Design and Validation of the Avoidant/Restrictive Food Intake Disorder Screening Tool

(ARFID-ST)

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Theoretical Framework

Global Definition

Eating disorders (EDs) are chronic and debilitating disorders that are characterized by unhealthy patterns of eating and weight regulation (Kaye, 2009). Two of the most widely researched eating disorders are anorexia nervosa (AN) and bulimia nervosa (BN), which affect approximately 1% to 3% of women in Canada respectively (Hoek & Hoeken, 2003). Typically, individuals diagnosed with AN are severely underweight and display obsessive concerns about body image. (Anderson, Lundgren, Shapiro, & Paulosky, 2004). Individuals diagnosed with BN tend to be of normal weight, and often engage in binge eating and purging by inducing vomiting or ingesting laxatives. The excessive concern with body image, shape, and weight is seen as the driving force behind the controlled food intake, binge eating, and food purging behaviors that are typically seen in AN and BN respectively (Anderson et al., 2004).

A proper understanding of EDs has been severely limited by past diagnostic criteria, mainly because most individuals diagnosed with an ED present with clinical symptoms that are difficult to categorize. As such, the DSM-IV-TR allowed clinicians and researchers to diagnose such individuals with an eating disorder not otherwise specified (EDNOS). In an attempt to simplify this diagnostic confusion, the DSM-5 sought to limit the number of cases who would have had previously received a diagnosis of EDNOS, and instead classify such cases into more specified diagnostic categories (Steiger, Coelho, Thaler, & Van Den Eynde, 2015). One such category that has been added into the DSM-5 is avoidant/restrictive food intake disorder (ARFID).

Specific Definition

According to the DSM-5, ARFID is defined as "an eating or feeding disturbance as manifested by persistent failure to meet appropriate nutritional and/or energy needs" (American Psychiatric Association, 2013). However, ARFID is not associated with cultural or religious practices regarding food (e.g., fasting due to religious reasons), shortage of available foods, or an overconcern with body image (Zimmerman & Fisher, 2017). Furthermore, ARFID is not considered "picky eating" (i.e., over selective about food choices). Although ARFID patients indeed make highly selective food choices, the nutritional deficiencies and psychosocial impairments associated with ARFID make it distinct from picky eating (Zickgraf, Murray, Kratz, & Franklin, 2019).

Behavioural Definition

ARFID is characterized by four core component behaviours: apparent lack of interest in eating or food, avoidance of certain food based on their sensory characteristics, fear and/or anxiety about the aversive consequences of eating, and significant nutritional deficiencies and/or dependence on nutritional supplements. According to Zickgraf and colleagues (2019), ARFID patients display a lack of interest in food or eating, despite their hunger or the influence of other individuals. Additionally, individuals with ARFID will avoid eating certain foods because of taste or texture. Moreover, ARFID patients commonly display signs of fear and anxiety regarding food and eating (e.g., fear of choking). Individuals with ARFID must also display marked psychosocial impairments, such as not being able to engage or enjoy in everyday activities due to their disorder (Zimmerman & Fisher, 2017). Although not considered behavioural, biological symptoms such as weight loss, nutritional deficiency, and dependence on nutritional supplements are commonly seen in patients, and such symptoms are also needed in order to render a diagnosis of ARFID (Zickgraf et al., 2019).

Objectives

The goal of creating the avoidant/restrictive food intake disorder screening tool (ARFID-ST) is to examine the presence and/or absence of ARFID symptoms in a class of undergraduate psychology students at Concordia University. Because ARFID symptoms are less pervasive compared to other EDs (e.g., AN & BN), the authors wish to assess the presence of certain types of ARFID symptoms in an effort to better understand how such symptoms may be displayed in individuals without an ED.

Seeing as ARFID is still a relatively new focus of research and given that it is not related to weight loss concerns, it is possible that individuals may not know that they display symptoms of an eating disorder. A measure designed to assess ARFID symptoms may be of use to researchers, as well as universities in order to illustrate how disordered eating patterns may impact the health and well-being of university students who do not have an ED. Due to the limitations of other measures, we set out to create an ARFID screening tool that would encapsulate the theoretical framework outlined in the DSM-5, as well as provide researchers with a continuous measure to indicate the presence of ARFID.

Other Measures

Description of measures

The criterion measure that was chosen for this study was identified as a normative criterion-referenced assessment. This criterion measure is used to assess whether an individual presents the characteristics of ARFID based on the pre-established criteria from the DSM-V. The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM–5; American Psychiatric Association, 2013) divides the diagnostic criteria for ARFID into four factors: (a) significant weight loss, (b) nutritional deficiency, (c) dependence on external feeding or oral supplements, and (d) interference with psychosocial functioning.

The original 88-item questionnaire has 7 sections and includes two types of response formats: forced choice, allowing participants to select one out of three options: *yes*, *no*, or

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Commented [RA3]: SAB: check APA format to see if you should be using numbers here or letters.

