

Clinical characteristics and health profiles of Swedish young children with avoidant/restrictive food intake disorder (ARFID)

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Abstract

Background

Knowledge of the clinical presentations and comorbidities of avoidant/restrictive food intake disorder (ARFID) in young children is limited, hampering early detection and intervention. This study aimed to characterize the clinical features and co-occurring conditions of a Swedish tertiary-care sample of children aged 2–8 years.

Method

Parents of 36 children with persistent and severe eating difficulties, aged 2–8 years, agreed to participate in a study that included child assessments and parent interviews conducted at the Folke Bernadotte Regional Habilitation Center in Uppsala, Sweden. We assessed the children's clinical characteristics and co-occurring symptoms and conditions using the clinical interview PARDI (Pica, ARFID, and Rumination Disorder Interview), as well as parent-report questionnaires screening for neurodevelopmental problems: ESSENCE-Q, Strengths and Difficulties Questionnaire (SDQ), and Five to Fifteen (FTF-R/FTF-T).

Results

All children ($n = 36$, 18 girls, 18 boys) were diagnosed with ARFID, and 86.1% met two or more diagnostic criteria (A1-A4). All children were psychosocially impaired by selective eating habits. Most children ($n = 31$) exhibited both sensory-based avoidance and low interest in eating. The majority (83.3%) received macro- or micronutrient supplementation, tube feeding, or a combination of both. Clinical assessments indicated that many of the children had co-existing health conditions, including gastrointestinal problems ($n = 22$), being born prematurely and/or having low birth weight ($n = 12$), respiratory problems ($n = 12$), food allergies ($n = 9$), and/or diagnosed neurodevelopmental conditions ($n = 5$). Screening further identified clinically significant neurodevelopmental difficulties primarily related to executive functions (hyperactivity/attention), behavior, social competence, and atypical sensory processing.

Conclusion

In this sample, ARFID was characterized by sensory-based avoidance, low interest in eating, and frequent overlapping medical and neurodevelopmental conditions. Parents reported early feeding difficulties in all children, and nutritional support was common. Although appropriate growth was partially maintained through parental support, supplements, or tube feeding, ARFID still significantly affected daily life and social functioning. Early neurodevelopmental challenges and atypical sensory processing may serve as

warning signs alongside early feeding difficulties, underscoring the importance of clinical awareness, timely screening, and multidisciplinary care.

Introduction

Avoidant/Restrictive Food Intake Disorder (ARFID) was reconceptualized from Feeding Disorder of Infancy and Early Childhood and introduced in the DSM-5 (American Psychiatric Association, 2013) to describe avoidant and restrictive eating patterns occurring across the lifespan. It is characterized by limited intake in the range or overall amount of food, leading to weight loss or, in children, stunted growth, significant nutritional deficiencies, need for nutritional support, and/or psychosocial impairment. In contrast to other eating disorders, ARFID shows a relatively equal distribution between males and females (Dinkler et al., 2022). Common clinical presentations include avoidance driven by sensory sensitivities to texture, taste, smell, or the appearance of food; restriction related to concern about aversive consequences such as fear of choking, vomiting, or gastrointestinal discomfort; and limited intake due to low appetite or low interest in eating (Reilly et al., 2019; Thomas, 2017). Unlike anorexia nervosa or bulimia nervosa, ARFID is not driven by concerns about body image (Izquierdo et al., 2019).

The disorder typically presents at a younger age than most other eating disorders, although it can occur at any stage of life (American Psychiatric Association, 2013; D'Adamo et al., 2023). Many individuals with ARFID are underweight because of reduced caloric intake, but some may have a normal or even high body weight if their restricted diet is based on energy-dense foods (Becker et al., 2020). However, regardless of weight status, ARFID can lead to significant nutritional imbalances that require medical and dietary support (Becker et al., 2019; Sanchez-Cerezo et al., 2023; Van Buuren et al., 2023).

A substantial overrepresentation of psychiatric and neurodevelopmental conditions (NDCs) among young children with ARFID is well established (Dinkler et al., 2022; Menzel & Perry, 2024; Reilly et al., 2019). At the same time, a high prevalence of ARFID has been observed among children with NDCs, especially those with autism spectrum disorder (ASD) (Koomar et al., 2021; Nygren et al., 2021). A meta-analysis by Sader et al. (2025) indicates that ca. 16 % of children with ARFID may meet criteria for ASD. Conversely, children with ASD frequently exhibit ARFID-related eating difficulties, which may be associated with sensory sensitivities to food textures, tastes, and smells (Kuschner et al., 2015; Sharp et al., 2013) as well as rigid, repetitive behaviors (Zickgraf et al., 2019). Emerging research also highlights connections between attention-deficit/hyperactivity disorder (ADHD) and disorganized or impulsive eating behaviors: inattention can reduce awareness of hunger and fullness cues, while impulsivity can disrupt mealtime routines (Saif & Jahrami, 2023). Additionally, for children with ADHD, mealtimes can be perceived as unengaging activities (El Archi et al., 2020; Kaşak et al., 2025; Norris et al., 2021).

Moreover, medical conditions, including eosinophilic esophagitis, celiac disease, and food allergies, can mimic or coexist with ARFID. Frequent gastrointestinal (GI) complaints can include nausea, abdominal pain, constipation, early satiety, and vomiting. These may be transient but may also lead to food selectivity and nutritional deficiencies (Harshman et al., 2019).

Despite increasing recognition of ARFID, important gaps remain in understanding how the disorder manifests in young children. Although ARFID commonly emerges early in development, most existing research has focused on school-aged children, adolescents, or mixed-age samples, limiting knowledge about early clinical presentations and developmental trajectories. In particular, little is known about how neurodevelopmental and medical comorbidities present in young children with ARFID. The heterogeneity of ARFID presentations and co-occurring conditions complicates early identification and intervention, underscoring the need for clinically detailed studies in younger age groups. Restricted eating, sensory sensitivities, gastrointestinal complaints, and autistic traits show how ARFID symptoms may overlap with neurodevelopmental/physical difficulties in early childhood (see Figure S1 in Supplements for an ARFID case study description), potentially delaying or hindering recognition and treatment (Gillberg, 2010; Merikangas et al., 2015) of either condition.

