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# Characteristics of outpatients diagnosed with the selective/neophobic presentation of avoidant/restrictive food intake disorder

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## Abstract

**Objective:** Although Avoidant/Restrictive Food Intake Disorder (ARFID) has existed since the publication of DSM-5 in 2013, research on the descriptive psychopathology of treatment-seeking patients with formal ARFID diagnoses is sparse, and limited to tertiary eating disorder-focused treatment settings where most patients present with weight loss/malnutrition. In these settings, the selective/neophobic symptom presentation is rare compared to other primary eating restrictions. We aimed provide initial descriptive psychopathology of ARFID primary selective/neophobic symptom presentation in an outpatient setting, and to explore the prevalence of the core ARFID symptoms and clinical differences among patients meeting criteria based on weight/nutritional symptoms versus psychosocial impairment only.

**Method:** We reviewed the charts of 22 consecutive outpatients diagnosed with ARFID caused by selective/neophobic eating, and describe symptoms, impairment, illness trajectory, and demographic features. Patients who met ARFID criteria because of weight loss/nutritional problems were compared to those who met for psychosocial impairment only on demographic and clinical characteristics.

**Results:** Patients were predominantly male (81.8%) and school-aged (4-11 years). 81.8% had no weight/nutritional symptoms documented by a medical provider. All met criteria for significant psychosocial impairment. There were few differences between patients who did versus did not meet weight loss/nutritional criteria for ARFID; they differed only in age and in the presence of appetite disturbances consistent with another proposed presentation of ARFID.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

**Discussion:** These results provide novel data on the clinical characteristics of individuals who present with a primary presentation of selective/neophobic ARFID, including support for psychosocial impairment as sufficient for fulfilling ARFID criterion A.

**Keywords**

appetite; ARFID; avoidant/restrictive food intake disorder; chart review; eating; feeding; food neophobia; picky eating; selective eating

## 1 | INTRODUCTION

Avoidant/Restrictive Food Intake Disorder (ARFID) was introduced in the DSM-5 for individuals whose avoidant or restrictive eating patterns leads to weight loss/growth failure, nutritional deficiency, dependence on nutritional supplements or enteral feeding, or significant psychosocial impairment (Criterion A; American Psychiatric Association, 2013). ARFID-related eating restrictions include under-eating due to poor appetite or lack of interest in eating (appetite/interest presentation), eating from a very narrow range of foods due to food neophobia and distaste for many common foods (selective/neophobic presentation), and/or avoidance of eating due to fear of negative consequences from eating, such as choking or vomiting (fear presentation; American Psychiatric Association, 2013; Thomas et al., 2017). The impact of restrictive eating can present heterogeneously in those with ARFID, with medical impairment that ranges from very severe weight loss and malnutrition to apparently healthy weight and absence of nutritional deficiencies. ARFID eating restrictions also present heterogeneously, with some researchers positing that the restrictive eating presentations represent distinct but overlapping dimensions (Thomas et al., 2017).

Since the ARFID diagnosis was introduced to the DSM-5 in 2013, several retrospective chart review studies have described the clinical presentation of ARFID. The reviews included samples of outpatients, intensive outpatients, partial patients, and inpatients in tertiary adolescent medicine eating disorder settings. Two of these recent chart reviews, conducted in adolescent medicine centers, attempted to classify ARFID patients according to their primary ARFID presentation (Norris et al., 2018; Zickgraf, Lane, Essayli, & Ornstein, 2019). In both reviews, the fear presentation was most common, followed by the appetite/interest presentation. Selective/neophobic eating was the least common presentation in both settings. However, research on subclinical ARFID symptoms suggests that, in unselected samples, the selective/neophobic presentation may be as, or more, common than the other ARFID presentations (e.g., 61% of the ARFID sample in a population-based sample of Swiss children; Kurz, Van Dyck, Dremmel, Munsch, & Hilbert, 2015, Kurz, Van Dyck, Dremmel, Munsch, & Hilbert, 2016).

The selective eating/neophobic presentation of ARFID is currently not well characterized. One reason may be the tendency to conflate this presentation with normative “picky eating” behaviors, which are very common across the lifespan, with as many as 35% of children and adults described as at least somewhat “picky” (e.g., Kauer, Pelchat, Rozin, & Zickgraf, 2015; Taylor, Wernimont, Northstone, & Emmett, 2015). The selective/neophobic

presentation of ARFID is distinguished from normative picky eating by the presence of significant nutritional or psychosocial impact. Research applying these criteria has been able to distinguish picky eating from ARFID: Zickgraf et al. (2016) found that, among community-dwelling adults, 33% endorsed picky eating, but only 9% of picky eaters (3.1% of the sample) endorsed significant ARFID symptoms. Only picky eaters with ARFID symptoms reported elevated clinical impairment or comorbid mood/anxiety symptoms, supporting the distinction of selective/neophobia ARFID from normative picky eating.

Although chart reviews have described clinical presentations of ARFID characteristics (Fisher et al., 2014; Forman et al., 2014; Nicely et al., 2014; Norris et al., 2014), no study to date has focused on characterizing the selective eating/neophobic presentation specifically. In addition, because they sample from relatively severe populations who were referred to eating disorder specialists, usually with weight loss and malnourishment (Forman et al., 2014; Nicely et al., 2014; Norris et al., 2014), previous studies of ARFID patients do not represent the full range of ARFID symptoms. The stem text of DSM-5 criterion A describes the eating restriction driving symptoms as “manifested by persistent failure to meet appropriate nutritional and/or energy needs,” but many researchers interpret “appropriate” as a relative term, defined according to developmental or cultural expectations and not by nutritional consequences of such a failure. Indeed, a proposal to remove this phrase from the next iteration of DSM-5, aimed at making the application of ARFID criteria more uniform across clinical and research groups, is under final consideration after an open public comment period in October-December 2018 (Walsh, 2018). Research on the clinical characteristics of patients who meet ARFID criteria only by experiencing significant psychosocial impairment will help to clarify this diagnostic issue.