Commented [RA4]: I think we have provided all of this in the theoretical background already. No need to repeat it here.

unknown, or open-ended allowing participants to complete sentences and specify missing concepts such as weight loss, previous psychiatric admissions, current and/or past psychiatric illnesses. This questionnaire takes previously validated scales that measure and assess characteristics of other eating disorders in children, such as AN, and compiles the scales together assuming that they appropriately assess EDs in an adult population. Based on this assumption, the questionnaire is assumed to assess ARFID. In particular, scales measuring picky eating, low appetite, and eating anxiety are placed together in order to form an assessment for ARFID (Zickgraf & Ellis, 2018).

Psychometric Strength/Weakness

The criterion measure displays both content and face validity. Specifically, the measure has content validity because it assesses key aspects of the psychological symptoms of ARFID (i.e., eating anxiety). The measure also displays face validity because the items that make up the questionnaire assess the behaviours typically seen in ARFID. Construct validity was analyzed based on the internal consistency of the ARFID criterion measure used in the current study. Results indicate a moderate Cronbach's alpha ($\alpha = .75$), suggesting that the criterion ARFID questionnaire measures what it is intended to measure. Thus, although this ARFID criterion measure is not a validated assessment, the internal consistency parallels with results in the literature.

Nevertheless, even with a moderate level of construct validity, one can argue that the pooling of different items from multiple questionnaires that assess other eating disorders within a child population, does not render the ARFID assessment valid for adults. Thus, the Cronbach alpha ($\alpha = .75$) that was analyzed may be measuring the construct validity of each the individual diagnostic measures that make up the questionnaire, rather than assessing the construct validity of the items within the newly developed ARFID questionnaire. Consequently, the items within the questionnaire are created to assess children and are assumed to be valid for children.

However, such items are not necessarily an appropriate reflection of the underlying symptoms portrayed within an adult population of ARFID patients.

The response choice utilized in the criterion measure, namely open-ended questions, allow assessors to retrieve more background and relevant information about participants. For example, an item asking participants if they had lost weight, and to specify how much wight, can be generally useful for assessors to indicate whether the weight loss was severe or not. However, items with a response choice format of *yes*, *no*, and *unknown* might not give assessors potentially useful information about the participant. These nominal responses are not only ambiguous, but they also give the participants an uninformative neutral response option. Giving participants the ability to select such uninformative options can elicit a lazy response style in some individuals and can in turn affect the accuracy of their results. Furthermore, the items on the criterion measure were not counterbalanced, therefore, there was no control for lazy response styles.

Practical Strengths and Weaknesses

The group administration of the AFRID questionnaire made test administration process practical and simple. Individuals were given the questionnaire at one time point and were instructed to submit them by a given due date. This allowed the assessors to retrieve all of the data simultaneously while keeping the participants' identities anonymous. Although group administration can be practical, there was the inability to answer any relevant questions about the criterion measure from the participants. Additionally, the shortened length of the questionnaire made it easier to analyze and score. It also prevented participants from feeling fatigued and/or irritated, which may have occurred if they had completed the original 88-item questionnaire. However, having a shortened version of this questionnaire limits our ability to assess all symptoms and factors related to ARFID. Furthermore, since this assessment is not validated, it will be generally more difficult to diagnose those with ARFID, compared to those suffering from other eating disorders.

Instrument Development

Questionnaire Development

The ARFID-ST is an objective typical performance test that aims to describe the typical functioning of an individual that might present with symptoms of ARFID. The first part of the questionnaire included demographic information such as age, sex, height, and weight, and are gathered with four sub-questions. Height and weight are needed to determine BMI (kg/m^2) and age and sex are needed because ARFID is more common in children (Zickgraf & Ellis, 2018) and is also more likely to occur in males (Hay et al., 2017). The remaining 19 questions encompass the four key dimensions of ARFID and their respective subcomponents. Namely: "picky eating", symptoms of appetite loss, fear of food, social norms relating food, as well as items meant to indicate the presence or absence of other eating disorder (e.g., anorexia nervosa, bulimia nervosa, or normal eating patterns). Additionally, each the subcomponents are measured with varying numbers of items. For instance, the subcategory of "picky eating" is the main category that is assessed within the ARFID-ST and is measured with five items, because the majority of the literature as well as the diagnostic criteria for ARFID has a main focus on picky eating (Bryant-Waugh et al., 2018). Picky eating is operationalized as refusing to eat foods that are deemed to have odd tastes, textures, and consistencies. Appetite loss is measured with three items, due to it be being a subjective measure that is provided by the respondent (Bryant-Waugh et al., 2018; Zickgraf & Ellis, 2018). Appetite loss is operationalized as the reduction of appetite stemming from the lack of interest in certain foods. Fear of foods is measured with four items and is included in the ARFID-ST due to its lack of consistent measurement in other ARFID measures, even though it is a necessary component of diagnosis. Fear of food is operationalized as the experience of fear or anxiety related to the consumption of certain foods (e.g., aversion to eating spaghetti due to fear of chocking on a noodle). Social norms relating to food is measured with two items, making it a secondary focus of the ARFID-ST, however it remains a core feature

important in the diagnosis of ARFID. Social norms relating to food is operationalized as potential cultural differences relating to the consumption of food that might better explain a sudden loss of weight or nutritional deficiency. We also made the decision to include counterbalanced items (items 4, 10, 13, 17, & 20) to ensure that respondents are providing consistent answers to similar components of the questionnaire.

