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SPACE-ARFID: A Pilot Trial of a Novel Parent-Based Treatment for Avoidant/Restrictive Food Intake Disorder

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Abstract

Objective: This pilot trial aimed to assess the feasibility, acceptability, treatment-satisfaction, and preliminary efficacy of SPACE-ARFID (Supportive Parenting for Anxious Childhood Emotions adapted for Avoidant/Restrictive Food Intake Disorder). SPACE-ARFID is a novel outpatient parent-based treatment that focuses on parental responses to child problematic eating habits and aims to promote food-related flexibility.

Method: Parents of 15 children (ages 6-14 years) with ARFID participated in 12 weekly sessions of SPACE-ARFID. Feasibility and acceptability were assessed by calculating enrollment, attendance, attrition and adverse events. Treatment-satisfaction was assessed with the Client Satisfaction Questionnaire (CSQ-8), administered post-treatment. ARFID symptom severity and impairment and family accommodation were assessed at baseline and post-treatment.

Results: Of 17 eligible families, 15 (88.24%) elected to participate in the trial. Of the 15 participating families, all except for one (6.67%) completed all 12 weekly treatment sessions. Both parents and children rated the treatment as highly satisfactory. ARFID symptom severity and impairment as well as family accommodation were significantly reduced from pre- to post-treatment. Increases in food-related flexibility are described.

Discussion: Findings provide preliminary evidence that SPACE-ARFID, a parent-based treatment that focuses on parental responses to the ARFID symptoms is feasible, acceptable, and satisfactory and produces improvement in clinical outcomes.

Keywords: picky-eating, ARFID, children, treatment, parents, family accommodation

SPACE-ARFID: A Pilot Trial of a Novel Parent-Based Treatment for Avoidant/Restrictive Food Intake Disorder

1. Introduction

Avoidant/restrictive food intake disorder (ARFID) is characterized by dietary restrictions that are not based on weight or shape concerns but result in marked interference in feeding, growth, or psychosocial functioning (American Psychiatric Association, 2013; Eddy et al., 2019). ARFID is a heterogeneous problem and research supports three distinct, and not mutually exclusive presentations: (a) selectivity of foods based on sensory properties (e.g., “picky eating” or food neophobia); (b) limited interest in eating or poor appetite; and (c) fear of aversive consequences from eating such as choking, vomiting or gastrointestinal pain (Bryant-Waugh, Markham, Kreipe, & Walsh, 2010; Lock, Robinson, et al., 2019; Norris et al., 2018; Zickgraf, Lane-Loney, Essayli, & Ornstein, 2019). One large community study reported a prevalence of 3.2% in children and adolescents ($N = 1,444$; ages 8-13 yrs; Kurz, van Dyck, Dremmel, Munsch, & Hilbert, 2015), underscoring the need for effective treatments for childhood ARFID.

In recent years, psychosocial interventions for childhood ARFID have been developed and show promise. These include family-based treatment, cognitive behavioral approaches and behavioral parent training. Family-based treatment (FBT) for ARFID is usually carried out in an outpatient setting. FBT empowers parents as the primary agents managing behavioral change and focuses on promoting increased food volume and variety (e.g., Eckhardt, Martell, Duncombe Lowe, Le Grange, & Ehrenreich-May, 2019; Ornstein, Essayli, Nicely, Masciulli, & Lane-Loney, 2017). One recently published randomized pilot trial in children aged 5-12 years compared FBT-ARFID ($n = 16$) with treatment as usual (TAU; $n = 12$) and found greater improvement in the FBT-ARFID group. Cognitive behavioral approaches have been applied in

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outpatient settings (e.g., Thomas, Brigham, Sally, Hazen, & Eddy, 2017; Zucker et al., 2019) as well as integrated into partial hospitalization programs (e.g., Dumont, Jansen, Kroes, de Haan, & Mulkens, 2019). These applications may include cognitive restructuring, systematic exposures to increased volume and/or variety of foods, self-monitoring, and relaxation techniques (Bryant-Waugh, 2013; Dumont et al., 2019; Fischer, Luiselli, & Dove, 2015; Ornstein et al., 2017; Thomas et al., 2017).

Although psychosocial interventions for childhood ARFID commonly acknowledge the importance of parental involvement in both maintaining the eating disorder and in facilitating change, and some include a parent component (e.g., Dumont et al., 2019; Eckhardt et al., 2019; Lock, Sadeh-Sharvit, & L'Insalata, 2019), most interventions are child-centered. An exception is the Picky Eaters Clinic, a parent-only outpatient group behavioral treatment, that was evaluated in an open trial (7 groups; 2-4 families in each group; $N = 21$, ages 4-11 years). Treatment focused on training parents of children with ARFID based on sensory properties in skills for modifying their child's eating behaviors (e.g., differential reinforcement). Picky eating symptoms were reduced following treatment, with gains maintained at 3-month follow-up (Dahlsgaard & Bodie, 2019).

