Telehealth acceptance and commitment therapy for adolescents with transdiagnostic health-related anxiety: A pilot randomized controlled trial

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**Abstract**

Health-related anxiety is an under-researched and pressing issue to understand in adolescents, particularly given the COVID-19 pandemic. The present study is a randomized, waitlist-controlled trial of 10 weekly, 50-minute sessions of telehealth ACT targeting health-related anxiety in adolescents as compared to a waitlist. A sample of 30 adolescents (ages 12-17), plus one caretaker each (N = 60), currently struggling with clinical levels of health-related anxiety were enrolled. The majority of caretakers and adolescents were White, non-Hispanic/Latine, and female. Data were analyzed using multilevel modeling across pre-, mid-, post-treatment, and one-month follow-up. Adolescents reported small, significant decreases in health-related anxiety as compared to the waitlist. Caretakers reported small to medium significant decreases in child general anxiety and small to medium improvements in parental psychological inflexibility. No additional significant differences were found between groups for caretaker- or adolescent-rated variables. Both adolescents and caretakers reported positive acceptability of the treatment. Limitations of this study include a small, homogenous sample, a lack of an active comparison group, and a short period of intervention and measurement. However, this study is the first randomized controlled trial examining ACT as a potential treatment for health-related anxiety in adolescents, and thereby adds to the growing literature supporting the use of ACT as a potential treatment option for youth with anxiety and related problems.

 *Keywords*: acceptance and commitment therapy, adolescents, health anxiety, transdiagnostic, telehealth

**Telehealth acceptance and commitment therapy for adolescents with transdiagnostic health-related anxiety: A randomized controlled trial**

Health-related anxiety (HA) in adolescents is a highly under-researched area in need of greater research and clinical attention. HA involves fear or anxiety surrounding bodily sensations and the possibility of illness development in oneself and/or a loved one; it can be considered a transdiagnostic symptom of obsessive-compulsive disorder (OCD), illness anxiety disorder, generalized anxiety disorder (GAD), and additional mental health concerns (Asmundson et al., 2010; Wright et al., 2016). Across a range of international studies, between 17-50% of youth reported HA, highlighting the prevalence and widespread impact of HA in children and adolescents (e.g., Rask et al., 2012; Reid & Hendry, 2001). HA in adolescents is additionally an important area of concern given its common prevalence across disorders (e.g., 8% prevalence of OCD in those diagnosed with illness anxiety; Shaw & DeMaso, 2010) and the suggested high levels of associated somatization and healthcare burden in youth (Mohapatra et al., 2014; Rask et al., 2016). Beyond potential burden on healthcare systems, HA also contributes to significantly impaired functioning and health-related quality of life in adolescents, as well as increased psychological distress later in life (Mohapatra et al., 2014; Sirri et al., 2015). As youth struggle to cope with symptoms, HA is also associated with unhealthy behaviors in adolescents such as disrupted sleep, smoking, reduced physical activity, and substance use (Sirri et al., 2015).

Little research exists on how to treat HA in adolescents; HA is often considered a highly neglected area of pediatric psychology and psychiatry (Mohapatra et al., 2014; Roberts-Collins, 2016). Modified forms of “third wave,” cognitive-behavioral therapy (e.g., mindfulness based cognitive therapy, acceptance and commitment therapy) are commonly utilized to treat HA (e.g., OCD, GAD, and illness anxiety disorder) in adults (Asmundson et al., 2010). However, there is little research on how to treat HA in youth beyond one case study on CBT as a transdiagnostic approach for HA in a 15-year-old female (Roberts-Collins, 2016). In the case study, the adolescent’s HA score fell below the clinical cut-off, and she reported clinically significant decreases in OCD, general anxiety, and depression following treatment. To date, there are no other studies on the treatment of HA in youth. Research on the treatment of HA in youth is imperative given the developmental differences in the presentation and trajectory of HA in youth as compared to adults (Rask, 2019). Because of the differing symptoms (e.g., reliance on caretakers, increased somatization) of HA in youth, a new approach and more transdiagnostic mode for treatment, such as acceptance and commitment therapy (ACT), may be warranted.