All items were close ended questions on a 4-point Likert scale (1- "Strongly Disagree", 4- "Strongly Agree"). A response format of this type allows the respondents to simply endorse a certain component behaviour or not, while precluding a neutral response (as would be possible with a 5-point Likert scale). Additionally, a Likert scale type response format allows for simple organization and presentation of items, as well as making the measure easy to score.

Correction of the Original Test

Prior to validation and administration for research purposes, the ARFID-ST received mirror modifications. The visual/structural template was reorganized to remove boarders around individual items. Additionally, the wording of item 12: "I am dependent on oral nutritional supplements" was altered to "I am dependent on nutritional supplements" to encompass various types of nutritional supplements beyond oral supplements.

Test Administration and Scoring

The ARFID-ST was designed to assess the presence and/or absence of ARFID symptoms in respondents. Due to its simple response format and short length, the ARFID-ST is easy to administer. Because the items are simple in nature, and only require the respondent to possess basic information about themselves, there is no need for an administrator to guide the respondent through the completion of the ARFID-ST. Therefore, the ARFID-ST should be administered to groups of individuals, potentially as part of a larger diagnostic battery for eating disorders. For instance, the ARFID-ST can be administered alongside other well validated measures that assess other EDs, such as the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin,

1994). The EDE-Q is a 41-item self-report questionnaire based on the Eating Disorder Examination structured clinical interview (EDE; Fairburn & Cooper, 1993). It assesses the presence and severity of cognitive ED symptoms along four dimensions: restraint, weight concerns, shape concerns, and eating concerns. All four subscales have shown internal consistency with Cronbach's alphas ranging from 0.88-0.93 (Luce & Crowther, 1999). The EDE-Q also allows respondents to report their frequency of bingeing, purging and self-induced vomiting during the previous 3 months by monthly intervals, consistent with DSM-5 diagnostic criteria. If administered with the EDE-Q, the ARFID-ST can be included in a larger test battery designed to assess all EDs in a quick and efficient manner.

The scoring process of the ARFID-ST is as follows: Items are given a score of 4 when marked as "Strongly Agree", 3 when marked as "Agree", 2 when marked as Disagree", and 1 when marked as "Strongly Disagree". Items 4, 10, 13, 17, & 20 are reverse-scored (See Appendix B). Reverse-Scored items are given a score of 4 when marked as "Strongly Disagree" and a score of 1 when marked "Strongly Agree". Scores for all items should then be summed to form a cumulative score. If a respondent has a cumulative score of 57 out of 76, they present enough symptoms whereby a diagnosis of ARFID can be inferred. However, if a respondent "agrees" or "strongly agrees" with one or more of the reversed-scored items, the presence of ARFID cannot be inferred. In other words, agreement with a reverse scored item precludes a diagnosis of ARFID. Such scoring procedures follow a logically driven criterion method and are intended to be congruent with the diagnostic criteria laid out in the DSM-5.

Methods

Selection of the Criterion Measure

The Avoidant/Restrictive Food Intake Disorder (ARFID) questionnaire was used as the criterion measure to validate the ARFID-ST. The criterion measure is a 33-item self-report scale, that is divided into seven sections assessing multiple facets of ARFID (Katzman et al., 2016).

The seven sections include; 1) demographic information, 2) clinical presentation, 3) physical features, 4) social history, 5) medical illness, 6) psychiatric illness, and 7) management of the feeding or eating disturbance. Not all seven sections were present in the adapted version of the questionnaire given to participants due to its original length being too long to complete in the allotted amount of time needed to fill out the questionnaire. The ARFID questionnaire was developed as a diagnostic scale for children and adolescents, that can also be generalized to adult populations (Schmidt, Kirsten, Hiemisch, Kiess & Hilbert, 2019). In addition, the factors used within ARFID questionnaire mirror the DSM-5 diagnostic criteria for the respective disorder. Due to the novelty of the disorder and the lack of research being conduct on ARFID, the ARFID questionnaire is an unvalidated measurement scale. However, limited findings in the literature have similar factors that are used in the ARFID questionnaire (Zickgraf & Ellis, 2018).

Zickgraf and Ellis (2018) conducted a study to develop a nine-item ARFID screening tool (NIAS) that parallels the DSM-V diagnostic criteria. Due to the insufficient amount of validate measurements, the researchers fixated on the reports of maladaptive eating behaviors present in case studies. A total of 1271 participants were recruited from an Amazon's Mechanical Turk, a nationally representative subject pool, as well as university undergraduate students. Exploratory and confirmatory factor analyses provided evidence for three factors (picky eating, appetite, and fear), paralleling the ARFID criterion measure. The NIAS subscales demonstrated high internal consistency ($\alpha = .90$) and test-retest reliability, $r(1270) = .95$, $p < 0.001$. Due to the similarities between the NIAS and the ARFID questionnaire, these finding suggest that the factors used in the ARFID questionnaire measure symptoms of the disorder accurately.

Bryant-Waugh and colleagues (2018) found similar results to Zickgraf and Ellis' study on ARFID (2018). The study assessed the presence of ARFID within a sample of 10-22-year old's (n = 57). The Pica, ARFID, and Rumination Disorder Interview (PARDI) questionnaire included various items from existing measures that assess separate symptoms within ARFID and is

measured on a six-point Likert scale (Bryant-Waugh et al., 2018). Results revealed that three

factors were being quantified in the PARDI scale. Furthermore, the factors had acceptable

internal consistency, with Cronbach's alphas as follows: sensory sensitivity (.77), lack of interest

food or eating (.89), fear of aversive consequences (.79), and overall severity (.89) (Bryant-

Waugh et al., 2018).

