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Validating Online Parent- and Self-Report Screening Methods for Avoidant/Restrictive Food Intake Disorder

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Abstract

Objective: Although several assessments have been developed to diagnose or measure avoidant/restrictive food intake disorder (ARFID) symptoms, few studies have validated these tools in non-clinical and adult samples. This study explored the validity of two self- and parent/guardian-report ARFID screening measures in identifying adults and children who may have ARFID within a large community sample.

Method: Fifty participants (divided into two groups: 25 adults and 25 parents/guardians of children) were selected from the ARFID-Genes and Environment study, which enrolled over 3,000 adults and parents/guardians of children who screened positive for ARFID on either the Pica, ARFID, and Rumination Disorder Interview–ARFID Questionnaire (PARDI-AR-Q) or the Nine Item ARFID Screen (NIAS) self- and parent/guardian-report measures. Participants then completed the ARFID portion of the Pica, ARFID, and Rumination Disorder Interview (PARDI) to determine ARFID diagnosis.

Results: Correlations between the PARDI-AR-Q and PARDI (r =.31-.67) were weaker than the correlations between the NIAS and PARDI (r=.53-.64) in both groups. The diagnostic positive predictive value for the PARDI-AR-Q was numerically higher (adults=55.0%; parents/guardians=76.0%) than the NIAS (adults=45.8%; parents/guardians=64.0%). Most PARDI-AR-Q dimensions and all NIAS dimensions were significant predictors of their corresponding PARDI dimension in both groups.

Discussion: The PARDI-AR-Q more accurately identified adults and children with ARFID, whereas the NIAS was a better estimator of ARFID symptoms. These findings provide partial support for using these self- and parent/guardian-report screeners. Results highlight the need to better understand diagnostic presentations of ARFID within community samples, particularly in adults, and to refine these tools within those populations.

Key terms:

ARFID; appetite; fear; picky eating; eating disorders; clinical assessment

Introduction

Avoidant/restrictive food intake disorder (ARFID) is a distinct, complex eating disorder affecting approximately 2–5% of the general population (American Psychiatric Association [APA], 2013; Dinkler et al., 2021). Added to the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (*DSM-5*) in 2013, ARFID imposes significant emotional, interpersonal, and financial burdens on those affected (APA, 2013; Dinkler et al., 2021). In the past decade, seven assessments (three self-report and four interviews) have been developed to diagnose or measure ARFID symptoms (Kambanis & Thomas, 2023). However, few studies have used these instruments to measure ARFID symptoms in general population samples (Hay et al., 2017; Hilbert et al., 2021; Van Buuren et al., 2023) and none used an interview format to establish diagnosis. Further, research has predominantly focused on pediatric and adolescent populations (Archibald & Bryant-Waugh, 2023). More research across all ages is needed to better understand those with ARFID in non-clinical samples. Thus, the purpose of this study was to document the validity of two self- and parent-report ARFID measures in identifying adults and children who may have ARFID using a large-scale study.

The *DSM-5* has four criteria (A-D) for an ARFID diagnosis (APA, 2013). In order for Criterion A to be met, there must be an eating disturbance that results in at least one of the following medical or psychosocial consequences: 1) significant weight loss or stunted growth, 2) nutritional deficiencies, 3) dependency on nutritional supplements or enteral feeding, or 4) psychosocial impairment. Additionally, ARFID symptoms cannot be better explained by: a lack of available food or a culturally sanctioned practice (Criterion B); another eating disorder (Criterion C); or another medical condition, neurodevelopmental disorder, or other mental disorder (Criterion D). Although not explicitly part of DSM-5 criteria, individuals with ARFID tend to have one or more of the following motivators for food avoidance or restriction: 1) sensitivity to the sensory characteristics of food (taste, smell, or texture); 2) general lack of appetite or interest in eating; and 3) fear of negative consequences associated with eating (e.g., choking or vomiting; APA, 2013). We refer to these three motivators as the ARFID dimensions. These dimensions can co-occur and may range in severity (Kambanis & Thomas, 2023).

The three measures most frequently used to assess ARFID include the Pica ARFID, and Rumination Disorder Interview (PARDI; Bryant-Waugh et al., 2019), the Pica, ARFID, and Rumination Disorder Interview ARFID Questionnaire (PARDI-AR-Q; Bryant-Waugh et al., 2022), and the Nine Item ARFID Screen (NIAS; Zickgraf & Ellis, 2018). The PARDI is a semi-structured clinical assessment that has demonstrated excellent validity in a sample of participants ages 10- to 22-years-old (Bryant-Waugh et al., 2019). However, it is time intensive, with the ARFID portion taking nearly 40 minutes to complete on average. The developers of the PARDI created a self-report and parent-report version to assess

ARFID called the PARDI-AR-Q (Bryant-Waugh et al., 2022). Preliminary research indicates the PARDI-AR-Q may be reliable in a sample of participants ages 14- to 40-years-old (Bryant-Waugh et al., 2022), but additional work evaluating the PARDI-AR-Q in larger, diverse, and community samples is needed to further validate the measure. The NIAS is a brief self-report and parent-report screening measure that has three subscales that mostly align with the three ARFID dimensions (Zickgraf et al., 2018). It has been cross-culturally validated, the factor structure has been confirmed, and the subscales have been shown to be sensitive to their respective ARFID presentations (Kaşak, et al., 2024; Zickgraf & Ellis, 2018; Zickgraf et al., 2023). However, most aspects of the DSM-5 diagnostic criteria of ARFID are not assessed, such as insufficient caloric and/or nutritional intake (Dinkler & Bryant-Waugh 2021). Previous work using a sample aged 10 to 76 indicates that the NIAS may not accurately distinguish between ARFID and other eating disorders (i.e., low specificity; Billman Miller et al., 2024; Burton Murray et al., 2021). Of note, these measures have not been validated against each other yet. Overall, research using larger and more diverse samples of children and adults is needed to further clarify the reliability and validity of these measures.

