Initial validation of the Nine Item Avoidant/Restrictive Food Intake disorder screen (NIAS): A measure of three restrictive eating patterns

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Abstract

Avoidant/Restrictive Food Intake Disorder (ARFID) is an eating or feeding disorder characterized by inadequate nutritional or caloric intake leading to weight loss, nutritional deficiency, supplement dependence, and/or significant psychosocial impairment. DSM-5 lists three different eating patterns that can lead to symptoms of ARFID: avoidance of foods due to their sensory properties (e.g., picky eating), poor appetite or limited interest in eating, or fear of negative consequences from eating. Research on the prevalence and psychopathology of ARFID is limited by the lack of validated instruments to measure these eating behaviors. The present study describes the development and validation of the nine-item ARFID screen (NIAS), a brief multidimensional instrument to measure ARFID-associated eating behaviors. Participants were 455 adults recruited on Amazon's Mechanical Turk, 505 adults recruited from a nationally-representative subject pool, and 311 undergraduates participating in research for course credit. Exploratory and confirmatory factor analyses provided evidence for three factors. The NIAS subscales demonstrated high internal consistency, test-retest reliability, invariant item loadings between two samples, and convergent/discriminant validity with other measures of picky eating, appetite, fear of negative consequences, and psychopathology. The scales were also correlated with measures of ARFID-like symptoms (e.g., low BMI, low fruit/vegetable variety and intake, and eating-related psychosocial interference/distress), although the picky eating, appetite, and fear scales had distinct independent relationships with these constructs. The NIAS is a brief, reliable instrument that may be used to further investigate ARFID-related eating behaviors.

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1. Introduction

Avoidant/Restrictive Food Intake Disorder (ARFID) is a new diagnosis to DSM-5, intended to identify individuals with eating pathology that causes significant impairment but is not driven by fear of weight gain or distorted body image. ARFID is an extension of the DSM-IV feeding disorder of early infancy and childhood, and can be diagnosed in individuals of any age whose limited intake or restricted dietary variety leads to insufficient caloric and/or nutritional intake and causes one or more of the following Criterion A symptoms: 1) weight loss, 2) nutritional deficiency, 3) dependence on nutritional supplements, or 4) psychosocial impairment. DSM-5 lists and briefly describes three categories of eating disturbance that can lead to the symptoms of ARFID: avoidance of many foods based on their sensory properties (“picky eating”), low appetite or limited interest in eating, and fear of negative consequences, such as choking or vomiting, from eating (American Psychiatric Association, 2013).

Although DSM-5 briefly describes how the three eating behavior patterns might lead to ARFID symptoms, it does not cite any research linking these patterns to ARFID-like symptoms (e.g., weight loss, nutritional deficiency, supplement dependence, eating related impairment). Furthermore, prevalence estimates for ARFID and ARFID-associated eating behaviors/traits in adults are nonexistent or highly inconsistent. These problems might be due, in part, to the limited number of self-report assessment instruments to measure these behavioral patterns. Of the three, picky eating has attracted the most research attention, but recent reviews of the picky eating literature highlighted the lack of psychometrically sound measures (e.g., Taylor, Wernimont, Northstone, & Emmett, 2015). There are validated self-report measurements of appetite, food motivation, fear of choking, and specific phobia of vomiting.
(e.g., Bosch, Veale, Ellison, & Reddell, 2013; Budak et al., 2017; Hunot et al., 2016), which resemble aspects of the appetite and fear manifestations of ARFID, but these have yet to be used explicitly in the assessment of ARFID symptoms. Whereas picky eating by definition refers to a restrictive eating behavior (e.g., Taylor et al., 2015), existing measures of appetite and vomiting or choking phobia in adults are limited because they do not explicitly assess restricted/limited eating associated with these constructs. The literature linking each of the eating patterns described by DSM-5 to outcomes analogous to the Criterion A symptoms of ARFID is limited. However, there is some evidence that eating patterns related to the traits and behaviors described by DSM-5 can lead to weight loss or overweight, inadequate fruit/vegetable intake, and eating-related psychosocial interference in general samples.

In children under 6, picky eating is associated with slow growth and risk for underweight (e.g., Antoniou et al., 2015; Dubois, Farmer, Girard, Peterson, & Tatone-Tokuda, 2007; Ekstein, Laniado, & Glick, 2010). However, in two studies, no relationship between picky eating and BMI, a measure of adiposity expressed in weight in kilograms per meter of height squared, was found in adults (e.g., Ellis, Galloway, Webb, & Martz, 2017; Kauer, Pelchat, Rozin, & Zickgraf, 2015). The Child Eating Behavior Questionnaire and the recently validated adult version (AEBQ) measure appetitive and interest in eating across the lifespan (Hunot et al., 2016; Wardle, Guthrie, Sanderson, & Rapoport, 2001). The AEBQ has seven subscales, three of which assess food approach traits (emotional over-eating, food responsiveness, and enjoyment of eating), and four of which assess food avoidant traits (food fussiness, emotional undereating, satiety responsiveness, and slow eating). In two studies using this measure, the food approach scales were positively associated with BMI, whereas slow eating and satiety responsiveness were negatively associated with adiposity (e.g., Hunot et al., 2016; Mallan et al., 2017). DSM-5 suggests that loss of appetite caused by anxiety and depression can lead to ARFID symptoms (APA, 2013). The child and adult eating behavior questionnaires assess under-eating in response to negative affect; this construct is also inversely correlated with BMI in adults and children (Mallan et al., 2017; Sleddens, Kremers, & Thijs, 2008; Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009).

