International Journal of Eating Disorders

WILEY

International Journal of EATING DISORDERS

ORIGINAL ARTICLE OPEN ACCESS

Comparing Outcomes for Telehealth Versus In-Person Family-Based Treatment: A Retrospective Chart Review

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Received: 10 May 2025 | **Revised:** 12 July 2025 | **Accepted:** 13 July 2025

Action Editor: Jake Linardon

Funding: This work was supported by Drs. Sasha Gorrell (K23MH126201; R21MH131787), Erin E. Reilly (K23MH131871), and Simar Singh (T32MH018261) are supported by the National Institute of Mental Health. Dr. Sasha Gorrell is also supported by the Brain & Behavior Research Foundation (Young Investigator Award). Dr. Verena Haas is supported by the German Ministry of Health (trial no. 01NVF23117). Dr. Rachel M. Radin (K23AT011048; R01DK132870) is supported by the National Center for Complementary and Integrative Health and the National Institute of Diabetes and Digestive and Kidney Diseases.

Keywords: adolescents | eating disorders | family treatment | telehealth | therapy

ABSTRACT

Objective: Telehealth services have become part of many eating disorder (ED) treatment settings; yet, few studies have examined the effectiveness of family-based treatment (FBT) delivered via telehealth. This study compared in-person and telehealth FBT in rates of weight restoration, treatment completion, and metrics of treatment progress, and explored potential moderators of these outcomes.

Method: Retrospective chart review identified 169 adolescents (10–18 years) with restrictive EDs who received FBT in person before the COVID-19 pandemic ($n = 92$) or via telehealth during the pandemic ($n = 77$). Regression models examined the effect of FBT format, controlling for baseline percent of expected body weight (%EBW). Zip code-based geospatial analyses compared the distance each format reached.

Results: Treatment format (in-person versus telehealth) did not predict whether patients were weight restored to ≥ 95% of EBW at the end of treatment (OR = 0.74) or completed treatment (ORs = 0.53–1.74). Older age predicted lower odds of treatment completion among in-person but not telehealth patients; there was no moderating effect of age on weight restoration or of baseline %EBW on either outcome. Patients who received FBT via telehealth were less likely to be early responders (i.e., gained 2.3 kg by session four; OR = 0.33). FBT format did not predict the number of sessions to 95% EBW ($f^2 = 0.01$), hospitalization frequency, or distance reached ($d = 0.27$).

Discussion: Results suggest no significant differences between telehealth and in-person FBT in restoring weight or preventing hospitalization for adolescents with restrictive EDs, and support continued use of telehealth FBT to improve treatment accessibility and scalability. Additional research using a randomized design and ED psychopathology measures is needed.

1 | Introduction

Eating disorders (EDs) are complex psychiatric conditions that are associated with significant psychosocial distress, functional impairment, and medical sequelae (Bodell et al. 2019; Johnson-Munguia et al. 2024; Mehler and Brown 2015). EDs often emerge during adolescence and early adulthood (Swanson et al. 2011; Udo and Grilo 2018), and family-based treatment (FBT; Lock and Le Grange 2012) is recommended as the first-line intervention (Australian Psychological Society 2018; Couturier et al. 2020; Crone et al. 2023; National Institute for Health and Care Excellence 2017). Recognizing parents as an invaluable resource in helping an adolescent recover from an ED, FBT first empowers parents or caregivers to facilitate weight restoration and reduce their child's ED behaviors before gradually transitioning autonomy over eating back to the adolescent when weight and behavioral symptoms have improved (Lock and Le Grange 2012). To date, several clinical trials have demonstrated the efficacy of FBT in facilitating weight gain, reducing binge eating and purging, and improving cognitive symptoms for adolescents with EDs (e.g., Agras et al. 2014; Le Grange et al. 2015, 2016; Lock et al. 2010; Madden et al. 2015b). Across several studies, early weight change has been observed to predict treatment outcome (Doyle et al. 2010; Hughes et al. 2019; Le Grange et al. 2014), such that patients who gain approximately 2.3 kg (~5 lbs) during the first 4 weeks of FBT are more likely to achieve remission following a standard course of treatment (Madden et al. 2015a). Moreover, receiving FBT early in the course of illness increases the likelihood that treatment will lead to a full recovery and prevent an adolescent from experiencing longstanding impairment (Fernández-Aranda et al. 2021; Treasure and Russell 2011).

Despite the importance of early intervention in adolescent EDs and the strong and growing body of literature supporting the efficacy of FBT, barriers to accessing evidence-based ED treatment remain a significant challenge in ensuring that youth with EDs receive FBT (Ali et al. 2025; Hart et al. 2011; Striegel Weissman and Rosselli 2017). These include geographical barriers to accessing a provider who is trained in FBT, as FBT therapists remain concentrated in urban areas with proximity to academic medical centers (Gorrell et al. 2019). Transportation and other indirect costs, as well as parental responsibilities, can also prohibit some families from attending weekly FBT sessions (Bailey-Straebler et al. 2024). Therefore, telehealth services may have great potential to increase FBT access and reduce indirect costs should they become part of routine care delivery in ED treatment settings (Datta et al. 2023). Particularly since the initiation of global restrictions on in-person gatherings and travel during the COVID-19 pandemic, numerous treatment sites have published on clinician and patient experiences delivering and receiving telehealth ED treatment (e.g., Devoe et al. 2023; Gorrell, Byrne, et al. 2022; Gorrell, Reilly, et al. 2022; Waller et al. 2020), including adaptations and guidelines for telehealth FBT (Matheson et al. 2020). Overall, this work highlights the feasibility of delivering FBT via telehealth with minimal adjustments to address unique challenges of the telehealth format, such as asking parents to weigh the adolescent instead of the clinician, working with families to position the camera optimally during the in-session family meal, and confirming the adolescent's privacy during the individual portion of FBT sessions (Matheson et al. 2020). To further inform clinical practice, authors have called for evaluation of factors that might indicate that the telehealth or in-person format will be more or less effective for a particular patient (Gorrell, Byrne, et al. 2022; Gorrell, Reilly, et al. 2022; Novack and Chadi 2025).

