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Cognitive-behavioral therapy for adults with avoidant/restrictive food intake disorder☆

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Abstract

There are currently no evidence-based treatments for adults with avoidant/restrictive food intake disorder (ARFID). The purpose of this study was to evaluate the acceptability, feasibility, and proof-of-concept of cognitive-behavioral therapy for ARFID (CBT-AR) for adults. Males and females (ages 18–55 years) were offered 20–30 outpatient sessions of CBT-AR delivered by one of five therapists. Of 18 eligible adults offered CBT-AR, 15 chose to participate and 14 completed treatment. All patients endorsed high ratings of treatment credibility and expected improvement after the first session, and 93% of completers provided high ratings of satisfaction at the conclusion of treatment. Therapists rated the majority (80%) of patients as “much improved” or “very much improved.” Based on intent-to-treat analyses, ARFID severity on the Pica, ARFID, and Rumination Disorder Interview (PARDI) showed a large and significant decrease from pre- to post-treatment; and patients incorporated a mean of 18.0 novel foods. The underweight subgroup (n = 4) gained an average of 11.38 pounds, showing a large and significant increase in mean BMI from the underweight to the normal-weight range. At post-treatment, 47% of patients no longer

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Disclosure of interest

JJT, KTE, and KRB receive royalties from Cambridge University Press for the sale of their books on ARFID. All other authors declare that they have no competing interest.

met criteria for ARFID. To our knowledge, this is the first prospective treatment study of ARFID in adults. The findings of this study provide preliminary evidence of feasibility, acceptability, and proof-of-concept of CBT-AR for heterogeneous presentations of ARFID in adults. Randomized controlled trials are needed to confirm these findings. ClinicalTrials.gov Identifier: NCT02963220.

Keywords

Avoidant/restrictive food intake disorder; Feeding and eating disorders; Picky eating; Cognitive-behavioral therapy; Psychotherapy trial; COVID-19

Introduction

Avoidant/restrictive food intake disorder (ARFID) is a *DSM-5* feeding and eating disorder that affects individuals across the lifespan (American Psychiatric Association, 2013). However, the majority of research has focused on children. The few studies that have examined ARFID and associated psychopathology in adults suggest that its symptoms are severe and impairing (e.g., Nakai, Nin, Noma, Teramukai, & Wonderlich, 2016); Zickgraf, Franklin, & Rozin, 2016), and that ARFID may be just as common as the better-known eating disorders. In a recent study of 3005 Australians ages 15 and older, the point prevalence of ARFID in 2014 was 0.3%, compared to 0.4% for anorexia nervosa (Hay et al., 2017).

There are currently a number of promising psychosocial treatments for ARFID in children and adolescents (e.g., Dumont, Jansen, Kroes, de Haan, & Mulkens, 2019); Lock, Sadeh-Sharvit, & L'Insalata, 2019; Sharp et al., 2016; Thomas et al., in press). However, no published studies have evaluated the efficacy of any intervention for ARFID in adults (for review, see Dalle Grave & Sapuppo, 2020). A handful of recent case reports have highlighted the potential of cognitive-behavioral therapy (CBT) for adults (e.g., Aloi, Sinopoli, & Segura-Garcia, 2018; Görmez, Kılıç, & Kırpınar, 2018; Steen & Wade, 2018). Our team has recently developed a novel form of CBT for ARFID (CBT-AR) that is designed for broad application across the lifespan to children, adolescents, and adults ages 10 and older (Thomas & Eddy, 2019). We recently evaluated the feasibility, acceptability, and proof-of-concept of CBT-AR in children and adolescents with ARFID (ages 10–17 years; Thomas et al., 2020). In that study, the majority of patients (85%) completed treatment, and completers reported high levels of treatment satisfaction. Furthermore, patients demonstrated significant decreases in ARFID severity from pre- to post-treatment, added an average of 16.7 novel foods to their diet, and—at the conclusion of treatment—70% no longer met criteria for ARFID (Thomas et al., 2020). However, the impact of CBT-AR for adults has yet to be evaluated.