ACT is a modern form of CBT that may be especially suitable for a transdiagnostic treatment approach to HA in adolescents. ACT aims to increase psychological flexibility, the ability to remain in the present moment and act consistently with one’s values without being swayed by internal experiences, and decrease psychological inflexibility (Ong & Eustis, 2021). Psychological *inflexibility*, the opposite of psychological flexibility, is a pattern of avoidance and/or rigid responses to thoughts, feelings, and other internal experiences that interferes with one’s meaningful engagement in life (i.e., valued behaviors; Ong & Eustis, 2021). Psychological inflexibility is a transdiagnostic factor present in many disorders relevant to HA across age groups (Bluett et al., 2014). For example, undergraduates with high HA report higher experiential avoidance, an aspect of psychological inflexibility, than those with lower HA (Wheaton et al., 2010). Another study found that psychological inflexibility acted as a mediator in the relationship between COVID-related HA and mental health outcomes (e.g., COVID-19 distress, general anxiety) in Italian adults (N = 944) during a mandatory national lockdown (Landi et al., 2020). These studies generally suggest that building psychological flexibility may help alleviate negative effects of HA.

ACT targets reducing psychological inflexibility using six unique processes: acceptance, present moment awareness (PMA), cognitive defusion, self-as-context, engagement with personal values, and committed action. The central aim of ACT is to change one’s relationships with internal experiences and increase behaviors that are in line with one’s personal values using the aforementioned six processes (e.g., choosing to volunteer in a hospital while experiencing fears of contracting an illness). There is a growing base of research supporting the use of internet-delivered ACT for HA in adults; two recent studies (N = 15 and N = 151) found large and significant changes in HA symptoms at pre-, post-treatment, and follow-up, as well as a lower cost of care (Hoffmann et al., 2018, 2021; Risør et al., 2022).

No research currently examines the use of ACT as treatment for youth with HA, an important and needed area of investigation (Frostholm & Rask, 2019). However, several past studies have tested ACT for HA in adults and found promising reductions in HA in both individual and group formats (Eilenberg et al., 2013, 2016, Khesmakhi et al., 2019). ACT has some initial support for many mental health concerns in youth, including anxiety (Hancock et al., 2018), stress and depression (Livheim et al., 2015), OCD (Shabani et al., 2019), and more (Swain et al., 2015). ACT is also considered useful for adolescents because of its process-based approach, which is easily implemented across diagnoses and personalized to the adolescent (Halliburton & Cooper, 2015). ACT has also been theorized as especially effective with youth because the experiential nature of ACT is similar to traditional education and can easily adapt therapy to a developmentally appropriate level (e.g., using stories, metaphors, experiential exercises; Rask, 2019). With this in mind, ACT may be especially suitable as a transdiagnostic treatment approach to HA in adolescents.

While there is no current research available on the use of ACT for adolescents with HA, the six processes of ACT have clear support for targeting specific concerns related to HA in adolescents specifically. Acceptance is established as a helpful therapeutic process for adults with HA (Hedman et al., 2013), and has associations with improved functioning and distress for adolescents with chronic pain (Beeckman et al., 2019; McCracken et al., 2010). In adolescent HA, acceptance can be similarly used as a coping mechanism for the uncertainties of what they know and do not know related to their health (Haig-Ferguson et al., 2020).

Processes like cognitive defusion and/or self-as-context may provide adolescents powerful abilities to re-conceptualize concerns about health (e.g., “I must have COVID because my chest is tight”) to passing internal experiences (e.g., “I am noticing that I am having the thought that my chest tightness is a symptom of COVID”). This perspective allows the adolescent to experience bodily sensations, thoughts, and feelings as fleeting parts of their life, rather than the immediate context for their behavior. Research on general adolescent populations have suggested that self-as-context and defusion may be important targets for decreasing anxiety and coping with mental health concerns (e.g., Bennett et al., 2021, Moran et al., 2018).