Children with ARFID are not always motivated to engage in treatment (Dahlsgaard & Bodie, 2019) and parental pressure to eat may lower the child's food intake and increase food aversion (Bryant-Waugh et al., 2010). A completely parent-based intervention that focuses on modifying parental involvement in ARFID symptoms without requiring direct child participation may prove especially useful for this problem. A central way in which parents may be involved in ARFID symptoms is through family accommodation, which refers to changes family members

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make to their own behavior, to help their relative who is dealing with psychopathology avoid or alleviate distress related to the disorder (Shimshoni, Shrinivasa, Cherian, & Lebowitz, 2019).

Family accommodation has been identified as a maintaining factor in eating disorders such as anorexia nervosa and bulimia (Fox & Whittlesea, 2017; Treasure & Schmidt, 2013) and is associated with greater symptom severity (Salerno et al., 2016) and caregiver burden (Anastasiadou, Medina-Pradas, Sepulveda, & Treasure, 2014; Sepulveda, Kyriacou, & Treasure, 2009). Family accommodation has also been studied in other childhood disorders, such as anxiety and OCD, where extensive support has been found for its associations with symptom severity (Lebowitz, Panza, & Bloch, 2016) functional impairment (Thompson-Hollands, Kerns, Pincus, & Comer, 2014), and poor treatment outcomes (Kagan, Peterman, Carper, & Kendall, 2016).

Research into family accommodation in ARFID is scarce, though it has been reported in pediatric picky eating (Carruth, Ziegler, Gordon, & Barr, 2004) and clinical experience with ARFID suggests that it is highly prevalent in this eating disorder as well. One recently published retrospective chart review of 22 outpatients (ages 4-25 years) diagnosed with ARFID reported the presence of accommodation in 100% of cases (Zickgraf, Murray, Kratz, & Franklin, 2019). Accommodation by parents of children with ARFID can involve active participation in symptom-driven behaviors (e.g., buying only preferred foods; bringing special foods to events) as well as modifications to family routines and schedules (e.g., only going to restaurants that serve preferred foods)(Shimshoni & Lebowitz, in press).

In OCD and anxiety, reducing family accommodation is increasingly recognized as an important treatment goal and is incorporated into treatment protocols (Comer et al., 2014; Freeman et al., 2014; Thompson-Hollands, Abramovitch, Tompson, & Barlow, 2015). SPACE

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(Supportive Parenting for Anxious Childhood Emotions) is a manualized parent-based treatment for childhood anxiety and OCD that places accommodation reduction at the core of its theoretical foundation and treatment objectives (Lebowitz, 2013; Lebowitz, Omer, Hermes, & Scahill, 2014). A recent randomized controlled noninferiority trial comparing SPACE with CBT ($N = 124$, ages 6-14 years) found SPACE to be as efficacious as CBT for childhood anxiety disorders (Lebowitz, Marin, Martino, Shimshoni, & Silverman, 2019).

SPACE-ARFID is an adaptation of SPACE based on commonly observed shared features between pediatric anxiety and ARFID. These include elevated levels of anxiety and avoidance (Fisher et al., 2014; Norris et al., 2014; Pallister & Waller, 2008; Zucker et al., 2019) and family accommodation (Brigham, Manzo, Eddy, & Thomas, 2018; Eddy et al., 2019; Shimshoni & Lebowitz, in press; Zickgraf, Murray, et al., 2019). SPACE-ARFID aims to increase food-related flexibility by systematically reducing family accommodation and food-related stress and increasing parental supportive responses. A recent case study described the application of SPACE-ARFID in a 7-year-old boy. SPACE-ARFID was successful in reducing ARFID symptoms and family accommodation and in increasing food-related flexibility (Shimshoni & Lebowitz, in press).

Increasing food-related flexibility is important considering the rigidity typical of childhood ARFID (Bryant-Waugh, 2013; Dahlsgaard & Bodie, 2019). In a study of children with picky eating/food neophobia ARFID, all patients were characterized with food-related rigidity as manifested by unwillingness to try new foods, brand specificity, and accepting only certain shapes or sizes of foods (Zickgraf, Murray, et al., 2019). Selective eating has also been linked to cognitive rigidity, further underscoring the importance of increasing flexibility in ARFID (Eddy et al., 2019; Zickgraf, Richard, Zucker, & Wallace, 2020).

The current pilot study examined the feasibility, acceptability and treatment-satisfaction of SPACE-ARFID. Secondary aims were to examine its effect on ARFID symptoms and related impairment, and to explore changes in food-related flexibility. The primary hypotheses were that SPACE-ARFID would be feasible and acceptable to parents of children with ARFID and that parents and children would find the treatment satisfactory. Thus, primary outcomes of interest were enrollment, attendance, attrition and adverse events, and parents' and children's satisfaction ratings. The secondary hypotheses were that following SPACE-ARFID, ARFID symptom severity and impairment and family accommodation would be reduced. Parents' descriptions were used to explore food-related flexibility.

2. Method

2.1 Participants

Participants were 15 children aged 6-14 years (Mean age: 9.14 years, $SD = 2.63$; 13.3% female) who presented at a pediatric specialty clinic at a large medical center in the Northeastern United States between June 2018 and June 2019, and their parents. Parents either self-referred or were referred by providers including mental health providers within secondary and tertiary care settings, and primary care practitioners.

