially in the early stages of introduction to different tastes and textures, may establish patterns that are more resistant to change and more difficult to treat.^{2,21–23}

The Problematic Mealtime Behaviors subscale includes items related to feeding refusal, stress behaviors during meal times, and strong preferences or requirements for the meal in order for the mealtime to be successful. The results of this study suggest that these behaviors are relatively infrequent in healthy, typically developing infants <12 months old, but increase during the toddler years (from 1 to 3 years), and then decrease with increasing age of the child. This is consistent with typical child development, where toddlers become more able to express their likes and dislikes, exert their independence, and may exhibit behaviors related to food neophobia.²⁴ Our findings are consistent with Carruth et al.,²⁵ who found increasing rates of "picky eating" between 4 and 24 months, and then also consistent with Mascola et al.,²⁶ who found decreasing incidence of "picky eating" from 2 years to 6 years of age. While the Problematic Mealtime Behavior subscale is not intended as a measure of picky eating, many of the behaviors described in the literature as defining picky eating are captured in this subscale (e.g., rigid behavior, avoiding mealtime, and slow eating).²⁴ The subscale score for Problematic Mealtime Behavior can be used by clinicians to identify the child whose behavior is outside the range of normal, taking into consideration the normal variation in behavior particularly in the toddler years. The results of this study now provide data to be able to make this distinction and enable earlier identification and treatment of children with problematic feeding.

The Selective/Restrictive Eating subscale includes items related to the sensory experience of feeding, such as the temperature and texture of food. As expected, there was an increase in symptoms related to selective and restrictive eating from 6–9 to 12–15 months, when infants and young toddlers are being

exposed to unfamiliar foods and are naturally wary of unusual sensory experiences with new foods. These symptoms then decreased with increasing age as children gained increased experience and became more tolerant of the differing sensory properties of foods. Interestingly, scores on the Selective/Restrictive Eating subscale did not mirror the scores on the Problematic Mealtime Behaviors subscale; after 15 months, the Selective/Restrictive Eating scores decreased, while Problematic Mealtime Behavior scores continued to increase until 24–30 months. The literature on picky eating often describes hypersensitivity and negative reactions to the sensory properties of food as a characteristic of the picky eater.^{27–30} The results of this study would suggest that hypersensitivity to food properties is a problem distinct from problematic mealtime behaviors and the subscale scores on the PediEAT could be used to distinguish the two, resulting in the possibility of earlier identification and treatment of the child exhibiting hypersensitivity to the sensory experiences of mealtime.

Finally, the Oral Processing subscale of the PediEAT includes items related to symptoms of difficulty with the oral processing of foods, such as getting food stuck in the cheek, preferring soft foods, putting too much food in the mouth and symptoms of difficulty with chewing. As expected, 6–9 month olds experienced the most symptoms of oral processing difficulty. It is during this time that infants are first being offered solid foods and parents begin the transition from smooth purees (e.g., stage 1 baby food) to more complex foods, such as thicker purees with lumps or soft finger foods. This continues in 9–15 month olds with the introduction of increasingly complex foods until the child is eating table foods. The introduction of these new textures and more complex foods require more complex chewing movements and lateralization of the tongue to move food to the chewing surfaces.³¹ The mismatch between the skills that were previously successful when being fed liquids or smooth purees and the new foods being introduced results in increased symptoms of difficulty.²³ With continued experience with these new textures and continued oral–motor development, these symptoms naturally decreased over time with increasing age. Like the other subscales, the data presented here can guide clinicians towards identifying the child who is experiencing elevated symptoms of problematic oral processing or who is not progressing as expected, and make appropriate referrals for early treatment.

The trajectory of the total PediEAT score followed an interesting, although somewhat expected, course. Overall symptoms of problematic feeding were relatively stable from 6 months through 12 months, then increased at 12–15 months, decreased from 15–24 months, spiked again between 24–30 months, and then decreased thereafter (Fig. 2). The elevations seen at 12–15 months and again at 24–30 months fit with commonly described behaviors of young toddlers who are being introduced to new and more complex foods and then again with 24–30 month olds who express the need for independence and commonly experience a period of “picky eating”.²⁵

This study fills a critical gap in the care of children experiencing feeding difficulty. Differentiating the child with typical feeding challenges from the child in need of specialty feeding assessment and care can be a challenge for pediatric providers. The PediEAT provides an objective assessment of feeding from the perspective of the parent, who is most familiar with the child’s eating across time and locations. The PediEAT can be used by all providers to guide discussions about feeding concerns, identify the child in need of specialty assessment and treatment, identify underlying areas of concern to personalize treatment, and to monitor response to interventions. The PediEAT can be used in combination with the Child Oral and Motor Proficiency Scale (ChOMPS),³² a measure of eating, drinking, and related skills, to conduct a complete assessment of the child’s eating.

Limitations

The sample used for this study represented geographic and socioeconomic diversity; however, despite our varied recruitment methods, the sample was primarily White and highly educated. The proportion of the sample reporting race as White (70%) was consistent with 2017 US Census Bureau Data, where 76.9% of the US population reported race as White alone.³³ Our sample had a higher proportion of the sample reporting as more than one race (16.6%) than the US Census Bureau data (2.6%), but our sample generally reflects the racial and ethnic diversity in the United States. In addition, our sample included more highly educated parents (57.5%) than the general US population, where 33.4% report a college or higher-level education.³⁴ Additional norm-reference sampling with a more racially, ethnically, and educationally diverse sample would further strengthen the validity of the tool with all children.

CONCLUSION

The PediEAT is the first valid and reliable parent-report measure of symptoms of problematic feeding in children between the ages of 6 months and 7 years old with age-based norm-reference values for clinical and research use. The age-based norm-reference values reported here can be used to guide score interpretation of the PediEAT and clinical decision-making about referral to feeding specialty care. Future directions include testing of the sensitivity and specificity of cut-off scores and clinical responsivity of the tool against clinician observation. Those interested in obtaining the PediEAT should contact the first author.

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AUTHOR CONTRIBUTIONS

Dr. Pados conceptualized and designed the study, collected and analyzed the data, drafted the initial manuscript, and reviewed and revised the final manuscript. Drs. Thoyre and Park contributed to the conceptualization and design of the study, contributed to the plan for data analysis and interpretation of the findings, revised the initial manuscript, and reviewed the final manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

ADDITIONAL INFORMATION

Competing interests: The authors declare no competing interests.

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