PMA adds to the power of these three processes by helping increase the ability to remain in the present moment and notice internal and external experiences non-judgmentally. Low PMA and mindfulness have been repeatedly associated with elevated HA and psychological distress in youth (Ciarrochi et al., 2011).Lastly, values and committed action help the adolescent orient to what they want their life to be about (values) and concrete steps they can take to move towards that direction (committed action). Many individuals with HA are more motivated by the need to have certainty around their health, rather than meaningful qualities of living (e.g., compassion, adventure). Thus, implementing values and committed action in the treatment of youth HA may involve identifying and orienting the adolescent to things they care about—things that may have fallen off the wayside in the face of HA symptoms. Furthermore, previous research with a variety of adolescent samples suggests that an emphasis on values can aid in improving stress (e.g., Cohen & Sherman, 2014).

Lastly, delivering treatments such as ACT via online methods (e.g., telehealth) is an important area of research for HA, especially in youth. Telehealth, provision of therapy via video or phone service, allows therapists to provide services to underserved areas and populations, while reducing the cost of travel and personal stigma common to in-person services (Maheu et al., 2012). Considering adolescents, a recent systematic review found that telehealth is considered effective for the delivery of psychological treatments for youth (Grist et al., 2019). However, there is no research examining the online delivery of any treatment for HA in youth. The delivery of ACT online is an established method of disseminating treatment to adolescents generally (e.g., Twohig et al., 2021), as well as for HA specifically in adults (e.g., Hoffmann et al., 2018, 2021). Previous research with adult HA has found internet-delivered ACT using clinician support and internet discussion forums both clinically (Hoffmann et al., 2018, 2021) and cost-effective (Risør et al., 2022). Further research using online forms of delivery for HA-focused ACT to adolescents thereby provides an important next avenue for research to increase access and build on previous work pointing towards the promise of ACT as a treatment for HA. Additionally, telehealth is a practical and necessary mode of treatment delivery due to the COVID-19 pandemic, which presented significant complications for the pursuit of in-person psychological services. Individuals with increased HA and/or physical health concerns may be especially hesitant to seek out in-person care. There may also be shortages of mental health treatment providers because providers may be self-isolating, ill, or burdened with increased waitlists during this crisis period (during which recruitment for this study occurred). Previous research supports the use of telehealth with youth during public health emergencies (Moor et al., 2019). Thus, telehealth presents a practical and cost-effective solution for delivering ACT for HA in adolescents.

The present pilot study tests preliminary effectiveness and feasibility of telehealth ACT as a transdiagnostic treatment approach for HA in adolescents as compared to a waitlist control. The following predictions were made:

1. ACT will be superior to the waitlist control condition and reduce health-related anxiety, anxiety sensitivity, psychological inflexibility, anxiety, and depression over the course of treatment and will maintain gains at 1-month follow-up.
2. Caretakers will report reduced familial accommodation and anxiety symptoms in their child and reduced parental psychological inflexibility after treatment and at 1-month follow-up.
3. ACT will have adequate treatment acceptability.

**Methods**

**Participants**

Participants were adolescents (n = 30; ages 12-17) and one caretaker per adolescent, for a combined total of 60 participants (i.e., caretakers and adolescents). Adolescents were living in Utah, reporting clinically significant disruptions in their life related to HA and seeking help for HA, meeting an above average HA score on a transdiagnostic symptom measure, and interested in participating in a research study. Participants also had to be stabilized on psychotropic medications for at least 30 days and pause all other psychotherapy while participating in the study. Psychological comorbidity was not an exclusion criterion, with the exception of a profound neurological impairment that would preclude someone from participating in the study, or a psychological condition that exceeds HA as the primary presenting problem (e.g., active self-harm or psychosis based off of the MINI-Kid).

**Recruitment**

Participants were recruited from around Utah through a variety of channels with a special consideration for recruitment from self-isolating and/or quarantined samples (e.g., homeschooled adolescents). The study used provider/school referrals, online postings on relevant websites and social media, and social media advertisements. Information about the study was also shared directly with potential referral sources, such as local therapists, psychiatrists, and primary care physicians.