To address these gaps, the present study aimed to characterize the clinical presentation and comorbidities of ARFID in a clinical sample of young children. Specifically, we aimed to (1) describe the clinical features of ARFID and (2) examine co-occurring medical and neurodevelopmental symptoms and conditions in a cohort of Swedish young children with severe ARFID.

Method

Procedure

This cohort study was conducted between January 2022 and January 2023, during which the Folke Bernadotte Regional Habilitation Center (FBHC) served as a national specialist unit providing multidisciplinary evaluation and intervention for children with complex feeding and eating difficulties

All families admitted to the FBHC during the study period were eligible for inclusion following informed consent. We applied no additional inclusion or exclusion criteria beyond the center's standard referral and admission procedures. Children were eligible for referral if they were under seven years of age at the time of referral, medically stable, did not require emergency inpatient care, and had severe and persistent feeding and eating difficulties that could not be adequately managed within local healthcare services. Referral required prior assessment and initial management by a pediatrician, dietitian, and speech and language therapist within the child's local healthcare setting.

Participants

The final study sample comprised 36 children aged 2–8 years with longstanding feeding difficulties. Most participants ($n = 33$) were referred to the FBHC from healthcare services across Sweden, while three were enrolled through a specialist medical clinic for children and young people that was collaborating closely with the FBHC during the data-collection period.

Before referral, most children had received diagnoses commonly used in pediatric medical settings to describe feeding- and nutrition-related difficulties. Children were admitted to the FBHC only after local

services assessed and appropriately treated or stabilized relevant medical conditions. These included structural abnormalities such as enlarged tonsils, tongue-tie, or nasopharyngeal polyps. Consequently, at the time of FBHC assessment, such conditions were not considered sufficient to account for the children's ongoing eating difficulties. A subset of this clinical cohort (28 of 36 children) received an intensive multidisciplinary intervention, described in a separate publication (Holmäng et al., 2026).

Measures

Diagnostic interview for ARFID

The Pica, ARFID, and Rumination Disorder Interview (PARDI) (Bryant-Waugh et al., 2019) is a structured diagnostic interview that assesses DSM-5 ARFID criteria and provides an overall severity score and dimensional scores for the three ARFID profiles: sensory sensitivity, lack of interest in eating or food, and concern about aversive consequences. The parent/carer-report version was administered. The interview comprises dichotomous items and items rated on a 0–6 Likert scale, with higher ratings indicating greater symptom severity.

Items assessing weight and shape concerns, which are used to exclude an ARFID diagnosis under DSM-5 Criterion C that may instead indicate another eating disorder (e.g., anorexia nervosa), were omitted because of the children's young age. In addition, the PARDI includes a health checklist designed to contextualize eating behaviors and identify potential exclusion criteria for an ARFID diagnosis under DSM-5 Criterion D. Both interviewers from the FBHC team received training from Dr. Rachel Bryant Waugh, who co-developed the PARDI.

ESSENCE-Q

All parents completed the 12-item *Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations Questionnaire* (ESSENCE-Q) (Hatakenaka et al., 2016; Landgren, Svensson, et al., 2022; Truter et al., 2025). The ESSENCE-Q screens for neurodevelopmental concerns and the need for further assessment. It has been used in clinical and research settings across several countries (Landgren, Svensson, et al., 2022). Responses are scored as 2 “Yes”, 1 “Maybe/a little”, or 0 “No”, yielding a total score from 0 to 24, with higher scores indicating greater concern. In the current study, we excluded the *Feeding problems* item from the results because almost all children with ARFID endorsed it (“Yes”: 94%). This modification meant we used neither the total ESSENCE-Q score nor the previously suggested cutoff values (Landgren, Raanan Soltis, et al., 2022). However, if any item other than *Feeding problems* was marked “Yes” (score = 2), we noted it as a significant concern within that category.

Strengths and Difficulties Questionnaire (SDQ)

The SDQ (Goodman, 2001) is a validated behavioral screening instrument that assesses functioning in children and adolescents. It consists of 25 items rated on a 3-point scale (0 “Not true”, 1 “Somewhat true”, 2 “Certainly true”), and forms five subscales: *Emotional Symptoms*, *Conduct Problems*, *Hyperactivity/Inattention*, *Peer Relationship Problems*, and *Prosocial Behavior*. A *Total Difficulties Score* is obtained by summing the four problem subscales (range 0–40), with higher scores indicating greater difficulties. The Prosocial scale is scored separately as a measure of strengths (the higher the score, the better the social competence). The SDQ demonstrates reliability and validity across clinical and non-clinical populations and is widely used in epidemiological studies, mental health screening, and intervention evaluation. Swedish cut-offs have been established for parent-report in 3- to 5-year-olds (Dahlberg et al., 2020) and 6- to 10- year-olds (Smedje et al., 1999) (Table S1 in Supplements). Two children were between 2 and 3 years old; we applied the 3-year-old cut-offs for them.

Five to Fifteen-R (FTF-R)

The FTF-R is a parent-teacher questionnaire developed in the 1990s by researchers and clinicians in Nordic countries. Originally called Five to Fifteen (FTF) (Kadesjö et al., 2004), it was designed for children aged 5–15 years. It has since been updated, revised, and renamed Five to Fifteen-R (FTF-R). Following a new norming study (Lambek & Trillingsgaard, 2015), it now covers children aged 5–17 years. FTF-R is used to assess developmental disorders and behavioral problems, offering insights into key areas of child development. The FTF-R consists of 181 items, each a statement that the respondent rates on a 0 (“Does not apply”), 1 (“Applies sometimes/to some extent”), or 2 (“Applies”) scale. The items are grouped into eight domains: *Motor skills*, *Executive function*, *Perception*, *Memory*, *Language*, *Learning*, *Social competence*, and *Behavior*. For children under 5, we used the 2–5 version of FTF, FTF-Toddler (FTF-T), along with matching norms (Johansson & Karlsson, 2015). We used cutoff scores for the 90th percentile, indicating moderate problems (Table S2 in Supplements). We did not include the *Learning* domain in the analysis because no cutoffs are available for this category.