Additional evaluation of ARFID screening methods will support researchers in accurately identifying participants who meet criteria for ARFID, particularly for large scale and population-based studies where using an interview is not feasible. The ARFID Genes and Environment (ARFID-GEN) study, which examines genetic and environmental factors that contribute to risk for developing ARFID (Bulik et al., 2023), provides a unique sample to begin to compare the NIAS and PARDI-AR-Q on how they perform at identifying those with ARFID within a community sample. The study utilized self-report and parent-report online screeners to enroll over 3,000 adults and children with ARFID. To validate the ARFID screening approach, a subset of individuals was selected to participate in a validation sub-study where they completed the PARDI via video-conferencing with a trained interviewer. Evaluating self-report and parent-report questionnaires compared to a diagnostic interview can help inform screening strategies for future large scale, community based ARFID research.

Current Study

The purpose of the current study was to preliminarily assess the validity of the online self- and parent-report ARFID screeners (PARDI-AR-Q and NIAS) used in the ARFID-GEN study in a subsample of 50 individuals across two groups (25 adults and 25 parents/guardians). While the sample size for each group was small, this study is the first to compare the PARDI-AR-Q and the NIAS to each other, is the first to examine the predictive validity of the PARDI-AR-Q, and is one of the few studies to use the PARDI-AR-Q and PARDI within a community sample. Aim 1 evaluated the validity of the PARDI-AR-Q as accurately screening adults with ARFID. Aim 2 evaluated the validity of the PARDI-AR-Q completed by parents/guardians as accurately screening for children ages 7–17 with ARFID. Aim 3 evaluated the validity of the NIAS as accurately screening adults with ARFID. Aim 4 evaluated the validity of the NIAS completed by parents/guardians as accurately screening for children ages 7–17 with ARFID. Finally, Aim 5 was an exploratory post hoc aim

that examined why those who met ARFID criteria on self-report measures did not meet diagnostic criteria on the PARDI interview.

We hypothesized that the PARDI-AR-Q would demonstrate excellent construct and criterion-oriented validity with the PARDI in both groups based on preliminary validation of the PARDI-AR-Q and because the PARDI-AR-Q is based on the PARDI (Bryant-Waugh et al., 2022). We also predicted the NIAS would demonstrate lower but acceptable construct and criterion-oriented validity in both groups based on previous research demonstrating lower specificity (Billman Miller et al., 2024; Burton Murray et al., 2021) and because the NIAS does not assess most aspects of the DSM-5 diagnostic criteria of ARFID. We did not have a priori hypotheses about why participants meeting ARFID criteria on self-report measures would not meet diagnostic criteria on the PARDI. By examining the validity of the screening assessments in a general population, this study contributes to the broader effort to integrate ARFID into clinical practice and research, which can facilitate better treatment for individuals affected by this disorder.

Methods

Procedure

ARFID-GEN study. Participants were recruited through social media ads and flyers posted on online platforms, research recruitment sites, and through community outreach strategies (schools, churches, eating disorder clinicians, and treatment centers). Interested participants followed a link to the online survey. After providing informed consent, they had the option to consent to be recontacted for future studies. A pre-screener with age-appropriate assessments was then completed online by adults (ages 18 years and older), parents/guardians of children (ages 7–17), and children (ages 7–17). To enroll in ARFID-GEN, individuals had to meet criteria for ARFID on either the PARDI-AR-Q or the NIAS, endorse no purging behaviors in the past four weeks (i.e., no vomiting or laxative use), have fewer than five episodes of binge eating in the past four weeks, and have a score of less than 4 on the Eating Disorder Examination – Questionnaire (EDE-Q 6.0) global score (Fairburn & Beglin, 1994). Participants were asked to complete additional questionnaires and were mailed a collection kit to provide a saliva sample. Participants were sent a $25 gift card once they completed all required questionnaires and their saliva kit was received by the study team. For detailed information on study recruitment and full study procedures, please see Bulik and colleagues (2023). The study was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill (IRB# 22–1524) and is registered on ClinicalTrials.gov (NCT05605067).

Validation sub-study. To validate the online screener, 25 adults and 25 parents/guardians from ARFID-GEN were randomly selected to be interviewed. Since only adults and the parents/guardians of the children completed the PARDI interview, child-reported measures completed during the ARFID-GEN study were not used in the current study. We contacted 135 participants (79 adults; 56 parents/guardians) who completed the ARFID-GEN study (e.g., completed all study questionnaires and submitted a saliva sample) between July 2023 and February 2024 and agreed to be recontacted about future studies by email to invite

them to participate in this sub-study. There were 42 adults and 31 parents/guardians who completed the consenting process but only 25 of each group responded to the scheduling email and attended the PARDI interview, which took place via HIPPA compliant Zoom. The average number of days between completing the screening assessments (i.e., PARDI-AR-Q, NIAS) and the PARDI for adults was 79.7 days (Min = 39, Max = 113; SD = 18.5) and for parents/guardians was 76.9 days (Min = 33, Max = 109; SD = 17.8). The average age of the adult participants was 42.3 years (range: 22–67 years) and the average age of the child for which parents/guardians were reporting was 10.5 years (range: 7–15 years). Most of the adult participants identified as female, White, and non-Hispanic. Based on parent/guardian report, most of children also identified as female, White, and non-Hispanic.

Measures

PARDI interview. Only the ARFID portion of the PARDI was used in this study. The PARDI (Bryant-Waugh et al., 2019) is a structured interview that uses dichotomous (yes/no) and Likert scale (rated 0 to 6) items to determine whether *DSM-5* Criterion A through D are met. Those who meet criteria A through D are scored as having an ARFID diagnosis. ARFID dimension and severity scores are also calculated. The dimensions are Sensory (avoidance based on sensory characteristics of food), Lack of Interest (a lack of interest in food or eating), and Concern (concern about aversive eating-related consequences). The Severity scale is calculated by taking the mean of 17 Likert scale items used to estimate ARFID symptoms. The PARDI was administered by two doctoral-level psychologists and a bachelor-level research assistant who were trained by one of the developers of the PARDI (N.M.). Training included attending a two-hour didactic session, scoring a recording of a previous interview, and completing 2 mock interviews (one adult, one parent) where scores were reviewed by N.M. Inter-rater reliability was calculated after the first 5 interviews. Kappa was initially found to be 0.62, which is less than in the ‘excellent’ range (>.8). Prior to conducting additional interviews, the interviewers received additional training. Each interviewer then scored two new interviews; the three-rater kappa for these new interviews equaled 1. The three interviewers and N.M. continued to meet throughout the study to discuss symptom ratings and how to rate complex clinical presentations on the PARDI.

