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A Comparison of Telehealth and In-Person Therapy for Youth Anxiety Disorders

Jonathan Rabner[a], Lesley A. Norris[a,b], Thomas M. Olino[a], and Philip C. Kendall[a]

[a]Department of Psychology and Neuroscience, Temple University; [b]Department of Psychiatry and Human Behavior, Brown University

ABSTRACT

Objective: At the onset of the COVID-19 pandemic, telehealth service use increased. However, little research has compared the efficacy of individual cognitive behavioral therapy (CBT) for youth with anxiety administered via (a) telehealth and (b) in-person. The present study used non-inferiority analyses to examine outcomes for youth with anxiety disorders (diagnosed by an Independent Evaluator; IE) treated via telehealth during the COVID-19 pandemic and youth treated via in-person therapy prior to the COVID-19 pandemic.

Method: Participants ($n = 92$; $M_{age} = 11.5$ years; 60.1% female; 75.0% White) were 46 youth who completed telehealth treatment and 46 youth who completed services in-person, matched on age and principal anxiety diagnosis. One-sided t-tests for non-inferiority were first estimated. Next, ANOVAs and regression models were performed, examining treatment differences and candidate moderators (e.g. social anxiety disorder, comorbid attention problems).

Results: Results support non-inferiority across multiple indices of outcomes (i.e. self- and caregiver-reported anxiety symptoms, IE-rated functional impairment, and IE-rated treatment response). Analyses indicate that both treatments were effective in reducing anxiety symptoms and functional impairment. Caregivers reported higher post-treatment levels of anxiety for youth treated via telehealth than youth treated in person. No variables moderated the differences in outcomes between treatment modalities.

Conclusions: Findings support that CBT administered via telehealth is similarly efficacious as CBT administered in-person for youth with anxiety. Implications regarding the availability and accessibility of evidence-based treatment for youth with anxiety are discussed.

Prior to the COVID-19 pandemic, anxiety disorders were already highly prevalent in children and adolescents (henceforth youth), with rates ranging from 10–32% (Costello et al., 2003; Merikangas et al., 2010). Anxiety disorders in youth are impairing (Swan & Kendall, 2016) and associated with academic underachievement and dropout (Van Ameringen et al., 2003; Woodward & Fergusson, 2001), impaired social functioning (Seeley et al., 2011), decreased life satisfaction (Dooley et al., 2015), and increased suicidal ideation (Crawford et al., 2019; O'Neil et al., 2012). Though the long-term impact of the COVID-19 pandemic is yet to be determined, reviews have detailed an increase in anxiety, depression, and stress (Nearchou et al., 2020; Zolopa et al., 2022). Results of a meta-analysis of the prevalence of anxiety symptoms during the first year of the pandemic suggest a doubling of these difficulties from 11.9% to 20.5% (Racine et al., 2021). As the prevalence of anxiety increases, so too does the need to provide effective treatment (e.g., cognitive-behavioral therapy; CBT; Higa McMillan et al., 2016; Walter et al., 2020).

In response to the COVID-19 pandemic, mental health providers altered the delivery of their services to ensure continuity of care amidst a varying health and safety landscape. Therapists began conducting sessions on the phone or via secure videoconferencing platforms at higher rates during the pandemic (7.1% pre-pandemic to 85.5% during the pandemic; Pierce et al., 2021). Though brought on by necessity, this transition to telehealth services (also referred to as teletherapy or telemental health) was associated with an increase in youth' service use (Saunders et al., 2022). Remote administration of therapy sessions reduces barriers to care through a reduction in transportation costs and an increase in the amount and diversity of potential providers for individuals, particularly in remote areas. However, equity concerns remain, as there is still a need for access to reliable internet and technology. Despite the increased uptake of telehealth services, few studies have examined their efficacy, and, in particular, no studies have examined individual CBT for youth with anxiety.

CONTACT Jonathan Rabner jrabner@temple.edu Department of Psychology and Neuroscience, Temple University, 1701 N 13th St, Philadelphia, PA 19122

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A recent review of telehealth services for youth with anxiety indicated that multiple treatments, including family-based CBT, computerized and self-directed CBT, and parenting skills programs, can be effectively and feasibly administered via telehealth (Orsolini et al., 2021). For instance, a pilot study of family-based CBT for youth with anxiety delivered via telehealth demonstrated the response in 90.9% of the treatment completers as well as the feasibility and acceptability to families (Carpenter et al., 2018). Additionally, a brief, parent-focused, transdiagnostic CBT program was effective in reducing parent-reported youth distress (Guzick et al., 2022). Parent-child interaction therapy adapted to be delivered remotely was associated with significantly greater symptom reduction and rates of treatment response than a waitlist control in children 3–8 years old (Comer et al., 2021). However, these studies did not directly compare telehealth and in-person individual therapy services for youth with anxiety. Comparisons between the two treatment modalities have been conducted for youth with other disorders. Telehealth services in the form of family-based CBT for youth with obsessive-compulsive disorder (Comer, Furr, Kerns, et al., 2017), medication management and parent training for youth with attention deficit hyperactive disorder (ADHD; Myers et al., 2015), and parent-child interaction therapy for youth with disruptive behavior disorders (Comer, Furr, Miguel, et al., 2017) have all shown comparable efficacy to in-person services. Individual, youth-focused CBT is well-established and a comparison of telehealth to in-person individual CBT in youth with anxiety is needed.