Inclusion criteria were: (a) primary presenting DSM-5 ARFID diagnosis; (b) ages 6-18 years. Exclusion criteria were: (a) current DSM-5 diagnosis of an eating disorder other than ARFID; (b) lifetime history of psychotic, bipolar, or autism spectrum disorder, or intellectual delay; (c) presence of severe behavioral problems that require immediate treatment; (d) presence of a serious medical condition by history that requires intensive care and directly impacts eating; (e) body mass index (BMI) < 5th percentile; (f) current psychosocial or pharmacological treatment for ARFID. Treatment for other co-occurring problems was permitted.

Twenty children were evaluated for this study. Three were excluded because oppositional defiant disorder was their primary diagnosis, and two families elected not to participate (Figure 1). Table 1 summarizes sociodemographic characteristics of participants in the study.

Insert Figure 1 around here

Insert Table 1 around here

2.2 Procedure

The study was approved by the University Institutional Review Board. Following initial telephone screening, families were invited to a baseline evaluation at the clinic, and after providing informed consent and assent were administered separate diagnostic interviews and a standardized assessment battery. Parents were contacted by telephone up to one week later, received clinical feedback, reviewed the study protocol, and eligible participants were then scheduled to begin treatment. Parents could choose to participate in-person or via video-conferences (Zoom). Three families chose to conduct their treatment sessions over Zoom (20.7% of treatment sessions). Assessment and treatment were carried out by a postdoctoral level clinical psychologist. Assessments were discussed in clinical meetings attended by several doctoral level clinical psychologists until expert consensus was reached. Trained research personnel assisted the children in completing questionnaires. Following the 12th and final treatment session, a post-treatment evaluation was conducted in-person, including diagnostic interviews and primary and secondary outcomes measures. Information about medical conditions and nutritional status was provided by parents and primary care providers and participants were monitored by their medical providers over the course of the study to ensure they remained medically stable.

2.3 Measures

2.3.1 ARFID

ARFID Diagnosis. ARFID diagnoses were established based on an interview following DSM-5 criteria (American Psychiatric Association, 2013); there was no standardized structured diagnostic interview for ARFID when this study was initiated. Following current trends and recommendations (Eddy et al., 2019; Walsh, 2019), ARFID could be diagnosed based on the presence of marked psychosocial interference (criterion A4) without significant weight-loss, nutritional deficiency, or dependence on oral supplements. It was also established whether food restriction was characterized by sensory sensitivity, lack of interest, and/or by anxiety about aversive consequences. Parents and children were asked to describe ARFID-related interference in four functional domains: family, school, social, personal (e.g., distress/sleep/health) and to provide an overall interference rating on a scale from 0 to 8, with 4 signifying clinical levels of interference and functional impairment. This procedure mirrors that of the Anxiety Disorders Interview Schedule - Child and Parent Versions (Albano & Silverman, 2020) used in this study for assessing anxiety and other disorders (see below). Final ARFID diagnoses and interference levels were determined by the clinician through the integration of information collected from both parents and children and agreed upon by expert consensus. The interview was administered separately to children and parents at baseline and post-treatment.

ARFID Symptom Severity. The Nine Item Avoidant/Restrictive Food Intake Disorder Screen (NIAS; Zickgraf & Ellis, 2018) assesses eating restrictions related to picky eating, poor appetite/limited interest in eating, and fear of negative consequences of eating. The NIAS contains nine items (e.g., *My child dislikes most foods that other people eat easily*), rated on a 6-point scale (0 = “strongly disagree”, to 5 = “strongly agree”). Total scores range from 0-45, and 0-15 for each of the three subscales (Picky eating, Appetite, Fear). The parent-report version of

the NIAS, used in this study, has good internal consistency ($\alpha = 0.91$; Zickgraf et al., 2020). It is a modification of the self-report version of the NIAS, which was validated in adults showing convergent and divergent validity as well as test-retest reliability and internal consistency ($\alpha = .90$; Zickgraf & Ellis, 2018). In the present sample, internal consistency was $\alpha = 0.78$ for Picky eating, $\alpha = 0.91$ for Appetite, and $\alpha = 0.90$ for Fear subscales. The NIAS was administered to parents at baseline and post-treatment.

Height and Weight: The Expected Body Weight percentage (%EBW) provides the percentage of the expected body weight given the age, height and gender. Child %EBW were calculated using the Center for Disease Control metrics in children and adolescents BMI charts (Kuczmarski et al., 2002) corresponding to the 50th percentile. Children's height and weight were measured by trained research personnel at baseline and post-treatment.

2.3.2 Feasibility and Acceptability

Feasibility and acceptability were assessed through the number of eligible families who elected to enroll in the study, the percent and total number of sessions attended by parents, the frequency of sessions being rescheduled, the number of families who dropped out of the study, and the frequency of adverse events related to the study.

2.3.3 Satisfaction

The Client Satisfaction Questionnaire (CSQ-8; Larsen, Attkisson, Hargreaves, & Nguyen, 1979) is an 8-item questionnaire that assesses satisfaction with treatment services (e.g., *If a friend were in need of similar help, would you recommend our program to him or her?*) on a 4-point Likert-type scale from 1 to 4. Total scores range from 8-32 with higher scores indicating greater satisfaction. Child and parent versions of the CSQ-8 were administered post-treatment.