Participants

Undergraduate psychology students (n = 49) and the professor of the Psychometrics and

Individual Differences (PSYC 426) course offered at Concordia University participated in the

present study. Data were collected from 50 (10 males, 40 females) participants with a mean age

of 24.47 (*SD*=5.07). The mean weight and height of the sample was 145.35LBS (*SD*=32.75) and

167CM (*SD*=9.22) respectively (see Table 1).

Materials

The 20 items of the ARFID-ST were determined through careful consideration of the

theoretical framework that is provided in the DSM-5, as well as examining other measures of

ARFID. As such, all four key dimensions of the construct (apparent lack of interest in eating or

food, avoidance of certain food based on their sensory characteristics, fear and/or anxiety about

the aversive consequences of eating, and significant nutritional deficiencies and/or dependence

on nutritional supplements) were included in the final questionnaire (American Psychiatric

Association, 2013; Zickgraf & Jordan, 2018). Additionally, items reflecting other EDs were

included to rule out the possibility that ARFID symptoms may be better explained by another

type of E.Ds. For instance, item 14, "I feel guilty after eating a large meal", is intended to

measure symptoms of AN, BN, and binge eating disorder (BED). Responses to all items were

provided on a 4-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree".

Responses to all items on the ARFID criterion measure scale had three options: "Yes", "No" and

"Unknown". All Questionnaire packets included the original ARFID-ST as well as the ARFID

questionnaire and were completed using pen (or pencil) and paper.

Procedure

Participants were administered both the ARFID-ST and the ARFID questionnaire

concurrently. Participants were instructed to complete the questionnaires at home or during class

hours and return the completed questionnaires to the researchers within one-week. All

questionnaires were then scored, and the resulting data was entered into Microsoft Excel for

organizational purposes. Lastly, all data was then transferred into IBM SPSS statistical software

25 and cleaned prior to conducting statistical analyses.

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Results

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The data was screened for univariate outliers and no out-of-range values were found.

Upon further analysis of the data, question 2.3b of the criterion measure was removed due to a

high rate of non-response. All other variables with missing information were identified and

recorded as missing data. The cumulative scored on the criterion measure was calculated by

summing the "Yes" responses in the criterion measure. The minimum amount of data for factor

analysis was not satisfied due to a sample size of 50. However, analysis of the Kaiser-Meyer-

Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity was still conducted.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy measured 0.776, which

suggests that a proportion of variance in our variables may be due to underlying factors.

Bartlett's test of sphericity resulted in a significant finding ($\chi^2(105) = 400.482, p < 0.05$),

suggesting that the variables are related. Analysis of the extraction communality determined that

all 19 items displayed a value greater than .3, further suggesting that each item shares a common

variance with all other items (Kaiser & Rice, 1974). Because our analysis revealed a KMO statist

greater than the cut-off of .5, a significant Bartlett's test of sphericity, and because we obtained a

variable with a communality above .3 (Field, 2018), an exploratory factor analysis was conducted to verify the factor grouping of the given variables.

Exploratory factor analysis (EFA) was conducted to determine how many factors are measured in the ARFID-ST. A confirmatory factory analysis (CFA) was not suitable for this analysis due to the inability of the researchers to identify which variables would be grouped together prior to the analysis. Rather, an EFA is considered to be a reflective model, whereby each item tries to explain the latent construct of interest. EFA systematically measures the covariance of the items and produces factor groupings of items with the highest shared variance.

Initial eigenvalues (λ) indicated a three or four factor solution. The first three factors explained 40.96%, 13.89, and 9.25% of the variance respectively. Factor 4 accounted for an additional 7.48% of the variation. Due to factors 1 to 4 resulting in an eigenvalue grater than 1, a three and four factor analysis was examined.

Firstly, the contingency of a three-factor solution was explored. Upon analysis, questions 8 and 13 were removed due to strong cross-loading between multiple factors. Question 16 was deleted due to low commonality, relative to item set ($< .3$). Therefore, these three variables were subject to removal due to their effects on reducing content validity. Furthermore, the items within each respective factor did not represent the motivations and measures the researcher sought to attain. In other words, there were multiple items that did not fit nor parallel with one another conceptually within a factor. For example, question 15 ("I am afraid of swallowing foods") and question 9 ("Food/eating does not interest me") formed within Factor 3 which measures lack of interest in food. Ideally, question 15 should not have correlated with question 9, and this is seen throughout all three factors. Therefore, a three-factor solution was not preserved for this analysis under the conditions that the factors did not represent the motivations of the researcher and high cross-loading.