To that end, the purpose of the current study was to evaluate the feasibility, acceptability, and proof-of-concept of CBT-AR in adults (ages 18 and older). Based on our preliminary findings in children and adolescents, we hypothesized that CBT-AR would demonstrate feasibility, in that the majority of patients offered the treatment would choose to take part, and there would be few adverse events. In terms of acceptability, we predicted that patients would provide high ratings of credibility and satisfaction. Lastly, regarding proof-of-concept

(Czajkowski et al., 2015), we hypothesized that therapists (reporting on their patients) and patients would report significant reductions in ARFID symptom severity from pre- to post-treatment. We further predicted that patients would incorporate several new foods and that underweight patients would gain significant weight. We anticipated that post-treatment, many patients would no longer meet criteria for ARFID and that patients would exhibit significant reductions in anxiety, depression, and clinical impairment.

Methods

Participants

We recruited patients from two sources. First, between November 2016 and March 2020 we recruited young adults ages 18–23 years from those who were already participating in an observational study of the neurobiology of ARFID (R01MH108595). Second, after receiving additional funding, between December 2019 and March 2020 we opened recruitment to adults ages 18 and older from consecutive referrals for ARFID treatment to the Massachusetts General Hospital Eating Disorders Clinical and Research Program.

Inclusion criteria for the neurobiology study are described elsewhere (Thomas et al., in press) but notably included no current pregnancy or breastfeeding, no use of hormonal contraceptives, no concurrent diagnosis of substance use disorder or psychotic disorder, no active suicidal or homicidal ideation, no lifetime history of gastrointestinal tract surgery, and no contraindications for magnetic resonance imaging (MRI). Participants recruited through the clinical referral pathway had to be at least 18 years old (with no upper age limit), and did not need to meet the MRI, pregnancy/breastfeeding, or hormonal contraceptive criteria. Additional inclusion criteria for this study that applied to all patients included medical stability for outpatient treatment; meeting full criteria for ARFID on the Pica, ARFID, and Rumination Disorder Interview (Bryant-Waugh et al., 2019); no past history or current symptoms of another eating disorder; no current tube feeding; living within one hour's drive of the clinic; not receiving concurrent psychosocial treatment; no changes in psychotropic medication (if taking) for the past 12 weeks; and availability to initiate treatment within four weeks of the baseline visit. Fig. 1 presents a participant flow diagram: Of 26 potential participants, eight (31%) were excluded, three (11%) declined participation, and 15 (58%) initiated treatment.

Procedure

The trial was registered at ClinicalTrials.gov (Identifier: NCT02963220) prior to data collection. Patients received the study treatment at no cost and were paid for a pre-treatment evaluation that included a three-hour screening visit and a baseline visit of variable length. Specifically, patients who were dually enrolled in the neurobiology study completed an eight-hour baseline visit (including interviews, questionnaires, physical exam, stool samples, blood draws, MRI, and behavioral tasks) and were paid $100–250 depending on the components completed. Patients who enrolled through the clinical referral pathway completed a three-hour baseline visit (including interviews, questionnaires, and physical exam only) and were paid $100–140. All patients were then paid up to a total of $200–300 for completing weekly questionnaires and another three-hour (clinical pathway) to

eight-hour (dually enrolled) visit after completing CBT-AR, prorated based on components completed.

Treatment

Cognitive-behavioral therapy for ARFID (CBT-AR)—CBT-AR is a four-stage modular treatment designed to target the specific psychopathology of ARFID. The core interventions are described in a published treatment manual (Thomas & Eddy, 2019) and are the same for children, adolescents, and adults. In Stage 1, patients receive psychoeducation about ARFID and begin self-monitoring of food intake and early change (including weight gain, for those who are underweight). They also work toward establishing (or reinforcing) a regular schedule of eating. Patients immediately begin working to increase volume or variety depending on their particular presentation of ARFID. Patients who need to work on both volume and variety always begin by increasing volume, beginning with preferred foods. In Stage 2, patients learn about risk for nutritional deficiencies and select foods for exposure in Stage 3 that will increase their representation across the five food groups, reduce psychosocial impairment, resolve nutrition deficiencies, and/or promote weight gain. In Stage 3, patients complete repeated exposures—both in-session and as homework—to address one or more primary maintaining mechanism(s) (i.e., sensory sensitivity, lack of interest, fear of aversive consequences). Patients with sensory sensitivity taste five novel foods per session; patients with fear of aversive consequences work through a fear and avoidance hierarchy; and patients with lack of interest practice interoceptive exposures. In Stage 4, patients create a relapse prevention plan.