2.3.4 Other measures

Diagnostic Assessment. A semi-structured diagnostic interview, the Anxiety Disorders Interview Schedule for DSM-5 - Child and Parent Versions (ADIS-C/P; Albano & Silverman, 2020), was administered separately to parents and children at baseline by a postdoctoral level clinical psychologist. The ADIS-C/P is widely used and has excellent psychometric properties. As in past research, in cases of discordant reports both informants' views were considered by a panel of experienced interviewers including one of the interview's authors to derive final diagnoses (Silverman, Saavedra, & Pina, 2001).

Family Accommodation. The Family Accommodation Scale Anxiety - Parent Version (FASA; Lebowitz, Scharfstein, & Jones, 2015; Lebowitz et al., 2013) assesses family accommodation of childhood anxiety. A total accommodation score is calculated from 9-items that rate the frequency of accommodations on a 5-point scale (0 = "very rarely" to 4 "very often") with total scores ranging from 0-36. Two subscale scores are calculated from items pertaining to active Participation in symptoms and to Modification of family routines and schedules. The FASA is the most widely used measure of family accommodation of childhood anxiety and has established psychometric properties, including good internal consistency and convergent and divergent validity and test-retest reliability (Lebowitz, 2013; Lebowitz, Marin, & Silverman, 2019; Lebowitz et al., 2014). In the present sample internal consistency was $\alpha = 0.85$, for Total FASA, $\alpha = 0.75$ for Participation and $\alpha = 0.76$ for Modification subscales. The FASA was administered to parents at baseline and post-treatment.

Food-related flexibility. To explore food-related flexibility, descriptions of child eating behaviors provided by the parents and documented by the clinician throughout treatment sessions were reviewed following treatment. These data were organized into the following categories indicative of increased flexibility: eating completely new foods; eating new brands/appearance of

preferred foods; eating new flavors of preferred foods; eating in new settings; flexibility in other aspects of eating.

2.4 Intervention

SPACE-ARFID consists of 12 weekly 60-minute sessions conducted with parents in an outpatient setting. The goal of treatment is to improve the child's food-related flexibility through the modification of parents' responses to the child's symptoms. As family accommodation can contribute to food-related rigidity and symptoms maintenance, SPACE-ARFID helps parents to systematically reduce their accommodations, reduce food-related stress, and increase supportive responses. When selecting a target for accommodation reduction, each accommodation is examined to determine whether it is facilitating better or worse functioning over time. SPACE-ARFID defines supportive responses to the child's symptoms as any parental response that conveys both acceptance of the child's genuine distress, and confidence in the child's ability to cope with and tolerate the distress. SPACE-ARFID was developed specifically to be implementable without direct child involvement, when necessary. Throughout the treatment process parents are not instructed to directly modify their child's behavior and treatment is not contingent on the child's agreement. Instead, SPACE-ARFID focuses on the parents' own behavior, particularly their responses to the child's symptoms. The focus on modification of the parents' behaviors, and not the child's, reduces the risk of parent-child conflict as there is no need for parents to impose demands on the child. SPACE-ARFID follows a manualized set of 7 parts with optional modules that can be implemented when needed. See Table 2 for an outline of treatment steps and Shimshoni and Lebowitz (in press) for a detailed description of the treatment.

Insert Table 2 around here

2.5 Data Analysis

Analyses were conducted in SPSS (version 24). Sociodemographic characteristics of the sample were examined first. Feasibility and acceptability were established by calculating the percent and number of eligible families who elected to participate, the percent and total number of sessions attended by parents, the frequency of sessions being rescheduled, the number of families who dropped out of the study, and the frequency of adverse events related to the study. Satisfaction was rated post-treatment by parents and children separately. Paired sample t-tests were used to compare baseline and post-treatment scores on study variables and Hedges' g was calculated to assess effect sizes (Hedges, 1981). Changes in food-related flexibility were summarized descriptively.

3. Results

3.1 Feasibility, Acceptability, and Satisfaction

Of 17 eligible families, 15 (88.24%) elected to participate in the trial. Of these, 14 (93.33%) completed all 12 weekly treatment sessions. The single family who dropped out completed 6 treatment sessions before discontinuing participation due to 'scheduling conflicts'. For the other families, out of 168 sessions (14 families x 12 sessions per family) 17 were rescheduled due to the family's request (the number of sessions rescheduled per family ranged between 0-2, with an average of 1.21% per family). No adverse events were recorded during the study period. Both parents and children rated the treatment as highly satisfactory ($M = 29.86$, $SD = 2.80$ for parents and $M = 24.14$, $SD = 4.66$ for children, out of the maximum score of 32). Most parents (64.29%) provided a score of at least 31 and six parents (42.86%) provided the maximum score of 32.