**Procedures**

To determine eligibility, participants (adolescent and caretaker) initially completed an online consent, and the adolescent completed a screener of health anxiety symptom severity (Childhood Illness Attitude Scale; Wright & Asmundson, 2003). For enrollment, a cutoff of 50 was used, based on past studies (Rask et al., 2016; Wright et al., 2016). If adolescent participants scored above average on the CIAS, they then took part in an online diagnostic interview with their caretaker present (Mini International Neuropsychiatric Interview - Kid [MINI]; Sheehan et al., 2010). If eligible, participants were entered into the study and randomized to immediate treatment or a 14-week waitlist. Participants randomized to the waitlist received treatment following the 14-week waiting period and did not complete any measures beyond those completed during the 14-week waiting period. Treatment consisted of 10, 50-minute weekly telehealth sessions. Adolescents and caretakers completed full assessment batteries at intake, post-treatment/waitlist, and one month following treatment. All treatment sessions took place on Zoom. Because there is evidence of the significant involvement of caretakers in the development of HA (Wright et al., 2017), caretakers were invited to participate in the final 10 minutes of each session if appropriate and desired by the adolescent participant. Adolescents had to provide verbal assent for the inclusion of their caretaker in each session; caretakers were not included if adolescents declined to invite them and/or if the caretaker was unavailable at the end of session. All study procedures were approved by Utah State University’s institutional review board and this study was pre-registered on Open Science Framework (OSF) prior to recruitment launch (see[*https://osf.io/zwqcp/?view\_only=9b3c22b27bff444e8c1d8b02b520e81b*](https://osf.io/zwqcp/?view_only=9b3c22b27bff444e8c1d8b02b520e81b)).

***Intervention***

The structure and order of treatment was based off research on ACT for OCD (Armstrong et al., 2013) and trichotillomania in adolescents (Twohig et al., 2021). Some of the session material was drawn from pre-existing ACT strategies for adolescents (e.g., L. L. Hayes & Ciarrochi, 2015; Zurita Ona, 2019) and others were adapted from ACT theory with developmental level in mind (e.g., introducing concepts via metaphors and/or experiential games/activities). ACT concepts were also taught in “bite sized” pieces. For example, implementing acceptance spanned across several sessions (sessions 2-6, see Table 6), breaking down metaphors into several pieces and teaching/reviewing each piece repeatedly at each session. ACT concepts were also explicitly used to build upon each other, as opposed to being introduced as a new concept. In this way, we relied upon repetition—an important element in developmentally appropriate learning.

Given the transdiagnostic emphasis of the study, the intervention was highly personalized to each adolescent’s presenting problem. In an effort to boost replicability while aligning with the functional nature of ACT, treatment of each participant followed a similar structure according to specific ACT processes and themes (see Table 6) but was not manualized in a highly structured fashion. In brief, the first session focused on understanding the client’s unique presentation and providing a treatment rationale. Session 2 introduced creative hopelessness and/or control as the problem. In sessions 3-5, present moment awareness, cognitive defusion, and acceptance were introduced to build awareness of and distance from HA. Values and committed action were the focus of sessions 6-7. Sessions 8-9 were specifically dedicated to practicing ACT skills using exposure exercises around HA. Lastly, session 10 consisted of a review and a focus on relapse prevention. Telehealth adaptations included regular use of the Whiteboard, screen sharing, video watching, engagement with adolescent’s personal belongings/surroundings (e.g., arranging stuffed animals to demonstrate “tug of war” metaphor). Telehealth also allowed for convenient engagement in exposures (e.g., encountering feared stimuli within their own environment) and inclusion of caretakers at the end of session. See Table 6 for a detailed overview of sessions, including examples and when each ACT process was emphasized.