Although telemedicine is widely used within ED treatment contexts (Datta et al. 2023), few studies have reported treatment outcomes for telehealth ED services. Regarding FBT specifically, Anderson et al. (2015, 2017) first examined the feasibility and effectiveness of telehealth FBT in 10 adolescents with anorexia nervosa (AN) and atypical AN. All patients completed treatment and experienced significant improvements in weight and overall ED pathology. Pereira et al. (2023) later compared a small cohort of 10 patients with AN or other specified feeding or eating disorder (OSFED) who received telehealth FBT at the start of the COVID-19 pandemic to 10 patients who received in-person treatment prior to the pandemic; there were no differences in the rate of weight gain throughout treatment or in the proportion of patients who were weight restored to 95% of expected body weight (EBW) at the end of treatment. In a pilot randomized clinical trial comparing telehealth FBT to online guided self-help FBT ($N = 40$), both treatments achieved improvements in weight and ED pathology, with medium to large effect sizes (Lock et al. 2021). Hambleton et al. (2024) delivered telehealth FBT to 19 adolescents in rural Australia and found comparable rates of weight restoration (68.4%) and both weight and psychological remission (36.8%). Finally, in a sample of adolescents with transdiagnostic EDs ($N = 210$), Steinberg et al. (2023) demonstrated the effectiveness of an enhanced version of FBT (FBT+, which includes peer and family mentors as part of the treatment team) when delivered via telehealth; after 16 weeks, 80% of adolescents on a weight gain plan were weight restored to 95% of EBW, with significant reductions in ED pathology. Taken together, early case series and one well-powered study suggest that telehealth FBT is acceptable to patients and families and effective in treating adolescent EDs. However, potential demographic and clinical patterns in who benefits from telehealth versus in-person treatment have yet to be characterized and can provide further guidance for clinicians and programs seeking to implement telehealth FBT into routine ED services.

The current study sought to replicate and build on prior work by evaluating the effectiveness of telehealth FBT as compared to in-person FBT in a large sample of adolescents who received services at a specialized ED clinic prior to and during the COVID-19 pandemic, when telehealth became the standard of care. Specifically, we aimed to compare in-person and telehealth FBT in rates of weight restoration (defined as achieving 95% of EBW) and treatment completion (i.e.,

Summary

- This retrospective chart review compared adolescents with restrictive eating disorders who received family-based treatment (FBT) via telehealth during the COVID-19 pandemic to those who received FBT in person prior to the pandemic across several clinical outcomes and measures of treatment progress.
- Telehealth and in-person FBT did not significantly differ in restoring weight or preventing hospitalization, irrespective of weight status at baseline.
- Older adolescents were less likely to complete treatment in person but as likely as younger patients to complete telehealth FBT.
- There was no significant difference in the geographic distance reached by each format.

proportion of patients who received a full course of FBT), and explore demographic and clinical variables that might contribute to patients attaining these outcomes in one format over the other. Additionally, we aimed to compare in-person and telehealth FBT across metrics of treatment progress, including number of sessions to weight restoration, hospitalization frequency during treatment, and the number of early treatment responders (i.e., 2.3 kg weight gain by session four, a predictor of treatment outcome in FBT; Madden et al. 2015a). Our final aim was to measure the geographic distance reached via telehealth FBT as compared to in-person FBT. Based on preliminary studies of telehealth FBT (Anderson et al. 2017; Pereira et al. 2023; Steinberg et al. 2023), we hypothesized that in-person and telehealth FBT would not differ in treatment outcomes or metrics of treatment progress, but that telehealth FBT would reach a farther geographic distance than in-person treatment due to the reduced time and travel burden of telehealth for families who lived farther from the treatment center. As no prior work has examined patient variables that might moderate the impact of FBT delivery (in-person vs. telehealth) on outcome, this aim was examined in an exploratory manner.

2 | Method

Retrospective chart review was used to collect information on all adolescent patients with restrictive EDs who received FBT at a dedicated multi-disciplinary ED treatment program within an urban academic medical center in the United States in person (January 1, 2014 to March 16, 2020) or at the initiation of telehealth treatment in the context of the COVID-19 pandemic (March 17, 2020 to September 30, 2023). Of note, all outpatient mental health clinics within the academic medical center provided care exclusively via telehealth for 27 months beginning in March 2020, with no option for in-person appointments. After the treatment center resumed in-person services on June 27, 2022, new patients decided whether to participate in FBT in person or via telehealth in collaboration with their treatment provider and based on the family's preference, ability to travel to the treatment center, and other factors (e.g., concerns about contracting COVID-19). Patients were included in the current study if they attended at least one session of FBT and received treatment entirely in person pre-pandemic or via telehealth during the pandemic. Because we were interested in differences between exclusively in-person versus exclusively telehealth FBT, patients who received a hybrid approach (e.g., transitioned from in-person to telehealth following stay-at-home orders) were excluded from the current study ($n = 44$). Patients were also excluded if they received FBT as part of a randomized controlled trial ($n = 25$), given the naturalistic nature of the current study. For those who completed multiple courses of FBT, only data from their first course of treatment were included. No other exclusion criteria were applied.

ED-specialized clinicians (psychologists: $n = 13$, clinical social worker: $n = 1$) conducted initial clinical assessments and delivered FBT. ED and comorbid psychiatric diagnoses were determined based on the Eating Disorders Assessment for DSM-5 (EDA-5; Sysko et al. 2015) and the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID; Sheehan et al. 2010), which were administered by the treatment provider or another team psychologist. While clinicians did not receive any formal training in delivering FBT via telehealth given the abrupt transition to virtual treatment at the start of the pandemic, they held weekly consult meetings to discuss relevant issues, and the academic medical center sent regular newsletters providing scaffolding and guidance on policy changes. In addition to FBT sessions, patients and families attended regular adolescent medicine visits and appointments with an ED-specialized registered dietitian and/or psychiatrist, as needed. The study was approved by the academic medical center's institutional review board with a waiver of informed consent.

A total of $N = 169$ patients were deemed eligible for study participation based on preliminary electronic medical record (EMR) review. The following additional data were extracted from the EMR: sex, gender, race, ethnicity, zip code at start of treatment, ED and other psychiatric diagnoses, FBT provider, FBT format (i.e., conjoint [adolescent and caregivers attended sessions with the therapist together], separated [therapist saw the adolescent and caregivers separately], or mixed [therapist used both formats throughout the course of treatment]), current psychiatric medications, and any prior ED treatment history as reported during patients' initial assessment (categorized as inpatient medical, inpatient psychiatric, residential, partial hospitalization program, intensive outpatient program, or individual outpatient treatment). Session dates and patient weights were extracted for each FBT session as available, as well as whether patients completed FBT, discontinued treatment early (noted by the treating clinician in patient notes), or were referred to an ED higher level of care or other outpatient ED treatment. EBW at the start of treatment and, if relevant, menstrual status at the start and end of treatment were retrieved from adolescent medicine visit notes; any ED hospitalizations over the course of FBT that were present in the medical record were also recorded. End of treatment was determined by the treating clinician in collaboration with patients and their caregivers, with consideration given to patients' weight status, presence or absence of ED behaviors and psychological symptoms, and the extent to which patients had returned to a developmentally normative level of eating independence.