3.2 Clinical Outcomes

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Table 3 summarizes baseline and post-treatment clinical characteristics. ARFID symptom severity and impairment were significantly reduced post-treatment. ARFID-related interference ratings based on the clinical interview were significantly reduced ($t = 7.77, p < .001, Hedge's g = 2.60$). ARFID symptom severity based on NIAS scores was also significantly reduced ($t = 5.50, p < .001, Hedge's g = 1.49$ for Total NIAS score; $t = 3.72, p = .003, Hedge's g = 1.23$ for Picky Eating, $t = 3.56, p = .003, Hedge's g = .57$ for Appetite, and $t = 3.42, p = .005, Hedge's g = .78$ for Fear).

At post-treatment eight participants (57.14%) no longer met criteria for a clinically impairing ARFID diagnosis. Five participants (35.71%) met criteria for ARFID at a low-to-moderate interference level, and a single participant met criteria for ARFID at a high interference level.

Family accommodation was likewise significantly reduced post-treatment, as assessed by the FASA Total scores ($t = 4.10, p = .001, Hedge's g = 1.17$) and subscales ($t = 2.81, p = .015, Hedge's g = .86$ for Participation and $t = 4.42, p = .001, Hedge's g = 1.81$ for Modification).

No significant changes were found in child %EBW following treatment.

Insert table 3 around here

Descriptions of increased flexibility in children's eating behavior are summarized in Table 4. Thirteen participants (92.86%) added new foods or beverages to their diet. The number of new foods/beverages ranged from 1 to 14. Five participants (35.71%) were willing to try most presented foods. Eleven (78.57%) increased flexibility around brands and flavors. Six (42.86%) increased flexibility in the settings in which they would eat (e.g., school, restaurants). Eight (57.14%) increased flexibility in other aspects of food-related flexibility such as tolerating foods touching on the plate, tolerating proximity to non-preferred foods, and eating solid foods. Two

participants (14.29%) showed increased flexibility in all domains, six (42.86%) increased flexibility in at least 4 domains, and 14 (100%) increased flexibility in at least 1 domain.

4. Discussion

This pilot study examined the feasibility, acceptability, treatment-satisfaction, and clinical impact of SPACE-ARFID, a novel parent-based treatment for childhood ARFID. As hypothesized, the treatment was highly feasible, as evidenced by the high enrollment rate among eligible families, the low dropout rate (only one participant), the high attendance rates and the absence of adverse events. SPACE-ARFID was also deemed highly satisfactory both by parents, who were the active treatment participants, and by children. The high parental satisfaction is important as the treatment not only focuses on parents, who might naturally prefer that the child be the patient, but also requires that they make significant changes in their own behavior. The high level of child satisfaction is also important, given that they did not participate directly in therapy.

Results also support the hypothesis that SPACE-ARFID can significantly improve clinical outcomes. All children showed a reduction in ARFID symptom severity and impairment following treatment, and most no longer met criteria for a clinically impairing ARFID diagnosis. The study was not powered to examine specific predictors of outcomes which could include parent, child, and family-level variables. Family Accommodation was also significantly reduced. Although effect sizes for these changes were mostly large, they should be interpreted with caution because of the small sample size and broad confidence intervals (Leon, Davis, & Kraemer, 2011). Additionally, although these findings are promising and support the continued development of SPACE-ARFID, randomized trials with larger samples are necessary before efficacy can be established.

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This is the first clinical trial to demonstrate reductions in family accommodation after treatment for childhood ARFID. Conceptually, family accommodation is thought to maintain the ARFID by promoting avoidance and reinforcing the child's pathological beliefs. For example, a child who fears trying new foods will cause them harm may feel relieved when parents accommodate but may remain fearful of new foods and may view the accommodation as confirmation of their belief. High levels of accommodation may also dampen children's motivation to make behavioral changes or to participate in treatment. Reducing accommodation may increase this motivation and can create opportunities for the child to experience themselves as better able to cope than they had previously believed. The reduction of family accommodation post-treatment should be interpreted in the context of an open trial, which limits understanding of directionality of change (Silverman, Kurtines, Jaccard, & Pina, 2009). With further treatment evaluation efforts, it will be of interest to examine directional paths (i.e., parent to child; child to parent), as well as bi-directional/reciprocal paths.

Of note, children in this sample presented without clinically significant weight-loss, or gross nutritional deficiencies. The average %EBW, at baseline and post-treatment, were slightly over 100%, indicating average normal weight. This is consistent with research in clinical (Zickgraf, Murray, et al., 2019) and nonclinical samples (Brown et al., 2018) suggesting that selective eating is not necessarily linked to weight-loss or nutritional deficiency. Furthermore, the sample comprised primarily children whose eating selectivity was based on sensory characteristics. It has been suggested that this ARFID presentation is less likely to be associated with weight-loss, growth problems, or nutritional deficiencies than are other presentations because selectivity in variety does not necessarily limit caloric intake (Zickgraf, Murray, et al., 2019). Indeed, the brand specificity and consumption of processed foods characteristic of ARFID

and picky eating may actually contribute to higher weight. Processed foods tend to be nutritionally unbalanced, are typically less satiating, and often have high glycemic loads (Fardet, 2016).