DSM-5 also describes conditioned anxiety associated with food intake following a traumatic experience such as intubation, invasive medical procedures involving the GI tract, choking, or persistent vomiting, as potentially leading to ARFID symptoms (APA, 2013). Specific phobia of choking, which often has its onset after a choking incident, is usually associated with food refusal or restriction, leading to some weight loss in a majority of published adult and child case reports (de Roos & de Jogh, 2008; McNally, 1994; Franko, Shapiro, & Gagne, 1997). There are no empirical studies on weight loss associated with choking phobia. Few studies have addressed eating behavior in adults with specific phobia of vomiting, but the available evidence suggests that most adults with vomit phobia (75–90%) report some food avoidance, and self-reported eating restrictions have been both associated with underweight and correlated with BMI in this population (Höller, van Overveld, Jutglar, & Trinka, 2013; Liposit, Fyer, Paterniti, & Klein, 2001; Veale, Costa, Murphy, & Ellison, 2012).

The second Criterion A ARFID symptom is nutritional deficiency. Picky eating in adults and children has been linked to reduced dietary variety, particularly for fruits and vegetables (e.g., Galloway, Fiorito, Lee, & Birch, 2005; Jaeger, Rasmussen, & Prescott, 2017; Knaapila et al., 2011; Zickgraf, 2018). Although reduced dietary variety within a category of food does not necessarily reflect reduced overall intake of that category, and neither reduced variety nor reduced intake necessarily reflect inadequate nutrition, measures of self-reported dietary variety have previously been shown to predict both intake and nutritional status (e.g., Drewnowski, Renderd, Driscoll, & Rolls, 1997; Foote, Murphy, Wilkens, Basiotis, & Carlson, 2004; Krebs-Smith, Smicklas-Wright, Guthrie, & Krebs-Smith, 1987). To our knowledge, the only available studies of nutritional behavior in individuals with eating-related fears concern specific phobia of vomiting, and the most commonly avoided foods are meat, poultry, seafood, and eggs (Höller et al., 2013; Price, Veale, & Brewin, 2012; Veale et al., 2012). There is also a lack of research linking any ARFID-related eating pattern in adults to the third Criterion A symptom, dependence on oral or enteral nutritional supplementation.

The final Criterion A symptom sufficient for an ARFID diagnosis is psychosocial interference due to restricted eating. The clinical impairment assessment is a measure of distress and interference from anorexia/bulimia symptoms including restrictive eating, but also from fear of weight gain, binge eating, and compulsatory behavior (Böhn & Fairburn, 2008; Böhn et al., 2008). Wildes, Zucker, and Marcus (2012) modified the instrument to only ask about the impact of “eating habits.” This version has been used to explore psychosocial interference associated with adult picky eating by several groups, which have all reported positive associations with psychosocial interference assessed using the modified clinical impairment assessment (e.g., Ellis et al., 2017; Wildes et al., 2012; Zickgraf, Franklin, & Rozin, 2016). Restricted eating in the context of specific phobia of vomiting has also been associated with significant psychosocial impairment; in one study, 19.6% of adults with vomit phobia reported occupational interference related to eating restrictions, 18% reported avoiding family meals, and approximately 34% avoided restaurants or eating at other people’s homes (Höller et al., 2013). In a separate sample, individuals with vomit phobia who significantly restricted their diets reported significantly greater impairment in social, occupational, and family functioning than adults with vomit phobia who did not restrict their eating (Veale et al., 2012).

The purpose of the study was to validate a brief self-report instrument that explicitly addresses eating restriction associated with the three ARFID-associated eating patterns (i.e., appetite, fear, and picky eating) described in DSM-5. First, a theoretically predicted three factor model was assessed using exploratory factor analysis in a semi-nationally representative sample of US adults (Sample 1). Confirmatory factor analysis was used to test the factor structure in an analogue clinical sample recruited for eating behaviors, traits, and psychopathology believed to be associated with elevated risk of ARFID-like eating behaviors and symptoms (Sample 2), and in an unselected undergraduate sample (Sample 3). Criterion validity of the NIAS was assessed by comparing mean scores and distributions across samples. Convergent and divergent validity were assessed within the clinical analogue sample using 1) Relationships between specific subscales and analogue ARFID symptom measures; 2) Relationships between each subscale and measures of related constructs (convergent validity) and constructs related to a different subscale (divergent validity); and 3) Relationships with a measure of anorexia and bulimia symptoms. We also assessed two-week test-retest reliability and measurement invariance with Sample 2 in the undergraduate sample (Sample 3).

2. Methods

2.1. Item development

The items were developed from 1) descriptions of the eating behaviors of interest presented in ARFID case studies and chart reviews (e.g., Bryant-Waugh, 2013; Bennett et al., 2017; Chiarello, Marin, Ballerini, & Ricca, 2017; Dosanjh, Fleisher, & Sam, 2017; Fisher et al., 2014; Fischer, Luiselli, & Dove, 2015; Nakai, Nin,
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