A second analysis was conducted to verify a four-factor model. A total of four items were eliminated as a result of not meeting the minimum criteria of having a primary factor loading greater than .4 and/or a weak cross loading less than + .3 (Field, 2018). Questions 7 and 15 were removed due to low primary factor loading and strong cross-loading. Such a result may be due to the heterogeneity of the question. In other words, the structure of questions 7 and 15 may be measuring several concepts rather than distinct features of a factor. Furthermore, question 13 was deleted due to strong cross-loading, whereas question 20 was removed due to weak primary factor loading. Question 13, "After I eat, I make my self vomit", was intended to be measured and scored as a means to eliminate other eating disorders and converge onto a diagnosis of ARFID. Upon further analysis, statistically and conceptually, the strong cross-loading may be due to the generalization of vomiting, rather than vomiting being due to a maladaptive perception of oneself. Thus, question 13 can be considered double barrelled as it is attempting to measure feature within both ARFID and BN. Lastly, question 20 derived a weak primary factor loading because it did not measure the global construct of nutrition. After the removal of four items, 15 out of the 19 items had extracted communalities that were above .3, suggesting that the items shared a common variance between the items (Table 2).

It was concluded that a four-factor solution best described the motivations and measures of the study. A four-factor solution explained 71.58% of the variance and was preferred due to the eigenvalues stabilizing on the scree plot after four factors and the difficulty of interpreting subsequent factors. More specifically, items within each factor were related and homogenous to one another, thus distinct labels for each factor were accessible. This was not the case for a three-factor solution.

Factor 1 consisted of question 2, 5, 6, 8 and 9, and was classified as "Picky Eating". The questions in this factor consisted of items that measure the relative interest, motivations and appeal towards food. Factor 2 was composed of questions 4, 10 and 19R and was labelled as

"Openness to Foods". The items attempted to measure participants openness and appeal to foods that are not usually eaten on a daily basis. Inspection of the factor loading, question 4 ($r = .90$) and 10 ($r = .57$) were positively correlated with factor 2, whereas question 19 ($r = -.59$) was negatively correlated (Table 2). This is a result of question 19 measuring opposite facets in comparison to question 4 and 10. Therefore, question 19 was reversed scored, too parallel the factor label and entered as Q19R in SPSS 25). Factor 3 encompassed questions 3, 11, 14, 17 and 18, and was recorded as "Fear/Anxiety in Relation to Food Intake". Questions within factor 3 evaluated participants overall fear and anxiety when consuming and/or handling foods. Factor 4 contained items 12, and 16 and was labelled as "Nutrition". Items within factor 4 attempt to measure the lack of nutritional variety and/or supplementation needs (Table 2).

Analysis of internal consistency of each factor was examined using Cronbach's alpha. Cronbach's alpha measures how closely set of items are related and is considered to be a measure of internal reliability (Field, 2018). The picky eating, openness to novel foods and fear/anxiety factors of the ARFID-ST had high Cronbach's alpha (α); .87, .78 and .83 respectively. Rather, the nutrition factor had a low reliability ($\alpha = .50$) (Table 3). A low reliability for the nutrition factor can be a result of having limited items within that factor (n=2) (Table 3). Thus, the Spearman-Brown prophecy formula was computed to estimate an alpha value, assuming that eight items were included in each factor. The Cronbach Alphas for picky eating and fear/anxiety factors increased slightly from $\alpha = .87$ to $\alpha = .91$ and $\alpha = .83$ to $\alpha = .89$, respectively (Table 3). This slight increase may be due to the addition of items (i.e., 5 items to 8 items). Rather, openness to novel foods and nutrition inherited a larger increase to their respective Cronbach alpha's. Openness to novel foods increased from $\alpha = .78$ to $\alpha = .91$, suggesting that having eight items opposed to three will produce a reliable and representative metric. Lastly, nutrition increased from $\alpha = .50$ to $\alpha = .80$, further suggesting and emphasizing that having two items measuring nutrition is not a reliable metric for the ARFID-ST (Table 3).

Pearson *r* correlation was conducted to identify the correlation between the factors, the criterion measure, and demographics data (Table 4). Analysis revealed that a significant negative correlation between factor 1 and factor 2, $r(48) = -.59$, $p < .01$, suggesting that as one develops picky eating habits, they are less likely to seek novel food. Factor 1 was found to have a significant positive correlation with factor 3, $r(48) = .55$, $p < .01$. There was significant negative relationship between factor 2 and factor 3, $r(48) = -.36$, $p < .01$, suggesting that as one develops fearful view against the consumption of food, they are less likely to deviate from their normal eating habits. Factor 3 was significantly related to factor 4, $r(48) = .28$, $p < .05$. Lastly, there was significant correlation between factor 4 and BMI, $r(46) = -.31$, $p < .05$, suggesting that nutritional deficiencies in ARFID are related to one's BMI. Results further indicated that factor 1, $r(48) = .27$, $p = .06$ and factor 4, $r(48) = -.05$, $p = .76$, were not significantly correlated to the cumulative score on the criterion measure. In contrary, factor 2, $r(48) = -.34$, $p < .05$, and factor 3, $r(48) = .54$, $p < .01$, were significantly correlated to the cumulative score on the criterion measure. There were no significant finding relating demographic data (i.e., age, sex, height, and weight) and the four factors.

Conclusions

The diagnosis of ARFID is new to the DSM-5, and is less understood compared to other EDs (reference one of the previous papers) Due to lack of knowledge on the topic, the authors wished to assess the presence and/or absence of certain types of ARFID symptoms in an effort to better understand how such symptoms may be displayed in individuals without an ED. As such the ARFID-ST was designed assess the presence or absence of ARFID symptoms in a class of undergraduate psychology students at Concordia University.