Consistent with the manual (Thomas & Eddy, 2019), sessions lasted 50 minutes. Patients who were not underweight were offered up to 20 sessions, and patients who were underweight were offered up to 30 sessions, with some flexibility due to the pilot nature of the study. All patients were offered the individual version of the treatment with the exception of those (n = 1) who were underweight and living at home, who were offered a family-supported version in which the parents attended all sessions.

Telehealth delivery due to COVID-19—At the start of the 2019 coronavirus (COVID-19) pandemic, eight patients had completed CBT-AR with face-to-face delivery. However, in line with public health directives (Centers for Disease Control and Prevention, 2020), in March 2020 we switched the five then-enrolled patients from face-to-face to telehealth delivery through a videoconferencing platform compliant with the Health Insurance Portability and Accountability Act. The final two patients completed all sessions via telehealth. For video sessions, we followed the recommendations of Waller et al. (2020) and Matheson, Bohon, & Lock (2020) for telehealth delivery of eating-disorder treatment.

Treatment fidelity—Treatment was provided by one of five doctoral or master's level therapists (JJT, KRB, HBM, LB, or KTE). Therapists met weekly to prevent therapist drift. All sessions were audio-recorded. Independent raters (JHJ, MJD, MCK) made fidelity and competence ratings based on a published measure (Thomas & Eddy, 2019). Ratings of two randomly selected sessions for each of 15 patients indicated high levels of fidelity (M =

6.96, SD = 0.21, on a 7-point scale) and competence (M = 4.99, SD = 0.11, on a 5-point scale).

Concurrent support—Patients could not receive concurrent psychosocial interventions for ARFID or another psychiatric disorder (e.g., psychotherapy, nutrition counseling) for the duration of the trial. However, all patients received medical monitoring from a physician with expertise in feeding and eating disorders, and a subset (n = 7, 47%) continued to take a stable dose of psychotropic medication that had been initiated at least 12 weeks prior to the trial.

Measures

Pica, ARFID, and Rumination Disorder Interview (PARDI)—The PARDI is a structured interview that assesses the specific psychopathology of ARFID (Bryant-Waugh et al., 2019). The PARDI can be used to confer ARFID diagnoses and also provides ratings of overall ARFID symptom severity as well as severity scores for the three primary presentations of ARFID, including sensory sensitivity, lack of interest in eating or food, and fear of aversive consequences. PARDI scores range from 0 (no symptoms) to 6 (extreme severity). We used the PARDI to determine ARFID diagnosis, as well as to evaluate change in ARFID severity and profile scores, from pre- to post-treatment. We also used the PARDI, supplemented by clinical impression, to assign CBT-AR Stage 3 modules. Independent assessors who were not study therapists conducted all PARDIs. Internal consistency (measured via McDonald's omega to account for skewed data) for the severity and profile ratings ranged from 0.89 to 1.0 in the current sample. Inter-rater reliability of the ARFID diagnosis (yes/no) for 20% of randomly selected cases at both pre- and post-treatment was excellent (100% agreement; kappa = 1.0).

Psychiatric comorbidities—We characterized pre-treatment psychiatric comorbidities with one of two structured interviews. For patients dually enrolled in the neurobiology study we used the Kiddie Schedule for Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version (KSADS-PL, Kaufman et al., 2013). For patients from the clinical referral pathway, we used the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) version 7.0.2. Inter-rater reliability for 20% of randomly selected cases (including two KSADS and one MINI) was 100% (kappa = 1.0) for comorbid diagnoses.