TABLE 1 | Demographic and clinical characteristics of patients at baseline.

	In-person		Telehealth		
	M	**SD**	**M**	**SD**	**Range**
Age	14.99	2.04	15.19	1.66	10.41–18.85
%EBW	91.00	7.55	88.15	9.14	64.12–108.90
	n	**%**	***n***	**%**	
Sex					
Female	78	84.8	66	85.7	
Male	14	15.2	11	14.3	
Gender					
Cisgender girl	78	84.8	65	84.4	
Cisgender boy	12	13.0	9	11.7	
Transgender girl	1	1.0	2	2.6	
Nonbinary	1	1.0	1	1.3	
Race					
Asian	9	9.8	14	18.2	
Black	1	1.1	1	1.3	
Indigenous/Native American	1	1.1	0	0.0	
White	59	64.1	44	57.1	
Biracial	8	8.7	3	3.9	
Other	14	15.2	11	14.3	
Unknown	0	0.0	4	5.3	
Ethnicity					
Hispanic/Latino	9	9.8	14	18.2	
Not Hispanic/Latino	80	87.0	60	77.9	
Unknown	3	3.3	3	3.9	
ED diagnosis					
AN	41	44.6	45	58.4	
AN-R	37	40.2	41	53.2	
AN-BP	4	4.3	4	5.2	
Atypical AN	33	35.9	24	31.2	
ARFID	5	5.1	2	2.6	
OSFED	13	13.3	6	7.8	
Comorbid psychiatric diagnoses[a]					
ADHD	4	4.3	2	2.6	
Adjustment disorder	3	3.3	1	1.3	
Agoraphobia with panic attacks	1	1.1	0	0.0	
Dysthymia	1	1.1	0	0.0	

(Continues)

TABLE 1 | (Continued)

	n	%	*n*	%
Functional neurological symptom disorder	1	1.1	0	0.0
GAD	27	29.3	15	19.5
MDD, current episode	23	25.0	14	18.2
MDD, in remission	4	4.3	2	2.6
OCD	6	6.5	6	7.8
Other specified anxiety disorder	8	8.7	2	2.6
Other specified depressive disorder	2	2.2	1	1.3
Panic disorder	2	2.2	1	1.3
PTSD	2	2.2	1	1.3
Social anxiety disorder	12	13.0	15	19.5
Separation anxiety disorder	1	1.1	0	0.0
Specific phobia	1	1.1	1	1.3
Substance use disorder	0	0.0	1	1.3
Tic disorder	1	1.1	1	1.3
Trichotillomania	1	1.1	0	0.0
Speech disorder	0	0.0	1	1.3
Amenorrhea	21	22.8	22	28.6
Irregular	10	10.9	11	14.3
Premenarchal	17	18.5	5	6.5
Regular	30	32.6	27	35.1
Not applicable	14	15.2	11	14.3
Prior ED treatment[b]				
Inpatient medical	42	45.7	45	58.4
Inpatient psychiatric	0	0.0	1	1.3
Residential	1	1.1	0	0.0
PHP	6	6.5	0	0.0
IOP	3	3.3	1	1.3
Individual outpatient	20	21.7	19	24.7
Medication at baseline[c]				
Anticonvulsant	2	2.2	1	1.3
Anxiolytic	2	2.2	1	1.3
Atypical antidepressant	3	3.3	0	0.0
Atypical antipsychotic	3	3.3	2	2.6
Mood stabilizer	1	1.1	0	0.0
NDRI antidepressant	2	2.2	0	0.0
SNRI antidepressant	2	2.2	0	0.0

(Continues)

TABLE 1 | (Continued)

	n	%	*n*	%
SSRI antidepressant	25	27.2	11	14.3
Tricyclic antidepressant	1	1.1	0	0.0
FBT format				
Conjoint	86	93.5	57	74.0
Separated	4	4.3	13	16.9
Mixed	2	2.2	7	9.1

Note: $N = 169$ (in-person $n = 92$; telehealth $n = 77$).
Abbreviations: ADHD, attention-deficit/hyperactivity disorder; AN-BP, anorexia nervosa, binge-purge type; AN-R, anorexia nervosa, restricting type; ARFID, avoidant/restrictive food intake disorder; GAD, generalized anxiety disorder; IOP, intensive outpatient program; MDD, major depressive disorder; NDRI, norepinephrine-dopamine reuptake inhibitor; OCD, obsessive compulsive disorder; OSFED, other specified feeding and eating disorder; PHP, partial hospitalization program; PTSD, posttraumatic stress disorder; SNRI, serotonin and norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor.
[a]64.1% ($n = 59$) of patients seen in person and 51.9% ($n = 40$) of patients seen via telehealth had at least one comorbid psychiatric diagnosis.
[b]62.0% ($n = 57$) of patients seen in person and 74.0% ($n = 57$) of patients seen via telehealth had received any prior ED treatment.
[c]33.7% ($n = 31$) of patients seen in person and 16.9% ($n = 13$) of patients seen via telehealth were taking at least one psychiatric medication at baseline.

2.1 | Measures

2.1.1 | Percent Expected Body Weight (%EBW)

Individualized EBWs were estimated by an ED-specialized registered dietitian based on patients' historical growth curve data, sex, age, height, and gender, and taking into account their expected physical growth trajectory over the next 12 months (Norris et al. 2018). During in-person FBT sessions, weight was recorded by the FBT provider using calibrated digital scales with the patient wearing light clothing without shoes. During telehealth sessions, patients' caregivers typically facilitated measuring patients' weight in light clothing using the family's personal scale and relayed the weight to the FBT provider. Each session weight was divided by the patient's EBW to calculate a percentage. For the purposes of the current study, patients who were ≥95% EBW at the last noted FBT session were considered to be weight restored. While prior FBT research has defined weight restoration using ≥95% median BMI (Couturier and Lock 2006; Le Grange et al. 2019), the use of EBW (calculated based on historical trajectories) provides a more accurate or individualized estimation of adolescents' weight status (Jary Franklin et al. 2024; Norris et al. 2018).

2.2 | Statistical Analyses

Analyses were conducted in RStudio (version 2025.05.1). Assumptions were met for logistic regressions (i.e., independence of observations, binary outcome variable, linearity of continuous logit, absence of multicollinearity, and lack of outliers), hurdle regressions (i.e., excess "real" zeros and independence of zero versus non-zero values) and *t* tests (i.e., independent groups, normality of sample means, and homogeneity of variances). The total number of sessions, length of treatment, and number of sessions to reach 95% EBW were positively skewed; thus, linear regressions were conducted following correction of these variables with a natural logarithmic transformation. Additionally, given baseline differences in %EBW between patients who received FBT in person versus telehealth, we included baseline %EBW as a covariate in all regression models. We reported odds ratios (ORs), Cohen's f^2, and Cohen's d as measures of effect size. ORs >1 suggest greater likelihood of the outcome among patients who received FBT via telehealth, while ORs <1 suggest less likelihood among telehealth patients. Following Cohen's (1988) conventions, $d = 0.20$ and $f^2 = 0.02$ were considered small effect sizes, $d = 0.50$ and $f^2 = 0.15$ medium effects, and $d = 0.80$ and $f^2 = 0.35$ large effects.