At the end of each session (5-10 minutes remaining), adolescents were asked if they wanted to include their caretaker. If the adolescent consented, the adolescent was asked to briefly review or teach the therapist the content from session before bringing in their caretaker and repeating the teaching processes with their caretaker. The caretaker was also informed of the adolescent’s planned practices for the week by the adolescent. Then the caretaker was allotted time for specific questions to the adolescent and/or therapist. Caretakers could meet with the therapist alone upon request and with adolescent consent about material discussed/shared.

 An advanced doctoral student with a master’s degree acted as the therapist for all 15 cases in the ACT condition. The therapist had received extensive training in ACT across the lifespan, including attending and leading multiple workshops, and is considered a specialist in the delivery of ACT for youth. Intervention sessions were recorded via Zoom and stored on a secure and HIPAA compliant server for supervision purposes. A licensed psychologist and expert in ACT for anxiety and related problems provided regular supervision for all cases. After recruitment was complete, 20% of recorded therapy sessions were reviewed and rated for fidelity to ACT and the six processes (see Treatment Fidelity section).

**Adolescent Measures**

***Demographics***

At pre-treatment, adolescents completed information about the following demographics: race, ethnicity, age, gender, health conditions, and previous therapy experiences.

***Childhood Illness Attitude Scale (CIAS; Wright & Asmundson, 2003)***

The CIAS is a 35-item, transdiagnostic questionnaire of HA symptoms and behaviors. The CIAS was selected as a primary outcome in order to capture the transdiagnostic symptoms HA targeted by ACT. Participants were asked to rate each item on a 3-point Likert scale (1 = *None of the time*, 2 = *Sometimes*, 3 = *A lot of the time*), with higher scores indicating higher HA. A score of 50 was used as an inclusion criterion based on previous studies, which found that general populations of youth averaged around 50 on the CIAS (Rask et al., 2016; Wright et al., 2016). The CIAS is a developmentally appropriate measure of illness anxiety, adapted from the Illness Attitude Scale for adults (Kellner et al., 1987). Previous research has documented good construct validity and reliability of the CIAS (Wright & Asmundson, 2003). In the present sample, the reliability of the CIAS was good ($α$ = .87).

***Childhood Anxiety Sensitivity Index (CASI; Silverman et al., 1991)***

The CASI is an 18-item questionnaire assessing anxiety sensitivity and perceived negative consequences of anxiety symptoms in youth. Participants responded to each item on a 3-point Likert scale (1 = *None*, 3 = *A lot*)—higher scores indicate higher anxiety sensitivity. Previous research supports good validity and reliability in clinical samples of youth (Silverman et al., 1999). In the present sample, the reliability of the CASI was good ($α$ = .82).

***Avoidance and Fusion Questionnaire for Youth (AFQ-Y8; Greco et al., 2008)***

The AFQ-Y8 is a shortened measure of psychological inflexibility, particularly experiential avoidance and cognitive fusion, in youth. The AFQ-Y8 has eight items that are ranked on a 5-point Likert scale (0 = *Not at all true*, 4 = *Very true*), with higher scores signifying greater psychological inflexibility. Research has demonstrated support for both reliability and validity of the AFQ-Y and the shortened AFQ-Y8 in youth (Greco et al., 2008). In the present sample, the reliability of the AFQ-Y8 was good ($α$ = .85).

***Screen for Anxiety and Related Disorders – Child Report (SCARED; Birmaher et al., 1999)***

The SCARED measures the presence of anxiety disorders (e.g., panic disorder, generalized anxiety disorders) using 41 items. Participants were asked to rank each item on a 3-point Likert scale, with scores greater than 25 indicating clinical levels of anxiety. The SCARED has been found to be reliable and valid with samples of children and adolescents (Birmaher et al., 1999). In the present sample, the reliability of the SCARED-child was good ($α$ = .86).

***Center for Epidemiologic Studies Depression Scale (CESD; Phillips et al., 2006)***

The CESD is a 20-item, self-report questionnaire of depressive symptoms. Participants were asked to rank each item on a 4-point Likert scale (*Rarely or none of the time [less than 1 day]* to *Most or all of the time [5-7 days])*, with higher scores indicating greater depressive symptoms. Previous research supports the reliability and validity with adolescents (Phillips et al., 2006; Stockings et al., 2015). In the present sample, the reliability of the CESD was excellent ($α$ = .92).