PARDI-AR-Q. The PARDI-AR-Q (Bryant-Waugh et al., 2022) is a 32-item self-report questionnaire based on the PARDI. Parents/guardians of children with ARFID completed the PARDI-AR-Q on behalf of their children. The first five questions are used to calculate BMI and BMI percentiles. The following 16 items assess diagnostic criteria A1-A4 using dichotomous and free-response questions to determine if the individual meets criteria for a possible ARFID diagnosis. These items assess for the presence of an eating problem, low weight or difficulty with growth, nutrition deficiency, supplement dependency, and psychosocial impairment. Dimension scores, as defined in the PARDI, and Severity are means calculated from the responses for the last 11 items, where each item is scored using a 7-point Likert scale (0–6) with higher scores indicating greater severity (Bryant-Waugh et al., 2022). Test-retest reliability has not yet been reported for this measure.

NIAS. The NIAS (Zickgraf & Ellis, 2018) is a 9-item self-report questionnaire that assesses three ARFID dimensions: Picky Eating (e.g., “*I am a picky eater*”), Low Appetite (e.g.,

"*I am not very interested in eating; I seem to have a smaller appetite than other people*") and Fear ("*I avoid or put off eating because I am afraid of GI discomfort, choking, or vomiting*". The items are rated on a 6-point Likert scale from 0 ("Strongly disagree") to 5 ("Strongly agree) with higher scores indicating greater severity. Dimension scores are calculated by summing the respective items. A total score is generated by summing across all items. Adults completed the NIAS as a self-report instrument and parents/guardians of children completed the NIAS on behalf of their children. Prior research supports the reliability and validity of the NIAS in adults (Zickgraf & Ellis, 2018) and in self-reporting children (Billman Miller et al., 2024). Previous work has found that if other eating disorder behaviors have been screened for, a score ≥10 for Picky Eating, ≥9 for Appetite, and/or ≥10 for Fear may be appropriate to use as clinical cut-offs (Burton Murray et al., 2021). The NIAS has demonstrated good test-retest reliability over a two-week period (reliability ranged from .82 - .95 for subscales; Zickgraf & Ellis, 2018).

Data analysis

Data were analyzed using SPSS version 29.0 (IBM Corp., 2022). Data were inspected for collinearity and non-normality. All variables except for PARDI Concern for adults had acceptable levels of skew and kurtosis < |3|. No data were missing for the PARDI, PARDI-AR-Q, and NIAS for either subsample.

Aim 1: Test the validity of the PARDI-AR-Q as accurately screening adults with ARFID. Construct validity was estimated by calculating the correlations between the PARDI-AR-Q and PARDI dimensions. Criterion-oriented validity was examined by comparing the diagnostic values on the PARDI-AR-Q to the PARDI interview. The positive predictive value (PPV) was calculated for ARFID diagnosis (i.e., the ratio of participants who met diagnostic criteria on the PARDI-AR-Q to those who were diagnosed with ARFID during the PARDI interview) and for each of the four ARFID criteria. Linear regression models were applied to predict each PARDI dimension from the respective PARDI-AR-Q dimension. The number of days between when the self-report PARDI-AR-Q and PARDI interview were completed was entered as a covariate because diagnoses from each assessment are considered 'current' and differences in ARFID symptomology between the two time points might be partially explained by time.

Aim 2: Test the validity of the PARDI-AR-Q completed by parents/guardians as accurately screening for children with ARFID. The same analyses reported in Aim 1 were conducted for Aim 2 using the parent/guardian reported measures in the sub-study sample.

Aim 3: Test the validity of the NIAS as accurately screening for adults with ARFID. As noted in Aim 1, construct validity was estimated by calculating the correlations between the NIAS and PARDI dimensions. Criterion-oriented validity was estimated by determining whether the NIAS accurately distinguished between those who did and did not meet the clinical cutoff for ARFID. Specifically, the PPV was calculated as the ratio of adults who were diagnosed with ARFID during the PARDI interview to those who met the proposed NIAS cut-offs for ARFID (Burton Murray, et al., 2021). Finally, linear regression

models were applied to predict each PARDI dimension from the respective PARDI-AR-Q dimension. The number of days between when the self-report NIAS and PARDI interview were completed was entered as a covariate.

Aim 4: Test the validity of the NIAS completed by parents/guardians as accurately screening for children with ARFID. The same analyses reported in Aim 3 were conducted for Aim 4 using the parent/guardian reported measures.

Aim 5: Examine why those who met ARFID criteria on self-report measures did not meet diagnostic criteria on the PARDI interview. We anticipated that some participants would not meet ARFID criteria on the PARDI. We examined what diagnostic criteria they did not meet on the PARDI and characteristics of their ARFID-like symptoms reported during the PARDI and compared this information to what was reported on the PARDI-AR-Q and NIAS. We used t-tests to examine mean differences on dimensions and total scores on the self and parent-reported measures between those who did and did not meet ARFID criteria on the PARDI interview.

Results

Aim 1 and Aim 2.

Correlations between the ARFID dimensions on the *adult* self-reported PARDI-AR-Q and PARDI were moderate for Sensory (r = .45) and for Lack of Interest (r = .65), and weak for Concern (r = .33). The correlation for Severity was moderate (r = .61). For the *parent/guardian* reported measures, correlations were weak for Sensory (r = .31) and moderate for Lack of Interest (r = .67), Concern (r = .52), and Severity (r = .60). Correlations are listed in Table 1.

The numbers and percents of the sample that met diagnostic criteria for the NIAS, PARDI-AR-Q, and PARDI are reported in Table 2. Using data from the 20 adult participants who met PARDI-AR-Q diagnostic criteria, the PPV for probable ARFID diagnosis determined from the *adult* self-reported PARDI-AR-Q compared with the ARFID diagnosis from the PARDI was 55.0%. The PPV for the *parent/guardian* sample was 76.0% and was calculated using data from the 21 participants who met PARDI-AR-Q diagnostic criteria.

Results from linear regression models predicting each PARDI dimension from the corresponding PARDI-AR-Q dimension are reported in Table 3. The number of days between completion of each measure was a significant predictor only for the Lack of Interest dimension within the *adult* group. The PARDI-AR-Q dimensions were all significant and positive predictors of their corresponding PARDI dimension except for Concern within the *adult* group and Sensory for the *parent/guardian* group, which were not significant predictors of their corresponding PARDI dimension.