Data analysis

Responses from PARDI, ESSENCE-Q, SDQ, and FTF-R/FTF-T are reported descriptively under Results. We ran descriptive statistics in IBM SPSS Statistics 29.

Results

ARFID characteristics according to PARDI

Thirty-six children (18 boys, 18 girls) aged 24–96 months ($M = 54$, $SD = 19$) participated in the study. The mean BMI standard deviation score (SDS) was -0.56 . According to the International Obesity Task Force (IOTF) classification, twenty-four children (67%) had a current weight within the “normal range”, nine children (25%) had underweight (mild, moderate, or severe thinness), and three children (8%) had overweight or obesity (Table 1).

All children were diagnosed with ARFID. Notably, 31 children (86%) met two or more diagnostic criteria A1–A4. Weight loss and/or faltering growth (criterion A1) and nutritional deficiencies of iron or vitamin B12 (criterion A2) were observed in 17 (47.2%) and 8 (22.2%) children, respectively. The majority of children (83.3%) met criterion A3: 12 children (33.3%) received nutritional supplement drinks, 2 received micronutrient supplementation (5.6%), 13 (36.1%) received tube feeding as a complement to solid foods (e.g., percutaneous endoscopic gastrostomy; PEG), and 3 children (8.3%) received a combination of tube feeding and oral nutrition supplementation (criterion A3). All children obtained at least part of their energy requirements from solid foods. Twenty-one children (58.3%) received more than half of their energy needs from tube feeding, nutritional supplements, or other high-energy products. All children met criterion A4 and demonstrated marked psychosocial impairment.

Most children ($n = 29$) began experiencing feeding difficulties at birth or during the transition to purees or solid foods at around 4–6 months of age, including limited food variety and small portion sizes. The average ARFID severity score was 3.42 ($SD = 0.88$, range 2.00–6.00) on a 0–6-point scale. Higher scores were observed in the *Sensory* ($M = 2.65$, $SD = 1.09$, range 0.50–4.90) and *Low interest* profiles ($M = 3.49$, $SD = 0.98$, range 0.72–5.00) compared with the *Fear* profile ($M = 0.07$, $SD = 0.15$, range 0.00–0.60). The combined *Sensory and Low interest* presentation was the most common phenotype ($n = 31$). Only 5.6% of children had the pure *Sensory* phenotype, and 8.3% had the pure *Low interest* phenotype.

The items where most children scored high (≥ 4) were *sensitivity to food consistency and texture* within the *Sensory-based avoidance profile* ($n = 28$, 77.8%) and *treating meals as a chore* within the *Low interest* profile ($n = 32$, 88.9%). Table 2 presents all problem areas in the *Sensory* and *Low interest* profiles.

Co-occurring medical and neurodevelopmental problems

Parents reported via the PARDI that co-occurring conditions were common: 30/36 children had at least one comorbidity, including medical conditions and NDCs. Thus, only six children had no reported comorbidities at the time of the study. The most frequently reported health issues were gastrointestinal problems ($n = 22$), such as constipation and chronic vomiting. One-third of the children had birth-related problems. Nine children were born prematurely (between 24 and 36 weeks of gestation), and 67% ($n = 6$) of those individuals had low birth weight. Respiratory problems ($n = 12$) and food allergies ($n = 9$) were also common. At the time of the study, many children were receiving daily medication for constipation ($n = 15$) and asthma ($n = 6$). Five children had received a formal NDC diagnosis: ASD ($n = 3$), ID ($n = 1$), and language disorder ($n = 1$) (Table 3). An additional 4 of the 36 children exhibited parent-reported neurodevelopmental concerns without a formal NDC diagnosis. Although co-occurring health conditions were common, they did not fully account for the restrictive eating patterns observed, supporting an ARFID diagnosis in these children.

According to the ESSENCE-Q screener, parents most frequently reported concerns (score 2="Yes") in the following domains: *Sensory reactions* ($n = 15$), *General development* ($n = 12$), *Communication* ($n = 12$), *Motor development* ($n = 9$), and *Activity/Impulsivity* ($n = 9$). See Table 4 for all domains with the highest scores.

Table 4
Screening results within ESSENCE-Q domains

ESSENCE category ¹	Significant concern N (%)
General development	12 (33.3%)
Motor development/milestones	9 (25.0%)
Sensory reactions (e.g., touch, sound, light, smell, taste, heat, cold, pain)	15 (41.7%)
Communication/language/babble	12 (33.3%)
Activity (overactivity/passivity) or impulsivity	9 (25.0%)
Attention/concentration/"listening."	7 (19.4%)
Social interaction/interest in other children	8 (22.2%)
Behavior (e.g., repetitive, routine insistence)	5 (13.9%)
Mood (depressed, elated/manic, extreme irritability, crying spells)	3 (8.3%)
Sleep	5 (13.9%)
"Funny spells"/absent-mindedness	1 (2.8%)
<i>Note:</i> ¹ Item <i>Feeding</i> is excluded. Significant concern: if item was scored 2 = "Yes" (n,%); range for each item 0–2.	
Abbreviations: ESSENCE: Early Symptomatic syndromes eliciting neurodevelopmental clinical examinations	

In the SDQ, more than half of the children (21/36) screened above the cut-off for abnormal behavior on the *Total Difficulties* score. Most children showed pronounced *Peer Relationship Problems* (30/36), and some had clear difficulties with *Hyperactivity/Inattention* (11/36). Many 2-5-year-olds were also close to clinical significance (above the borderline cut-offs), mostly in the areas of *Hyperactivity/Inattention* (13/24) and *Emotional symptoms* (7/24; Table 5).