As telehealth becomes more prevalent, it is important to identify for whom telehealth or in-person therapy is differentially more effective. Such tests of moderation supplement primary analyses to ensure that variability in outcomes are understood (Kraemer et al., 2006). Among youth anxiety treatments, few consistent moderators have emerged (Norris & Kendall, 2020). Thus, theoretically driven potential moderators are proposed, including a principal (or co-principal) diagnosis of social anxiety disorder (SOC) and comorbid attention problems. There is some evidence that a diagnosis of SOC predicts poorer CBT outcomes (Knight et al., 2014) and, in the Child/Adolescent Anxiety Multimodal Study (CAMS), SOC was found to moderate some measures of outcome, favoring conditions with medication (i.e., sertraline and CBT + sertraline) over CBT alone and pill placebo (Compton et al., 2014). Exposure tasks are an important component of anxiety treatment, particularly in the treatment of SOC (Peris et al., 2015). It is possible that virtual exposures may not readily generalize to real-world, face-to-face situations and that the limitations of the COVID-19 pandemic (e.g., social distancing, virtual learning) may limit engagement in exposure tasks. Similarly, studies reported that youth with ADHD experienced greater difficulty with remote learning than their peers without ADHD (Becker et al., 2020; Sibley et al., 2021). Parents of youth with ADHD also endorsed challenges of their child "staying on task" at a greater rate than parents of youth without ADHD (Roy et al., 2022). As remote learning and telehealth both involve focusing on a screen for an extended period of time, it is possible that youth with comorbid ADHD may have difficulty with telehealth.

This study examined multiple indices of treatment outcome for youth with anxiety treated via telehealth during the COVID-19 pandemic and youth treated via in-person therapy prior to the COVID-19 pandemic, matched on age and principal anxiety diagnosis. Examined outcomes included: (a) self- and caregiver-reported anxiety symptoms, (b) Independent Evaluator (IE)-reported functional impairment, (c) IE determination of treatment response, and (d) caregiver-reported treatment satisfaction. Two theoretically driven potential moderators of outcome were examined: principal (or co-principal) diagnosis of SOC and comorbid attention problems. In line with recommendations by Kraemer et al. (2006) on the need for exploratory moderation analysis to inform future studies, demographic variables (i.e., age and sex) were also explored. It was hypothesized that both treatment delivery methods will be associated with positive posttreatment outcomes, such that telehealth will be non-inferior to a gold standard treatment for youth anxiety (i.e., *Coping Cat* delivered in-person; Walter et al., 2020). Additionally, we hypothesized that (a) a principal (or co-principal) diagnosis of SOC and (b) comorbid ADHD will be significant moderators of treatment outcome favoring in-person therapy over telehealth.

Method

Participants

Participants were youth ($n = 92$) aged 7–17 years and their primary caregiver who presented to and completed treatment at the Child and Adolescent Anxiety Disorders Clinic (CAADC), an outpatient anxiety research clinic at Temple University. Youth were required to meet DSM-5 diagnostic criteria of a principal anxiety diagnosis (i.e., separation anxiety disorder, social anxiety disorder, generalized anxiety disorder, specific phobia, panic disorder, or agoraphobia), as assessed by an IE. The telehealth condition and the in-person condition are described separately:

Seventy-nine youth were consented and received an evaluation between June 2020 and May 2021. Eleven youth were ineligible and seven were eligible but did

not seek treatment. An additional six youth did not complete treatment or the posttreatment assessment, and nine youth engaged in treatment in a hybrid manner (i.e., both in-person and telehealth sessions occurred) during this time period and were excluded from the present sample. This resulted in 46 youth who completed telehealth treatment.

