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## Preliminary effectiveness of a cognitive-behavioral, family-centered partial hospitalization program for children and adolescents with avoidant/restrictive food intake disorder

Marley G. Billman<sup>1</sup>, Lauren N. Forrest<sup>2</sup>, Mariah Johnson<sup>3</sup>, Marlana A. Quail<sup>4</sup>, Steven King<sup>5</sup>, Kyle Mausteller<sup>5</sup>, Susan E. Lane-Loney<sup>1,2</sup>, Jamal H. Essayli<sup>1,2</sup>

<sup>1</sup>Department of Pediatrics, Penn State College of Medicine, Hershey, USA

<sup>2</sup>Department of Psychiatry and Behavioral Health, Penn State College of Medicine, Hershey, USA

<sup>3</sup>School of Medicine, Tufts University, Boston, USA

<sup>4</sup>Barry University, Miami, USA

<sup>5</sup>Penn State College of Medicine, Hershey, USA

### Abstract

**Objective:** This study explored the preliminary effectiveness of a partial hospitalization program (PHP) for children/adolescents with avoidant/restrictive food intake disorder (ARFID). We evaluated how ARFID symptoms changed from admission to discharge, and collected follow-up data on symptoms and outpatient care following PHP discharge.

**Method:** Twenty-two children/adolescents with ARFID (77.3% White, 63.6% female) completed measures assessing ARFID symptomatology at admission and discharge from a PHP for eating disorders. Six months and twelve months following their discharge, participants were contacted to complete study measures again and take part in an interview assessing follow-up care.

**Results:** Paired samples *t*-tests indicated that participants demonstrated increases in weight and decreases in ARFID symptomatology from admission to discharge with medium to large effects. All participants reported receiving some form of outpatient treatment following discharge, with the type of outpatient services varying across participants. Data from the 86% of participants who completed the six-month follow-up and 50% who completed the twelve-month follow-up suggest that participants generally maintained treatment gains following PHP discharge.

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Marley Billman, BS (Corresponding author), Clinical Research Coordinator, Penn State College of Medicine, Department of Pediatrics, 12 Briarcrest Square, Hershey, PA 17033-0850, mbillman@pennstatehealth.psu.edu, Ph: 717-701-5792.

Co-author: Lauren Forrest, PhD

Assistant Professor of Psychiatry and Behavioral Health

Co-author: Mariah Johnson

Co-author: Marlana A. Quail, MS

Co-author: Steven King

Co-author: Kyle Mausteller

Co-author: Susan E. Lane-Loney, PhD

Associate Professor of Pediatrics and Psychiatry and Behavioral Health

Co-author: Jamal H. Essayli, PhD

Assistant Professor of Pediatrics and Psychiatry and Behavioral Health

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**Discussion:** Participants experienced symptom improvements from admission to discharge and appeared to maintain these gains after discharge. These results provide preliminary evidence that PHPs are an effective treatment option for children and adolescents with ARFID.

### Keywords

avoidant/restrictive food intake disorder (ARFID); partial hospitalization program (PHP); cognitive-behavioral therapy (CBT); children and adolescents

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Avoidant/restrictive food intake disorder (ARFID) is an eating disorder (ED) characterized by eating disturbances that are unrelated to body image concerns (American Psychiatric Association, 2013). Reasons for food avoidance and/or restriction in ARFID include fear of choking/vomiting, low appetite or disinterest in eating, and/or sensitivity to foods' sensory properties (Reilly et al., 2019; Zickgraf et al., 2019). Patients with ARFID are often younger than those with other EDs, which may increase the risk for negative long-term health consequences from malnutrition (Norris et al., 2014; Nicely et al., 2014; Katzman et al., 2019).