Given that different predominant ARFID eating restrictions likely require different treatment approaches, understanding the clinical characteristics of ARFID subgroups is critical to developing structured assessment tools and targeted treatment models (Thomas et al., 2017). In addition, there is no consensus about how the nutritional and weight symptoms of ARFID should be defined; unlike other eating disorder diagnoses in DSM-5, the diagnostic criteria do not specify weight ranges or indicators of malnutrition associated with the diagnosis. The primary aim of this chart review is to describe the clinical characteristics of children, adolescents, and young adults diagnosed with the selective/neophobic presentation of ARFID in a non-eating disorder-focused outpatient setting, including demographics (age, gender), psychological and medical comorbidities, age of onset, symptom trajectory (history of adding or eliminating foods), and qualitative descriptions of psychosocial interference described by patients and families. A secondary aim is to explore the prevalence of each of the four components of Criterion A for ARFID (weight loss/difficulty gaining weight, nutritional deficiency, supplement use, and psychosocial interference) using strict and more expansive definitions of the three weight/nutrition criteria. We hypothesize that patients who meet multiple impairment criteria, defined either expansively or strictly, will show signs of greater symptom severity, including more medical or psychosocial comorbidity, longer illness duration, more domains of psychosocial impairment, and a more restrictive eating history.

# 2 | METHOD

## 2.1 | Participants and procedures

We conducted a retrospective chart review of all outpatients diagnosed over a four-year period with the selective/neophobic presentation of ARFID at a university clinic for pediatric anxiety and obsessive/compulsive-spectrum disorders that accepts referrals related to selective/neophobic eating. Before an intake assessment was scheduled, all prospective patients/parents underwent a structured phone screening procedure to identify referral questions, including selective/neophobic eating. The clinic conducts approximately 100 intake assessments per year.

We identified cases for this retrospective chart review by hand-searching records of every intake conducted from 2014 to 2017 for an ARFID diagnosis. Twenty-two cases with diagnoses of ARFID due to selective/neophobic eating were identified. Five cases with ARFID driven by specific phobia or OCD symptoms were also identified. Because our clinic did not routinely diagnose ARFID in cases where the eating restriction was attributable to a specific fear or OCD symptoms, we did not include this presentation in the chart review. The Institutional Review Board at the University of Pennsylvania approved this study.

## 2.2 | Measures

All patients received a 2-hr intake assessment with a masters-level clinical psychology trainee or doctoral-level psychologist that included a clinical interview and a semi-structured diagnostic interview with the Kiddie Schizophrenia and Affective Disorders Schedule (K-SADS; Kaufman et al., 1997) and/or Anxiety Disorders Interview Schedule (ADIS; Brown & Barlow, 2014). All clinicians had experience in assessing for the presence of eating disorders in the context of differential diagnoses for anxiety and mood disorders.

Our clinic used a semi-structured interview, developed by the first author, as part of ARFID evaluations. The ARFID Diagnostic and Severity Interview for children 11 and younger and for adults and adolescents 12 and older (ADSI; Appendices A and B) was designed to assess the nature of eating restrictions (including ruling out eating restrictions primarily driven by shape/weight concerns or specific fears/OCD symptoms), quantify psychosocial impairment (Table 1), and to elicit parent/patient report about outside evidence for other ARFID criteria (e.g., medical history, supplement use; Table 1).

**2.2.1 | ARFID diagnosis—**To meet diagnostic criteria for ARFID, patients must experience at least one of four Criterion A consequences of restrictive eating: weight loss/growth faltering (A1), nutritional deficiency (A2), supplement dependence (A3), and/or psychosocial interference (A4). Whereas eating disorder-focused settings usually include multidisciplinary teams including medical doctors, nutritionists, and psychologists, our diagnoses were made by psychologists alone. Therefore, we were not able to collect and interpret the data necessary to assess A1–A3 (i.e., the weight/nutrition consequences) independently. During the intake evaluation, clinicians reviewed outside records (e.g., after-visit summaries, communications with physicians) and interviewed patients/parents to gather information about growth trajectory, current body mass index (BMI), medical history,

supplement use, and verbal report of physicians' concerns and recommendations at the most recent medical visit. All patients were required to have had recent contact (e.g., within a year) with a primary care provider or other physician.

Although information about weight/nutritional symptoms of ARFID was collected, the clinical ARFID diagnosis was made based primarily on evidence of psychosocial impairment; considerations about strict versus expansive applications of Criteria A1–A3 were not part of the clinical diagnosis.

#### 2.2.2 | Chart review: Strict versus expansive definitions of ARFID criteria A1–A3—

All patients were judged by the treating clinician to meet ARFID criteria based on psychosocial impairment, relying on information collected using the ADSI and outlined in Table 1. The authors reviewed the information from the intake evaluation report to confirm the ARFID diagnosis. To address our secondary study aim, we coded the information available supporting the presence of diagnostic criteria A1–A3, and developed strict versus expansive definitions of these criteria. Strict criteria required evidence from outside records of (a) growth faltering, weight loss, or growth stunting attributed to the eating disturbance, (b) evidence of a specific nutritional deficiency based on bloodwork (e.g., vitamin, mineral, or protein deficiencies) or nutritional analysis of the patients' diet indicating that it lacked a dietary source of specific nutrient, or (c) use of supplements to compensate for an identified nutritional deficiency.

More expansive criteria included patient reports of physician concerns with weight/nutrition, patients' and families' own reported concerns, use of supplements without evidence of a specific nutritional deficiency, and patient/referring clinician report that restrictive eating interfered with adherence to nutritional recommendations for weight management or management of a chronic medical condition. See Table 1 for strict and expansive criteria.