2.2.1 | Service Delivery

We first examined potential differences in how in-person and telehealth FBT were delivered. Linear regressions tested the effects of FBT format on the total number of sessions and length of treatment in months.

2.2.2 | Treatment Outcomes: Weight Restoration and Treatment Completion

Binomial logistic regressions ('glm' package; R Core Team) tested the effect of FBT format (i.e., in-person or telehealth) on weight restoration (i.e., ≥95% EBW) at end of treatment. Multinomial logistic regressions examined whether FBT format predicted the relative likelihood of completing a full course of FBT, without need for additional ED care (as opposed to early dropout, referral to a higher level of care, or referral to another outpatient ED treatment).

Binomial logistic regressions also examined whether age or %EBW at baseline (previously identified predictors of outcome in FBT; Gorrell, Byrne, et al. 2022; Gorrell, Reilly, et al. 2022; Swenne et al. 2017) moderated the relation between FBT format and weight restoration at the end of treatment or treatment completion. Age and baseline %EBW were mean-centered to facilitate interpretation of interactions.

2.2.3 | Metrics of Treatment Progress

Binomial logistic regression tested the effect of FBT format on early response to FBT, which was defined as achieving ≥2.3 kg of weight gain by the fourth session of treatment (Lock et al. 2015, 2024). Linear regressions examined whether FBT format predicted the number of sessions to reach 95% EBW.

TABLE 2 | Comparison of in-person and telehealth family-based treatment across treatment outcomes and metrics of service delivery and treatment progress.

	In-person		Telehealth					
	n	**%**	***n***	**%**	***B***	**SE**	***p***	**OR**
Weight restored to 95% EBW at EOT[a]					−0.29	0.40	0.457	0.74
Weight restored	62	68.1	42	56.0				
Not weight restored	29	33.0	33	44.0				
FBT completion[b]								
Completed	52	56.5	36	46.8	—	—	—	—
Dropped out	18	19.6	24	31.2	0.56	0.41	0.172	1.74
Referred to higher level of care	10	10.9	12	15.6	0.47	0.53	0.375	1.60
Referred to other ED outpatient	12	13.0	5	6.5	−0.64	0.63	0.313	0.53
Early response to FBT[c]					−1.11	0.51	0.029	0.33
Early responder	21	25.0	7	12.5				
Not an early responder	63	75.0	49	87.5				
Hospitalized during FBT[d]					−0.22	0.44	0.620	
Hospitalized	18	19.6	15	19.5				
Not hospitalized	74	80.4	62	80.5				
	M	**SD**	**M**	**SD**	***B***	**SE**	***p***	**Cohen's f^2**
Total number of sessions[e]	18.17	12.39	19.10	15.94	−0.16	0.13	0.209	0.01
Treatment duration (months)[e]	8.12	6.44	7.33	6.42	−0.06	0.14	0.644	0.00
Number of sessions to 95% EBW[e]	5.58	6.33	8.48	10.01	0.16	0.13	0.234	0.01
Number of hospitalizations during FBT[f]	1.44	0.78	1.80	1.42	0.34	0.92	0.713	—
	M	**SD**	**M**	**SD**	***t***	***p***	**Cohen's *d***	
ZCTA distance from treatment center (km)	26.52	48.25	42.42	71.54	−1.62	0.108	0.27	

Note: $N = 169$ (in-person $n = 92$; telehealth $n = 77$). 0 = in person and 1 = telehealth in all regression models. Note that effect sizes cannot be approximated for hurdle regression models (Martin and Hall 2016).

Abbreviations: EBW, expected body weight; ED, eating disorder; EOT, end of treatment; FBT, family-based treatment; ZCTA, zip code tabulation area.

[a]0 = not weight restored; 1 = weight restored.

[b]0 = completed treatment; 1 = dropped out; 2 = referred to a higher level of care; 3 = referred to another outpatient ED treatment.

[c]Early response to FBT is defined as 2.3 kg weight gain in the first 4 weeks of treatment (Lock et al. 2015). 0 = not an early responder; 1 = early responder.

[d]0 = not hospitalized during FBT; 1 = hospitalized during FBT.

[e]Analysis conducted following a natural logarithmic transformation.

[f]Among patients hospitalized at least once during FBT.

Because data were zero-inflated, the frequency of hospitalizations during treatment across in-person versus telehealth FBT groups was examined using hurdle regression ($n = 136/169$, 80.5% not hospitalized vs. $n = 33/169$, 19.5% hospitalized, with number of hospitalizations ranging 1–5). We modeled a negative binomial distribution, given the variance in hospitalization frequency was greater than its mean (dispersion statistic = 2.06) and controlled for %EBW at baseline.

2.2.4 | Treatment Reach

To assess the geographic areas reached by in-person and telehealth FBT, we first mapped patient zip codes to zip code tabulation areas (ZCTAs) using a crosswalk table provided by the Human Resources and Service Administration (2020). The unique number of ZCTAs reached by in-person versus telehealth FBT were compared descriptively. We then calculated the distance from the treatment center's ZCTA to each patient's residence ZCTA using the Vincenty Ellipsoid method, an approach that measures the shortest distance between two points on the Earth's surface, correcting for its ellipsoidal effects ('geosphere' package; Hijmans et al. 2017); *t* tests compared average distance between patient residence and treatment center ZCTAs for each patient group (i.e., in-person or telehealth FBT). We also examined the rurality of patient residences by mapping patients' zip codes onto 2010 rural–urban commuting area codes (RUCAs) classified into four categories: urban core (RUCA codes 1.0 and 1.1), suburban (RUCA codes 2.0–3.0), large rural (RUCA codes 4.0–6.1), and small town/rural (RUCA codes 7.0–10.6; Washington State Department of Health 2016).