Growing evidence indicates that partial hospitalization programs (PHPs), which offer treatment that is greater in intensity but shorter in length than outpatient therapy, effectively treat EDs characterized by weight and shape concerns (Ornstein et al., 2012; Brown et al., 2018). However, few studies have evaluated the degree to which PHPs effectively treat ARFID (Bryson et al., 2018; Ornstein et al., 2017). The few studies that have explored PHPs for ARFID have several limitations, including: use of chart review to retrospectively (vs. prospectively) evaluate symptom changes; reliance on measures that were developed for EDs characterized by shape and weight concerns rather than measures designed specifically for ARFID; and lack of follow-up data following discharge (Ornstein et al., 2017, Lane-Loney et al., 2020). The one study that included follow-up data has methodological limitations of retaining < 50% of participants and conducting follow-up assessments at a wide interval (12–54 months following discharge; Bryson et al., 2018).

Addressing these limitations, we conducted a prospective study evaluating the preliminary effectiveness of a cognitive-behavioral, family-centered PHP for children and adolescents with ARFID by systematically measuring outcomes at admission, discharge, and six- and twelve-month follow-up. We used measures that assess ARFID-specific symptomatology, including the Nine-Item ARFID Screen (NIAS) (Zickgraf & Ellis, 2018) and the Food Fussiness and Satiety Responsiveness subscales of the Children's Eating Behavior Questionnaire (CEBQ) (Wardle et al., 2011). We hypothesized that children and adolescents with ARFID would experience significant improvements in ARFID symptomatology and body weight throughout treatment in the PHP.

Additionally, we took a descriptive approach to explore outpatient services children and adolescents with ARFID receive following PHP discharge, and their outcomes while receiving outpatient treatment. We expected that participants would experience a variety of outpatient services and maintain treatment gains six and twelve months after PHP discharge.

## Method

### Participants and Procedures

Between May 2018 and March 2020, 33 children and adolescents with ARFID receiving treatment in the PHP were asked to have their treatment data used for research purposes and be contacted at six and twelve months after discharge for follow-up. We received parental consent and child assent for 22 patients (66.7% of recruitment pool). The PHP structure is six hours per day, five days per week, and includes an interdisciplinary team of dietitians, therapists, pediatricians, nurse practitioners, and psychiatrists. The program and approach to treatment is described in Bryson et al. (2018), Lane-Loney et al., (2020), Ornstein et al. (2017), and Supporting Information.

Participants and their caregivers completed questionnaires at admission, discharge and six- and twelve-month follow-up. All participants completed discharge assessments. At six-month and twelve-month follow-up, research staff conducted structured interviews assessing psychiatric services received after PHP discharge (see Supporting Information). Follow-up visits were conducted in-person or remotely. Nineteen (86%) and 11 (50%) participants completed six- and twelve-month follow-up assessments, respectively.

Age ranged from 7–17 years ( $M=12.26$ ). Length of illness ranged from 1–48 months. PHP duration ranged from 3–17 weeks. Most participants were female (63.6%). Participant ethnicities were White (77.3%), Hispanic/Latino (9.1%), Multiracial (9.1%), and Asian (4.4%). ARFID diagnoses were verified by a licensed clinical psychologist with extensive training and experience in identifying and treating ARFID, using a DSM-5 diagnostic checklist. NIAS-based ARFID presentations (Burton Murray et al., 2021), which are not mutually exclusive (Thomas et al., 2017), included: 15 participants (68.2%) with clinical picky eating, 18 (81.8%) with clinical low appetite, and 10 (45.5%) with clinical fear of choking/vomiting. All participants entered PHP with a goal of weight gain.

This study was approved by the Penn State College of Medicine Institutional Review Board.

### Measures

**Percent Median Body Mass Index (%MBMI).**—Participants' height and weight were assessed at all time points. For remote follow-up visits, height and weight were obtained from electronic medical records or pediatricians. If this information was unavailable, height and weight were obtained from caregivers. We calculated %MBMI according to the 50<sup>th</sup> percentile BMI-for-age using the 2000 Centers for Disease Control and Prevention growth charts ([www.cdc.gov/growthcharts](http://www.cdc.gov/growthcharts)).