**Caretaker Measures**

***Demographics***

At pre-treatment, caretakers completed information about the following demographics: race, ethnicity, age, household income, marital status, gender, and employment status.

***Screen for Anxiety and Related Disorders – Parent Report (SCARED-parent; Birmaher et al., 1999)***

The SCARED parent report is identical to the SCARED child report, except it asks the parent to rate their child’s anxiety. In the present sample, the reliability of the SCARED-parent was good ($α$ = .85).

***Familial Accommodation Scale – Anxiety (FAS; Lebowitz et al., 2013)***

The FAS is a 13-item scale assessing familial accommodation. The first 9 items cover participation in symptoms and modification of routines; each is ranked on a 5-point Likert scale (0 = *Never*, 4 = *Daily*). The remaining 4 items ask about distress and consequences related to familial accommodation, also ranked on a 5-point Likert scale (0= *None*, 4 = *Extreme*). The FAS can be broken into two scores: a total accommodation score (from the first nine items) and a child distress score (the final three items). Higher scores indicate greater accommodation and distress. The FAS has established good validity in previous research (Lebowitz et al., 2013). In the present sample, the reliability of the FAS total was good, and the reliability of the FAS distress was acceptable ($α$ = .82 and .71 respectively).

***Parental Acceptance Questionnaire (PAQ; Greene et al., 2015)***

The PAQ is an 18-item questionnaire of psychological inflexibility related to parenting. The PAQ asks participants to rank each item on a 4-point Likert scale (1 = *Strongly disagree/never*, 4 = *Strongly agree/almost always*) and higher scores indicate greater psychological inflexibility related to parenting. The PAQ has excellent validity and reliability in previous research with parents (Greene et al., 2015). In the present sample, the reliability of the PAQ was good ($α$ = .89).

**Treatment Acceptability**

***Treatment Evaluation Inventory-Short Form (TEI-SF; Kelley et al., 1989)***

The TEI-SF is a questionnaire measuring perceptions of and satisfaction with treatment. Participants were asked to rate 9 items on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). In the present study, the questionnaire was adapted to be specific to anxiety, and only seven of the original nine items were used. Higher scores indicate greater satisfaction and treatment acceptability. In the present study, a score of 21 or higher indicates moderate acceptability (Kelley et al., 1989). There is good research support for the reliability of the TEI-SF in youth and their parents (Palermo et al., 2016). In the present sample, the reliability of the TEI-SF was good for both adolescents ($α$ = .83) and caretakers ($α$ = .90).

**Data Analysis**

 All analysis took place in R with RStudio (R Core Team, 2021). The following packages were used: stringr (Wickham & Wickham, 2019), furniture (Barrett & Brignone, 2017), lmerTest (Kuznetsova et al., 2017), effsize (Torchiano & Torchiano, 2020), sjPlot (Lüdecke & Lüdecke, 2015), texreg (Leifeld, 2013), and cowplot (Wilke et al., 2019).

***Between Group Comparisons***

Multilevel models (MLMs) were used to investigate the effect of treatment over time (at pretreatment, mid-treatment, posttreatment, and follow-up time points) relative to the waitlist condition on the following outcomes: HA (CIAS), depression (CESD), general anxiety (SCARED-child), anxiety sensitivity (CASI), and psychological inflexibility (AFQY8). MLMs were also used to investigate the effect of treatment on parental psychological inflexibility (PAQ), total familial accommodation (FAS), adolescent distress related to accommodation (FAS distress), and parent-reported child anxiety symptoms (SCARED-parent). All models include an interaction of time and condition, as well as one random intercept for individual participants. Final models were estimated using the maximum likelihood criterion. Effect sizes using Hedges’ *g* were also calculated for between- and within-group changes across timepoints (pre-treatment to mid-, post-treatment, and one-month follow-up). The following benchmarks were used: 0.2 for a small effect, 0.5 for a medium effect, and 0.8 for a large effect. The use of Hedges’ *g* in this manner is consistent with previous pilot studies on ACT for adolescents (e.g., Twohig et al., 2021; Petersen et al., 2022a).