#### 2.2.3 | Chart review: Onset, trajectory, illness duration—

During the intake interview, clinicians collected information on the age of onset of notable selective eating. For the current chart review, we coded age of onset into the following categories: birth/early infancy, 9–24 months, toddler (ages 2–3), preschool (ages 4–5), or later. For the chart review, trajectory was defined as whether the child (a) had ever stopped eating (“selected out”) a previously preferred food or (b) had ever added a new food to their diet since first being identified as a picky eater. These features were chosen in an effort to describe the degree of restrictiveness in patients' diets. Illness duration (determined by calculating age of onset to current age) reflected how long the patient had been identified as being more selective/neophobic than other children (i.e., a “picky eater”), but not necessarily the duration of ARFID symptoms (i.e., weight, nutritional, or psychosocial consequences of selective/neophobic eating).

### 2.3 | Data analysis

Descriptive data and summary statistics are presented for both aims. Chi square analyses with Cramer's V effect sizes were used for analyses involving dichotomous categories and variables, including trajectory of eating restrictions (whether patients who have a history of

eliminating previously preferred foods are less likely to have added new foods to their diet; Aim 1), and to compare Criterion A diagnostic groups on dichotomous demographic and clinical variables (Aim 2). For continuous demographic/clinical variables (age, illness duration), one-way ANOVAs, with $\eta^2$ effect sizes, were used to compare three Criterion A groups. Student's *t*-test and Cohen's *d* were used for analyses comparing two groups (interference only vs. strictly and expansively defined weight/nutrition).

## 3 | RESULTS

### 3.1 | Aim 1: Quantitative descriptive psychopathology

Twenty-two patients with selective/neophobic ARFID diagnoses were identified. This represented approximately 5.5% of the approximately 400 intakes conducted over the 4-year period covered by the chart review. A majority of patients were referred by a primary care provider or other physician (31.8%) or following an evaluation by a pediatric feeding clinic (31.8%) or adult outpatient eating disorder clinic (9.1%). An additional 9.1% were referred by outpatient psychologists and 18.2% were self-referred.

**3.1.1 | Age, gender and ethnicity—**Of the 22 patients identified with an ARFID diagnosis with a selective/neophobic eating presentation, four (18.2%) were female and 18 (81.8%) were male. Thirteen were children ages 4–11 (59.1%), five were adolescents ages 13–17 (22.7%), and four were young adults ages 19–25 (18.2%). All but two identified as white and non-Hispanic; both were from Southeast Asian backgrounds.

**3.1.2 | Comorbidities—**Fifteen patients (68.2%) were given one or more DSM-5 diagnoses in addition to ARFID. These included generalized anxiety disorder ($n = 6$), social anxiety disorder ($n = 2$), obsessive compulsive disorder ($n = 3$), unspecified anxiety disorder ($n = 3$), tic disorder ($n = 2$), major depressive disorder ($n = 3$), unspecified mood disorder ($n = 1$), and attention deficit/hyperactivity disorder ($n = 3$). One patient had a historical diagnosis of a learning disorder. Five patients (22.7%) had comorbid medical conditions: Type I diabetes ($n = 1$), asthma ($n = 2$), chronic constipation ($n = 1$), gastroesophogeal reflux ($n = 1$), and polycystic ovarian syndrome ($n = 1$). Six of the 22 patients (27.2%) were in the overweight or obese weight range (BMI > 85th and 95th percentiles for age, respectively), whereas two (9.1%) were in the underweight range (BMI < 5th percentile for age). See Table 3 for each patient's DSM-5 and medical diagnoses.

**3.1.3 | Age of onset—**The modal age of onset of feeding problems was between ages 2–3 years, during the transition to table food and self-feeding ($n = 10$, 45.4%). Seven patients (31.8%) reported onset around age one, with the transition to more textured pureed food, finger foods, and/or table foods. Three (13.6%) reported onset at four or five during the transition to preschool and eating outside of the family environment, and two (9.1%) had had feeding problems since birth. None reported onset of selective/neophobic eating after age 5.

**3.1.4 | Trajectory—**Twelve patients (54.5%) had added new foods to their diet since their symptoms were identified. Eight patients (36.4%) had stopped eating one or more previously preferred foods. Patients who had selected out foods appeared to be less likely to

add new foods: 37.5% of those who had stopped eating a food had added new foods versus 62.5% who had not. This difference in proportions was not statistically significant, although it was associated with a small-moderate effect size ($\chi^2[1] = 1.47$, $\phi = 0.26$, $p = .23$).

## 3.2 | Aim 1: Qualitative descriptive psychopathology

**3.2.1 | Symptom presentations—**By self- or parent-report, all patients were generally unwilling to try any new food at all, tolerating small amounts of new/non-preferred foods infrequently and with distress. All patients were rigid about how their preferred foods were prepared and presented (e.g., brand specificity, accepting only certain shapes or size of food), and 11 (50%) described examining almost all food they ate and rejecting preferred foods with visual differences (e.g., chicken nuggets with brown spots) or based on smell. Patients described their reaction to trying new or non-preferred foods as primarily one of disgust, rather than fear/anxiety, which abated quickly when the expectation to eat was withdrawn.

Patients varied in their enthusiasm for eating in general, and the degree to which they felt motivated to eat preferred foods by hunger or enjoyment. A total of seven patients (four children, one adolescent, two adults, 31.8%), all male, were diagnosed with significant appetite/interest symptoms as co-primary with selectivity/neophobia. The four children with the combined presentation were described as distractible and disruptive during meals, were reluctant to come to meals even when preferred foods were being offered, and consistently prioritized other activities over eating. Their portion sizes were small even when eating highly preferred foods, and they complained of being full after eating relatively little (i.e., early satiety). They required a high degree of prompting and adult supervision at meals, and preferred to graze on small amounts of food between meals.

The adolescent and young adult patients with the combined presentation reported rarely feeling subjective hunger and experiencing early satiety when eating. Two reported further appetite suppression when anxious or distressed. All three were described or described themselves as having been distractible and/or disruptive during meals as children, and all three prioritized other activities over eating, often forgot to eat, and regarded eating as a chore.