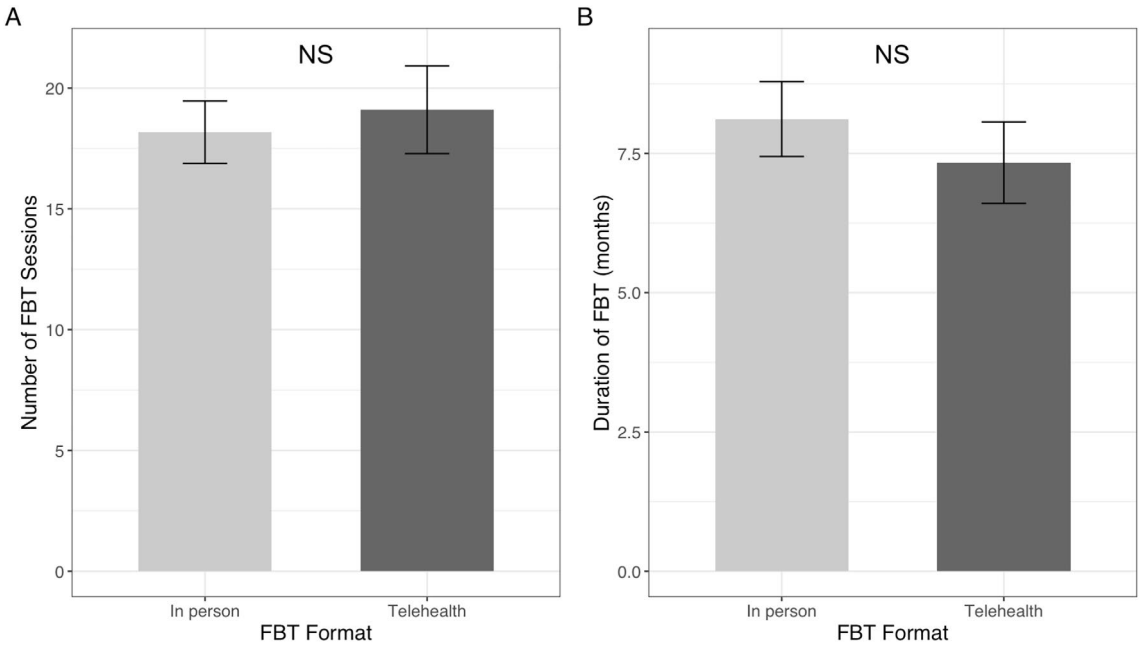

FIGURE 1 | Service delivery outcomes for in-person and telehealth family-based treatment (FBT). $N = 169$ (in-person $n = 92$; telehealth $n = 77$). NS, no significant difference between groups ($p > 0.05$).

TABLE 3 | Binomial logistic regressions exploring age and %EBW at baseline as moderators of treatment outcome.

	Weight restoration at end of treatment[a]				Treatment completion[b]			
	B	**SE**	***p***	**OR**	***B***	**SE**	***p***	**OR**
Format[c]	−0.21	0.41	0.615	0.81	−0.30	0.35	0.388	0.74
Age (centered)	−0.18	0.14	0.191	0.83	−0.34	0.13	0.007	0.71
%EBW at baseline (centered)	15.53	3.05	< 0.001	5534965.0	6.06	2.27	0.008	429.06
Format*Age	−0.16	0.23	0.492	0.85	0.51	0.21	0.014	1.66
	Weight restoration at end of treatment[a]				**Treatment completion[b]**			
	B	**SE**	***p***	**OR**	***B***	**SE**	***p***	**OR**
Format[c]	−0.29	0.41	0.488	0.75	−0.29	0.34	0.402	0.75
%EBW at baseline (centered)	13.90	3.88	< 0.001	1083366.0	3.66	2.92	0.210	38.74
Format*%EBW at baseline	0.44	5.68	0.938	1.56	2.82	4.24	0.506	16.77

Note: $N = 169$ (in-person $n = 92$; telehealth $n = 77$). EBW = expected body weight.
[a]0 = not weight restored to ≥ 95% EBW at end of treatment; 1 = weight restored to ≥ 95% EBW at end of treatment.
[b]0 = dropped out, referred to a higher level of care, or referred to another outpatient ED treatment; 1 = completed treatment.
[c]0 = in person; 1 = telehealth.

3 | Results

Table 1 shows the demographic and clinical characteristics of patients who received in-person (54.4%, $n = 92$) or telehealth (45.6%, $n = 77$) FBT. Most participants were White (60.9%, $n = 103$) cisgender girls (84.6%, $n = 143$) with a diagnosis of AN (50.9%, $n = 86$) or atypical AN (33.7%, $n = 57$). Those with avoidant/restrictive food intake disorder (4.1%, $n = 7$) and OSFED (11.2%, $n = 19$) needed to gain weight as part of treatment, as determined by their %EBW at baseline and clinician's progress notes. Among patients who received FBT via telehealth, most (81.8%, $n = 63$) initiated care in the context of pandemic stay-at-home orders. Fourteen patients (18.2%) began telehealth FBT after the treatment center had resumed in-person appointments; these patients accounted for 70.0% of all families ($n = 20$) who initiated and received FBT between the return to in-person services and the end of the chart review period. Six patients (30.0%) not included in the study elected for in-person FBT during this time. Among study participants, telehealth FBT patients had a lower %EBW at baseline than in-person patients, $t(119.68) = 2.03$, $p = 0.044$, $d = 0.34$, while a larger proportion of patients seen in person were taking at least one psychiatric medication at baseline compared to those seen via telehealth, $\chi^2(1, N = 169) = 5.31$, $p = 0.021$, Cramer's V = 0.19. Additionally, a larger proportion of in-person families received conjoint FBT compared to

telehealth patients, $\chi^2(2, N=169)=12.19$, $p=0.002$, Cramer's V = 0.27, such that adolescents and caregivers attending in person were more likely to participate in sessions together, rather than separately (i.e., separated) or a blend of these approaches (i.e., mixed). Patients who received in-person versus telehealth FBT did not significantly differ in age, gender, race, ethnicity, ED diagnosis, presence, or number of comorbidities, ED-related medical hospitalization prior to starting FBT, or prior ED treatment.