A novel contribution of this study is the description and categorization of flexibility/rigidity domains, showing positive changes in these domains over the course of treatment. Rigidity has been previously implicated in ARFID as a possible maintaining mechanism (Zickgraf, Murray, et al., 2019; Zickgraf et al., 2020). Although preliminary and descriptive, these findings support the importance of increasing flexibility in ARFID. Additional research into the proposed flexibility/rigidity domains, including validation of a measure for assessing food-related flexibility is needed.

The results of this study should be interpreted given its limitations including the absence of follow-up data, an independent evaluator, or reliability ratings for the ARFID diagnoses which were finalized after discussion and expert consensus. Furthermore, the open study design of this pilot study precludes determining whether some improvement may be attributed to the passage of time or to other factors and underscores the need for rigorous randomized trials. Another limitation relates to the sample characteristics and exclusion criteria. Participating children were primarily males (87%), presented with food selectivity based primarily on sensory features (93%), and did not suffer from weight-loss. Thus, the generalizability of the findings to more heterogeneous populations remains to be examined. Such high rates of males and of the picky eating presentation have not been reported in previous ARFID samples (e.g., Kurz et al., 2015; Norris et al., 2014). Yet, because the sample was of modest size, the homogeneity could be coincidental. Although the study allowed for participation of children ages 6-18 years, the oldest participant was 14. It is uncertain how the treatment would have been received by older

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adolescents. The exclusion of children with ASD and intellectual delay also precludes conclusions regarding the applicability of the treatment to children with these comorbidities.

This preliminary study focused on children who were medically stable and therefore it is unknown to what extent findings would apply to more severe medical presentations. Relating to this, medical conditions and nutritional deficiencies in the children were not directly assessed as part of this study, but rather information was gathered through reports from parents and primary care providers. Although ARFID intervention programs often include a multidisciplinary team of providers (including psychiatrists, physicians, psychologists/social workers, and nutritionists), it has been posited that this approach is most needed when treating low-weight or nutritionally compromised patients, and that less severe cases may be successfully treated by a single expert practitioner (Eddy et al., 2019). Conducting single-therapist outpatient treatment for children with ARFID who are not medically compromised, with adjunct medical monitoring, may significantly reduce costs and resources. Additionally, this model may better reflect treatment in the community and can increase availability of treatment. The option of delivering treatment over teleconference further increases the scalability of the treatment. The delivery of mental health treatment through teleconsultation has increased in recent years in an effort to reduce costs and increase treatment access. Systematic reviews of mental health treatment via teleconsultation report these treatments to be as efficacious as face-to-face treatment (Drago, Winding, & Antypa, 2016; Shigekawa, Fix, Corbett, Roby, & Coffman, 2018). Finally, because there are no available measures for assessing family accommodation in childhood ARFID, we used the FASA to assess accommodation. To address the need to systematically examine the prevalence, characteristics and impact of family accommodation in ARFID, a family accommodation scale for disordered eating is currently being developed by the authors of this study.

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SPACE-ARFID is among the first parent-based treatments for childhood ARFID and the first to focus systematically on family accommodation. The high feasibility, acceptability and treatment-satisfaction of SPACE-ARFID and its potential to improve ARFID symptomatology, underscore the need for controlled studies to further examine its efficacy.

For Review Only

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Figure 1. Consort Diagram of Study Enrollment and Retention