**Nine-Item ARFID Screen (NIAS) (Zickgraf & Ellis, 2018).**—ARFID symptoms were assessed with the parent-report version of the NIAS. The NIAS consists of three subscales: Picky Eating ( $\alpha = .93$ ), Appetite ( $\alpha = .82$ ), and Fear ( $\alpha = .89$ ). Items are scored on a six-point Likert scale ranging from 0 (strongly disagree) to 5 (strongly agree). Sum scores were calculated for each subscale.

**Children's Eating Behavior Questionnaire (CEBQ) (Wardle, et al., 2011).**—The CEBQ is a 35-item parent-report measure assessing facets of eating behavior. We evaluated change in two CEBQ subscales: Food Fussiness ( $\alpha = .88$ ) and Satiety Responsiveness ( $\alpha = .73$ ). Items are scored on a five-point Likert scale, ranging from 1 (never) to 5 (always). Mean scores were calculated for each subscale.

## Data Analysis

Data were analyzed using IBM SPSS (version 28.0, SPSS Inc., Chicago, Illinois). Paired samples Cohen's  $d$  effect sizes evaluated changes in %MBMI and ARFID symptomatology from admission to discharge. Due to small sample size and attrition, we used descriptive statistics to examine outpatient services received after discharge, and effect sizes to explore changes in outcomes from admission to six- and twelve-month follow-up.

## Results

### Treatment Outcomes in PHP

Table 1 shows means and standard deviations for outcomes across timepoints. From admission to discharge, participants experienced an increase in %MBMI, with a large effect size ( $d = -1.81$ ). Participants also experienced decreases on most measures of ARFID symptomatology from admission to discharge, with a large effect for the NIAS Picky Eating subscale ( $d = .864$ ), and medium effects for the NIAS Appetite ( $d = .673$ ), NIAS Fear ( $d = .703$ ), and CEBQ Satiety Responsiveness ( $d = .650$ ) subscales.

### Outpatient Services and Outcomes at Follow-Up

Table 2 displays outpatient services participants received following PHP discharge. All participants sought some form of outpatient services, with 89.5% reporting receiving therapy at six-month follow-up, and 81.8% at twelve-month follow-up. The type of outpatient therapy varied. For example, 70.6% reported receiving some form of behavioral treatment [e.g., cognitive behavioral therapy (CBT)] at six-month follow-up, while 23.5% indicated that exposure was integrated into therapy sessions. Approximately 40% of participants indicated that parents were involved in the majority of their therapy sessions.

Roughly half of the sample sought nutrition services following discharge. While only 40% of those reported that exposure was included in their nutrition sessions, 60% reported that “challenging foods” were discussed in nutrition sessions, at six-month follow-up. One participant moved to a higher level of care by twelve-month follow-up.

%MBMI remained higher at six-month follow-up (102.8%,  $d = -1.28$ ), and twelve-month follow-up (94.3%,  $d = -.402$ ), than at admission (87.67%). Scores on the NIAS and CEBQ subscales were lower at six-month and twelve-month follow-up relative to admission. The three NIAS subscales demonstrated medium effects at six- and twelve-month follow-up. The CEBQ Satiety Responsiveness subscale demonstrated a large effect at six-month follow-up and medium effect at twelve-month follow-up, while the Food Fussiness subscale demonstrated small effects at both follow-up points.

## Discussion

To our knowledge, this is the first study to prospectively evaluate outcomes of patients with ARFID using the NIAS and the first to describe post-PHP discharge outpatient services and outcomes at six- and twelve-month follow-up. Consistent with prior research (Bryson et al., 2018; Ornstein et al., 2017), patients experienced significant improvement from PHP admission to discharge. From admission to discharge, %MBMI increased, while the NIAS subscales and CEBQ Satiety Responsiveness scores decreased, with medium to large effects. These results provide further support for the effectiveness of intensive treatment programs for children and adolescents with ARFID.