To comprise the in-person therapy comparison condition, the 46 youth who received services via telehealth were matched to youth who received services in-person in the four years prior to the COVID-19 pandemic on both age and principal anxiety diagnosis. Age and principal anxiety diagnosis were selected as matching variables as there is some evidence of their role as moderators or predictors of outcome (for reviews see Knight et al., 2014; Norris & Kendall, 2020). Matching was conducted by the first author using a reduced dataset of families who had previously completed treatment at the CAADC that only contained age, and principal anxiety diagnosis. About 47.8% ($n = 22$) of youth were matched exactly on both metrics, 30.4% ($n = 14$) of youth were matched exactly on principal diagnosis and within one year of age, and 10.9% ($n = 5$) youth were matched exactly on principal diagnosis and within two years of age. The remaining five youth (10.9%) were matched as follows: one was matched exactly on age but with a co-principal agoraphobia diagnosis, two were matched within one year of age but without a co-principal specific phobia (SP) diagnosis, one was matched within two years of age and with an additional co-principal SP diagnosis, and one was matched within three years of age and with an additional co-principal SP diagnosis due to a lack of older youth with separation anxiety disorder. Descriptive statistics and principal (or co-principal) anxiety diagnoses for both conditions are in Tables 1 and 2, respectively.

Telehealth Attrition Analysis

The 46 youth who completed treatment and six youth who did not complete treatment or the posttreatment assessment were compared on functional impairment, youth- and caregiver-reported anxiety symptoms, age, and sex. No significant differences were found.

Table 2. Principal (or co-principal) anxiety diagnoses by treatment condition.

	Telehealth ($n = 46$)	In-person ($n = 46$)
Sep	3 (6.5%)	2 (4.3%)
Soc	15 (32.6%)	14 (30.4%)
GAD	15 (32.6%)	16 (34.8%)
SP	1 (2.2%)	1 (2.2%)
Panic Disorder	1 (2.2%)	1 (2.2%)
GAD and Soc	7 (15.2%)	6 (13.0%)
GAD and Sep	1 (2.2%)	2 (4.3%)
GAD and SP	1 (2.2%)	0 (0.0%)
Sep and SP	0 (0.0%)	1 (2.2%)
Soc and SP	1 (2.2%)	2 (4.3%)
Soc and Agg	0 (0.0%)	1 (2.2%)
GAD, Sep, and Soc	1 (2.2%)	0 (0.0%)

Sep = Separation anxiety disorder; Soc = Social anxiety disorder; GAD = Generalized anxiety disorder; SP = Specific phobia; Agg = Agoraphobia.

Measures

Independent Evaluator (IE) Measures

Anxiety Disorder Interview Schedule for DSM-5 – Children and Parent (ADIS-5-C/p). The ADIS-5-C/P (A. Albano & Silverman, 2016) is a semi-structured interview utilized to diagnose anxiety disorders and other related disorders. A clinical severity rating (CSR) from 0 (none) to 8 (severely impaired) was assigned by an IE based on the presence of diagnostic symptoms and the severity of associated impairment reported by the youth and caregiver in separate interviews. A composite diagnosis was established using CSRs from both interviews. In this study, IEs completed reliability training and inter-rater reliability was calculated among the IEs on a subset of consecutive interviews ($N = 20$). Inter-rater reliability on diagnoses ranged from 0.82 to 0.94 for youth- and guardian-reported GAD, SOC, and SEP intraclass correlation coefficients.

Clinical Global Impression-Improvement Scale (CGI-I). The CGI-I (Guy, 1976) is a single-item scale

Table 1. Descriptive statistics for telehealth and in-person treatment conditions.

	Telehealth ($n = 46$)	In-person ($n = 46$)	p-value
Age (mean ± SD)	11.48 ± 2.88	11.54 ± 3.00	.46
Sex (% female)	33 (71.7%)	24 (52.2%)	.05
Race [n (%)]			
White	34 (73.9%)	35 (76.1%)	.06
Black	2 (4.3%)	5 (10.9%)	
Asian	2 (4.3%)	3 (6.5%)	
Hispanic	0 (0.0%)	2 (4.3%)	
Multiracial	8 (17.4%)	1 (2.2%)	
Parental marital status (% married)	73.9%	80.4%	.68
Principal or co-principal SOC	23 (50.0%)	23 (50.0%)	1.00
Comorbid attention problems [n (%)]	20 (43.5%)	12 (26.1%)	.10

SD = standard deviation; SOC = Social anxiety disorder.

assessing overall improvement. Treatment response was defined as a score of 1 (very much improved) or 2 (much improved), on a scale from 1 to 7, as assessed at the end of treatment by an IE. The present study used a composite score determined from both the youth and caregiver interviews. CGI-I scores ≤ 2 have been used by multiple studies to indicate response (e.g., Wagner et al., 2004; Walkup et al., 2008). In a sample of 15 consecutive posttreatment assessments, inter-rater agreement on identifying responder status was 94.1%.

Children's Global Assessment Scale (CGAS). The CGAS (Shaffer et al., 1983) is a single-item scale measuring global functional impairment (i.e., not exclusive to anxiety) as assessed by an IE. The scale ranges from 1 (*needs constant supervision*) to 100 (*superior functioning in all areas*) with standardized guidelines and descriptions for each decile. The CGAS has demonstrated test-retest reliability and inter-rater reliability as well as concurrent and discriminant validity (Bird et al., 1987; Shaffer et al., 1983). The present study used a composite score determined from both the youth and caregiver interviews. The CGAS was collected at both pre- and post-treatment.