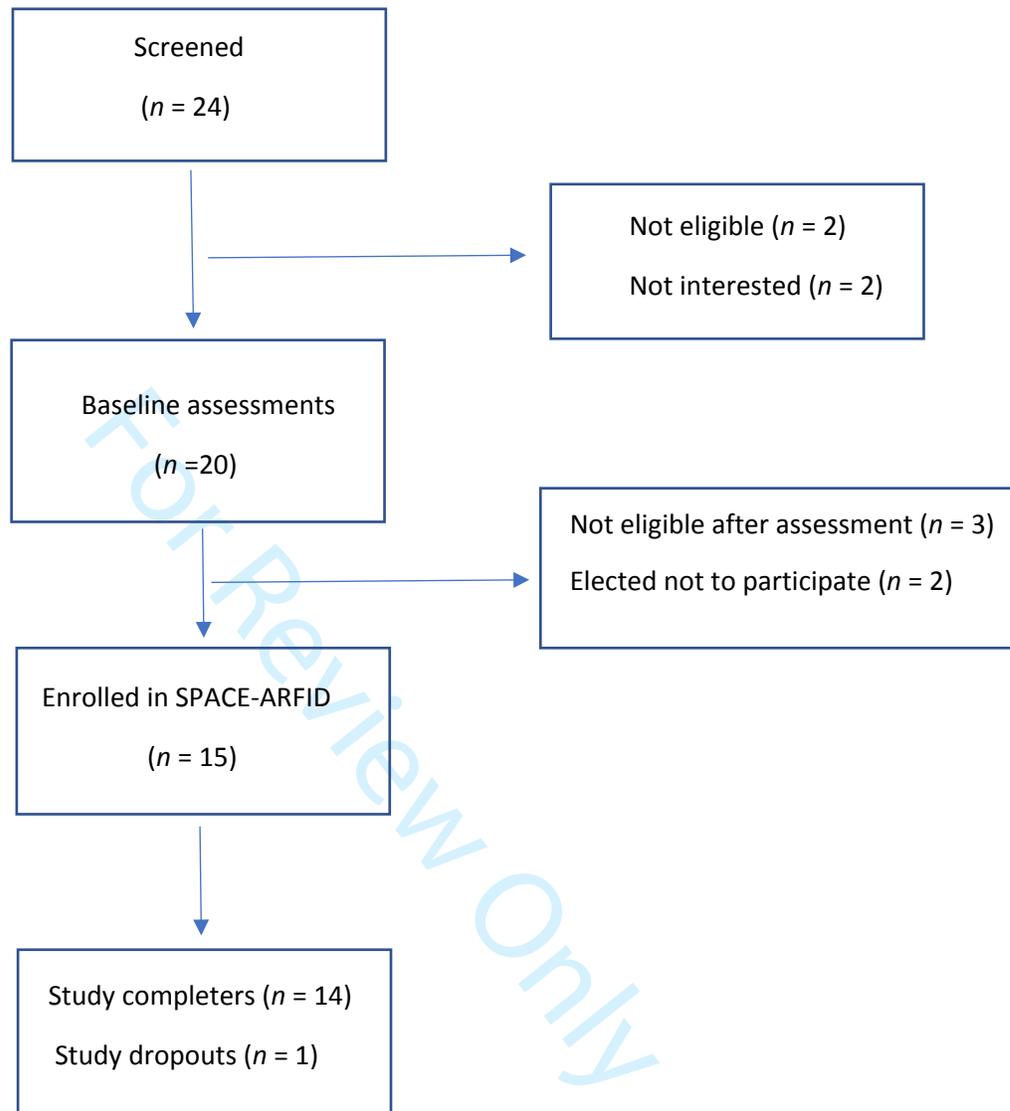


Table 1

*Sample Characteristics at Baseline**N* = 15

Age in years	
Mean (SD)	9.14 (2.63)
Sex	
% male	86.7%
	<u>% (n)</u>
ARFID presentation	
Picky eating	93.33 (14)
Appetite	6.67 (1)
Fear	26.67 (4)
Other diagnoses	
Anxiety and OCD	33.33 (5)
ADHD	26.67 (4)
ODD	26.67 (4)
Dysthymia	6.67 (1)
Child Ethnicity	
Non-Hispanic or Latino	85.7 (12) (1 missing)
Child Race	
White	92.9 (13) (1 missing)
Multiracial	6.67 (1)
Marital Status	
Married	86.67 (13)
Single	6.67 (1)
Divorced	6.67 (1)
Annual household family income	
< \$41,000	14.3 (2)
\$41,000-\$60,999	6.70 (1)
\$61,000-\$80,999	6.70 (1)
\$81,000-\$99,999	6.70 (1)
\$100,000-\$124,999	20.0 (3)
\$125,000-\$149,999	26.7 (4)
>150,000	14.3 (2)

Note. ARFID = Avoidant/Restrictive Food Intake Disorder, OCD = Obsessive-Compulsive Disorder, ADHD = Attention-Deficit/Hyperactivity Disorder, ODD = Oppositional Defiant Disorder.

Table 2

SPACE-ARFID Treatment Parts

Part	Key interventions
<u>Part 1</u> Introduction and setting the stage for parent work 1-2 sessions	Psychoeducation on ARFID Introducing the rationale for parent work Introducing the main treatment goals and concepts: increasing flexibility and adjustment in food related situations by reducing family accommodation, reducing food related stress, and increasing supportive responses
<u>Part 2</u> Monitoring parent behavior 2-3 sessions	Discussing family food habits and attitudes Discussing parent-child food related interactions Parents start to work on reducing conflict and increasing support Charting accommodation Completing Food Ladders
<u>Part 3</u> Picking a target and formulating a plan 1-2 sessions	Picking a target and formulating a detailed plan for: Reducing conflict and stress in food related situations Reducing accommodation of the ARFID symptoms Increasing supportive responses to the child's distress
<u>Part 4</u> Implementation 3-5 sessions	Informing the child of the parents' plan Implementing the plan Monitoring implementation and troubleshooting
<u>Part 5</u> Additional tools Alongside implementation	Incorporating additional tools aimed at increasing the child's exposure to non-preferred foods or food related situations in a 'game-like' manner (e.g., food chaining, increasing the child's knowledge of food and involvement in food preparation, food-related games)
<u>Part 6</u> Additional targets 3-5 sessions	Charting accommodation Formulating a second plan Informing the child Implementing a second plan Monitoring implementation and troubleshooting
<u>Part 7</u> Relapse prevention and termination 1 session	Assessing treatment gains Discussing additional goals Treatment termination
<u>Modules (optional)</u> Alongside implementation	Recruiting and engaging supporters Dealing with extreme disruptive behavior Dealing with threats of self-injury or suicide Improving collaboration between parents