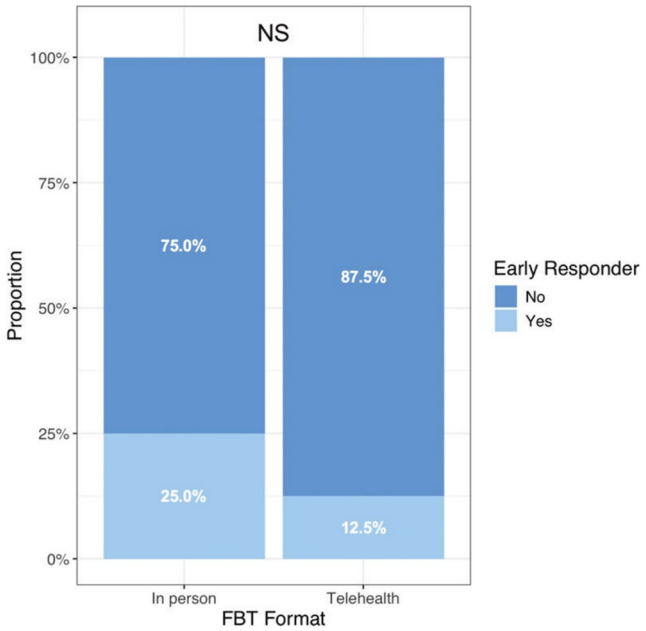

FIGURE 2 | Proportion of early treatment responders across in-person and telehealth family-based treatment (FBT). $N=169$ (in-person $n=92$; telehealth $n=77$). Early response to FBT is defined as 2.3 kg weight gain in the first 4 weeks of treatment (Lock et al. 2015).

Three patients (1.8%, $n=1$ in person, $n=2$ telehealth) declined to be weighed throughout treatment or during their final FBT sessions and so were excluded from weight restoration analyses. Additionally, 11 EMRs (6.5%, $n=6$ in person, $n=5$ telehealth) were missing patient zip codes at the start of FBT and thus were excluded from analyses pertaining to treatment reach. There were no other missing data in the dataset.

3.1 | Service Delivery

On average, both in-person and telehealth FBT were delivered in less than 20 sessions over the course of 7–8 months (see Table 2 and Figure 1). Treatment format did not predict the total number of FBT sessions or treatment duration. For patients who completed treatment (52.1%, $n=88$), they attended on average 22 sessions over 10 months, with no significant effect of treatment format on the total number of sessions, $B=5.79$, SE = 3.50, $p=0.102$, $f^2=0.04$, or treatment duration, $B=1.30$, SE = 1.51, $p=0.391$, $f^2=0.01$. For patients who were referred to an ED higher level of care or other ED outpatient treatment (23.1%, $n=39$), treatment format did not predict the number of FBT sessions, $B=1.63$, SE = 3.74, $p=0.665$, $f^2=0.01$, or the amount of time in FBT, $B=-1.23$, SE = 1.50, $p=0.420$, $f^2=0.02$, prior to referral.

3.2 | Treatment Outcomes: Weight Restoration and Treatment Completion

Table 2 also compares treatment outcomes for in-person versus telehealth FBT. Treatment format did not predict whether patients were weight restored to ≥95% of EBW at the end of treatment or whether patients completed treatment, dropped out of treatment, or were referred to another ED treatment.

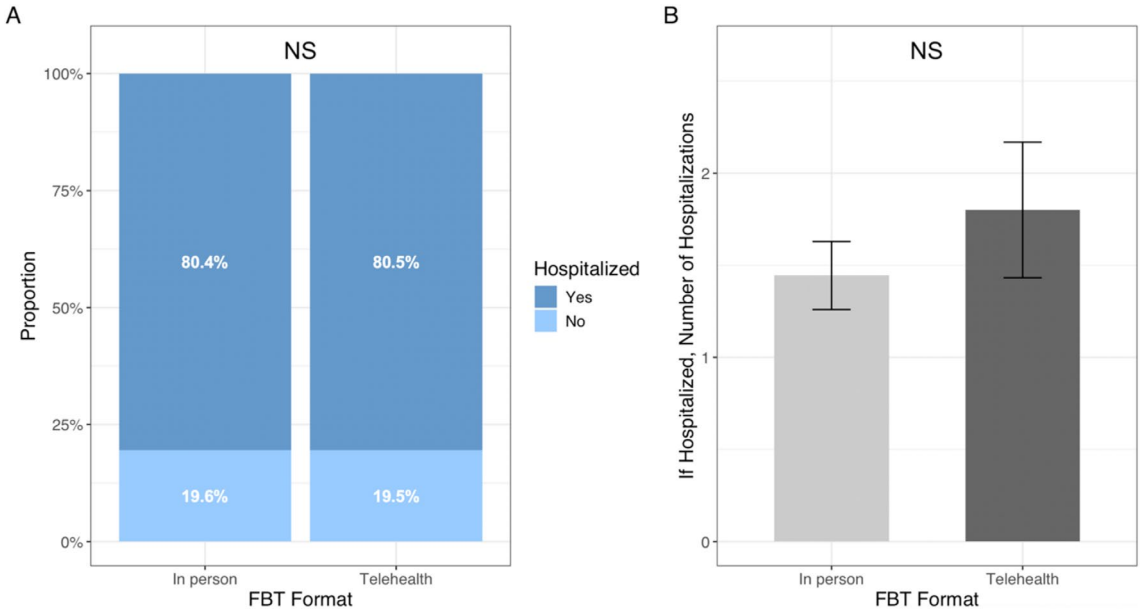

FIGURE 3 | Proportion and number of hospitalizations during in-person and telehealth family-based treatment (FBT). $N=169$ (in-person $n=92$; telehealth $n=77$).

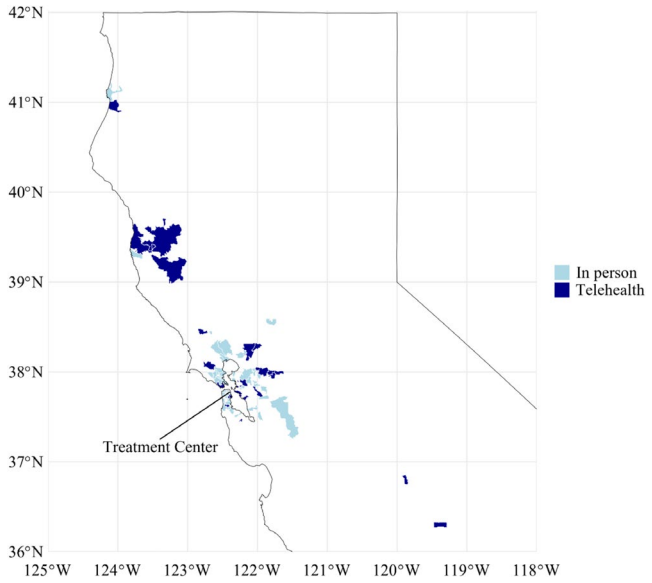

FIGURE 4 | Map of zip code tabulation areas reached by in-person and telehealth family-based treatment (FBT).

Results from the moderation analyses are shown in Table 3. There was a moderating effect of age on the relation between FBT format and treatment completion. Simple slopes analysis indicated that older age predicted lower odds of completing treatment among patients who received FBT in person (AME = −0.07, SE = 0.02, $p = 0.002$), but this effect was not significant for telehealth FBT patients (AME = 0.04, SE = 0.04, $p = 0.275$). Neither age nor %EBW at baseline moderated the impact of FBT format on weight restoration; %EBW at baseline did not moderate the impact of FBT format on treatment completion.