We did not observe notable decreases from admission to discharge on the Food Fussiness subscale of the CEBQ, perhaps because this subscale assesses experiences that are less amenable to short-term change and/or are not direct treatment targets in PHP. For example, our PHP does not directly target increasing patients' *enjoyment* of eating new foods (as assessed via one item on the CEBQ Food Fussiness subscale) but rather targets the *behaviors* of eating new foods and consuming entire meals (as assessed via one item on the CEBQ Satiety Responsiveness subscale). Further research is warranted to better understand the utility of the CEBQ subscales as markers of treatment progress for ARFID, and develop other measures that are sensitive to change in ARFID symptomatology.

All participants who completed follow-up interviews reported receiving outpatient services following discharge. Most participants received outpatient psychotherapy, medical monitoring, nutrition, and psychiatry sessions at six-month follow-up. Although CBT, which includes exposure therapy (Lane-Loney et al., 2020; Thomas & Eddy, 2018; Dumont et al., 2019), and family-based treatment (FBT) (Lock et al., 2019) are emerging evidence-based treatments for ARFID, many patients appeared to be receiving non-standardized forms of outpatient treatment. For example, contrary to FBT, patients reported that their parents were often not included in outpatient therapy sessions. Contrary to exposure-oriented CBT, a minority of participants reported receiving exposure as part of therapy or nutrition sessions. However, over half of participants reported that "challenging foods" were integrated into outpatient nutrition sessions. Thus, while most participants did not appear to receive treatment that was framed as "exposure," their treatment may have included elements of exposure, such as eating anxiety-provoking foods. Further research is warranted to determine what type of outpatient services are most helpful for individuals with ARFID, and whether non-standardized treatments are sufficient to maintain treatment gains following discharge from a PHP.

Six- and twelve-month follow-up data indicated that participants generally maintained weight status after discharge, and symptom scores remained lower than admission. Given that all participants received some form of outpatient services, we cannot disentangle the degree to which these post-discharge outcomes are attributable to the effects of the PHP versus outpatient services. Still, these findings are encouraging, as they suggest that children and adolescents who make significant improvements in a PHP and are likely to maintain these treatment gains over the next several months while receiving a variety of outpatient services.

## Limitations

Without a control group or randomization to various outpatient services, we cannot conclude whether evidence-based outpatient treatments like CBT or FBT would have resulted in better outcomes. Although our findings suggest that receiving interdisciplinary outpatient treatment may be important for maintaining treatment gains at follow-up, we cannot conclude whether maintenance of treatment gains would have been any worse without this interdisciplinary treatment or no outpatient treatment at all.

Likewise, while it is reasonable to assume that the improvements participants made during PHP were due to the specific components of this intensive treatment, we do not know how these same participants would have fared in a less intensive treatment setting, or in a PHP with a different treatment model. Additionally, the eclectic nature of our treatment model makes it difficult to replicate in other treatment settings. We do not know which elements of our program (e.g., family involvement, exposure therapy, psychiatric medication, nutritional services) contributed most to favorable outcomes.

We were successful in completing six-month follow-up with 86% of participants. Only 50% of participants completed the twelve-month follow-up, in part due to barriers related to the COVID-19 pandemic, and is consequently not representative of our full cohort. Lastly, our sample was primarily White, female, and from the central Pennsylvania region, limiting generalizability to more diverse groups from different geographical areas.