Aim 3 and 4.

For the *adult* reported NIAS and PARDI, correlations were moderate for Sensory/Picky Eating (r = .63), Lack of Interest/Low Appetite (r = .64), and Concern/Fear (r = .53). Correlations were also all moderate for the *parent/guardian* reported PARDI and NIAS

(Sensory/Picky Eating r = .53, Lack of Interest/Low Appetite r = .64, and Concern/Fear r = .52).

The percent of the sample that met diagnostic criteria for each measure is reported in Table 2. Using data from the 24 adult participants who met the NIAS cut-off, the PPV for probable ARFID diagnosis determined from the *adult* self-reported NIAS compared with the ARFID diagnosis from the PARDI was 45.8%. The PPV for the *parent/guardian* reported NIAS was calculated using data from all 25 participants and was 64.0%. Associations between each PARDI dimension and the corresponding NIAS dimension were all significant and positive within both samples (see Table 3).

Aim 5.

Figure 1a–b illustrates why participants did not meet ARFID criteria during the PARDI interview. Based on the PARDI interview, 14 adults did not meet criteria for ARFID. Four of those adults met criterion A and were excluded based on not meeting Criterion C or Criterion D (i.e., had another disorder or condition that better explained the symptoms). The other ten adults did not meet ARFID criteria on the PARDI based on Criterion A, six of whom also missed diagnosis on an additional PARDI criterion. Descriptions of why ARFID criteria were not met for adults are provided in Table 4.

Based on the parent/guardian PARDI interview, nine children did not meet criteria for ARFID; eight of these did not meet Criterion A and one did not meet Criterion C. Four of the eight children who did not meet Criterion A on the PARDI interview met only Criterion A4 (psychosocial functioning) on the PARDI-AR-Q. The other four did not meet PARDI-AR-Q criteria and were included in the ARFID-GEN study based on NIAS scores. Additional descriptions of why ARFID criteria, based on the PARDI, were not met for children are provided in Table 4.

When evaluating mean differences, those who met ARFID criteria had higher PARDI-AR-Q Severity, NIAS Picky Eating, and NIAS Total scores than those did not meet criteria within the adult group (p's < .05). Similarly, those who met ARFID criteria had higher PARDI-AR-Q Severity and NIAS Picky Eating scores (p's < .05) than those did not meet criteria within the parent/guardian group.

For each participant, details regarding whether the clinical cut-off was met for each measure, which diagnostic criteria were met, and which ARFID dimensions they endorsed are presented in supplementary materials.

Discussion

This study was a preliminary examination of the validity of the PARDI-AR-Q and the NIAS as screening methods compared to the PARDI for population-based research studies of ARFID using a subsample of the ARFID-GEN study. Overall, correlations were stronger between the NIAS and PARDI than between the PARDI-AR-Q and PARDI for both the adult and the parent/guardian groups. All NIAS dimensions were significant predictors of the corresponding PARDI dimensions in both the adult and the parent/guardian groups,

whereas the PARDI-AR-Q had one subscale in the adult (Concern) and the parent/guardian (Sensory) group that was not predictive of the corresponding PARDI subscale. The NIAS unexpectedly demonstrated better convergent validity than the PARDI-AR-Q. However, the PARDI-AR-Q had better specificity compared to the NIAS based on the PPV for ARFID diagnosis. Thus, in the current study, the PARDI-AR-Q was shown to be more accurate at identifying both adults and children with ARFID whereas the NIAS was a better estimator of symptom dimensions.

The NIAS having overall higher correlations than the PARDI-AR-Q with the corresponding PARDI dimensions was unexpected given that the PARDI-AR-Q was developed to align with the PARDI. In both the NIAS and the PARDI-AR-Q, the subscales were derived from three items compared to ten in the PARDI. Compared to the items used for the PARDI-AR-Q subscales, the items used for the NIAS are broader and briefer in nature, which may have led to responses being more consistent with the more robust PARDI subscales. Moreover, the NIAS was developed and tested in community samples while the PARDI-AR-Q has been primarily used with clinical samples. This could explain why the NIAS performed better on convergent validity in the current community sample. Additionally, test-retest validity has yet to be established for the PARDI-AR-Q which may potentially influence the observed differences in ARFID symptoms across the two time points. However, even though the NIAS had mostly higher correlations than the PARDI-AR-Q with the corresponding PARDI dimensions, all correlations were moderate for NIAS and weak to moderate for PARDI-AR-Q—none of the dimensions had strong correlations with the corresponding PARDI dimensions. This pattern of findings therefore might be due to the PARDI-AR-Q performing relatively poorly rather than the NIAS performing well. Additional research is needed to replicate these unexpected findings.

The PPV for both the PARDI-AR-Q and the NIAS was particularly low for adults, indicating that adults may self-identify as having ARFID and screen positive for ARFID but fail to meet clinical cut-offs on a diagnostic interview. An exploratory aim of this study was to determine why individuals might screen positive for ARFID on one of the two validated screening measures but fail to meet diagnostic criteria on a clinical interview. Interestingly, during the clinical interview, several adults noted that they had extreme picky eating but for 3 or fewer foods or foods/spices related to other cultures (N=5), which may be distressing for the adult and impact their ability to engage in social eating while not meeting clinical criteria for psychosocial impairment given the specificity of the restriction. Future research is needed in community-based samples of adults to capture and characterize a wider range of presentations of ARFID in order to further refine our screening and diagnostic instruments to reflect these populations.

These screening and diagnostic tools have been developed and tested primarily within clinical samples. As a result, they may be better at assessing symptoms that are more prominent in people seeking treatment rather than the symptoms experienced in community samples. Our exploratory analyses revealed that the PARDI-AR-Q Severity scores were indeed higher in both adults and children and the NIAS Total scores were higher in adults who ultimately met diagnostic criteria on the PARDI compared with those who did not. Therefore, the PARDI may be identifying individuals with more severe presentations rather

than the full spectrum of presentations of individuals who self-identify as having ARFID symptomology and associated distress.