***Treatment Acceptability***

Treatment acceptability was evaluated using the total score of the TEI-SF for caretakers and adolescents. Individual item scores were also examined for better understanding of treatment acceptability ratings. Open-ended questions were coded for common themes.

***Treatment Fidelity***

 Based on previous research using ACT (Ong et al., 2021; Twohig et al., 2021), 20% of all sessions (30 of 150) from the active condition were selected for fidelity coding. At least two videos per participant were coded and at least three videos per session number were coded. Within these constraints, videos for coding were randomly selected using a random number generator. Selected sessions were then assessed for treatment integrity based on standardized scoring measures from previous clinical trials using ACT (Ong et al., 2021; Twohig et al., 2021). Each ACT process was rated on a scale from 1 (*The variable was never explicitly covered*) to 5 (*The variable occurred with high frequency and was covered in a very in-depth manner*). The following ACT-inconsistent processes were also rated on the same scale: cognitive challenging, experiential avoidance strategies, and promotion of the idea that thoughts and feelings cause behaviors. Lastly, global adherence to ACT was rated from 1 (*Not at all adherent*) to 5 (*Extremely adherent*).

 The videos were coded by two graduate research assistant who had received formal training in ACT. Before coding the selected videos, the two research assistants established interrater reliability with another trained rater of at least 0.8 or greater for two videos.

**Results**

 The adolescent participants were mostly White, non-Hispanic/Latine, girls with an average age of 14.2 (*SD* = 1.6). The most common primary diagnoses, as diagnosed by the Mini-KID, were GAD (43.3%), followed by OCD (26.7%). There were no significant differences in adolescent demographics or pre-treatment measures between groups. A breakdown of the adolescent demographics can be found in Table 1. The caretakers who participated in the study were also mostly White, non-Hispanic/Latine women (86.7%) with an average age of 43.4 (*SD* = 4.9). There were no significant differences in caretaker demographics or pre-treatment measures between groups. All caretaker demographics can be found in Table 2.

There were no dropouts in the treatment condition; all participants who were assigned to ACT attended all ten sessions. There was one adolescent and one caretaker (from different families) who did not complete the measures within the required time window for post-treatment and one month follow-up. In the waitlist condition, one participant was removed from the study due to a sudden increase in self-harm. The waitlist condition had more variable responses to assessments, with the majority completing measures at all timepoints (*n*s ranging from 12-15). See Figure 1 for a CONSORT diagram of participant flow.

**Adolescent Outcomes**

 Means and standard deviations over time for adolescent outcomes can be found in Table 3. Estimated marginal means and 95% confidence intervals from best-fitting multilevel models for adolescent outcomes can be found in Table 4. Effect sizes for within the ACT condition and between groups across timepoints for adolescent outcomes can be found in Table 5.

***Primary Outcome***

 **Health-Related Anxiety.** The model for the CIAS had a significant interaction between time and condition (see Figure 2, *p* = .03). There was also a significant fixed effect of time alone (*p* = .002). Within-group effect sizes indicated small changes from pre- to mid-, post-treatment, and one-month follow-up (Hedges’ *g*s ranging from 0.22 to 0.38). Between-group effect sizes also indicated small changes from pre- to mid-, post-treatment, and one-month follow-up (Hedges’ *g*s ranging from -0.22 to -0.27).

***Secondary Outcomes***

 **General Anxiety.** The model for the SCARED-child did not have a significant interaction between time and condition (see Figure 2, *p* = .12). The model had a significant fixed effect of time (*p* = .03). All effect sizes were negligible, except for the within-group effect size from pre- to post-treatment (Hedges’ *g* = 0.32).