Given that the DSM-5 outlines four key components of ARFID (apparent lack of interest in eating or food, avoidance of certain food based on their sensory characteristics, fear and/or anxiety about the aversive consequences of eating, and significant nutritional deficiencies and/or

dependence on nutritional supplements), it was important to design a measurement instrument that conforms to this theoretical framework as closely as possible. After conducting an EFA, it was discovered that a four-factor solution best described the latent construct of interest. Specifically, the factors rendered from the analysis were: "Picky Eating", "Openness to Foods", "Fear/Anxiety in Relation To Food Intake", and "Nutrition". All four factors displayed strong internal consistency with Cronbach's alphas ranging from .80 to .91. Importantly, all four factors conform to the theoretical foundations outlined in the DSM-5 and relevant literature (e.g., Zickgraf et al., 2019; Zimmerman & Fisher, 2017). Lastly, the ARFID-ST demonstrates strong content and face validity.

Strengths and Weaknesses

To our knowledge, the ARFID-ST is the first questionnaire that is both grounded in a purely theoretical framework, and includes items often ignored by other measures, such as fear of foods. Given its theoretical basis, the ARFID-ST may lead to more accurate diagnoses of ARFID patients and may additionally eliminate the use of redundant diagnostic instruments currently used to assess ARFID. Further, the ARFID-ST will help extend our knowledge of how ARFID related symptoms may present in both healthy and eating disorder populations.

One weakness of the ARFID-ST is that the criterion measure that was used in this validation study is not a validated measure to assess ARFID. The ARFID questionnaire is a shortened version of a much longer questionnaire and has also not been validated in its shortened form. Therefore, the ARFID-ST has been validated against an unvalidated measure. Additionally, it may be difficult to properly validate the ARFID-ST without other well validated ARFID screening measures, or access to a clinical population. Additionally, because ARFID is a relatively new diagnosis in the DSM, it is possible that researchers will uncover additional symptoms and/or sequalae of ARFID that are not captured in the current version of the ARFID-ST.

Implications and Future Directions

Although an EFA rendered a four-factor solution that conforms to previous theory and research, the ARFID-ST is still a limited measurement tool. For one, not all of the factors contain the same number of items. Having a consistent number of items in each factor would help the ARFID-ST capture more symptoms and behaviours that are characteristic of ARFID, thus additional items should be generated. Additionally, the ARFID-ST has only been pilot tested once, and therefore cannot be considered a final product. Further testing should be conducted on clinical samples to determine if the ARFID-ST can indeed distinguish an individual with ARFID from a healthy individual. Even in its current form, the ARFID-ST may provide researchers with the necessary theoretical concepts to help diagnose certain symptoms of ARFID, and how such symptoms might worsen over time. If the ARFID-ST can be well validated, it may have further clinical applications by providing clinicians with a screening tool to assess individuals who may be at risk for the later development of ARFID. Additionally, future research should seek to create ARFID screening measurements for individuals above and below the age of 18.

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Appendix A: Criterion Measure: Avoidant/Restrictive Food Intake Disorder (ARFID)

Avoidant/restrictive food intake disorder (ARFID)

Please complete the following sections for the case identified above.
Strict confidentiality of information will be assured.

SECTION 1 – DEMOGRAPHIC INFORMATION

1.1 Date of birth: _____ /_____ /_____
                     DD   MM   YYYY

1.2 Sex: Male   Female

SECTION 2 – CLINICAL PRESENTATION

2.1 Does the patient have an eating or feeding disturbance manifested by persistent failure to meet appropriate

nutritional and/or energy needs leading to:	Yes	No	Unknown
a) Significant weight loss	___	___	___
If yes, specify amount: _____ kg, over what period of time? _____			
b) Failure to achieve expected weight gain	___	___	___
If yes, over what period of time? _____			
c) Faltering growth	___	___	___
If yes, over what period of time? _____			

SECTION 2 – CLINICAL PRESENTATION (cont'd)	Yes	No	Unknown
d) Significant nutritional deficiency	___	___	___
e) Dependence on enteral feeding or oral nutritional supplements	___	___	___
f) Marked interference with psychosocial functioning	___	___	___
2.3 a) Is there evidence of lack of available food?	___	___	___
b) Is there an associated culturally sanctioned practice contributing to the weight loss or lack of weight gain?	___	___	___

2.4 Other behaviours/features:	Yes	No	Unknown
• Fasting	___	___	___
• Food avoidance	___	___	___
• Loss of appetite, little or no desire to eat	___	___	___
• Apparent lack of interest in eating or food	___	___	___
• Eating, but not eating enough	___	___	___
• Eating, but avoiding certain foods	___	___	___
• Not initiating eating or seeking out food as expected	___	___	___
• Preoccupation with food/food intake	___	___	___

Appendix B: Avoidant/Restrictive Food Intake Disorder Screening Tool (ARFID-ST) – *Original*

Version

Avoidant/Restrictive Food Intake Disorder Screening

| 1. Demographics	
1.1 Age	
1.2 Sex	
1.3 Weight (lbs or kgs)	
1.4 Height (feet or meters)	