**3.2.2 | Psychosocial interference—**All patients (100%) experienced impairment in family functioning (e.g., accommodation and family conflict), 10 (45.5%) in occupational functioning, and nine (40.9%) in social functioning (Table 3).

Family accommodation usually involved preparing separate meals for the patient and/or planning family meals around the patients' preferences, avoiding eating outside the home, only eating at specific restaurants, or bringing separate meals to social occasions. The parents of nine of the 13 school-aged children no longer regularly required their children to try new foods because of the anxiety and oppositional behavior it produced. All parents of adolescent patients described conflict with their children at meal times over trying new foods or eating non-preferred foods, but they no longer exercised much control over their food choices. The four adult patients described ongoing mealtime conflict with their parents or extended families.

In terms of distress, most patients ($n$ = 17, 77.3%) reported anticipatory anxiety about their disgust reaction to new/non-preferred foods (e.g., fear that they would gag or vomit, or be embarrassed if others noticed their reaction to food). These patients also articulated worry and distress related to their narrow dietary range that extended beyond the immediate experience of eating a non-preferred food. All adolescent and adult patients reported worries about the health implications of their diet, social worries about being perceived as rude or immature, and feelings of shame about their "unhealthy" and/or "childish" eating habits. School-aged patients did not tend to report worrying about the future implications of their diets (although parents of 10 of the 13 child patients reported having significant worries about their children's future health and social functioning); however, eight of the 13 child patients reported social worries and anxiety about being hungry in situations where preferred foods were not available. Five patients (22.7%, boys ages 4–8) did not experience any anxiety or distress about eating beyond their immediate aversive reaction to new or non-preferred foods, per their own and their parents' reports.

### 3.3 | Aim 2: Differences between patients meeting different A-criteria

Using strict criteria to define A1–A3, only four patients had a documented history of weight loss/growth faltering or physician-recommended nutritional supplement use (18.2%). No patient had a medical history indicating a specific nutrient deficiency. However, when more expansive definitions were used for weight/growth concerns, probable nutritional deficiencies, and nutritional supplementation, an additional 11 patients met criteria (50.0%); seven patients did not meet weight/nutrition criteria using either strict or expansive definitions (31.8%). All 22 patients were judged to meet A4, psychosocial interference. See Table 2 for proportion of patients meeting each criterion, and see Table 3 for information on criteria met for each patient, and the support from medical records and patient/parent report for ruling out or applying criteria A1–A3.

**3.3.1 | Diagnostic criterion A group comparisons—**Patients were grouped into three categories based on which A-criteria they met. All patients met criteria for A4-psychosocial interference (which is defined with enough flexibility to not require separate strict/expansive criteria). Those who met A1–A3 based on strict weight/nutrition criteria ($n$ = 4) were compared to those who met A1–A3 based on expansive weight/nutrition criteria ($n$ = 11) and to those who were diagnosed with ARFID based only on psychosocial impairment ($n$ = 7). The number and nature of A criteria met (e.g., A4-only, strict vs. expansive A1–A3) was not significantly associated with any demographic or clinical variables other than being diagnosed with a combined ARFID presentation. However, there was a five-year age difference between the A4-only patients and those meeting either strictly or expansively defined criteria A1–A3; when the two A1–A3 groups were combined into a single group ($n$ = 15, $M_{age}$ = 13.53 $sd$ = 6.49), a Student's $t$-test revealed a significant age difference, associated with a large effect size $t(19.77) = 2.52$, $d = 1.07$, $p = .02$.

## 4 | DISCUSSION

This study is the first to describe the clinical characteristics of outpatients diagnosed with the selective/neophobic presentation of ARFID, and the first to explore different ways of

operationalizing the core diagnostic criteria related to weight and nutrition. It had two aims: (a) To describe the clinical characteristics, including patient demographics, illness trajectory, degree of dietary restrictiveness, and patients' qualitative descriptions of the nature of their eating-related distress and anxiety and family accommodation, and (b) to compare patients meeting ARFID criteria based on psychosocial impairment alone versus strictly and expansively applied weight and nutrition criteria (Table 4).

Patients diagnosed with the selective/neophobic presentation of ARFID were predominantly white and male, predominantly school-aged, and the majority reported normal weight and growth, with more patients reporting overweight/obesity than underweight. The male predominance among ARFID patients was greater than that of the clinic as a whole during 3 of the 4 years covered by this chart review, where 58% of patients with anxiety and OC-spectrum diagnoses were male (Zickgraf & Elkins, 2018). In every case, the onset of selective eating was before age five; the modal age of onset was during the toddler years. Patients described their response to new/non-preferred food as disgust/aversion, although most also had secondary anxiety about the experience of the disgust response as well as more general eating-related anxiety, worry, and shame/embarrassment. Approximately equal numbers of patients reported a history of selecting a formerly preferred food out of the diet and adding a new preferred food to the diet. A subset of patients also reported behaviors/experiences consistent with the appetite/interest presentation of ARFID. These patients reported early satiety, prioritizing other activities over eating, and being disruptive and/or distractible during meals.

With respect to the second aim, there was little evidence that having weight/nutritional symptoms of ARFID (broadly or narrowly defined) was associated with a more severe or complex presentation in terms of psychiatric comorbidities, illness duration, or dietary restrictiveness. Only having symptoms of the appetite/interest presentation, and older age were associated with meeting weight/nutritional criteria versus A4-only.

Having more than one avoidant/restrictive eating pattern might increase impairment generally, but it might also be the case that the selective/neophobic presentation of ARFID is less likely to be associated with weight loss, growth problems, or gross nutritional deficiencies because selective eating results in inadequate dietary variety, but not necessarily inadequate caloric intake. In a food environment where many common foods such as dairy and grain products are nutritionally enriched, selective eaters may be able to meet many of their nutritional needs within their narrow diets. However, there is evidence to suggest that by adulthood, eating a narrow diet, often lacking in an entire food category (e.g., fruits and vegetables) increases the risk of morbidity from cardiovascular disease, some cancers, and metabolic diseases, and of all-cause mortality (Kant, Schatzkin, Harris, Ziegler, & Block, 1993).