Youth- and Caregiver-Report Measures

Child Behavior Checklist (CBCL). The CBCL is a 113-item caregiver-report that assesses a range of youth internalizing and externalizing behaviors (Achenbach & Rescorla, 2001). For the present study, the 10-item Attention Problems Scale was used. Sample items include: "Can't concentrate, can't pay attention for long," "Can't sit still, restless, or hyperactive," and "Impulsive or acts without thinking." Items were rated on a three-point scale from 0 (not true) to 2 (very true or often true), with higher scores indicating greater attention problems. Items were summed to create a total score which was converted to a T-score with a mean of 50 and a standard deviation of 10 that accounts for age and sex. A T-score ≥63 was used to classify youth into the comorbid attention problems group, based on findings that this score maximized sensitivity/specificity in classifying ADHD in youth with anxiety (Elkins et al., 2014). The CBCL Attention Problems Scale has been found to converge with ADHD, combined type diagnoses as well as differentiate between anxious youth with and without ADHD (Biederman et al., 1993; Jarrett et al., 2016). Internal consistency (Cronbach's alpha) for the CBCL Attention Problems Scale was .85.

Multidimensional Anxiety Scale for Children (MASC). The MASC is a 39-item youth- (MASC-C) and caregiver-report (MASC-P) measure of anxiety symptoms in the previous two weeks (March et al., 1997). Items were rated on a four-point scale from 0 (never) to 3 (often), with higher scores indicating greater anxiety symptoms. The MASC was collected at both pre- and post-treatment. MASC scores were converted to standardized T-scores, accounting for age and sex. The MASC demonstrated good convergent and divergent validity, retest reliability, and diagnostic accuracy (March et al., 1997; Rynn et al., 2006; Villabø et al., 2012). Internal consistency (Cronbach's alpha) for the MASC-C was .92 at baseline and .93 at posttreatment and for the MASC-P was .85 at baseline and .92 at posttreatment.

Client Satisfaction Questionnaire (CSQ). The CSQ is an 8-item caregiver-report measure of treatment satisfaction (Larsen et al., 1979). Items were rated on a 4-point Likert scale from 1 to 4, with different response options for different items (e.g., poor to excellent, quite dissatisfied to very satisfied). The CSQ was administered at posttreatment and greater scores indicate greater posttreatment satisfaction. The CSQ-8 has good convergent validity with other measures of satisfaction as well as measures of functioning (Attkisson & Zwick, 1982). Internal consistency (Cronbach's alpha) for the CSQ was .92.

Procedure

Institutional review board approval and participant informed consent and assent were obtained. Caregivers and youth separately completed an initial diagnostic assessment (i.e., ADIS-5-C/P) with reliable IEs to determine eligibility. For youth in the telehealth condition, this assessment occurred via video conferencing platform and for youth in the in-person condition, this assessment occurred in-person. Youth and caregivers then completed the MASC and CBCL. Families completed measures online for the telehealth condition and on-site in a private space for the in-person condition.

Youth received 16 sessions of CBT administered by advanced doctoral student therapists using either the *Coping Cat* protocol (Kendall & Hedtke, 2006) for children or the *C.A.T. Project* protocol (Kendall, 2002) for adolescents. Treatment included two phases: (1) a psychoeducation component involving skills to better cope with anxiety and (2) an exposure component involving a series of graded in-vivo and/or imaginal exposures. Homework was assigned at each session in line with the goals of the two phases (i.e., initially practicing the skills learned in session and later completing exposures at home). Sessions occurred in-person for the

in-person condition and via a video conferencing platform for the telehealth condition. All elements of treatment were otherwise delivered with similar fidelity (e.g., youth were mailed the *Coping Cat* workbook for use in treatment; visual examples were displayed in session using the "share screen" function).

Following 16 CBT sessions, a posttreatment diagnostic assessment was conducted by IEs, separately with youth and caregivers; conducted remotely for those in the telehealth condition and in-person for the in-person condition. IEs were unaware of the course of treatment, though not to the treatment condition. IEs were also not made aware of the study hypotheses. IEs used information from both interviews to rate treatment response (CGI-I). Youth and caregivers also completed self- and caregiver-report measures at this time, including the MASC and CSQ.

Data Analysis Plan

All analyses were conducted in R (R Core Team, 2022), version 4.2.2. Non-inferiority analyses followed the logic from the TOSTER package (Caldwell, 2022; Lakens, 2017); however, due to the use of imputed data, analyses were conducted using complementary t-tests using MKmisc (Kohl, 2022). For treatment differences and moderation, ANOVA analyses were conducted using the miceadds package in R (Robitzsch & Grund, 2023) and regression analyses were conducted using the norm package in R (Novo & Schafer, 2022).