When comparing the PARDI-AR-Q and PARDI interview A4 criterion questions, the PARDI-AR-Q has only one yes/no question, whereas the PARDI interview includes three questions (individuals must score at least a four or higher on one question of those questions). Thus, in the PARDI interview, participants rated as having mild psychosocial impairment by the interviewer would not meet ARFID criteria. In contrast, *any* psychosocial impairment is enough to meet the A4 criterion on the PARDI-AR-Q. Our exploratory analyses indicated that four children did not meet ARFID criteria on the PARDI based on psychosocial impairment. Two of these children did not have clinically significant psychosocial impairment, but the interviewer noted that this was likely due to their young age and relatively few social engagements where impairment might be more pronounced (e.g., limited outside of school interaction with peers). The other two children had elevated eating symptoms, but their parent/caregiver denied any significant functional impairment. Requiring moderate psychosocial impairment for a young child with limited social interactions may lead to under-identification of youth with emergent ARFID symptomology. Although it is important to rely on parent/caregiver input for younger children, it is possible that parents/caregivers may have limited insight into the true impact of their child's eating concerns on their social life.

It is also important to note that neither the PARDI-AR-Q nor the NIAS assess exclusion criteria (Criteria C and D) evaluating the presence of other disorders that may account for feeding and eating difficulty. Indeed, our exploratory analysis indicated that several adults who screened positive on the NIAS or PARDI-AR-Q ultimately did not meet criteria on the PARDI because their symptoms may have been better accounted for by anorexia nervosa or body image concerns (Criterion C, N=3) or due to medical illness or medication that affects dietary choices such as IBS (Criterion D, N=4). One child also did not meet criteria on the PARDI due to another eating disorder. The EDE-Q was used to rule out specific disordered eating pathology and elevated global score but did not apply criteria to assess other current eating disorders. Previous research has found that NIAS may not accurately distinguish between ARFID and other eating disorders (Burton Murray et al., 2021) and although we were unable to evaluate discriminant validity in the current study, these findings indicate that the PARDI-AR-Q may also misidentify anorexia nervosa symptomology as ARFID. Since the NIAS and the PARDI-AR-Q do not have an item related to exclusion of other disorders, there may have been an over-identification of individuals with ARFID whose limited eating is related to other psychiatric or medical conditions.

Although these findings are preliminary, they may guide or inform future studies investigating ARFID diagnosis and symptomology. We concur with Burton Murray and colleagues (2021), who recommend using the EDE-Q or another eating disorder measure to screen out individuals with other types of eating disorders. Even though the current study used the EDE-Q as a screen, participants whose eating behaviors were influenced by weight and shape concerns still ended up in the study. Therefore, future research should explore whether more stringent cut-offs are necessary if exclusion of individuals with other eating disorders is desired. It would also be valuable to evaluate whether the diagnostic

cut-offs for the NIAS should be made more stringent given that the measure had low specificity in this study and another study (e.g., Burton Murray, et al., 2021; specificity = .63). Additionally, expanding the NIAS to include items that address other ARFID diagnostic criteria, such as assessing whether eating concerns are attributable to another disorder or medical condition, may improve its accuracy. Overall, for studies and clinical settings aiming to identify individuals with ARFID, the PARDI-AR-Q may be more suitable due to the higher specificity in this study. For research or clinical applications focused on tracking changes in ARFID symptom dimensions, the NIAS may be more appropriate since the measure demonstrated better convergent validity with the PARDI than the PARDI-AR-Q.

Strengths and Limitations

The present study had several strengths. The use of the community-based sample and particularly the inclusion of adults adds significantly to the literature on screening measures appropriate for use to identify ARFID in the general population. Additionally, interviewers were trained by one of the developers of the PARDI and attended regular consensus meetings to ensure high fidelity and consistent scoring. However, it is important to note study limitations. We had a relatively small sample size in the validation sub-study which impacts the power of our analyses and therefore our ability to draw firm conclusions. Participants were only included if they likely met criteria for ARFID on the self-report screeners and did not screen positive for purging, more than weekly binge-eating, or have an elevated global score on the EDE-Q. The lack of controls prevented examining divergent validity, negative predictive value, sensitivity, and specificity of the PARDI-AR-Q. Additionally, our sample was from the U.S. and results may not generalize to other countries and other cultural presentations of ARFID.

Conclusion

As research on the prevalence and phenomenology of ARFID increases and more large-scale, population-based studies of ARFID are conducted, researchers will need to rely on brief, self-administered screening measures for both inclusion criteria and to characterize their sample. Our study indicates that the PARDI-AR-Q may more accurately identify individuals with ARFID, but the NIAS may better estimate symptom profiles. The choice of which screening instrument to use may be based on the intended function of the instrument. Future research is needed in community-based samples to refine these existing instruments or to develop new instruments that can provide both adequate positive predictive value for diagnosis as well as symptom-level data with strong convergent validity in a brief screener format.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Data Availability:

These data will be available from the National Data Archive.

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Public Significance Statement

Few studies have used non-clinical and adult samples to validate measures of avoidant/restrictive food intake disorder (ARFID) symptoms. Our participants completed self-report and parent/guardian-report ARFID measures (PARDI-AR-Q and NIAS) and a clinical interview (PARDI) to determine ARFID diagnosis. Our findings provide partial support for using these questionnaires and highlight the need to better understand diagnostic presentations of ARFID within community samples, particularly in adults.