Meeting weight/nutrition criteria was associated with older age by approximately 5 years. Psychosocial impairment might be an early sign of ARFID in children with selectivity/neophobia, with weight/nutritional consequences developing later, particularly as parents exert less control over their children's food environments and eating behavior. It may also be the case that higher energy demands during puberty cannot be met by the same restrictive

diets that were sufficient earlier in childhood. In this sample, all patients older than 15 met either strictly or expansively defined weight/nutritional criteria for ARFID. Addressing selective/neophobic eating behaviors before the development of weight/nutritional, or even psychosocial, consequences, might help to prevent later poor health outcomes.

In outpatient mental health settings where evaluation and treatment is conducted entirely by psychologists or other mental health specialists, the ability to diagnose ARFID based on weight/nutritional consequences is dependent on the quality and nature of outside evaluation. Our assessments relied on patients' secondhand reports from physicians and other specialists, and where possible, review of outside records or consultations with outside providers. Based on this information, only a minority met strictly defined weight/nutrition criteria. However, when patients' subjective concerns about weight and growth, self-directed use of dietary supplements, and difficulty adhering to medically recommended dietary interventions were taken into account, the majority experienced some weight/nutritional consequences. Had these families pressed for a multidisciplinary evaluation, more subtle nutritional inadequacies or growth problems might have been identified. In applying the criteria for weight/nutritional consequences, providers should take into account families' and patients' subjective concerns about weight and nutrition, as well as the potential impact of ARFID eating restrictions on dietary management of health conditions.

In our sample, more patients were in the overweight or obese weight ranges than in the underweight range. Although overweight/obese weight status itself is not indicative of a nutritional problem nor necessarily caused by selective/neophobic eating, several patients reported that restrictive eating impeded weight loss efforts because they were unable to substitute “healthier” foods into their diets. Given the high prevalence of obesity and related physical comorbidities, more research on the features and potential health consequences of ARFID-like eating restrictions in individuals with overweight and obesity is warranted. Previous research on the characteristics of ARFID has mostly described how ARFID presents in children/young adults with significant weight loss (e.g., Fisher et al., 2014; Nicely et al., 2014; Norris et al., 2014, 2018). Individuals with highly selective diets with overweight/obesity might be less likely than peers to be recognized by families and physicians as having a potential eating/feeding. There is a need for future research exploring primary care providers' perceptions about selective eating and their practice with regard to assessing their patients' eating behaviors and reasons for choosing or avoiding foods.

A majority (68%) of patients met criteria for a comorbid mood or anxiety disorder. It is possible that referral bias might have contributed to the high rate of comorbidity. However, the high prevalence of internalizing comorbidity is consistent with previous findings that in community samples, selective/neophobic eating is correlated with anxiety symptoms (e.g., Taylor et al., 2015), and children with selective/neophobic eating are more likely to develop both mood and anxiety disorders (Zucker et al., 2015). Although more research on ARFID and its comorbidities is needed, it seems likely that treatments for the selective/neophobic subtype of ARFID will have to account for the management of co-occurring anxiety and mood symptoms.

A limitation of the present study is that we did not have access to validated psychometric measures of psychosocial interference or the severity of anxiety, mood, or behavioral comorbidities that might have been able to show more fine-grained group differences. In addition, this small sample was underpowered to identify small or moderate group differences; even some moderate-large effect sizes were nonsignificant in the present sample, highlighting the need for future research in this population before firm conclusions can be drawn about clinical differences between outpatients with and without weight/nutritional impairment from selective/neophobic eating. Finally, because the ARFID diagnosis was made as part of clinic practice, and not as part of prospective research or this chart review, we do not have information regarding inter-rater reliability for the ARFID diagnosis.

Whereas most tertiary ED clinic assessments are conducted by teams including psychologists/social workers, psychiatrists, physicians, and nutritionists, our evaluations were conducted only by psychologists. Although the lack of multidisciplinary assessment might be seen as a limitation of this study, it also reflects normal clinical practice. It is unclear whether there is enough value to a multidisciplinary assessment of the predominantly selective/neophobic presentation of ARFID to outweigh the resource demand and burden to patients when primary care providers do not have concerns about growth or nutrition. Because psychologists are not usually qualified to assess growth and nutrition independently, we recommend that outpatients with the selective/neophobic presentation of ARFID have regular appointments with a primary care provider. Any concerns about growth or nutrition should be evaluated by a physician or by a multidisciplinary eating disorder/feeding disorder team before outpatient ARFID treatment begins.

Selective/neophobic eating emerges early in life and remains common across the lifespan (Kauer et al., 2015; Taylor et al., 2015). When concerns are raised with pediatricians, the response is often to reassure parents that selective/neophobic eating is developmentally normative and that children “grow out of it” (McKee, Maher, Deen, & Blank, 2010; Zucker et al., 2015). Our results suggest that, for some children, this is not accurate, and selective/neophobic eating persists to cause substantial impairment. Our findings add to a growing body of evidence that childhood selective/neophobic eating is not necessarily benign, and that particularly when families are concerned about a child's restrictive eating, primary care providers and other healthcare professionals should consider interventions aimed at increasing dietary flexibility and variety before the potential development of ARFID symptoms. Doing so in early or middle childhood might help to prevent the development of weight/nutritional consequences of restrictive eating later in childhood, adolescence, and young adulthood.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## REFERENCES

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders. Arlington, VA: American Psychiatric Publishing. 10.1176/appi.books.9780890425596

Brown TA, & Barlow DH (2014). Anxiety and Related Disorders Interview Schedule for DSM-5 (ADIS-5L)-Lifetime Version: Client Interview Schedule. Oxford: Oxford University Press.