Power Analysis

An *a priori* power analysis determined the necessary sample size for non-inferiority and treatment differences analyses. Power for non-inferiority tests was calculated using the PowerTOST package (Labes et al., 2022) for continuous outcomes and the TOSTER package (Caldwell, 2022; Lakens, 2017) for binary outcomes. Assuming a coefficient of variation (i.e., the SD divided by the mean) equal to 0.25 for MASC-C, 0.38 for MASC-P, and 0.16 for CGAS, based on posttreatment data from the CBT condition in CAMS (A. M. Albano et al., 2018; Walkup et al., 2008), total sample sizes of 68, 146, and 30, respectively, are required to detect non-inferiority with power = .80 and one-sided $\alpha = .025$. For treatment response, using the CAMS CBT response rate of 59.7% and an estimated equivalence margin of 0.2, a total sample size of 103 is required to detect non-inferiority with power = .80 and one-sided $\alpha = .025$. This leaves the present study examining non-inferiority with response and the MASC-P as outcomes, with actual achieved power equal to .79 and .60, respectively.

Power for treatment differences tests was calculated using both repeated measures ANOVA and linear regression via G*Power (Faul et al., 2007). For a 2×2 (treatment condition x time) repeated measures ANOVA, a total sample size of 90 is required to detect a moderate within factor effect or interaction effect of $f^2 = .15$, with power = .80 and $\alpha = .05$. To detect a small to moderate effect size ($f^2 = .1$) with power = .80 and $\alpha = .05$, a total sample size of 81 is required to conduct regression analyses including one predictor.

Non-Inferiority

Non-inferiority analysis tests a null hypothesis that a new treatment is inferior to the existing treatments, rather than traditional comparative analysis that tests a null hypothesis that there is no difference between the treatments (Kaul & Diamond, 2006; Walker & Nowacki, 2011). The null hypothesis is rejected when the tail of the confidence interval (CI) falls with the non-inferiority margin (i.e., the maximal difference with which one can still accept comparable efficacy). Non-inferiority margins are often determined using a combination of clinical judgment and data on effect sizes from meta-analyses comparing treatment to a waitlist control (Kaul & Diamond, 2006; Walker & Nowacki, 2011). Researchers then choose the fraction of that effect with which they want to preserve or are comfortable losing in return for the new treatment's benefits. For the present analyses, effect size information was derived from a recent meta-analysis of anxiety treatment outcomes comparing CBT to a waitlist control (James et al., 2020). Given the available meta-analytic data, a combined effect size metric for both response and remission, a more conservative outcome, was used to calculate the margin for response. Additionally, due to the lack of meta-analytic data on satisfaction, non-inferiority analysis was not conducted on the CSQ. The fraction used in the present analysis was 50%, ensuring that at least half of the effect was preserved.

We converted the effect size back to a raw mean difference by multiplying it by the pooled standard deviation (SD) as analysis using standardized mean differences may produce biased results (Caldwell, 2022; Lakens, 2017). Similar approaches have been employed in other studies (e.g., Haugland et al., 2017; Hedman et al., 2011). To present a more conservative margin, the lower end of the CI was selected over the effect size estimate. For example, James et al. (2020) meta-analysis found that posttreatment global functioning was found to be 1.03 SD higher in CBT than in the control condition with a CI of (0.68, 1.38). At 50% effect retention and with a pooled SD of 10.71, the margin would equal 5.52 points using the effect size estimate (1.03) and the margin would equal 3.64 points using the

lower bound of the effect size CI (0.68), shrinking the margin with which one can conclude non-inferiority.

The non-inferiority margins are presented as follows in the format of [SD_{pooled} *x lower bound of the effect size CI]/2 = margin*: (a) MASC-C: [13.60 × 0.47]/2 = 3.20; (b) MASC-P: [11.97 × 0.51]/2 = 3.05; (c) CGAS = [10.62 × 0.68]/2 = 3.61; and (d) Response: [0.46 × 0.92]/2 = 0.21. In clinical terms, the MASC-C/P margins represent about one third of a SD difference in anxiety symptoms, the CGAS margin represents a change in functioning equivalent to 33% of one 10-point band, and the response margin represents a difference of 21 percentage points. One-sided t-tests for non-inferiority were conducted comparing outcomes by treatment condition as is standard in tests of non-inferiority as the test's focus is whether one treatment is worse than another and not better or different (Walker & Nowacki, 2011). Alpha was set at .025, resulting in one-sided 95% CIs.