Credibility/Expectancy Questionnaire—After session 1 (in which patients heard the rationale for CBT-AR), we used the Credibility/Expectancy Questionnaire (Devilly & Borkovec, 2000) to assess patients' confidence and expectations for symptom change. We inquired about "food restriction and avoidance" as target symptoms. Credibility scores ranged from 1 (not at all logical/successful) to 10 (very logical/successful). Patients rated expectancy as the percentage change (0–100%) in their eating that they thought would occur.

Client Satisfaction Questionnaire (CSQ)—We used an 8-item version of the CSQ (Attkisson & Zwick, 1982) to assess satisfaction with treatment length, quality, and delivery. Higher scores indicate greater satisfaction, with scores above 26 indicating high levels

of satisfaction (Kelly et al., 2018). Patients completed the CSQ at the post-treatment assessment. Cronbach alpha was 0.84.

Clinical Global Impression Scale (CGI)—The CGI provides a global rating of symptom change with scores ranging from 1 (very much improved) to 7 (very much worse) (Guy, 1976). Therapists provided CGI ratings on their patients at post-treatment.

Food Neophobia Scale (FNS)—The FNS is a 10-item self-report questionnaire that assesses reluctance to try novel foods (Pliner & Hobden, 1992). It is rated on a 7-point scale from “disagree extremely” to “agree extremely.” Higher scores represent greater neophobia. Cronbach alpha was 0.85 for the current sample. We used the FNS to evaluate change in food neophobia from pre- to post-treatment.

Weight and height—For 14 pre-treatment and ten post-treatment visits, a nurse practitioner (KH or MS) measured height in triplicate on a stadiometer and averaged the three height measurements. Weight was measured on a calibrated scale without shoes. Height and weight were used to obtain body mass index (BMI). Due to COVID-19, one pre-treatment weight and four post-treatment weights were collected virtually via video or telephone. In the virtual assessments, we asked the patient to weigh him- or herself in real time on a home scale and report the number to the assessor. (All four underweight participants were weighed in-person at pretreatment, and three of the four were weighed in-person at post-treatment.)

State-Trait Anxiety Inventory (STAI)—The STAI trait subscale is a 20-item self-report questionnaire measuring anxiety proneness (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Items assess how the respondent usually feels, with higher scores indicating greater anxiety. Cronbach alpha was 0.96 in our sample. We used the STAI to evaluate change in anxiety symptoms from pre- to post-treatment.

Beck Depression Inventory-II (BDI-II)—The BDI-II is a self-report questionnaire that measures symptoms of depression (Beck, Steer, & Brown, 1996). Higher scores indicate greater depression. We used the BDI-II to evaluate change in depressive symptoms from pre- to post-treatment. Cronbach alpha was 0.85 in the current sample.

Clinical Impairment Assessment (CIA)—The CIA is a self-report questionnaire that measures functional impairment related to eating, shape, and weight in adults with eating disorders. Higher scores indicate greater impairment with a score above 16 indicating clinically significant impairment. We used the CIA to evaluate change in clinical impairment from pre- to post-treatment. Cronbach alpha in the current sample was 0.88.

Data analysis

To evaluate our predictions about feasibility and acceptability, we calculated the percentage of patients offered CBT-AR who chose to participate, and the percentage who completed treatment. We also calculated the average number of sessions completed and the weeks to complete them. We interpreted the pre-treatment credibility and expectancy ratings and post-treatment satisfaction ratings according to measure scoring instructions.

To test our proof-of-concept hypotheses, we considered responses from both therapists and patients using intent-to-treat analyses. We conducted post-treatment assessments on all patients, except for our one dropout, for whom we used baseline assessment carried forward.[1] First, we noted the frequency of positive treatment response at the final session (i.e., CGI scores of "much improved" or "very much improved"). Next, we conducted paired *t*-tests (a special case of linear mixed models) to evaluate change in pre- versus post-outcome measures. We set the significance level at $p < .05$ and did not correct for family-wise error given the preliminary nature of the study. We used Cohen's *d*– -interpreted as small ($d = .20$), medium ($d = .50$), or large ($d = .80$)—to estimate within-subjects effect size. We compared pre- and post-measures of ARFID symptom severity, ARFID profile scores, and FNS. For the underweight subgroup, we also compared change in weight and absolute BMI from pre- to post-treatment. We then evaluated the change in the proportion of the sample meeting criteria for ARFID from pre- to post-treatment using McNemar's chi squared tests for dependent categories. Lastly, to evaluate the impact of CBT-AR on general psychopathology, we evaluated change in STAI, BDI-II, and CIA. We conducted all statistical analyses in R (R Core Team, 2018).