Fisher MM, Rosen DS, Ornstein RM, Mammel KA, Katzman DK, Rome ES, … Walsh BT (2014). Characteristics of avoidant/restrictive food intake disorder in children and adolescents: A "new disorder" in DSM-5. Journal of Adolescent Health, 55(1), 49–52. 10.1016/j.jadohealth.2013.11.013

Forman SF, McKenzie N, Hehn R, Monge MC, Kapphahn CJ, Mammel KA, … Rome ES (2014). Predictors of outcome at 1 year in adolescents with DSM-5 restrictive eating disorders: Report of the national eating disorders quality improvement collaborative. Journal of Adolescent Health, 55(6), 750–756. 10.1016/j.jadohealth.2014.06.014

Kant AK, Schatzkin A, Harris TB, Ziegler RG, & Block G (1993). Dietary diversity and subsequent mortality in the first national health and nutrition examination survey epidemiologic follow-up study. The American Journal of Clinical Nutrition, 57(3), 434–440. 10.1093/ajcn/57.3.434 [PubMed: 8382446]

Kauer J, Pelchat ML, Rozin P, & Zickgraf HF (2015). Adult picky eating. Phenomenology, taste sensitivity, and psychological correlates. Appetite, 90, 219–228. 10.1016/j.appet.2015.03.001 [PubMed: 25747855]

Kaufman J, Birmaher B, Brent D, Rao UMA, Flynn C, Moreci P, … Ryan N (1997). Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS-PL): Initial reliability and validity data. Journal of the American Academy of Child & Adolescent Psychiatry, 36(7), 980–988. 10.1097/00004583-199707000-00021 [PubMed: 9204677]

Kurz S, Van Dyck Z, Dremmel D, Munsch S, & Hilbert A (2015). Early-onset restrictive eating disturbances in primary school boys and girls. European Child & Adolescent Psychiatry, 24(7), 779–785. 10.1007/s00787-014-0622-z [PubMed: 25296563]

Kurz S, Van Dyck Z, Dremmel D, Munsch S, & Hilbert A (2016). Variants of early-onset restrictive eating disturbances in middle childhood. International Journal of Eating Disorders, 49(1), 102–106. 10.1002/eat.22461

McKee MD, Maher S, Deen D, & Blank AE (2010). Counseling to prevent obesity among preschool children: Acceptability of a pilot urban primary care intervention. The Annals of Family Medicine, 8(3), 249–255. 10.1370/afm.1057 [PubMed: 20458109]

Nicely TA, Lane-Loney S, Masciulli E, Hollenbeak CS, & Ornstein RM (2014). Prevalence and characteristics of avoidant/restrictive food intake disorder in a cohort of young patients in day treatment for eating disorders. Journal of Eating Disorders, 2(1), 21. 10.1186/s40337-014-0021-3 [PubMed: 25165558]

Norris ML, Robinson A, Obeid N, Harrison M, Spettigue W, & Henderson K (2014). Exploring avoidant/restrictive food intake disorder in eating disordered patients: A descriptive study. International Journal of Eating Disorders, 47(5), 495–499. 10.1002/eat.22217

Norris ML, Spettigue W, Hammond NG, Katzman DK, Zucker N, Yelle K, … Obeid N (2018). Building evidence for the use of descriptive subtypes in youth with avoidant restrictive food intake disorder. International Journal of Eating Disorders, 51(2), 170–173. 10.1002/eat.22814

Taylor CM, Wernimont SM, Northstone K, & Emmett PM (2015). Picky/fussy eating in children: Review of definitions, assessment, prevalence and dietary intakes. Appetite, 95, 349–359. 10.1016/j.appet.2015.07.026 [PubMed: 26232139]

Thomas JJ, Lawson EA, Micali N, Misra M, Deckersbach T, & Eddy KT (2017). Avoidant/restrictive food intake disorder: A three-dimensional model of neurobiology with implications for etiology and treatment. Current Psychiatry Reports, 19(8), 54. 10.1007/s11920-017-0795-5 [PubMed: 28714048]

Walsh BT (2018). Diagnostic categories for eating disorders: Current status and what lies ahead. Psychiatric Clinics.

Zickgraf HF, & Elkins A (2018). Sensory sensitivity mediates the relationship between anxiety and picky eating in children/adolescents ages 8–17, and in college undergraduates: A replication and age-upward extension. Appetite, 128, 333–339. 10.1016/j.appet.2018.06.023 [PubMed: 29928938]

Zickgraf HF, Franklin ME, & Rozin P (2016). Adult picky eaters with symptoms of avoidant/restrictive food intake disorder: Comparable distress and comorbidity but different eating

behaviors compared to those with disordered eating symptoms. Journal of Eating Disorders, 4(1), 26. 10.1186/s40337-016-0110-6 [PubMed: 27800160]

Zickgraf HF, Lane SL, Essayli JH, & Ornstein RM (2019). Further support for diagnostically meaningful ARFID subtypes in an adolescent medicine partial hospitalization program. International Journal of Eating Disorders. (in press).

Zucker N, Copeland W, Franz L, Carpenter K, Keeling L, Angold A, & Egger H (2015). Psychological and psychosocial impairment in preschoolers with selective eating. Pediatrics, 136(3), e582–e590. 10.1542/peds.2014-2386 [PubMed: 26240213]