Treatment Differences

A set of 2 × 2(treatment condition x time) repeated measures ANOVAs were conducted to compare the effect of both treatment conditions on the following dependent variables: (a) youth-reported anxiety symptoms (MASC-C), (b) caregiver-reported anxiety symptoms (MASC-P), (c) IE-reported impairment (CGAS). Next, one logistic regression and one linear regression were conducted to examine the degree to which treatment condition differentially predicts posttreatment responder status (CGI-I) and treatment satisfaction (CSQ), respectively.

Moderation

For moderation analysis, linear and logistic regressions were conducted on the aforementioned five outcomes. Models were run to include treatment condition and the candidate moderator as independent variables as well as an interaction term between treatment condition and the moderator. Models were run separately for each of the four candidate moderators (i.e., principal (or co-principal) diagnosis of SOC, comorbid attention problems, age, and sex). All continuous variables were mean-centered.

Results

Missing Data

Data were missing from less than 5% of all MASC items. CGAS at posttreatment and income were missing from one participant each. Data were missing from 6–9% of CSQ items. Missing data were imputed using the mice package in R (Van Buuren & Groothuis-Oudshoorn, 2011) to create five "complete" datasets. All variables were included in the imputation model. Models were estimated for each imputed dataset and pooled estimates are reported.

Non-Inferiority

Descriptive statistics for all measures at each timepoint are reported by treatment condition in Table 3. To examine non-inferiority, a series of one-sided t-tests were conducted comparing outcomes by treatment condition. For the MASC-C/P where lesser values are indicative of a better outcome, the upper bound test was used. For the other outcomes, where greater values are indicative of a better outcome, the lower bound test was used. Results supported non-inferiority for all outcomes: self-reported anxiety (95% $CI_{Upper} = 0.54$, $p = .01$), caregiver-reported anxiety (95% $CI_{Upper} = -2.74$, $p < .001$), functional impairment (95% $CI_{Lower} = -2.58$, $p = .02$), and response (95% $CI_{Lower} = -0.18$, $p = .03$).

Treatment Differences

To examine treatment differences, a series of 2 × 2 (Time x Treatment) mixed ANOVAs were conducted on the outcomes assessed pre- and post-treatment (i.e., MASC-P, MASC-C, CGAS). For the caregiver-report MASC, results indicate significant main effects of time [$F(1, 238801.95) = 16.86$, $p < .001$, $\eta_p^2 = .09$] and treatment [$F(1, 36808.89) = 8.79$, $p = .003$, $\eta_p^2 = .05$], but no significant interaction [$F(1, 109030.90) = 0.58$, $p = .44$,

Table 3. Baseline and posttreatment data for telehealth and in-person treatment conditions.

	Telehealth ($n = 46$)		In-person ($n = 46$)	
	Baseline	Posttreatment	Baseline	Posttreatment
Self-report Anxiety (T-score)	60.79 ± 14.20	55.95 ± 13.80	61.93 ± 12.42	51.89 ± 13.23
Caregiver-report Anxiety (T-score)	63.26 ± 11.09	57.90 ± 11.65	59.08 ± 9.12	51.26 ± 11.47
Functional Impairment	54.12 ± 6.12	61.33 ± 8.80	53.54 ± 8.47	62.50 ± 12.24
Treatment Responder	-	71.74%	-	69.57%
Satisfaction	-	28.95 ± 3.72	-	27.83 ± 3.75

Self/Caregiver-Report Anxiety = Multidimensional Anxiety Scale for Children – Child/Parent Report; Functional Impairment = Children's Global Assessment Scale; Response = Clinical Global Impression-Improvement Scale; Satisfaction = Client Satisfaction Questionnaire.

$\eta_p^2 = .00$]. For the self-report MASC, results revealed a significant main effect of time [$F(1, 383835.90) = 14.05$, $p < .001$, $\eta_p^2 = .07$], but no significant main effect of treatment [$F(1, 198529.40) = 2.20$, $p = .14$, $\eta_p^2 = .01$] or interaction [$F(1, 531496.90) = 1.71$, $p = .19$, $\eta_p^2 = .01$]. Likewise, for the CGAS, results showed a significant main effect of time [$F(1, 10196.28) = 34.99$, $p < .001$, $\eta_p^2 = .17$], but no significant main effect of treatment [$F(1, 2975.91) = 0.33$, $p = .57$, $\eta_p^2 = .00$] or interaction [$F(1, 11466.66) = 0.39$, $p = .53$, $\eta_p^2 = .00$]. These results suggest that both treatments were comparably effective in reducing anxiety symptoms and functional impairment and that caregivers reported higher levels of anxiety for youth treated via telehealth than youth treated in person.

Next, one logistic regression and one linear regression were also conducted to examine whether treatment condition differentially predicted posttreatment responder status and satisfaction, respectively. Treatment condition did not differentially predict posttreatment responder status [$b = 0.10$, SE = 0.46, $p = .82$] or satisfaction [$b = 1.12$, SE = 0.78, $p = .15$].