Results

Feasibility and acceptability

Of the 18 patients offered CBT-AR, 15 chose to participate. Table 1 presents their pre-treatment demographic and clinical characteristics. Fourteen patients completed treatment. One patient dropped out after two sessions in the setting of flu-like and gastrointestinal symptoms. We referred her to a gastroenterologist for further evaluation and treatment. One other patient also developed flu-like symptoms but completed CBT-AR. Both patients sought evaluation for COVID-19 but tested negative. We classified these as adverse events that were unrelated to the study protocol and of moderate severity.

Of the 14 completers, underweight patients ($n = 4$) completed an average of 24.5 (SD = 10.72) sessions, and patients who were not underweight ($n = 10$) completed an average of 20.7 ($SD = 3.6$) sessions. Sessions were delivered over an average of 29.3 weeks. Patients endorsed high average ratings of treatment credibility and expectations for improvement after session 1. At post-treatment, patients reported high ratings of treatment satisfaction, with 93% ($n = 14$) scoring above the cut-off of 26 on the CSQ (Table 2).

Proof-of-concept

Table 2 displays pre- and post-treatment scores on all outcome measures, along with 95% confidence intervals for change scores to aid in interpretation given the modest sample size. Therapists rated 80% of patients as "much improved" or "very much improved" on the CGI. Using intent-to-treat analyses, patient PARDI ratings of ARFID overall severity ($p < .001$) and sensory sensitivity ($p < .001$) decreased significantly with large effect sizes. PARDI lack of interest decreased significantly ($p = .03$) with a small effect size, and PARDI fear

[1]Given that this patient dropped out after just two sessions and was rated by her therapist on the CGI as having made "no change" by that time, we felt that baseline assessment carried forward was the most conservative approach.

of aversive consequences decreased at trend level with a small effect size ($p = .06$). Food neophobia decreased significantly ($p < .001$) with a large effect size. Patients incorporated a mean of 18.0 (SD = 13.2) new foods from pre- to post-treatment, primarily from groups underrepresented in their diets including fruits, vegetables, and proteins. The underweight subgroup ($n = 4$) gained an average of 11.38 (SD = 7.47) pounds, moving from an average BMI in the underweight range to an average BMI in the normal-weight range, representing a trend-level increase in weight ($p = .06$) and a significant increase in BMI ($p = .04$), both with large effect sizes. All four patients who were underweight at pre-treatment achieved a BMI > 18.5 at post-treatment. Using the PARDI diagnostic algorithm, 47% ($n = 7$) of patients no longer met criteria for ARFID at post-treatment, representing a significant change from pre-treatment when 100% met criteria ($p = .01$). Clinical impairment also decreased significantly ($p = .02$) with a medium effect size, though anxiety ($p = .78$) and depression ($p = .26$) did not change.

Discussion

To our knowledge, this is the first study to evaluate an ARFID treatment for adults. In our initial study of 15 patients, CBT-AR showed preliminary evidence of feasibility, acceptability, and proof-of-concept. Highlighting feasibility and acceptability, the majority of adults offered CBT-AR chose to participate, few dropped out, and 93% of completers endorsed high levels of treatment satisfaction. Regarding proof-of-concept, patients showed large and significant reductions in ARFID symptom severity, added an average of 18.0 new foods to their diets, and the underweight subset ($n = 4$) showed a significant increase in BMI. At post-treatment, 47% no longer met criteria for ARFID. Taken together, findings suggest that CBT-AR is a potentially efficacious treatment for adults with ARFID that requires more rigorous evaluation.