## TABLE 1

Operationalizing ARFID core diagnostic criteria A1–A3

| | Strict | Expansive |
|---|---|---|
| A1: Weight loss, growth faltering | *Outside records documenting:*<br>• Stunted growth,<br>• Growth faltering, and/or<br>• Weight loss<br>*…attributed to the eating disturbance* | *Outside records documenting:*<br>• Small stature with stable growth/no documented history of stunting or faltering<br>• Low weight without stunting, underweight, or weight loss/growth faltering<br>• Difficulty gaining weight<br>*…attributed to the eating disturbance* |
| A2: Nutritional deficiency | *Outside records documenting that…*<br>• Patient is unable to meet nutritional needs with food alone and is not using supplements or despite supplement use<br>*…attributed to the eating disturbance*<br>*Determined by nutritional analysis of diet or results of bloodwork* | *Outside records documenting that…*<br>• Diet interferes with nutritional management of a medical condition (e.g., weight loss, gastroesophageal reflux, type I diabetes)<br>*Or…*<br>• PCP recommended supplements but patient refuses<br>• PCP expresses general concerns about nutritional status based on restricted range/volume, but no specific deficiencies identified |
| A3: Supplement dependence | *Outside records documenting that…*<br>• Patient requires nutritional supplements (including boost and other commercial supplements, homemade supplements, supplementation with high-calorie preferred foods, or calorie-boosting) to meet nutritional needs<br>*…attributed to the eating disturbance*<br>*Determined by nutritional analysis of diet or results of bloodwork* | • Use of fiber supplements or multivitamins to compensate for perceived deficiencies<br>• Use of nutritional supplements without evidence of dependence |
| A4: Psychosocial interference | *Evidence from clinical interview for one or more of the following*<br>• Accommodation (preparing a different meal or preparing foods in a specific way, providing specific brands of food) at one or more meals/day<br>• Interference (avoiding activities, extra preparation or putting off eating to be able to participate) at least once/week<br>• Distress (anxiety, guilt, embarrassment, parents: Conflict with other adults/other parent) related to eating at least once/week | No expansive criteria were developed/used for A4 |

*Note.* PCP = Primary care provider. Information summarized in Table 1 was collected using the ARFID Diagnostic and Severity Interview, an author-developed semistructured interview, or obtained from review of outside records. The distinction between strict and expansive criteria for A1–A3 was subsequently developed for the current chart review.

## TABLE 2

Percent of patients meeting A-criteria based on strict versus expansive definitions

| | Strict | Expansive | Total |
|---|---|---|---|
| A1: Weight loss or growth faltering | 3 (13.6%) | 4 (18.2%) | 7 (31.8%) |
| A2: Nutritional deficiency | 0 (0.0%) | 8 (36.4%) | 8 (36.4%) |
| A3: Dependence on supplements | 2 (9.1%) | 4 (18.2%) | 6 (27.3%) |
| A4: Psychosocial interference | N/A | N/A | 22 (100%) |
| One criterion (A4 only) | 18 (81.8%) | 7 (31.8%) | 7 (31.8%) |
| Two criteria | 3 (13.6%) | 8 (36.4%) | 8 (36.4%) |
| Three criteria | 1 (4.5%) | 7 (31.8%) | 7 (31.8%) |
| Four criteria | 0 | 0 | 0 |

*Note.* N/A = Not applicable (There were no strict vs. expansive criteria for A4).

**TABLE 3**

Strict versus expansive ARFID criteria

| Age/ gender | Referral | Criteria met: Strict (expansive) | A1: Weight loss or growth faltering | A2: Nutritional deficiency | A3: Supplement dependence | A4. Psychosocial impairment | Psychological comorbidity | Medical comorbidity | ARFID presentation |
|---|---|---|---|---|---|---|---|---|---|
| Impairment only (A4): *n* = 7 | | | | | | | | | |
| 1. 4/M | Feeding clinic | A4 | Ruled out; Normal BMI, stable growth | Ruled out | Ruled out | Family | None | None | Selective |
| 2. 5/M | Feeding clinic | A4 | Ruled out; stable growth trajectory | Ruled out | Ruled out | Family | OCD, GAD, ADHD | None | Selective |
| 5. 7/F | Feeding clinic | A4 | Ruled out; BMI% = 50, stable growth trajectory | Ruled out | Ruled out | Family, social, occupational | GAD | None | Selective |
| 8. 8/M | Outside psychologist | A4 | Overweight | No PCP concern | No PCP concern | Family | Tics, ADHD | None | Selective |
| 12. 10/F | Self-referred[a] | A4 | No PCP concern | No PCP concern | No PCP concern | Family, social | GAD, OCD, tics | Asthma | Selective |
| 13. 11/M | PCP | A4 | No PCP concern | No PCP concern | No PCP concern | Family | Unspecified anxiety disorder | None | Selective |
| 14. 13/M | PCP | A4 | Overweight | No PCP concern | No PCP concern | Family, social, occupational | MDD, LDs | None | Selective |
| Strict weight/nutrition criteria (A1–A3): *n* = 4 | | | | | | | | | |
| 3. 6/M | Feeding clinic | A1, A3, A4 | Small stature, history of BMI < 5th %. At intake BMI% = 15, stable growth trajectory since age 3 | Ruled out | Supplement use (Pediasure 1×/day) | Family, social, occupational | GAD, SAD | None | Selective, appetite/ interest |
| 16. 14/M | Self-referred | A1, A4 (A2) | BMI % < 5 | PCP concerns but no evidence of deficiency | PCP recommended, patient refuses | Family, occupational | SAD | None | Selective |
| Age/ gender | Referral | Criteria met: Strict (expansive) | A1: Weight loss or growth faltering | A2: Nutritional deficiency | A3: Supplement dependence | A4. Psychosocial impairment | Psychological comorbidity | Medical comorbidity | ARFID presentation |
| 17. 15/M | PCP, endocrinologist | A1, A4 (A2) | Evidence of stunting: Growth hormone deficiency ruled out BMI % = 9th | PCP concerns but no evidence of deficiency | PCP recommended, patient refuses or uses sporadically | Family | GAD | None | Selective, appetite/ interest |
| 19. 19/M | PCP | A1, A3, A4 | BMI = 16 (<5%) consistent growth curve, no evidence | Ruled out | Boost high protein 2×/day | Family, social, occupational | ADHD | None | Selective, appetite/ interest |