3.3 | Metrics of Treatment Progress

Comparisons across metrics of treatment progress are shown in Table 2 and Figures 2 and 3. Treatment format predicted whether or not patients were early responders, such that the odds for patients who received FBT via telehealth to gain 2.3 kg by session four were significantly lower than those of patients seen in person. Treatment format did not predict the number of sessions to reach 95% of EBW or likelihood of being hospitalized during treatment, nor did it predict the number of hospitalizations among those who were hospitalized at least once during treatment.

3.4 | Treatment Reach

Figure 4 shows a map of the ZCTAs reached by in-person and telehealth FBT. In-person FBT reached 55 unique ZCTAs that were 0.00–401.65 km from the treatment center, including 28 ZCTAs not reached by telehealth FBT, while telehealth FBT reached 56 unique ZCTAs that were 0.09–384.48 km from the treatment center, including 29 ZCTAs not reached by in-person treatment. There was no significant difference in the average Vincenty Ellipsoid distance between the treatment center and the residences of patients seen via telehealth versus in person (see Table 2). Most patients (93.7%, $n = 148$) resided in urban core areas. Among patients seen in person, one resided in a suburban area (1.2%), two in large rural areas (2.3%), and one in a small town/rural area (1.2%). One patient seen via telehealth resided in a suburban area (1.4%), three in large rural areas (4.2%), and two in small town/rural areas (2.8%).

4 | Discussion

Telehealth treatment is increasingly available for adolescents with EDs (Datta et al. 2023) and has the potential to reduce barriers to evidence-based care; yet, few studies have evaluated the effectiveness of FBT when delivered via telehealth or examined patient variables that might guide recommendations regarding treatment format. The current study conducted a retrospective chart review to compare telehealth FBT to in-person FBT across a range of treatment-related outcomes. Consistent with hypotheses and despite potential logistical challenges in delivering FBT via telehealth (Matheson et al. 2020), there was no significant effect of treatment format on whether adolescents were weight restored at the end of treatment or completed treatment, as opposed to discontinuing treatment early or being referred to another ED treatment option. As weight restoration is the primary early treatment target in FBT (Le Grange et al. 2019), these findings suggest that the telehealth format does not interfere with the main goals associated with the delivery of FBT interventions. Compared to past published data regarding the effectiveness of in-person FBT, the proportion of patients who achieved weight restoration in the current study is consistent with what was found in a similar academic medical specialty clinic (53.8%; Accurso et al. 2015) and a private practice setting (45.9%; Goldstein et al. 2016). The rates of retention and treatment completion observed across groups further suggest that telehealth FBT is feasible and not significantly different from in-person FBT in preventing worsening of symptoms and/or hospitalization. By directly comparing in-person and telehealth FBT formats in a relatively large sample, these findings extend the results of prior work demonstrating favorable outcomes for telehealth FBT (Anderson et al. 2017; Pereira et al. 2023; Steinberg et al. 2023) and support the continued use of telehealth FBT as part of outpatient ED treatment programs.

Although patients who received FBT via telehealth were less likely to be considered early treatment responders in weight gain, FBT format did not predict the number of sessions needed to reach 95% of their EBW. Thus, while the telehealth format may have made early momentum in FBT more challenging, this did not appear to impact patients' overall rate of progress throughout treatment. Notably, 95% of EBW is a more personalized weight metric than the raw amount of weight change (i.e., 2.3 kg by session four), which may account for these discrepant findings. The effect of FBT format on early response could also be due to the fact that the telehealth group was undergoing a major stressor (i.e., the pandemic) alongside the start of treatment. Finally, telehealth and in-person FBT did not significantly differ in the need for or frequency of hospitalization during treatment, suggesting that adolescents who

received either treatment format were similar in the extent to which they were able to remain in their lives (e.g., live at home, with access to school, friendships, and other interests/activities) while receiving FBT.

Exploratory moderation analyses found that older patients were less likely to complete treatment in person than younger patients but were as likely as younger patients to complete telehealth FBT. While the reason for this effect is not clear, it could be secondary to an increase in need for autonomy and competing priorities among older adolescents (e.g., high school, college applications, and extracurricular activities) that can interfere with engagement in in-person treatment. While these barriers likely still existed in some form for the telehealth group, the format of the treatment may have presented fewer logistical barriers to attendance. The fact that there was no moderating effect of baseline %EBW on the relation between treatment format and outcome suggests that in-person and telehealth FBT were effective for patients of varying ED severities at the start of treatment. However, visual inspection of means and proportions suggests higher rates of weight restoration and treatment completion when FBT was delivered in person, though the small effect sizes and study sample size limit any conclusions that can be drawn from these findings. As other predictors of FBT outcomes (e.g., caregiver self-efficacy and expressed emotion; Gorrell, Byrne, et al. 2022; Gorrell, Reilly, et al. 2022) could potentially make telehealth treatment more challenging, research that includes additional measures of adolescent, caregiver, and family characteristics is needed to further clarify for whom each format may be more or less beneficial.

Although the COVID-19 stay-at-home orders are no longer a barrier to accessing ED services in person, telehealth may reduce geographic barriers to evidence-based care. Consistent with this notion, in the current study, telehealth FBT served adolescents who lived farther on average from the treatment center than those seen in person, though the average distances did not significantly differ and very few patients lived in rural areas based on RUCA codes. Areas farther from the academic medical center providing FBT are increasingly rural, where other barriers to care (including stigma, financial and insurance-related barriers, and limited internet access; Ferris-Day et al. 2021) may pose challenges to families accessing FBT, even when delivered via telehealth. Moreover, adolescents from rural communities may be less likely to access or be referred to specialized medical or mental health treatment at an urban academic medical center (Hahn et al. 2023). Regardless of geographic distance, some patients and families may prefer telehealth services due to factors such as reduced travel time and transportation costs, greater privacy in the context of a small community, and better balance with other responsibilities (e.g., work and caretaking responsibilities), while others may feel more connected to their provider when in person or have difficulty accessing a private space or reliable internet connection for telehealth (Honey et al. 2023; Mseke et al. 2023; Tavernier et al. 2025). As expanding the reach of ED treatments has great potential to reduce the public health burden of EDs (Moessner and Bauer 2017), more research is needed to further identify the barriers to care that adolescents and families experience, understand which barriers telemedicine is effective in addressing, and further update and enhance the model of care delivery to serve more people.