Although adults in this study made significant improvements with CBT-AR, the post-treatment remission rate of 47% was somewhat lower than the 70% we reported for our previous trial of CBT-AR in children and adolescents (Thomas et al., 2020). The finding that children and adolescents may respond more fully than adults to ARFID treatment, or perhaps have a better overall prognosis, mirrors the literature for anorexia nervosa (e.g., Jagielska & Kacperska, 2017; Kass, Kolko & Wilfley, 2013). Potential reasons for superior outcomes in children and adolescents with ARFID may include shorter illness duration, shorter history of illness-related accommodations, and lower level of psychiatric comorbidity. Furthermore, greater family involvement in the youth version of CBT-AR may increase treatment efficacy.

The spread of COVID-19 mid-way through the trial enabled us to make observations about the potential feasibility of conducting CBT-AR via telehealth. Approximately half of our sample received some or all CBT-AR sessions via video. The pandemic itself had several negative impacts on treatment including higher patient stress levels due to worry about the virus, reduced opportunities for social eating due to physical distancing, and the inability to procure specific foods due to supply chain disruptions. However, video delivery had many of the benefits previously noted for other forms of behavioral treatment for eating disorders (Matheson et al., 2020; Waller et al., 2020), including the immediate accessibility of food

in the home (which facilitated the completion of in-session food preparation and exposures), and the increased convenience of attending sessions (which may have contributed to low dropout). If future research provides additional support for CBT-AR efficacy, the ability to adapt it for video delivery may aid in its dissemination to underserved populations.

Our findings must be interpreted in light of study limitations. First and most importantly, the sample size was small, rendering effect size estimates potentially unstable and requiring cautious interpretation of *p*-values. Second, with no control group we cannot rule out alternative rival hypotheses for the observed improvements (e.g., therapist attention, passage of time). However, our sample reported an average illness duration of 17 years and nearly half (47%) reported prior unsuccessful treatment attempts. Third, it is possible that recruiting participants from those who were already willing to take part in an intensive longitudinal neurobiology study, and then paying them for completing assessments, may have contributed to the low rate of treatment dropout. Fourth, most of the sample was non-Hispanic white. Fifth, we used the KSADS (originally designed for use with children and adolescents) with a subset of young adults in the current study who were drawn from a neurobiology study with a younger age range. Lastly, we have limited ability to draw conclusions about proof-of-concept for family-supported CBT-AR for adults given that most patients received the individual version.

Nevertheless, our study also had many strengths, including structured interviews administered by independent assessors, a manualized treatment delivered with high levels of fidelity, and a low dropout rate. Perhaps most notably, to our knowledge, this was the first prospective study to report on the feasibility, acceptability, and proof-of-concept of *any* ARFID treatment for adults. Our findings are consistent with positive outcomes of single case reports of CBT for ARFID in adults (e.g., Aloi et al., 2018; Görmez et al., 2018; Steen & Wade, 2018), and suggest that CBT-AR is a promising new treatment worthy of further evaluation for adults with ARFID.