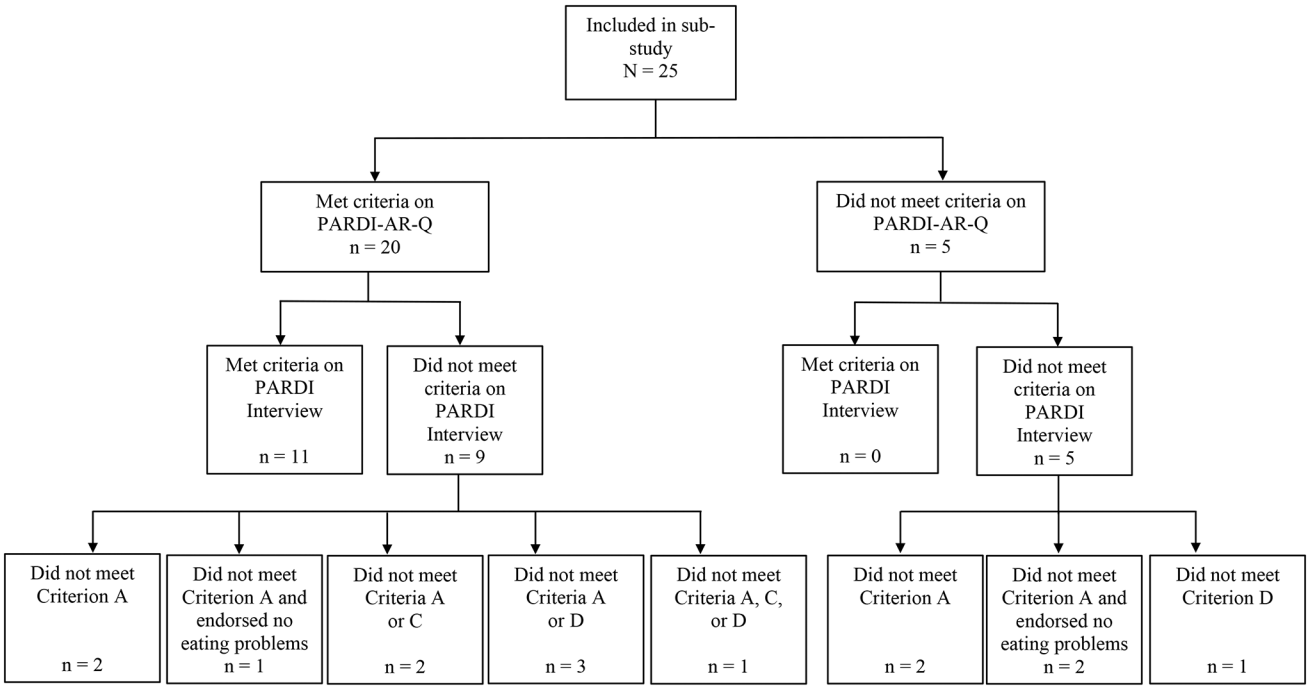

Figure 1a.

The number of adult participants who did and did not meet PARDI-AR-Q and PARDI Interview criteria. The specific criteria of the PARDI that were not met are listed for those who did not meet ARFID diagnostic criteria.

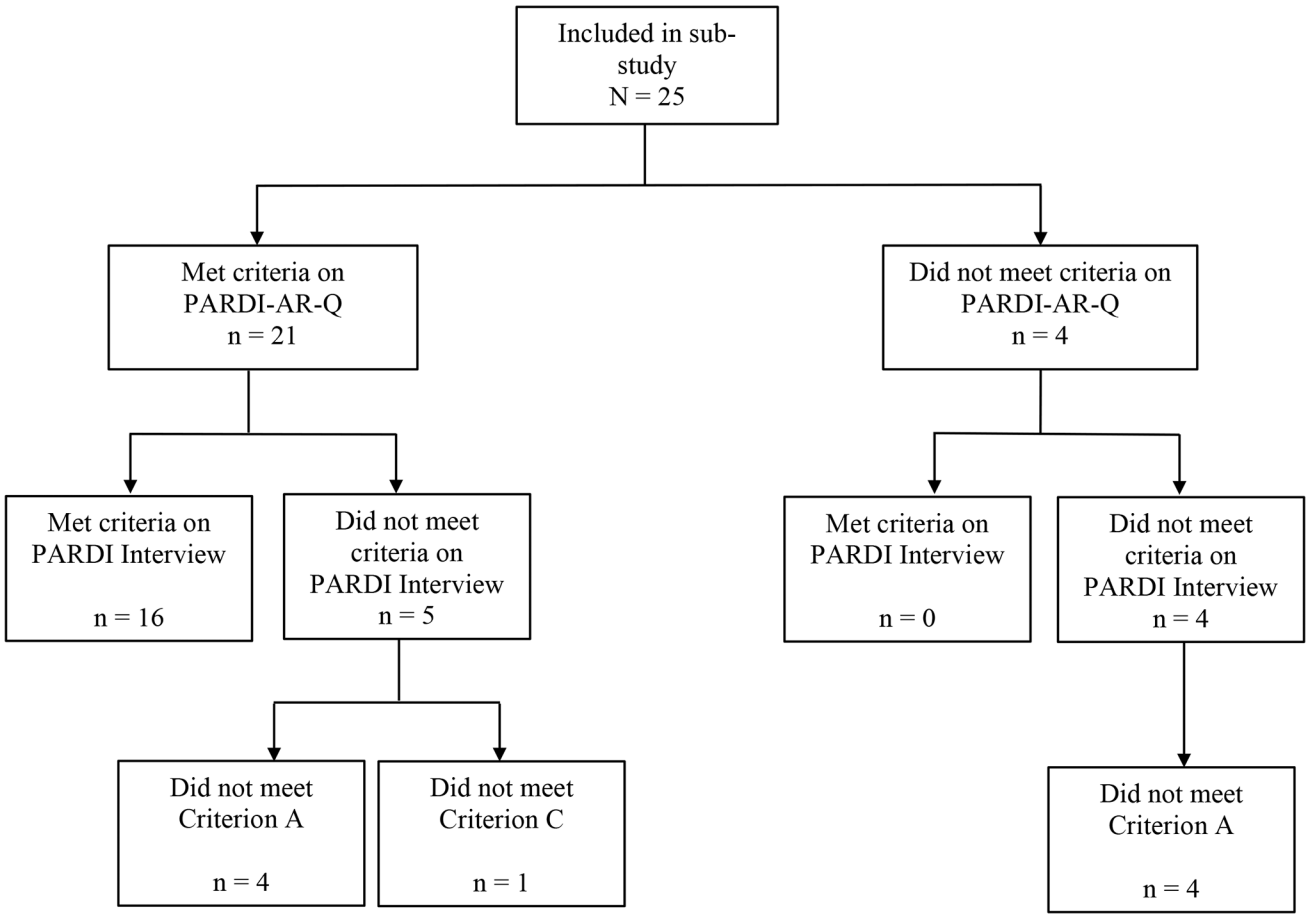

Figure 1b.

The number of children who did and did not meet on parent/guardian reported PARDI-AR-Q and PARDI Interview criteria. The specific criteria of the PARDI that were not met are listed for those who did not meet ARFID diagnostic criteria.

Table 1a.

Descriptive Statistics and Correlations with Confidence Intervals for PARDI, PARDI-AR-Q, and NIAS Dimensions in Adult Group (*p < .05. **p < .01).