Reliable Change Index

To further examine the main effects of time for anxiety symptoms and functional impairment, reliable change indexes (RCI) were calculated to determine whether these differences were clinically meaningful. RCIs were calculated using the sample standard error as published standard errors were not available. RCIs using a .05 confidence level were calculated to be 3.55 for self-report MASC, 2.96 for caregiver-report MASC, and 2.14 for CGAS. Differences in telehealth pre-post scores for the self-report MASC (4.84), caregiver-report MASC (5.36), and CGAS (7.21) were all greater than their respective RCIs indicating that a clinically meaningful change was present. The same pattern held for in-person self-report MASC (10.04), caregiver-report MASC (7.82), and CGAS (8.96) scores.

Moderation

Separate regression models were run for each of the four candidate moderators (i.e., principal diagnosis of SOC, comorbid attention problems, age, and sex). There were no significant interactions found (see Supplemental Materials for full statistics). Main effects of ADHD were found with functional impairment [$b = -7.21$, SE = 3.57, $p = .04$] and response [$b = -1.69$, SE = 0.72, $p = .02$] as outcomes, but not self-report MASC, parent-report MASC, or satisfaction as outcomes. Specifically, youth with comorbid attention problems were rated as having worse functional impairment (59.94 vs 62.96) and lower response rates (59.38% vs 76.67%) than youth without attention problems. Main effects of treatment were found in MASC-P models for all candidate moderators except sex, such that caregivers reported higher levels of anxiety for youth treated via telehealth than youth treated in person: principal diagnosis of SOC [$b = 7.98$, SE = 3.41, $p = .02$], comorbid attention problems [$b = 8.97$, SE = 3.02, $p = .003$], and age [$b = 6.75$, SE = 2.44, $p = .01$]. No main effects of SOC, age, or sex were found.

Discussion

The present findings support the non-inferiority of telehealth to in-person therapy, indicating that individual CBT (i.e., *Coping Cat*) delivered via telehealth is as effective as individual CBT delivered in-person, a gold standard treatment for youth anxiety (Walter et al., 2020). Analyses did not suggest differences between treatments – again indicating that both methods of delivery are associated with positive outcomes. Further analyses indicate that caregivers rated anxiety higher in telehealth than in-person, and that youth with attention problems responded worse and had lower functioning than youth without attention problems across treatments. No candidate treatment moderators were supported.

CBT administered via telehealth is similarly efficacious as CBT administered in-person. Response rates were 71.7% and 69.6% for telehealth and in-person therapy, respectively. Comparatively, the response rate for both treatment conditions was similar to the response rate of 59.7% for CBT in CAMS, the preeminent anxiety randomized-controlled trial (Walkup et al., 2008). Additionally, functional impairment improved in both treatment conditions by about one decile with mean functioning falling in the decile representing "some difficulty in a single area, but generally functioning pretty well" (Shaffer et al., 1983). Following treatment, anxiety symptom T-scores for both telehealth and in-person therapy decreased and fell in the range that is considered average per caregiver- and self-report. Finally, equally high satisfaction ratings were reported by caregivers. Given that individual CBT for youth anxiety is considered a well-established treatment (Higa McMillan et al., 2016; Walter et al., 2020) and the non-inferiority results in the present sample, telehealth is likely an empirically supported treatment.

This is the first study comparing CBT for anxiety in youth administered via telehealth and CBT administered in-person. These promising results can be used as a catalyst for a larger, randomized controlled trial. Such a study could include follow-up assessments to

examine whether treatment gains are similarly maintained or different follow-up care (e.g., booster sessions) is required. Future research could also examine the efficacy of a hybrid treatment model, where some sessions are conducted in person and others via telehealth.

The present findings buttress the chance to increase the availability and accessibility of evidence-based treatment for youth with anxiety. With data supporting the positive outcomes from telehealth-administered youth anxiety treatment, insurance companies should continue to cover telehealth therapy sessions and therapists can feel confident in their continued offering of telehealth. Telehealth services has the potential to increase availability of therapy by increasing the pool of potential providers. Likewise, accessibility may be increased through reduced barriers such as transportation and childcare costs. Telehealth may offer added comfort to youth who engage in therapy from their home, though providers of services for anxiety should weigh this benefit with potentially masked avoidance behavior. It is worth noting the potential downsides of telehealth. Results of a qualitative, focus group study identified youth' concerns related to a lack of privacy during telehealth sessions, the technological demands of this modality, and, in some cases, a difficulty developing a close relationship over telehealth (Castro et al., 2022). As society continues to adjust to the ever-evolving health and safety landscape, therapists, caregivers, and youth will benefit from considering the pros and cons of any treatment option and determine what is best for their specific needs. The present results support therapy administered via telehealth as a viable option for youth with anxiety disorders.