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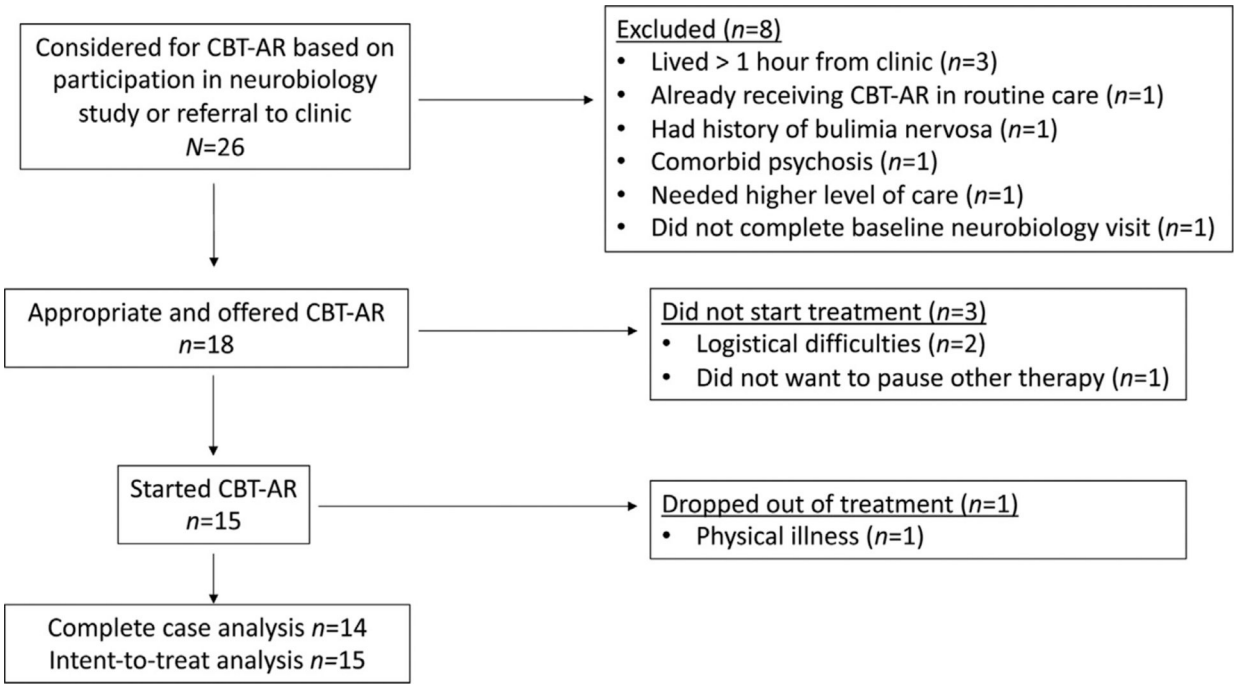

Figure 1.

Patient flow diagram for proof-of-concept trial of cognitive-behavioral therapy for avoidant/restrictive food intake disorder (CBT-AR) in adults.

Table 1

Demographic and clinical characteristics of 15 patients from the intent-to-treat sample of a proof-of-concept study of cognitive-behavioral therapy for avoidant/restrictive food intake disorder (CBT-AR).

	M (SD) or *n* (%)
Age (years)	25.0 (10.1)
Gender	
Male	5 (33%)
Female	10 (67%)
Race	
Caucasian	15 (100%)
Non-Caucasian	0 (0%)
Ethnicity	
Hispanic	1 (7%)
Non-Hispanic	14 (93%)
ARFID Presentation (s)	
Sensory Sensitivity only	6 (40%)
Lack of Interest only	1 (7%)
Fear of Aversive Consequences only	3 (20%)
Sensory Sensitivity + Lack of Interest	3 (20%)
Lack of Interest + Fear of Aversive Consequences	1 (7%)
All 3 presentations	1 (7%)
DSM-5 criteria met for ARFID (A1–A4) based on PARDI	
A1 Low weight (BMI < 18.5), significant weight loss, failure to grow as expected	4 (27%)
A2 Nutritional deficiency (diagnosed by healthcare professional via blood test)	3 (20%)
A3 Dependence on nutritional supplements (i.e., prescribed vitamins or high-energy drinks)	6 (40%)
A4 Psychosocial impairment (one or more PARDI impairment items > = 4)	14 (93%)
Duration of ARFID (years)	16.9 (12.3)
Current comorbid psychiatric diagnoses by KSADS-PL or MINI[a]	
Panic disorder	6 (40%)
Social anxiety disorder	2 (13%)
Generalized anxiety disorder	6 (40%)

	M (SD) or *n* (%)
Agoraphobia	1 (7%)
Obsessive-compulsive disorder	3 (20%)
Attention deficit hyperactivity disorder	1 (7%)
Autism spectrum disorder	1 (7%)
Oppositional defiant disorder	1 (7%)
No comorbid diagnoses	6 (40%)
Weight status	
Underweight (*n* = 4)	
BMI	17.65 (1.23)
Normal weight (*n* = 4)	
BMI	22.10 (2.26)
Overweight (*n* = 7)	
BMI	31.51 (3.53)
Eating Disorder Examination-Questionnaire Global	0.65 (0.59)
Treatment format	
Family-supported	1 (7%)
Individual	14 (93%)

ARFID: avoidant/restrictive food intake disorder; KSADS-PL: Kiddie Schedule for Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version (completed by *n* = 11 patients); MINI: Mini International Neuropsychiatric Interview (completed by *n* = 4 patients); BMI = body mass index.