Table 5
Parent-reported results for the SDQ

Categories	Borderline N (%)	Abnormal N (%)
Total difficulty score	4 (16.7%)	21 (58.3%)
Emotional symptoms	7 (29.2%)	4 (11.1%)
Conduct problems	2 (8.4%)	6 (16.7%)
Hyperactivity/inattention	13 (54.2%)	11 (30.6%)
Peer problems	2 (8.4%)	30 (83.3%)
Social competence	-	8 (22.2%)
<i>Note:</i> Abbreviations: SDQ: Strengths and Difficulties Questionnaire; N = 36, mean age = 4.5 years, cut-offs (Dahlberg et al., 2020; Smedje et al., 1999). Borderline results are presented for children aged 2-5-years (N = 24), where age- specific cut-offs were available. For 2 children aged 2 to 3 years, we applied the 3-year-old cut-offs.		

Based on the FTF-R and FTF-T questionnaires, many children exhibited problems above the normative cutoff, primarily in the following areas: *Behavior/Emotions* (n = 12), *Social competence* (n = 9), and *Executive functions/Hyperactivity/Inattention* (n = 7). Complete data were available for 28 of 36 children. See Table 6 for results across all FTF domains.

Table 6
Proportion of children who presented with problems above cutoffs in FTF-R/FTF-T domains

FTF domains	Screen-positive N (%)
Motor skills	5 (17.9%)
Executive functions/ Hyperactivity/ Inattention	7 (25.0%)
Perception	4 (14.3%)
Memory	2 (7.1%)
Language	5 (17.9%)
Social competence	9 (32.1%)
Behavior/Emotions	12 (42.9%)
<i>Note:</i> N = 28; Abbreviations: FTF-R: Five to Fifteen Revised; FTF-T: Five to Fifteen Toddler	

Discussion

In this tertiary-care cohort of 36 young children with severe and persistent feeding and eating difficulties that could not be adequately managed within local services, ARFID presentations were predominantly characterized by a combination of sensory sensitivity and low interest in eating. Nutritional support

needs, parent-reported current or previous medical conditions, and concerns identified through neurodevelopmental screening were common. Clustering of multiple neurodevelopmental, psychiatric, and medical conditions appears to be particularly relevant among children presenting with complex feeding and eating difficulties (Menzel & Perry, 2024; Micai, 2023). Such comorbidity may reflect the multifactorial and complex nature of ARFID.

Weight status varied considerably, consistent with previous studies (Becker et al., 2020). Although more than 60% of children were within the normal weight range, many had experienced faltering growth and relied on nutritional supplements or tube feeding. Almost 60% of children

received more than half of their energy needs from tube feeding, nutritional supplements, or other high-energy products. While these strategies aimed to correct nutritional deficiencies and support normal growth, the children's nutritional vulnerabilities and the limitations of oral intake remained evident. Notably, the rate of nutritional deficiencies in this group (22.2%) aligns with other reports from other clinical child samples (Katzman et al., 2021; Watts et al., 2023).

According to PARDI interviews, psychosocial impairment was substantial despite the young age of the cohort. Most children were reported to experience mealtime stress, social difficulties, and impaired functioning in preschool or school settings. Also in screening reports, parents indicated elevated emotional, attentional, and behavioral difficulties, with peer relationship problems being particularly common. There were no ADHD diagnoses at the time of the study, though parents observed hyperactivity and impulsivity, both in everyday behavior and in relation to food. This pattern indicates that while internalizing and attentional symptoms affect a substantial subset, peer difficulties appear to be a central feature of the psychosocial profile in this group of children with ARFID. Some children were described as developmentally behind their peers (e.g., in language), being sensitive to demands, acting out, and feeling ashamed of having different eating habits. These results show the need for research on social functioning in children with ARFID, how it is affected by ARFID, and the mechanisms behind this association.

A key finding from PARDI interviews was that the predominant presentation of ARFID involving a combination of sensory sensitivity and low interest in eating, consistent with previous studies in a similar age group (Dinkler et al., 2025). Oral defensiveness and hypersensitivity to sensations in and around the mouth were common and may have contributed to limited food acceptance. Feeding difficulties most often emerged during the transition to purées and solid foods, a developmental stage characterized by increasing demands on sensory processing and oral-motor coordination as infants adapt to new textures, tastes, and chewing requirements (Harris & Mason, 2017). In some children, early sensory hypersensitivity may limit oral exploration and exposure to diverse textures, which may, over time, restrict opportunities for oral-motor practice and contribute to the development or reinforcement of avoidant eating behaviors (da Silva & Gomes, 2024). Longitudinal research is needed to clarify the relationship between sensory sensitivity, tolerance of novel food textures, and the development of eating behaviors.

In addition to atypical sensory processing, parents frequently reported reduced appetite awareness, poor recognition of hunger and satiety cues, limited meal anticipation, and early satiety. Previous studies suggest that the low-interest presentation of ARFID is associated with altered hunger signaling and reduced interoceptive awareness, which may contribute to reduced motivation to eat (Datta & Lock, 2023; Thomas et al., 2025). In contrast, fear of aversive consequences was virtually absent in this cohort, consistent with similar findings from other studies of young children with ARFID (Dinkler et al., 2025). One explanation may be the young age of the sample, as fears related to choking, vomiting, or other adverse eating experiences may not yet have fully developed; thus, parents may not be aware of their presence or able to report them (Gianneschi et al., 2024).