## Conclusion

Children and adolescents with ARFID who participated in a cognitive-behavioral, family-centered PHP demonstrated improvements in weight and ARFID symptomatology from admission to discharge. Participants did not appear to receive standardized, evidence-based outpatient therapy following discharge, yet maintained treatment gains made during PHP. Further studies using control groups, randomization, multiple sites, and larger, more diverse samples are warranted to better understand the effectiveness of PHPs and other levels of care for children and adolescents with ARFID.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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## Data Availability Statement:

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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**Public Significance Statement:**

This study provides preliminary evidence that intensive, evidence-based PHPs are effective in treating ARFID. Our findings suggest that children and adolescents with ARFID who receive flexible, cognitive-behavioral, family-centered treatment in a PHP for EDs experience improvements in weight and ARFID symptomatology from admission to discharge. Despite receiving variable and non-standardized outpatient treatment, individuals with ARFID appear to maintain treatment gains six and twelve months after discharge in a PHP.

**Table 1.**

Descriptive statistics, including means and standard deviations for measures assessing weight and ARFID symptomatology at admission, discharge, six-month follow-up, and twelve-month follow-up, and results from statistical tests evaluating changes in measures from admission to discharge, six-month follow-up, and twelve-month follow-up.

	Admission (N = 22)		Discharge (N = 22)		6-m f/u (N = 19)		12-m f/u (N = 11)		Admission - Discharge		Admission - 6-m f/u		Admission - 12-m f/u	
	M (SD)		M (SD)		M (SD)		M (SD)		d	95% C. I.	d	95% C. I.	d	95% C. I.
% MBMI	87.67 (9.19)		98.87 (10.20)		102.78 (14.75)		94.27 (15.92)		-1.81	-2.49, -1.12	-1.28	-1.93, -.599	-.402	-1.01, .223
NIAS Picky	10.55 (4.17)		7.50 (4.33)		8.74 (4.46)		7.73 (4.65)		.864	.365, 1.35	.558	.067, 1.04	.762	.071, 1.42
NIAS Appetite	12.55 (3.61)		9.14 (4.44)		10.26 (3.94)		10.18 (5.40)		.673	.202, 1.13	.529	.041, 1.00	.694	.018, 1.34
NIAS Fear	8.05 (5.65)		4.59 (4.49)		3.95 (3.89)		5.09 (4.87)		.703	.228, 1.16	.604	.106, 1.09	.689	.014, 1.34
CEBQ Food Fussiness	3.24 (0.60)		3.21 (0.48)		3.09 (0.51)		3.12 (0.57)		.057	-.362, .475	.315	-.150, .772	.231	-.374, .824
CEBQ Satety Responsiveness	3.81 (0.82)		3.39 (0.77)		3.34 (0.75)		3.37 (0.86)		.650	.183, 1.11	.814	.284, 1.33	.749	.061, 1.41

Note. %MBMI = percent median body mass index, EDE-Q = Eating Disorder Examination-Questionnaire, NIAS = Nine Item Avoidant and Restrictive Food Intake Disorder Screen, CEBQ = Children's Eating Behavior Questionnaire; 6-m f/u = 6-month follow-up; 12-m f/u = 12-month follow-up;

Paired sample *t*-tests performed using completer analyses rather than intent to treat.

**Table 2.**

Percentages of participants who received various outpatient services following discharge.

Variable	6-m f/u (n = 19)	12-m f/u (n = 11)
No Services Received	0 (0.0)	0 (0.0)
Received Therapy	17 (89.5)	9 (81.8)
Received Nutrition	10 (52.6)	5 (45.5)
Received Psychiatry	12 (63.2)	8 (72.7)
Received Medical	12 (63.2)	8 (72.7)
Higher Level of Care	0 (0.0)	1 (9.1)
Received Outside Therapy	11 (64.7)	6 (54.5)
Received Behavioral Therapy	12 (70.6)	4 (36.4)
Parents in 50% of Therapy	7 (41.2)	3 (27.3)
Exposure in Therapy	4 (23.5)	0 (0.0)
Exposure in Nutrition	4 (40.0)	1 (9.1)
Challenge Foods in Nutrition	6 (60.0)	4 (36.4)

Note. 6-m f/u = 6-month follow-up; 12-m f/u = 12-month follow-up;

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