Please answer the following statements as quickly and honestly as possible.	Strongly Disagree	Disagree	Agree	Strongly Agree
2. I am a picky eater.	☐	☐	☐	☐
3. I have to force myself to eat regular meals throughout the day.	☐	☐	☐	☐
4. I eat a variety of food regardless of visual appeal, texture, consistency and consequences.	☐	☐	☐	☐
5. There are more foods that I dislike than I enjoy.	☐	☐	☐	☐
6. My friends/family pressure me into diversifying my food choices.	☐	☐	☐	☐
7. I restrict myself to certain foods because I am afraid that other foods will cause discomfort or chocking.	☐	☐	☐	☐
8. I dislike most of the foods my peers eat.	☐	☐	☐	☐
9. Food/eating does not interest me.	☐	☐	☐	☐
10. I am opened to trying new foods.	☐	☐	☐	☐
11. I feel tense when I am around novel food.	☐	☐	☐	☐
12. I am dependent on oral nutritional supplements.	☐	☐	☐	☐
13. After I eat, I make myself vomit.	☐	☐	☐	☐
14. When I eat, I feel disgusted and have a loss of appetite.	☐	☐	☐	☐
15. I am afraid of swallowing foods.	☐	☐	☐	☐
16. I eat foods based on their texture and/ or consistency rather than their nutritional value.	☐	☐	☐	☐
17. I feel guilty after eating a large meal.	☐	☐	☐	☐
18. I do not eat novel food because I am afraid of the consequences.	☐	☐	☐	☐
19. I do not like to try food with a specific smell, taste, appearance, or a certain consistency.	☐	☐	☐	☐
20. I have nutritional deficiencies because I cannot afford healthy food choices.	☐	☐	☐	☐

Appendix C: Avoidant/Restrictive Food Intake Disorder Screening Tool (ARFID-ST) – *Revised*

Version

Avoidant/Restrictive Food Intake Disorder Screening

1. Demographics	
1.1 Age	
1.2 Sex	
1.3 Weight (lbs or kgs)	
1.4 Height (feet or meters)	

| Please answer the following statements as quickly and honestly as possible.	Strongly Disagree	Disagree	Agree	Strongly Agree
2. I am a picky eater.	☐	☐	☐	☐
3. I have to force myself to eat regular meals throughout the day.	☐	☐	☐	☐
4. I eat a variety of food regardless of visual appeal, texture, consistency and consequences.	☐	☐	☐	☐
5. There are more foods that I dislike than I enjoy.	☐	☐	☐	☐
6. My friends/family pressure me into diversifying my food choices.	☐	☐	☐	☐
7. I dislike most of the foods my peers eat.	☐	☐	☐	☐
8. Food/eating does not interest me.	☐	☐	☐	☐
9. I am open to trying new foods.	☐	☐	☐	☐
10. I feel tense when I am around new food.	☐	☐	☐	☐
11. I am dependent on nutritional supplements.	☐	☐	☐	☐
12. When I eat, I feel disgusted and have a loss of appetite.	☐	☐	☐	☐
13. I eat foods based on their texture and/ or consistency rather than their nutritional value.	☐	☐	☐	☐
14. I feel guilty after eating a large meal.	☐	☐	☐	☐
15. I do not eat new food because I am afraid of the consequences.	☐	☐	☐	☐
16. I do not like to try food with a specific smell, taste, appearance, or consistency.	☐	☐	☐	☐