N = 25	**1**	**2**	**3**	**4**	**5**	**6**
1.PARDI Sensory	–					
2. PARDI Lack of Interest	.51**	–				
	(.14, .75)					
3. PARDI Concern	.36	.43*	–			
	(−.04, .66)	(.04, .70)				
4. PARDI Severity	.71**	.56**	.64**	–		
	(.45, .87)	(.21, .78)	(.33, .83)			
5. PARDI-AR-Q Sensory	.45*	.41*	.16	.52**	–	
	(.06, .72)	(.02, .70)	(−.25, .53)	(.16, .76)		
6. PARDI-AR-Q Lack of Interest	.31	.65**	−.02	.21	.30	–
	(−.10, .63)	(.34, .83)	(−.41, .38)	(−.20, .56)	(−.13, .62)	
7. PARDI-AR-Q Concern	.02	.15	.33	.24	.31	.18
	(−.38, .41)	(−.26, .51)	(−.08, .64)	(−.17, .58)	(−.10, .63)	(−.23, .54)
8. PARDI-AR-Q Severity	.60**	.38	.30	.61**	.52**	.22
	(.27, .80)	(−02, .67)	(−.11, .62)	(.29, .81)	(.15, .76)	(−.19, .57)
9. NIAS Picky Eating	.63**	.19	.09	.64**	.35	.29
	(.31, .82)	(−.23, .54)	(−.32, .47)	(.32, .82)	(−.06, .65)	(−.12, .63)
10. NIAS Low Appetite	.19	.64**	.05	.16	.17	.78**
	(−.22, .55)	(.33, .83)	(−.36, .43)	(−.25, .52)	(−.24, .53)	(.56, .90)
11. NIAS Fear	.01	.22	.53**	.21	−.03	.20
	(−.39, .40)	(−.19, .57)	(.17, .76)	(−.21, .56)	(−.42, .37)	(−.21, .55)
12. NIAS Total	.41*	.61**	.37	.51**	.25	.73**
	(.02, .69)	(.28, .81)	(−.03, .67)	(.14, .75)	(−.17, .59)	(.47, .87)
Mean	1.88	2.24	.84	1.92	2.68	3.24
SD	1.17	1.17	1.17	1.12	1.67	1.63
Scale Alpha (α)	.74	.82	.90	.96	.65	.78

N = 25	**7**	**8**	**9**	**10**	**11**	**12**
1.PARDI Sensory						
2. PARDI Lack of Interest						

3. PARDI Concern												
4. PARDI Severity												
5. PARDI-AR-Q Sensory												
6. PARDI-AR-Q Lack of Interest												
7. PARDI-AR-Q Concern	–											
8. PARDI-AR-Q Severity	.29 (−.12, .61)	–										
9. NIAS Picky Eating	.02 (−.38, .41)	.49* (.12, .74)	–									
10. NIAS Low Appetite	.03 (−.37, .42)	.09 (−.32, .47)	.03 (−.37, .42)	–								
11. NIAS Fear	.69** (.40, .85)	.15 (−.26, .51)	−.17 (−.53, .25)	.22 (−.20, .56)	–							
12. NIAS Total	.42* (.03, .70)	.37 (−.04, .66)	.39 (−.01, .68)	.75** (.50, .88)	.63** (.32, .82)	–						
Mean	2.36	2.52	11.44	9.52	7.44	28.40						
SD	1.55	1.66	3.45	4.56	4.31	7.48						
Scale Alpha (α)	.82	.69	.66	.88	.82	.65						

Table 1b.

Descriptive Statistics and Correlations with Confidence Intervals for PARDI, PARDI-AR-Q, and NIAS Dimensions in Parent/Guardian Group (*p < .05. **p < .01).

N = 25	**1**	**2**	**3**	**4**	**5**	**6**
1.PARDI Sensory	–					
2. PARDI Lack of Interest	.31	–				
	(−.10, .63)					
3. PARDI Concern	.22	.28	–			
	(−.19, .57)	(−.13, .61)				
4. PARDI Severity	.33	.43*	.02	–		
	(−.07, .64)	(.04, .70)	(−.38, .41)			
5. PARDI-AR-Q Sensory	.31	.17	.03	0.08	–	
	(−.10, .63)	(−.24, .53)	(−.37, .42)	(−.33, .46)		
6. PARDI-AR-Q Lack of Interest	.05	.67**	.24	.49*	.23	–
	(−.35, .44)	(.37, .84)	(−.17, .58)	(.11, .74)	(−.18, .57)	
7. PARDI-AR-Q Concern	.20	.29	.52**	0.30	.25	.28
	(−.22, .55)	(−.13, .61)	(.15, .76)	(−.11, .62)	(−.16, .59)	(−.13, .61)
8. PARDI-AR-Q Severity	−.03	.42*	.14	.60**	.22	.52**
	(−.42, .37)	(.04, .70)	(−.27, .51)	(.26, .80)	(−.20, .56)	(.16, .76)
9. NIAS Picky Eating	.53**	.27	−.002	.59**	.32	.34
	(.18, .77)	(−.15, .60)	(−.40, .39)	(.25, .80)	(−.09, .63)	(−.06, .65)
10. NIAS Low Appetite	.24	.64**	.17	.42*	.07	.60**
	(−.17, .58)	(.33, .83)	(−.24, .53)	(.03, .70)	(−.34, .45)	(.26, .80)
11. NIAS Fear	.34	.28	.52**	.44*	.30	.44*
	(−.07, .65)	(−.13, .61)	(.16, .76)	(.07, .72)	(−.11, .62)	(.06, .71)
12. NIAS Total	.42*	.50*	.37	.58**	.28	.59**
	(.03, .70)	(.13, .75)	(−.03, .67)	(.24, .79)	(−.14, .60)	(.25, .80)
Mean	2.54	2.43	.62	2.44	4.63	3.75
Standard Deviation	1.11	1.07	.76	0.85	1.13	1.05
Scale Alpha (α)	.73	.85	.75	.83	.77	.51
N = 25	**7**	**8**	**9**	**10**	**11**	**12**
1.PARDI Sensory						

2. PARDI Lack of Interest												
3. PARDI Concern												
4. PARDI Severity												
5. PARDI-AR-Q Sensory												
6. PARDI-AR-Q Lack of Interest												
7. PARDI-AR-Q Concern	–											
8. PARDI-AR-Q Severity	.47* (.10, .73)	–										
9. NIAS Picky Eating	.16 (−.25, .52)	.35 (−.05, .66)	–									
10. NIAS Low Appetite	.16 (−.25, .52)	.27 (−.25, .60)	.45* (.07, .72)	–								
11. NIAS Fear	.62** (.30, .82)	.25 (−.16, .59)	.43* (.05, .71)	.47* (.09, .73)	–							
12. NIAS Total	.46* (.08, .72)	.34 (−.06, .65)	.68** (.39, .85)	.80** (.59, .90)	.87** (.72, .94)	–						
Mean	1.67	3.42	13.60	11.52	7.64	32.76						
Standard Deviation	1.77	1.50	1.87	3.34	4.43	7.81						
Scale Alpha (α)	.81	.89	.77	.87	.91	.84						

Table 2.