As clinical work and research on telehealth treatment progress, consideration of the question "what treatment works best for whom?" (Kiesler, 1966) remains important. Though no candidate moderators were supported by the present findings, comorbid attention problems did predict lower response rates and worse functional impairment across treatment condition (but did not predict self- or caregiver-reported anxiety symptoms). Lower response rates for youth with attention problems have been found in some studies (e.g., Halldorsdottir et al., 2015), but not others (for a review see Knight et al., 2014). Though our hypothesis was that youth with ADHD would respond worse to telehealth treatment that in-person treatment given the sustained focus on a screen, it is possible that youth with ADHD had difficulty "staying on task" in both treatment conditions. The finding of worse functional impairment in youth with attention problems may simply reflect the permissible inclusion of non-anxiety-related impairment in CGAS ratings. Given the non-inferiority of telehealth found in this study and the uptick in its use (Pierce et al., 2021), it remains important that research examines for whom telehealth and in-person therapy may be best suited (i.e., tests of treatment moderation) in powered samples.

It is worth noting that cohort effects may exist as the two treatments were administered at different times. This issue is of particular relevance to the finding that caregivers rated youth anxiety higher in the telehealth condition than the in-person condition at both baseline and posttreatment. This corresponds with the doubling of the prevalence of anxiety symptoms during the first year of the pandemic (Racine et al., 2021), in which caregivers also reported increases in youth anxiety since the pandemic started (Raviv et al., 2021). As this difference was not found for youth self-report in the present study, it is possible that caregiver perceptions of the reality of youth mental health may have increased concurrent with the increase in symptoms. In a sample of Norwegian parents, such an increase in health literacy was found during the COVID-19 pandemic compared to pre-pandemic levels (Mikkelsen et al., 2022). In our study, this is also evidenced by parent ratings of youth anxiety falling a few points below child ratings for in-person therapy and a few points above child ratings for telehealth. In addition to this increase in awareness on the individual level, a positive resultant of the pandemic was also an increased focus on youth mental health at the federal level (Office of the Surgeon General, 2021). It is likely that youth were aware of the reality of their mental health, and only now are caregivers and society catching up. Furthermore, the COVID-19 pandemic was a global stressor with a wide-ranging impact (e.g., family life, education, employment). Study findings may be confounded by the impact of this event. As caregivers exist within the larger family system, it is possible that their report of higher youth anxiety might be due to the impact of the COVID-19 pandemic on stress and anxiety symptoms across the larger family system. Future, prospective research comparing in person and telehealth treatment should elucidate these differences.

This study has several strengths including the use of multiple informants of treatment outcome (i.e., independent evaluator, caregiver, and youth self-report) and multiple metrics of treatment outcome (i.e., symptoms, functioning, satisfaction, and overall response). Additionally, the comparison of telehealth to a gold-standard treatment rather than a non-active treatment (e.g., waitlist control) bolsters this study's findings. In the context of these strengths, several limitations merit consideration. First, youth were not randomized, rather treatment condition was necessitated by the COVID-19 pandemic. We mitigated this by matching participants on age and principal anxiety diagnosis. Nevertheless,

a randomized controlled trial is needed. Second, about 75% of the present sample identified as White, so generalization is limited. It is known that racial minority youth are underserved by the mental health system compared to their White counterparts (Merikangas et al., 2011). One such reason is availability, accessibility, and affordability of mental health care (Planey et al., 2019). In theory, telehealth services could increase service availability and reduce some accessibility and affordability concerns, however, increased efforts to attain the goal of representative and generalizable research are still needed. Third, inherent in non-inferiority analysis is the assumption that a logical margin was selected. Though efforts were made to ensure a more conservative non-inferiority margin, it is possible that the margin selected in this study was too broad, thus leading to a misguided conclusion. Fourth, inter-rater reliability was not conducted on the CGAS. Conclusions from this measure are best drawn in conjunction with similar findings from other indices of treatment outcome.

In sum, individual CBT (i.e., *Coping Cat*) delivered via telehealth appears to be as effective as individual CBT delivered in-person. A larger, randomized controlled trial is required to confirm these findings as well as to examine potential moderators in an effort to identify individual differences in outcome and determine when one modality may be more indicated. Nevertheless, therapists and insurance companies should view individual CBT delivered via telehealth as an acceptable treatment for youth with anxiety. As telehealth reduces certain barriers to care (e.g., transportation costs, availability of providers), it is our hope that these findings will contribute to more youth receiving evidence-based and efficacious anxiety treatment.

Disclosure Statement

Dr. Rabner, Dr. Norris, and Dr. Olino report no competing interests. Dr. Kendall has received support from NIMH and NICHD. He has received royalties from the sales of materials related to the treatment of anxiety disorders in youth (e.g., Guilford Press; Workbook Publishing; Gyldendal Norsk; Gyldendal Akademisk).

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