Table 3

Outcome Measures for Treatment Completers at Baseline and Post-Treatment

	Baseline		Post Treatment		<i>t</i>	<i>df</i>	<i>p</i> <i>value</i>	<i>Hedge's g</i> <i>(95%CI)</i>
	Mean	SD	Mean	SD				
%EBW	102.01	16.29	102.50	18.20	-.47	13	.650	
ARFID interference*								
Parent rated	6.36	.84	3.46	1.41	7.43	13	<.001	2.43 (1.45, 3.40)
Child rated	2.92	1.31	1.67	1.47	2.29	11	.043	.87 (.10, 1.65)
Clinician rated	6.43	.76	3.36	1.49	7.77	13	<.001	2.52 (1.53, 3.51)
ARFID symptom severity - parent rated (NIAS)								
Picky eating	14.50	1.16	11.42	3.34	3.72	13	.003	1.20 (.39, 2.00)
Appetite	8.79	5.38	5.85	4.99	3.56	13	.003	.55 (-.20, 1.30)
Fear	5.93	5.05	2.71	2.97	3.42	13	.005	.75 (-.01, 1.52)
Total	29.36	5.15	20.14	7.07	5.50	13	<.001	1.45 (.62, 2.28)
Family accommodation - parent rated (FASA)								
Participation	11.29	4.30	7.57	4.33	2.81	13	.015	.84 (.06, 1.61)
Modification	6.43	3.13	2.29	.79	4.42	13	.001	1.67 (.81, 2.53)
Total	17.71	6.65	9.86	6.72	4.10	13	.001	1.14 (.34, 1.94)

Note. %EBW = Expected Body Weight Percentage; ARFID = Avoidant/Restrictive Food Intake Disorder; NIAS = Nine Item Avoidant/Restrictive Food Intake Disorder Screen, FASA = Family Accommodation Scale Anxiety.

*Based on the diagnostic interview.

Table 4

Increases in food-related flexibility for study participants

Age (years)/gender (F/M)	New foods added to the child's diet	New brands/appearance of preferred foods added to the child's diet	New flavors of preferred foods added to the child's diet	New settings the child will eat in	Flexibility in other aspects of eating	Met criteria for ARFID post treatment (Yes/No)
1. 9/M	Milk Noodles with beef			Eats at restaurants including non-preferred restaurants	Tolerates foods touching on the plate Tolerates preferred and non-preferred foods touching on the plate Eats leftovers	No
2. 12/M	Pasta shells with cheese Spinach Cauliflower Broccoli Cucumber Yellow pepper Blueberries Raspberries Hamburgers Lobster Calamari *Will try more foods	Mac & cheese			Tolerates physical proximity to non-preferred foods Helps to cook	No
3. 7/M		Chicken nuggets				Yes
4. 7/F	Cheeseburgers	Eats different brands	Eats different flavors			Yes

		when part of the school lunch	when part of the school lunch				
	Vanilla yogurt School lunch *Will try most presented food at school and at home						
5.	14/M	Buns Pineapple Root beer Carrots Grapes French fries	Bread Peanut butter		Eats with parents Eats in the school cafeteria	Prepares some of his own food	Yes
6.	6/M	Peanut butter Sandwiches Corn on the cob Breaded chicken White rice Beef stew with vegetables Watermelon Tomato sauce Mac & cheese Peas Pears Apple juice	Different color apples Crackers			Eats solid foods Eats independently Uses utensils Tolerates preferred and non-preferred foods touching on the plate Tolerates physical proximity to non-preferred food	No
7.	12/M	Carrots Yogurt Eggs Baby bell cheese	Bread	Yogurt Crackers			Yes
8.	6/M	Pizza Popcorn Strawberry yogurt	Cheese pizza - any Crackers	Goldfish crackers	Eats with parents Eats at birthday parties, camps,	Tolerates physical proximity to non-preferred food	No

		Bread and butter sandwiches Mac & cheese Chicken nuggets Apples Blueberries Potato chips Bacon Hamburgers Spaghetti with tomato sauce *Will try most foods	fieldtrips and restaurants	Helps with grocery shopping	
9.	11/M	Tomatoes Bacon Corn Eggs Sunflower seeds Blueberry waffles Grilled cheese sandwich Watermelon Corn chips Sausage School lunch *Will try most foods			Yes
10.	9/F	Goldfish crackers Milk Corn on the cob Celery Waffles Vegetable salad *Will try more foods	Salad dressing		No

11. 12/M	Grilled cheese with ham sandwiches Ice cream Pasta with mozzarella cheese	Grilled cheese sandwiches from various restaurants New shapes and brands of pasta		Joins family meals Eats at non-preferred restaurants	Tolerates physical proximity to and smells of non-preferred foods	No
12. 7/M	White bread White bread and cheese sandwiches Noodles with sauce School provided breakfast Cheerios Pizza Homemade chicken nuggets Nutella Tacos with lettuce and cheese	Cereal New sizes and shapes of cheese	Cheese	Eats at non-preferred restaurants, birthday parties and camps	Tolerates preferred and non-preferred foods touching on the plate	Yes
13. 7/M	Steak Bacon Chicken nuggets Donut with blueberry frosting			Joins family meals		No
14. 6/M	Water	Yogurt Fruit and vegetable pouches Mac & cheese	Yogurt Fruit and vegetable pouches Juice		Eats independently	No