The findings regarding communication and peer-related difficulties are also relevant when considering the sensory sensitivity and low-interest profiles identified in this tertiary-care group of children with ARFID. Results from the ESSENCE, SDQ, and FTF indicated that, in addition to feeding difficulties, many children experienced communication and social functioning difficulties. The co-occurrence of feeding difficulties with communication and peer-related problems is consistent with previous research showing that neurodevelopmental difficulties, including communication, social interaction, and peer problems, are more common among children with ARFID than among children without ARFID (Dinkler et al., 2025). A longitudinal Japanese study also found that early difficulties in communication and social interaction were associated with later ARFID (Dinkler et al., 2022). Together, these findings highlight the importance of considering ARFID within a broader neurodevelopmental and psychosocial context, rather than as a condition restricted only to eating-related difficulties. However, the present study cannot determine whether communication and social difficulties contribute to, or arise as a consequence of, restrictive eating. Further longitudinal research is needed to clarify whether particular ARFID profiles, including sensory sensitivity and low interest in eating, are associated with distinct developmental patterns of communication and social functioning.

One third of the cohort had birth-related complications, including premature birth and/or low birth weight. Medical complications associated with prematurity may involve prolonged hospitalization, invasive procedures, neonatal tube feeding, and stressful feeding experiences during critical periods of development. Such experiences may disrupt appetite regulation, hunger-satiety signaling, and oral-motor development, and increase the risk of oral aversion and sensory feeding-related hypersensitivity (Pados et al., 2021). Prematurity may further heighten vulnerability through its association with later neurodevelopmental difficulties, including atypical sensory processing, emotional regulation difficulties, and impaired adaptive functioning (Pivodic et al., 2024). Together, these factors may contribute to persistent feeding disturbances and increase the likelihood of avoidant or restrictive eating behaviors later in childhood. However, feeding difficulties in very young children should not automatically be attributed to developmental immaturity or prematurity-related complications. Even in early childhood, children may meet clear criteria for ARFID, which should be distinguished from feeding difficulties that are better explained by developmental factors or other underlying conditions.

Our results underscore the need for early multidisciplinary assessment of young children with severe restrictive eating behaviors. Given the high rates of sensory sensitivities, gastrointestinal symptoms, developmental concerns, and psychosocial difficulties observed in this cohort, assessment and intervention may benefit from collaboration among pediatricians, dietitians, psychologists, speech-language pathologists, occupational therapists, physiotherapists, and educational professionals.

Taken together, these findings suggest that ARFID in early childhood is a heterogeneous condition and early manifestations of severe selective and restrictive eating appear closely intertwined with neurodevelopmental and medical vulnerabilities. Longitudinal research is needed to clarify developmental trajectories, identify early risk markers, and determine whether early multidisciplinary intervention may reduce chronicity and improve long-term outcomes. Importantly, medical and/or neurodevelopmental comorbidities should not prevent clinicians from considering ARFID as a distinct diagnosis (Estrem et al., 2025; Zickgraf et al., 2025).

Strengths and Limitations

A major strength of this study is its focus on young children with ARFID, an understudied group for which knowledge of clinical characteristics and comorbidities remains limited. The comprehensive overview of growth, medical, and neurodevelopmental conditions in the multi-symptom clinical sample provides a rare and valuable perspective for this age group. Furthermore, the use of validated measures and clinical data enhances the reliability of the results and their applicability to clinical practice.

However, several limitations remain. All included children, except for six, had co-occurring medical conditions, including genetic syndromes, which may have limited variation across profiles. As a result, the findings may not generalize to less clinically complex populations, where ARFID presentations may vary more. The relatively small sample size also limits the generalizability of the findings beyond the clinical population studied.

Because only mothers completed the questionnaires, the study lacks a paternal perspective. Finally, the cross-sectional design precludes drawing conclusions about causal relationships between ARFID and comorbidities, such as whether medical problems contribute to or partly result from restrictive eating.

Conclusion

In this clinically referred cohort of young children with ARFID, severe and persistent feeding and eating difficulties predominated, alongside combined sensory sensitivity and low interest in eating. Nutritional support was common. All children had psychosocial impairment, and parents frequently reported medical conditions and neurodevelopmental concerns, while weight status varied. Our findings characterize a highly selected tertiary-care group and should not be generalized to young children with ARFID more broadly. They underscore the value of comprehensive multidisciplinary assessment of nutritional, medical, developmental, and psychosocial needs. Larger longitudinal studies are needed to examine generalizability and developmental course.

Table 1
Anthropometric measures and BMI categories based on the IOTF classification

Anthropometric measures	Mean (SD), Range or N (%)
Height (SDS)	-0.95 (1.59), -4.00 to 1.90
Weight (SDS)	-0.97 (1.16), -4.00 to 1.50
BMI (SDS)	-0.56 (1.43), -3.20 to 3.00
IOTF BMI Categories	
Severe thinness (-3)	1 (2.8%)
Moderate thinness (-2)	1 (2.8%)
Mild thinness (-1)	7 (19.4%)
Normal weight (0)	24 (66.7%)
Overweight (1)	2 (5.6%)
Obesity (2)	0 (0.0%)
Severe obesity (3)	1 (2.8%)
<i>Note:</i> Anthropometric data were obtained using the Pica, ARFID, and Rumination Disorder Interview (PARDI). BMI categories follow the IOTF classification. Terminology reflects IOTF category labels. Abbreviations: IOTF: International Obesity Task Force; BMI: Body Mass Index; SDS: Standard deviation score/z-score; SD: Standard deviation.	