| Age/ gender | Referral | Criteria met: Strict (expansive) | A1: Weight loss or growth faltering | A2: Nutritional deficiency | A3: Supplement dependence | A4. Psychosocial impairment | Psychological comorbidity | Medical comorbidity | ARFID presentation |
|---|---|---|---|---|---|---|---|---|---|
| | | | of stunting: Tall, low weight | | | | | | |
| Expansive weight/nutrition criteria (A1–A3): *n* = 11 | | | | | | | | | |
| 4. 7/M | Feeding clinic | A4 (A1, A3) | Small stature, BMI % = 14, consistent growth trajectory | Ruled out | Refuses supplements; relies on ice cream for calories at feeding clinic recommendation | Family | None | None | Selective, appetite/ interest |
| 6. 7/M | Feeding clinic | A4 (A2) | Overweight | Per feeding and diabetes care team: Diet interferes with weight management and type I diabetes | Ruled out | Family | None | Type I diabetes | Selective |
| 7. 7/M | PCP | A4 (A3) | BMI% = 75th, consistent growth trajectory, no PCP concern | No PCP concern | No PCP concern (given protein bars because other food sources of protein are non-preferred) | Family | Unspecified anxiety and mood disorders | None | Selective |
| 9. 9/M | PCP | A4 (A1) | Tall, thin-appearing BMI % = 5th, consistent growth, no stunting | No PCP concern | No PCP concern | Family, occupational | None | None | Selective, appetite/ interest |
| 10. 9/M | Feeding clinic | A4 (A2) | Overweight | Per feeding clinic: Diet interferes with weight management | Ruled out | Family, social, occupational | GAD | Asthma | Selective |
| 11. 10/M | PCP and GI | A4 (A2, A3) | No PCP concerns | Per GI: Diet contributes to constipation | Fiber supplements | Family, social, occupational | None | Chronic | constipation |
| Selective | | | | | | | | | |
| 15. 13/M | Self-referred | A4 (A2) | Small stature; no documented evidence of stunting or underweight | PCP concerns but no evidence of deficiency | PCP recommended, patient refuses | Family | Unspecified anxiety | None | Selective |
| 18. 16/F | PCP | A4 (A2) | Family concerned about stunting due to short stature, but not known whether height is attributable to ARFID; overweight BMI | PCP concerns but no evidence of deficiency | PCP recommended, patient refuses | Family | OCD | History of failure to thrive (preterm birth) | Selective |
| 20. 22/M | Self-referred | A4 (A2) | No PCP concern | No specific PCP concerns raised but patient | No PCP concern, but uses multivitamins and occasionally | Family, social | MDD | None | Selective, appetite/ interest |

| Age/ gender | Referral | Criteria met: Strict (expansive) | A1: Weight loss or growth faltering | A2: Nutritional deficiency | A3: Supplement dependence | A4. Psychosocial impairment | Psychological comorbidity | Medical comorbidity | ARFID presentation |
|---|---|---|---|---|---|---|---|---|---|
| | | | | believes present given diet | supplements or protein shakes | | | | |
| Age/ gender | Referral | Criteria met: Strict (expansive) | A1: Weight loss or growth faltering | A2: Nutritional deficiency | A3: Supplement dependence | A4. Psychosocial impairment | Psychological comorbidity | Medical comorbidity | ARFID presentation |
| 21. 24/M | Outpatient weight and eating disorders psychologist | A4 (A1, A2, A3) | BMI = 19.5 tall, low weight – Difficulty gaining and building muscle | No PCP concerns, but patient believes present | No PCP concern, but patient drinks large amounts of milk for calories and minerals (multivitamins) | Family, social, occupational | GAD | None | Selective, appetite/ interest |
| 22. 25/F | Outpatient weight and eating disorders psychologist via PCOS care team | A4 (A2) | Obese BMI | Per PCOS team and GI: Diet interferes with weight management, triggers GERD | No PCP concern (multivitamins); patient refusing GI surgery due to concerns about liquid diet (refuses supplements) | Family, occupational | MDD | Polycystic ovarian syndrome, GERD | Selective |

*Note.* FSC = Feeding and Swallowing Clinic, PCP = Primary care physician, GYN = Gynecologist, GI = Gastroenterologist, ED clinic = Eating disorders clinic, GAD = Generalized anxiety disorder, SAD = Social anxiety disorder, MDD = Major depressive disorder, ADHD = Attention deficit/hyperactivity disorder, LD = Learning disability, GERD = Gastroesophageal reflux disease, PCOS = Polycystic ovarian syndrome.

[a]Not referred for feeding problems.

**TABLE 4**

Comparison of patient demographics and clinical characteristics based on A-criteria met

| | | Psychosocial impairment (A4) only | Strict criteria: A1–A3 | Expansive criteria: A1–A3 | $\chi^2(2)$, $\phi$ |
|---|---|---|---|---|---|
| | *n* | 7 (%) | 4 (%) | 11 (%) | |
| Gender (female) | 4 | 2 (28.6%) | 0 (0.0%) | 2 (18.2%) | 1.40, 0.25 *ns* |
| Combined presentation (selective/neophobic and appetite/interest) | 7 | 0 (0.0%) | 3 (75.0%) | 4 (36.4%) | 6.81, 0.56 ** |
| Selected out preferred foods | 8 | 1 (14.3%) | 3 (75.0%) | 4 (36.4%) | 4.06, 0.43 *ns* |
| Incorporated new foods | 12 | 4 (57.1%) | 2 (50.0%) | 6 (54.5%) | 0.05, 0.05 *ns* |
| Psychiatric comorbidity | 15 | 6 (85.7%) | 4 (100%) | 5 (45.5%) | 5.48, 0.50 *ns* |
| Medical comorbidity | 5 | 1 (14.3%) | 0 (0.0%) | 4 (36.4%) | 2.63, 0.35 *ns* |
| | *Range* | *M*(*SD*) | | | *t*(21), *d* |
| Age | 4–25 | 8.29 (3.25) | 13.50 (5.45) | 13.55 (7.08) | 1.91, 0.16 *ns* |
| Duration of illness (proportion of years of life with symptoms) | 37%-100% | 73.41% (20.68) | 88.43% (5.40) | 82.61% (10.03) | 1.70, 0.15 *ns* |

* $p < 0.05$.

** $p < 0.01$.