Appendix D: Scree plot
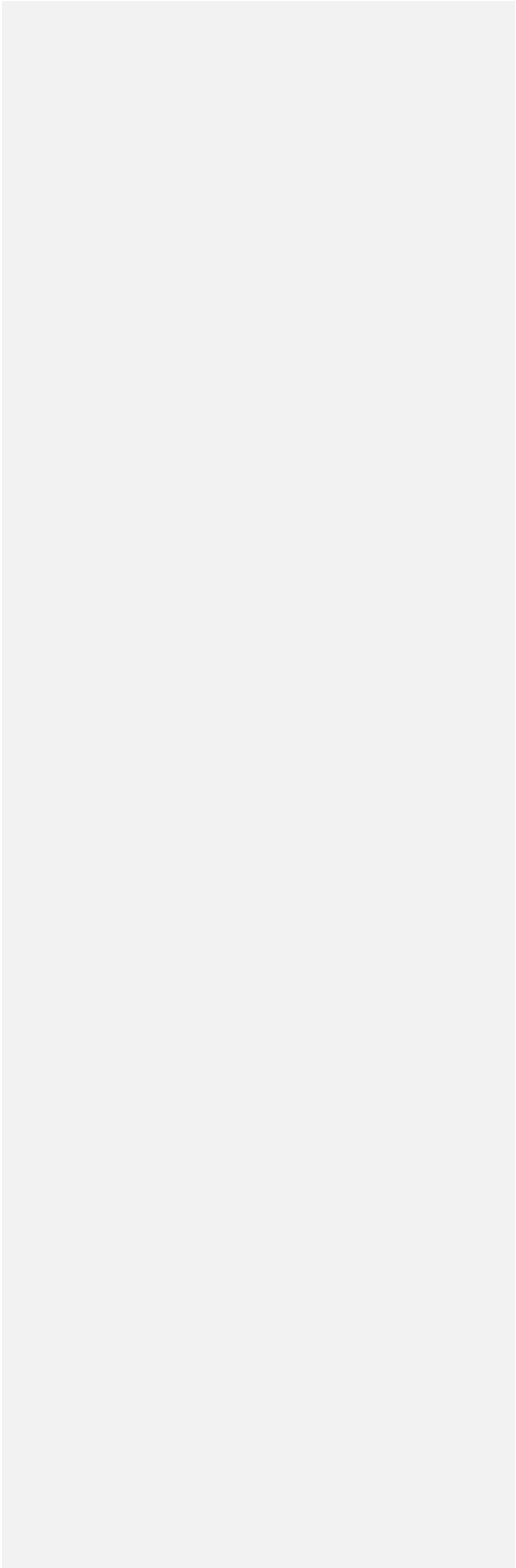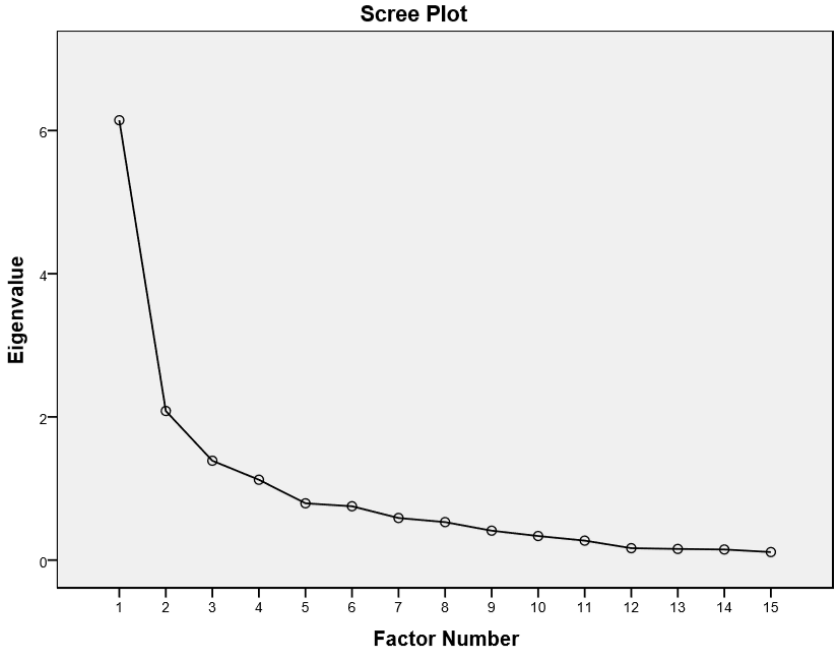
Figure 1: Scree plot indicating Factors.

Appendix E: Statistic Tables

Table 1
Descriptive Statistics for Males and Females Participants

	Total		Males		Females	
	M	SD	M	SD	M	SD
Number of Participants	(50)	-	(10)	-	(40)	-
Participant age	24.47	5.07				
Weight (lbs)	145.35	32.75				
Height (cm)	167	9.22				
BMI	23.73	4.24				

Table 2

Factor loadings and communalities for the four-factor solution.

	Factor 1 Picky Eating	Factor 2 Openness to Food	Factor 3 Fear/ Anxiety	Factor 4 Nutrition	Communality
I dislike most of the foods my peers eat	.775				.756
I am a picky eater	.689	-.340			.706
Food/eating does not interest me	.667				.420
There are more foods that I dislike than I enjoy	.665				.679
My friends/family pressure me into diversifying my food choices	.572		.326		.682
I eat a variety of food regardless of visual appeal, texture, consistency, and consequences		.901			.807
I do not like to try food with a specific smell, taste, appearance, or a certain consistency		-.588	.308		.649
I am open to trying new foods	-.384	.565			.633
When I eat, I feel disgusted and have a loss of appetite			.906		.821
I do not eat new foods because I am afraid of the consequences			.721		.725
I feel guilty after eating a large meal			.617		.347

I feel tense when I am around new food	-.419	.547	.757
I have to force myself to eat regular meals throughout the day		.546	.380
I eat foods based on their texture and/or consistency rather than their nutritional value		.735	.515
I am dependent on oral nutritional supplements		.422	.330

Note. Factor loadings < .3 are suppressed

Table 3

Reliabilities

	Cronbach Alpha (α)	Spearman-Brown Correction
Factor 1	.87	.91
Factor 2	.78	.91
Factor 3	.83	.89
Factor 4	.50	.80
Criterion Measure	.75	———

Table 4

Correlation between variables

Variables	1	2	3	4	5	6	7	8
1. Factor 1	-							
2. Factor 2	-.591**	-						
3. Factor 3	.553**	-.362**	-					
4. Factor 4	.235	.026	.280*	-				
5. Criterion cumulative score	.271	-.340*	.538**	-.045	-			
6. BMI	.086	-.065	.250	-.306*	.330*	-		
7. Sex	-.233	-.144	-.085	-.059	.022	-.112	-	
8. Age	.197	-.106	.011	-.058	-.037	.053	-.357*	-

*$p < .05$. **$p < .01$