Table 2
Proportion of children scoring ≥ 4 on each of the Sensory-based avoidance and Low Interest profile items in the PARDI

Category	N (%)
Sensory-based avoidance profile	
Overall sensitivity	22 (61.1%)
Oral sensitivity (around and in the mouth)	25 (69.4%)
Smell sensitivity	15 (41.7%)
Taste sensitivity	19 (52.8%)
Sensitivity to food temperature	18 (50.0%)
Sensitivity to food texture/consistency	28 (77.8%)
Food avoidance because of smell	2 (5.6%)
Sensitivity to food appearance	18 (50.0%)
Sensitivity to food color/ chooses safe food colors	11 (30.6%)
Preference for a specific brand	7 (19.4%)
Low interest profile	
Difficulty recognizing hunger	25 (69.4%)
Forgetting to eat	28 (77.8%)
Lack of anticipation for meals	29 (80.6%)
Poor appetite	23 (63.9%)
Needs prompting	23 (63.9%)
Eats less because of negative feelings	20 (55.6%)
Eats less because of positive feelings	10 (27.8%)
Treats eating as a chore	32 (88.9%)
Not enjoying food/eating	26 (72.2%)
Gets full before the meal is finished	28 (77.8%)
Feels uncomfortable when full	2 (5.6%)

Table 3
Parent-reported co-occurring conditions from the Physical and Mental
Health Checklist (PARDI).

Co-occurring conditions	N (%)
Gastroenterological problems	22 (61.1%)
Chronic vomiting	8 (22.2%)
Reflux	5 (13.9%)
Constipation	12 (33.3%)
Respiratory problems	12 (33.3%)
Asthma	11 (30.6%)
Bronchopulmonary dysplasia	1 (2.8%)
Birth-related problems	12 (33.3%)
Preterm birth	9 (25.0%)
Low birth weight	9 (25%)
Food allergies/intolerances	9 (25%)
Milk protein allergy	3 (8.3%)
Nut allergy	3 (8.3%)
Egg allergy	2 (5.6%)
Lactose intolerance	2 (5.6%)
Gluten intolerance	1 (2.8%)
Structural abnormalities	8 (22.2%)
Enlarged tonsils (previously)	2 (5.6%)
Tongue-tie (previously)	2 (5.6%)
Polyps in the nose/throat (previously)	1 (2.8%)
Cardiac problems	6 (16.7%)
Aortic stenosis	1 (2.8%)
Ventricular Septal Defect	1 (2.8%)
Heart murmur	1 (2.8%)
Previous cardiac surgery	3 (8.3%)
<i>Note: N = 36. Children may be represented in more than one category.</i>	

Co-occurring conditions	N (%)
Neurological problems	4 (11.1%)
Hydrocephalus (previously)	1 (2.8%)
Epilepsy	2 (5.6%)
Cerebral palsy	1 (2.8%)
Genetic syndromes	
Coffin-Siris, Horners, Turners, Klinefelter, SCID	5 (13.9%)
Other medical conditions	3 (8.3%)
Sleep apnea	1 (2.8%)
Lymphadenopathy	1 (2.8%)
Congenital hypogonadotropic hypogonadism	1 (2.8%)
Neurodevelopmental problems (NDCs)	5 (13.9%)
Autism	3 (8.3%)
Intellectual disability	1 (2.8%)
Language disorder	1 (2.8%)
Poor oral-motor coordination	2 (5.6%)
No comorbidity	6 (16.7%)
<i>Note: N = 36. Children may be represented in more than one category.</i>	

Declarations

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Competing interests

No conflicts to declare.

Consent for publication

Not applicable.

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Human Ethics and Consent to Participate

The study was approved by the Swedish Ethical Review Authority (reference numbers: 2020-01284, 2020-03908). All participants gave written informed consent. We conducted all methods in compliance with applicable guidelines and regulations, in accordance with the Declaration of Helsinki.

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Availability of data material

The authors will make data available upon reasonable request.

References

1. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed., Vol. 17).
2. Becker KR, Breithaupt L, Jo JH, Eddy KT, Thomas JJ. Adapting evidenced-based therapies for Avoidant/Restrictive food intake disorder. Adapting evidence-based eating disorder treatments for novel populations and settings. Routledge; 2020. pp. 146–68.
3. Becker KR, Keshishian AC, Liebman RE, Coniglio KA, Wang SB, Franko DL, Eddy KT, Thomas JJ. Impact of expanded diagnostic criteria for avoidant/restrictive food intake disorder on clinical comparisons with anorexia nervosa. *Int J Eat Disord*. 2019;52(3):230–8.

4. Bryant-Waugh RM, Nadia, Cooke L, Lawson EA, Eddy KT, Thomas JJ. (2019). Development of the Pica, ARFID, and Rumination Disorder Interview, a multi-informant, semi-structured interview of feeding disorders across the lifespan: A pilot study for ages 10–22. *International Journal of Eating Disorders*, 52(4), 378–387.
5. D'Adamo L, Smolar L, Balantekin KN, Taylor CB, Wilfley DE, Fitzsimmons-Craft EE. Prevalence, characteristics, and correlates of probable avoidant/restrictive food intake disorder among adult respondents to the National Eating Disorders Association online screen: a cross-sectional study. *J Eat Disorders*. 2023;11(1):214.
6. da Silva RV, Gomes DL. Eating behavior and nutritional profile of children with autism spectrum disorder in a reference center in the Amazon. *Nutrients*. 2024;16(3):452.
7. Dahlberg A, Fält E, Ghaderi A, Sarkadi A, Salari R. Swedish norms for the Strengths and Difficulties Questionnaire for children 3–5 years rated by parents and preschool teachers. *Scand J Psychol*. 2020;61(2):253–61.
8. Datta N, Lock JD. Exploration of interoceptive capabilities in avoidant/restrictive food intake disorder and anorexia nervosa. *J Eat Disorders*. 2023;11(1):189.
9. Dinkler L, Brimo K, Holmäng H, Yasumitsu-Lovell K, Kuja-Halkola R, Kantzer A-K, Omanovic Z, Sukanuma N, Eitoku M, Fujieda M, Fernell E, Möllborg P, Bryant-Waugh R, Gillberg C, Råstam M. Avoidant restrictive food intake disorder (ARFID) in Swedish preschool children: a screening study. *J Eat Disorders*. 2025;13(1):179. <https://doi.org/10.1186/s40337-025-01369-w>.
10. Dinkler L, Yasumitsu-Lovell K, Eitoku M, Fujieda M, Sukanuma N, Hatakenaka Y, Hadjikhani N, Bryant-Waugh R, Råstam M, Gillberg C. Early neurodevelopmental problems and risk for avoidant/restrictive food intake disorder (ARFID) in 4-7-year-old children: A Japanese birth cohort study. *JCPP Adv*. 2022;2(3):e12094. <https://doi.org/10.1002/jcv2.12094>.
11. El Archi S, Cortese S, Ballon N, Réveillère C, De Luca A, Barrault S, Brunault P. Negative affectivity and emotion dysregulation as mediators between ADHD and disordered eating: a systematic review. *Nutrients*. 2020;12(11):3292.
12. Estrem HH, Pederson JL, Dodrill P, Romeo C, Thompson K, Thomas JJ, Zucker N, Noel R, Zickgraf H, Menzel J. A US-based consensus on diagnostic overlap and distinction for pediatric feeding disorder and avoidant/restrictive food intake disorder. *Int J Eat Disord*. 2025;58(3):489–99.
13. Gianneschi JR, Washington KA, Nicholas J, Pilato I, LeMay-Russell S, Rivera-Cancel AM, Mines EV, Jackson JE, Marsan S, Lachman S. Assessing fears of negative consequences in children with symptoms of avoidant restrictive food intake disorder. *Int J Eat Disord*. 2024;57(12):2329–40.
14. Gillberg C. The ESSENCE in child psychiatry: Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations. *Res Dev Disabil*. 2010;31(6):1543–51. <https://doi.org/10.1016/j.ridd.2010.06.002>.
15. Goodman R. Psychometric properties of the strengths and difficulties questionnaire. *J Am Acad Child Adolesc Psychiatry*. 2001;40(11):1337–45.