Number (%) of Participants Meeting Diagnostic and Clinical Cut-Offs

	Adults (n = 25)	Children (n = 25)
	N (%)	N (%)
Met PARDI ARFID diagnostic criteria	11 (44)	16 (64)
Met PARDI-AR-Q ARFID criteria	20 (80)	21 (84)
Met NIAS ARFID cut-off	24 (96)	25 (100)

Table 3.

Results from Linear Regression Models Predicting Each PARDI Dimension from the Respective PARDI-AR-Q and NIAS Dimensions for the Adult and Parent/Guardian Group

Adult Group	**B**	**95% CI**	**F**	**t**	**p**
PARDI-AR-Q Sensory → PARDI Sensory	0.31	.05, .57	4.50	2.39	.020
PARDI-AR-Q Lack of Interest → PARDI Lack of Interest	0.42	.21, .64	13.74	4.10	<.001
PARDI-AR-Q Concern → PARDI Concern	0.28	−.03, .59	2.02	1.85	.070
PARDI-AR-Q Severity → PARDI Severity	0.39	.17, .62	9.29	3.67	.001
NIAS Picky → PARDI Sensory	0.20	.08, .32	7.94	3.50	.002
NIAS Appetite → PARDI Lack of Interest	0.15	.08, .23	13.96	4.14	<.001
NIAS Fear → PARDI Concern	0.16	.06, .26	6.18	3.40	.003
Parent/Guardian Group					
PARDI-AR-Q Sensory → PARDI Sensory	0.30	−.12, .71	1.26	1.50	.150
PARDI-AR-Q Lack of Interest → PARDI Lack of Interest	0.71	.37, 1.04	9.57	4.37	<.001
PARDI-AR-Q Concern → PARDI Concern	0.22	.06, .38	3.99	2.82	.010
PARDI-AR-Q Severity → PARDI Severity	0.33	.13, .53	6.33	3.41	.003
NIAS Picky → PARDI Sensory	0.32	.10, .54	4.85	3.05	.006
NIAS Appetite → PARDI Lack of Interest	0.21	.10, .32	8.06	4.01	<.001
NIAS Fear → PARDI Concern	0.09	.02, .15	4.01	2.86	.009

Note. Model statistics reflect having number of days between completion of assessments included as a covariate.

Table 4.

Descriptions of why ARFID Criteria were not met

Category	Example	N
Adult		
AN/Partial remission from AN (Criterion C)	Weight/shape concerns are preventing eating/weight gain	3
Medication or IBS impacting eating (Criterion D)	Avoiding certain foods to manage GI issues such as IBS	4
Extreme picky eating of fewer than 3 foods and/or spices	May avoid cooking areas or foods made with certain ingredients and/or spices but not significantly impacted	5
Subthreshold lack of appetite issues	Will go long periods without eating but not significantly impacted	3
Subthreshold lack of sensory issues	Reporting multiple sensory issues but not significantly impacted	2
Child		
Another eating disorder (Criterion C)	Weight/shape concerns are preventing eating/weight gain	1
Remission from ARFID	Symptoms currently subthreshold but were worse several months ago	2
Subthreshold but may worsen with age	Likely will have more social and functional impairment when older	2
Parent unsure of functional impairment or reported elevated symptoms but no functional impairment	Multiple ratings of a ‘3’ but none that reached clinical significance of ‘4’	3

Table 5.

Independent T-Tests Comparing Those who did not Meet ARFID Criteria to Those who did on Self- and Parent/Guardian-Report Measures

	Did not Meet ARFID Criteria		Met ARFID Criteria				
	n = 14		n = 11				
	M	SD	M	SD	t	95% CI	Two-Sided p
Adults							
PARDI-AR-Q Sensory	2.36	1.26	3.09	2.07	−1.03	−2.24, .77	.317
PARDI-AR-Q Lack of Interest	2.79	1.60	3.82	1.56	−1.63	−2.35, .29	.118
PARDI-AR-Q concern	2.21	1.59	2.55	1.56	−0.52	−1.65, .99	.607
PARDI-AR-Q Severity	1.86	1.62	3.36	1.32	−2.56	−2.76, −.26	.018*
NIAS Picky Eating	9.93	3.83	13.36	1.50	−3.07	−5.97, −.90	.007**
NIAS Low Appetite	8.36	4.05	11.00	4.92	−1.44	−6.35, 1.07	.166
NIAS Fear	7.00	4.21	8.00	4.58	−0.56	−4.71, 2.71	.581
NIAS Total	25.29	4.75	32.36	8.61	−2.45	−13.25, −.91	.027*
Children	n = 9		n = 16				
PARDI-AR-Q Sensory	4.59	0.89	4.65	1.27	−0.11	−1.05, .94	.913
PARDI-AR-Q Lack of Interest	3.30	1.03	4.00	1.00	−1.67	−157, .67	.108
PARDI-AR-Q concern	1.93	1.93	1.52	1.73	0.54	−1.15, 1.96	.595
PARDI-AR-Q Severity	2.33	1.46	4.03	1.16	−3.20	−2.80, −.60	.004**
NIAS Picky Eating	12.56	2.19	14.19	1.42	−2.23	−3.12, −.14	.034*
NIAS Low Appetite	10.44	3.40	12.13	3.26	−1.22	−4.53, 1.17	.246
NIAS Fear	7.22	4.49	7.88	4.53	−0.35	−4.55, 3.24	.732
NIAS Total	30.22	8.96	34.19	6.99	−1.23	−10.63, 2.70	.231

* $p < .05$.

** $p < .01$.