[a]Diagnoses do not add up to 100% because some patients had multiple comorbid diagnoses.

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Table 2

Pre- and post-treatment measures of feasibility, acceptability, and clinical outcomes for the intent-to-treat sample of adults ($n = 15$) in a proof-of-concept study of cognitive-behavioral therapy for avoidant/restrictive food intake disorder (CBT-AR).

	Possible Range on Measure	**Pre-treatment (M, SD) or *n* (%)**	**Post-treatment (M, SD) or *n* (%)**	***t***	***p***	**95% confidence intervals[c]**	**Effect size (*d*)**
Credibility (evaluated after session 1 only)	0–10	7.96 (1.31)	----	----	----	----	----
			----	----	----		----
Expected percent change in ARFID symptoms (evaluated after session 1 only)	0–100%	68.00 (20.07)	----	----	----	----	----
			-----	-----	-----		-----
Client Satisfaction Questionnaire (evaluated at post-treatment only)[a]	8–32	-----	29.43 (3.30)	-----	-----	-----	-----
Therapist rating of patient as “much improved” or “very much improved” on Clinical Global Impression—Global Improvement Scale	% of 15 patients	---	12 (80%)	-----	-----	-----	-----
		-----	-----	-----	-----		-----
Pica, ARFID, and Rumination Disorder Interview							
Overall Severity	0–6	2.59 (0.88)	1.46 (0.82)	6.17	<.001	0.75, 1.56	1.35
Sensory Sensitivity	0–6	1.47 (0.81)	0.7 (0.58)	4.39	<.001	0.39, 1.15	1.06
Lack of Interest	0–6	1.53 (1.38)	1.02 (0.98)	2.48	0.03	0.07, 0.94	0.37
Fear of Aversive Consequences	0–6	0.93 (1.36)	0.35 (0.58)	2.06	0.06	−0.02, 1.18	0.46
Food Neophobia Scale	10–70	61.0 (8.8)	53.5 (10.3)	4.69	<.001	4.09, 10.98	1.95
Number of new foods incorporated	----	----	18.0 (13.2)	----	----	----	----
Weight status—Underweight patients only							
Weight (lbs)	----	107.45 (2.86)	118.83 (7.08)	3.05	0.06	−0.51, 23.27	2.09
BMI	----	17.65 (1.23)	19.49 (0.53)	3.65	0.03	0.23, 3.45	1.95
Met diagnostic criteria for ARFID on Pica, ARFID, and Rumination Disorder Interview	% of 15 patients	15 (100%)	8 (53%)	----	0.01	----	----
Comorbid Psychopathology							
STAI-Trait[b] (T scores)	20–96	59.4 (14.3)	57.9 (12.7)	0.29	0.78	−9.64, 12.71	0.11
BDI-II[b] (T scores)	0–90	51.5 (8.2)	47.6 (8.4)	1.17	0.26	−3.28, 11.14	0.47
CIA	0–48	15.1 (8.9)	9.07 (6.5)	2.65	0.02	1.15, 10.98	0.77

ARFID: avoidant/restrictive food intake disorder; BMI: body mass index; STAI: State-Trait Anxiety Inventory; BDI-II: Beck Depression Inventory II; CIA: Clinical Impairment Assessment.

[a]Because the CSQ was given at post-treatment only, CSQ data are only available for completers (n = 14).

[b]One patient who was age 17.99 at his pre-treatment baseline visit but age 18.07 at his first treatment visit took the child version of both measures at baseline (i.e., the STAIC and CDI; Spielberger, 1973; Kovacs, 2011) but the adult version at post-treatment. Therefore, we have presented our findings as T scores rather than raw scores.

[c]95% confidence intervals represent intervals for the differences between pre- and post-metrics (i.e., mean of differences).