16. Harris G, Mason S. Are there sensitive periods for food acceptance in infancy? *Curr Nutr Rep.* 2017;6(2):190–6.
17. Harshman SG, Wons O, Rogers MS, Izquierdo AM, Holmes TM, Pulumo RL, Asanza E, Eddy KT, Misra M, Micali N. (2019). A diet high in processed foods, total carbohydrates and added sugars, and low in vegetables and protein is characteristic of youth with avoidant/restrictive food intake disorder. *Nutrients*, 11(9), 2013.
18. Hatakenaka Y, Fernell E, Sakaguchi M, Ninomiya H, Fukunaga I, Gillberg C. (2016). ESSENCE-Q—a first clinical validation study of a new screening questionnaire for young children with suspected neurodevelopmental problems in south Japan. *Neuropsychiatr Dis Treat*, 1739–46.
19. Holmäng H, Brimo K, Ås A, Dinkler L, Bryant-Waugh R, Gillberg C, Råstam M, Posserud M-B. (2026). Intensive Multidisciplinary Intervention for Young Children With ARFID: Clinical Outcomes and Parental Experiences From a Prospective Cohort Study. *Int J Eat Disord*.
20. Izquierdo A, Plessow F, Becker KR, Mancuso CJ, Slattery M, Murray HB, Hartmann AS, Misra M, Lawson EA, Eddy KT. Implicit attitudes toward dieting and thinness distinguish fat-phobic and non-fat-phobic anorexia nervosa from avoidant/restrictive food intake disorder in adolescents. *Int J Eat Disord*. 2019;52(4):419–27.
21. Johansson S, Karlsson H. (2015). *Utprovning av Fem till Femton- formulärets småbarnsversion för utredning av barns utveckling och beteende i åldrarna 25–40 månader [Evaluation of the Five to fifteen questionnaire - toddlers' version for assessment and development and behavior in children aged 25–40 months] [Unpublished masters's thesis in Speech and Language pathology]*. Gothenburg University.
22. Kadesjö B, Janols L-O, Korkman M, Mickelsson K, Strand G, Trillingsgaard A, Gillberg C. The FTF (Five to Fifteen): the development of a parent questionnaire for the assessment of ADHD and comorbid conditions. *Eur Child Adolesc Psychiatry*. 2004;13(3):iii3–13.
23. Kaşak M, Okumuş HG, Çelik YS, Kırşan FZ, Coşkun M, Öztürk Y, Efe A, Ögütü H. (2025). Selective Eating and Sensory Sensitivity in Children With ADHD: A Comparative Study of ARFID Symptom Profiles. *Int J Eat Disord*.
24. Katzman DK, Spettigue W, Agostino H, Couturier J, Dominic A, Findlay SM, Lam P-Y, Lane M, Maguire B, Mawjee K. Incidence and age-and sex-specific differences in the clinical presentation of children and adolescents with avoidant restrictive food intake disorder. *JAMA Pediatr*. 2021;175(12):e213861–213861.
25. Koomar T, Thomas TR, Pottschmidt NR, Lutter M, Michaelson JJ. Estimating the prevalence and genetic risk mechanisms of ARFID in a large autism cohort. *Front Psychiatry*. 2021;12:668297.
26. Kushner ES, Eisenberg IW, Orionzi B, Simmons WK, Kenworthy L, Martin A, Wallace GL. A preliminary study of self-reported food selectivity in adolescents and young adults with autism spectrum disorder. *Res Autism Spectr Disorders*. 2015;15:53–9.
27. Lambek R, Trillingsgaard A. Elaboration, validation and standardization of the five to fifteen (FTF) questionnaire in a Danish population sample. *Res Dev Disabil*. 2015;38:161–70.