Taken together, this study's findings suggest that telehealth FBT could be recommended as a viable first-line option in contexts where families encounter barriers to in-person treatment that are ameliorated by accessing care remotely. Furthermore, as few significant differences were observed between groups, it is possible that the structure and principles of FBT are particularly well-suited for the telehealth format. For example, FBT primarily focuses on behavioral change as facilitated by the patient's caregivers, whereby caregivers assume responsibility for preparing, serving, and supervising their child's meals and snacks and interrupting all ED behaviors. Thus, regardless of whether sessions with the FBT therapist occur in person or via telehealth, the primary agents of recovery continue to operate in person within the patient's home. Guidelines for delivering FBT via telehealth demonstrate how clinician communication and family participation can be enhanced (e.g., through greater reliance on verbal communication and facial cues rather than fuller body language, by asking family members to arrange themselves in a semi-circle around the camera) to support telehealth FBT implementation without the need for significant adaptations to the treatment's structure or components (Matheson et al. 2020). In the current study, clinicians who delivered FBT via telehealth more often used a separated format (i.e., met with the adolescent and caregivers separately). While we cannot speculate about individual therapist decisions that were made based on clinical judgment, this approach may have felt more manageable than seeing the entire family together in the novel telehealth setting. It is also possible that indicators that usually suggest separated FBT would be helpful (e.g., higher expressed emotion; Allan et al. 2018) may have been more salient within the stress context of the pandemic and aftermath (Xiong et al. 2020). Despite the suitability of FBT for telehealth, efforts to train and supervise FBT clinicians should incorporate discussion of challenges inherent to telehealth care and strategies for increasing clinician comfort and effectiveness to ensure comparable outcomes.

There are several limitations that warrant consideration when interpreting and applying this study's findings. First, due to inconsistent administration of self- and parent-report questionnaires across the data collection period, we were unable to compare treatment formats in their reduction of psychological ED symptoms, an important component of remission that features prominently in patients' and families' definitions of ED recovery (Kenny et al. 2020; Wetzler et al. 2020). As psychological symptoms maintain ED behaviors (Grilo et al. 2019; Mitchison et al. 2017; Stice and Shaw 2002) and increase risk for future relapse (Berends et al. 2018; Boehm et al. 2016), their inclusion as an outcome in future studies of telehealth FBT is imperative.

Second, the majority of patients seen via telehealth received care during COVID-19 stay-at-home orders, which limits the generalizability of our findings and could have affected our results in several ways. Previous studies suggest that adolescents with EDs experienced more severe psychopathology in the context of the COVID-19 pandemic (Meier et al. 2022; Schlissel et al. 2023), which may have given rise to the difference in baseline %EBW between the study's groups. Moreover, pandemic-related stress may have inhibited some families' capacity to implement FBT interventions, while other families may have found it easier to prepare and supervise their child's meals and snacks while working and attending school from home, thereby enhancing

treatment fidelity in the telehealth group. Some families may also have been more likely to complete telehealth FBT due to in-person treatment options not being available. As noted above, patient preferences may have further impacted results, with some adolescents being more receptive to seeing a therapist via telehealth and others having negative perceptions of this format (Mseke et al. 2023). It is also possible that the more frequent use of separated FBT in the telehealth group bolstered telehealth FBT's effectiveness, given the higher end-of-treatment remission rates that have been found for separated FBT (Le Grange et al. 2016). Thus, further well-powered, randomized evaluation of telehealth FBT acceptability and effectiveness as part of ongoing and more routine care delivery is needed, as well as research that considers the influence of patient and caregiver preferences regarding FBT format, particularly given the extent to which telehealth FBT is being implemented.

Finally, while rates of representativeness across gender, race, and ethnicity were higher than in randomized controlled trials of FBT (Agras et al. 2014; Lock et al. 2005, 2010), the majority of patients were White, cisgender girls with AN, which limits the generalizability of our findings and precluded direct comparison of outcomes across different genders and ED presentations. Due to structural and systemic barriers to ED identification and treatment among marginalized youth (Accurso et al. 2021), this demographic represents the majority of patients presenting to ED treatment settings (Halbeisen et al. 2022); more representative samples are critical to evaluating whether efforts to improve care access (such as the use of telehealth) reduce treatment barriers for those who are currently underserved and where additional work is needed to improve health equity.

In summary, the current study suggests that telehealth FBT may be as effective as in-person FBT at restoring weight and limiting hospitalization in restrictive EDs. Given the potential for the use of telehealth FBT to reduce barriers to evidence-based care, continuing to document its impact on clinical outcomes in adolescent EDs is crucial to informing clinical decision-making and referral to care. Such findings can also be used to advocate for continued coverage of telehealth services by health insurance companies in the US (including public insurance) and equal access to high-speed internet. Future work that includes assessment of psychological symptoms, randomized study design, and consideration of patient and family preferences will further refine guidelines surrounding the delivery of telehealth FBT to ensure equitable outcomes across treatment formats.

Author Contributions

Catherine R. Drury: conceptualization, data curation, formal analysis, investigation, methodology, project administration, visualization, writing – original draft, writing – review and editing. **Simar Singh:** conceptualization, data curation, formal analysis, methodology, project administration, visualization, writing – original draft, writing – review and editing, investigation. **Michael Manzano:** investigation, writing – original draft, writing – review and editing. **Sasha Gorrell:** conceptualization, investigation, methodology, writing – review and editing. **Erin E. Reilly:** investigation, writing – review and editing, methodology. **Michelle Odette:** resources, writing – review and editing. **Erin C. Accurso:** methodology, writing – review and editing. **Leigh Brosof:** writing – review and editing. **Lindsey Bruett:** writing – review and editing. **Sarah Forsberg:** writing – review and editing. **Verena Haas:** conceptualization, writing – review and editing. **Lisa Hail:** writing – review and editing. **Kathryn M. Huryk:** writing – review and editing. **Jessica Keyser:** writing – review and editing. **Rachel Kramer:** writing – review and editing. **Naomi Lynch:** writing – review and editing, investigation. **Stuart B. Murray:** writing – review and editing. **Rachel M. Radin:** writing – review and editing. **Justine Underhill:** writing – review and editing. **Kianna Zucker:** investigation, writing – review and editing. **Daniel Le Grange:** resources, supervision, writing – review and editing, conceptualization.

Ethics Statement

This study was approved by the University of California, San Francisco's Institutional Review Board (IRB) with a waiver of informed consent and exemption from continuing review given that it did not meet the definition of human subjects research, as participants provided data as part of routine clinical care.

Conflicts of Interest

Dr. Le Grange receives royalties from Guilford Press and Routledge. He is co-director of the Training Institute for Child and Adolescent Eating Disorders LLC, and a member of the Clinical Advisory Board of Univa Health. Dr. Forsberg receives royalties from Routledge.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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