28. Landgren V, Raanan Soltis Z, Svensson E, Theodosiou M, Landgren M, Knez R. (2022). The ESSENCE-questionnaire in medical records screening for neurodevelopmental symptoms/problems: utility and clinical validity. *Neuropsychiatr Dis Treat*, 2559–74.
29. Landgren V, Svensson L, Knez R, Theodosiou M, Gillberg C, Fernell E, Landgren M, Johnson M. (2022). The ESSENCE-questionnaire for neurodevelopmental problems—a Swedish school-based validation study in 11-year-old children. *Neuropsychiatr Dis Treat*, 2055–67.
30. Menzel JE, Perry TR. Avoidant/Restrictive Food Intake Disorder: Review and Recent Advances. *Focus*. 2024;22(3):288–300.
31. Merikangas KR, Calkins ME, Burstein M, He J-P, Chiavacci R, Lateef T, Ruparel K, Gur RC, Lehner T, Hakonarson H. Comorbidity of physical and mental disorders in the neurodevelopmental genomics cohort study. *Pediatrics*. 2015;135(4):e927–38.
32. Micai M, Fatta LM, Gila L, Caruso A, Salvitti T, Fulceri F, Ciaramella A, D'Amico R, Del Giovane C, Bertelli M, Romano G, Schunemann HJ, Scattoni ML. Prevalence of co-occurring conditions in children and adults with autism spectrum disorder: A systematic review and meta-analysis. *Neurosci Biobehavioral Reviews*. 2023;155:105436.
33. Norris ML, Obeid N, Santos A, Valois DD, Isserlin L, Feder S, Spettigue W. Treatment needs and rates of mental health comorbidity in adolescent patients with ARFID. *Front Psychiatry*. 2021;12:680298.
34. Nygren G, Linnsand P, Hermansson J, Dinkler L, Johansson M, Gillberg C. Feeding problems including avoidant restrictive food intake disorder in young children with autism spectrum disorder in a multiethnic population. *Front Pediatr*. 2021;9:780680.
35. Pados BF, Hill RR, Yamasaki JT, Litt JS, Lee CS. Prevalence of problematic feeding in young children born prematurely: a meta-analysis. *BMC Pediatr*. 2021;21(1):110.
36. Pivodic A, Hansson M, Löfqvist C, Sävman K, Elfvin A, Jacobson L, Dinkler L, Hallberg B, Ley D, Morsing E. Challenges of parenting children born before 24 weeks of gestation. *Acta Paediatr*. 2024;113(11):2414–22.
37. Reilly EE, Brown TA, Gray EK, Kaye WH, Menzel JE. Exploring the cooccurrence of behavioural phenotypes for avoidant/restrictive food intake disorder in a partial hospitalization sample. *Eur Eat Disorders Rev*. 2019;27(4):429–35. <https://doi.org/10.1002/erv.2670>.
38. Sader M, Weston A, Buchan K, Kerr-Gaffney J, Gillespie-Smith K, Sharpe H, Duffy F. The Co-occurrence of autism and Avoidant/restrictive food intake disorder (ARFID): a prevalence-based meta-analysis. *Int J Eat Disord*. 2025;58(3):473–88.
39. Saif Z, Jahrami H. Eating Disorders in Children and Adolescents with Attention Deficit Hyperactivity Disorder. *Eating Disorders*. Springer; 2023. pp. 123–44.
40. Sanchez-Cerezo J, Nagularaj L, Gledhill J, Nicholls D. What do we know about the epidemiology of avoidant/restrictive food intake disorder in children and adolescents? A systematic review of the literature. *Eur Eat Disord Rev*. 2023;31(2):226–46. <https://doi.org/10.1002/erv.2964>.
41. Sharp WG, Berry RC, McCracken C, Nuhu NN, Marvel E, Saulnier CA, Klin A, Jones W, Jaquess DL. Feeding problems and nutrient intake in children with autism spectrum disorders: a meta-analysis

- and comprehensive review of the literature. *J Autism Dev Disord*. 2013;43(9):2159–73. <https://doi.org/10.1007/s10803-013-1771-5>.
42. Smedje H, Broman JE, Hetta J, Von Knorring AL. (1999). Psychometric properties of a Swedish version of the Strengths and Difficulties Questionnaire. *European child & adolescent psychiatry*, 8(2), 63–70.
 43. Thomas JJ, Holsen L, Van De Water AL, Becker KR, Breithaupt L, Burton-Murray H, Asanza E, Gydus J, Palmer LP, Stern CM. Neural Response to Food Cues in Avoidant/Restrictive Food Intake Disorder. *JAMA Netw Open*. 2025;8(2):e2460101–2460101.
 44. Thomas JJ, Lawson E, Micali N, Misra M, Deckersbach T, Eddy KT. Avoidant/Restrictive Food Intake Disorder: A Three-Dimensional Model of Neurobiology with Implications for Etiology and Treatment. *Curr psychiatry Rep*. 2017;19:1–9.
 45. Truter B, Slogrove AL, Billstedt E, Thompson L, Conradie P, van der Walt A, Gillberg C. (2025). Clinical and contextual profiles of preschoolers after community-based neurodevelopmental screening in rural South Africa *Available at SSRN 5939448*.
 46. Van Buuren L, Fleming CAK, Hay P, Bussey K, Trompeter N, Lonergan A, Mitchison D. The prevalence and burden of avoidant/restrictive food intake disorder (ARFID) in a general adolescent population. *J Eat Disorders*. 2023;11(1):104.
 47. Watts R, Archibald T, Hembry P, Howard M, Kelly C, Loomes R, Markham L, Moss H, Munuve A, Oros A. (2023). The clinical presentation of avoidant restrictive food intake disorder in children and adolescents is largely independent of sex, autism spectrum disorder and anxiety traits. *eClinicalMedicine; Part Lancet Discovery Sci*, 63.
 48. Zickgraf HF, Cares SR, Schwartz RA, Breiner CE, Stettler NM. Toward a Specific and Descriptive Definition of Avoidant/Restrictive Food Intake Disorder: A Proposal for Updated Diagnostic Criteria. *Int J Eat Disord*. 2025;58(5):844–52.
 49. Zickgraf HF, Lane-Loney S, Essayli JH, Ornstein RM. Further support for diagnostically meaningful ARFID symptom presentations in an adolescent medicine partial hospitalization program. *Int J Eat Disord*. 2019;52(4):402–9. <https://doi.org/10.1002/eat.23016>.

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