 **Depression.** The model for the CESD did not have a significant interaction between time and condition (see Figure 3, *p* = .19). There were no significant fixed effects for time or condition alone. Within-group effect sizes were negligible at all timepoints. Between-group effect sizes indicated small changes from pre-treatment to all other time points as compared to the waitlist group (Hedges’ *g*s ranging from 0.30 to 0.32).

***Process Outcomes***

 **Psychological Inflexibility.** The model for the AFQY8 did not have a significant interaction between time and condition (see Figure 4, *p* = .45). There were no significant fixed effects for time or condition alone. Within-group effect sizes indicated small change from pre- to mid-treatment (Hedges’ *g* = -0.22) for the ACT group, but effect sizes for other timepoints were negligible. Between-group effect sizes indicated small change at all timepoints (Hedges’ *g*s ranging from -0.30 to -0.34).

 **Anxiety Sensitivity.** The model for the CASI did not have a significant interaction between time and condition (see Figure 4, *p* = .15). The model only had a significant effect of time (*p* = .01). Between-group effect sizes were all negligible. Within-group effect sizes were negligible from pre- to mid-treatment, but small from pre-treatment to post-treatment (Hedges’ *g* = 0.39) and to follow-up (Hedges’ *g* = 0.32).

**Caretaker Outcomes**

 Means and standard deviations over time for caretaker outcomes can be found in Table 3. Estimated marginal means and 95% confidence intervals from best-fitting multilevel models for caretaker outcomes can be found in Table 4. Effect sizes for within the ACT condition and between groups across timepoints for caretaker outcomes can be found in Table 5.

***Primary Outcome***

 **Parent Report of Child Anxiety.** The model for the SCARED-parent had a significant interaction between time and condition (see Figure 5, *p* = .002). There was also a significant fixed effect of time alone (*p* < .001). Within-group effect sizes indicated negligible changes from pre- to mid-treatment, but medium changes from pre-treatment to post-treatment (Hedges’ *g* = 0.93) and to one-month follow-up (Hedges’ *g* = 0.70) in the ACT condition. Between-group effect sizes also indicated small changes from pre- to mid-treatment (Hedges’ *g* = -0.43), and medium from pre-treatment to post-treatment (Hedges’ *g* = -0.64) and to one-month follow-up (Hedges’ *g* = -0.54).

***Secondary Outcomes***

 **Total Familial Accommodation.** The model for the total FAS did not have a significant interaction between time and condition (see Figure 5, *p* = .87). There were no significant fixed effects for time or condition alone. Within-group effect sizes for the ACT condition were negligible from pre- to mid-treatment, but small from pre-treatment to post-treatment (Hedges’ *g* = 0.30) and to one-month follow-up (Hedges’ *g* = 0.27). Between-group effect sizes indicated small, bordering on medium, change from pre- to mid-, post-treatment, and one-month follow-up (Hedges’ *g*s ranging from -0.44 to -0.47).

 **Child Distress Associated with Accommodation.** The model for the FAS distress did not have a significant interaction between time and condition (see Figure 5, *p* = .46). There were no significant fixed effects for time or condition alone. Within-group effect sizes for the ACT condition were negligible from pre- to mid- and post-treatment, but small for pre-treatment to follow-up (Hedges’ *g* = 0.27). Between-group effect sizes were negligible at all timepoints.

***Process Outcome***

 **Parental Psychological Inflexibility.** The model for the PAQ had a significant interaction between time and condition (see Figure 5, *p* = .04). There were no significant fixed effects for time or condition alone. Within-group effect sizes for the ACT condition were negligible at all timepoints. Between-group effect sizes indicated small to medium change from pre- to mid-, post-treatment, and one-month follow-up (Hedges’ *g*s ranging from -0.49 to -0.56).

**Treatment Acceptability**

***Adolescent Rated Acceptability***

 Overall, adolescent participants rated the treatment positively, falling above the predicted cut-off for moderate acceptability. At post-treatment, participants rated each TEI-SF item between 3.5 to 4.2 on average, indicating agreement that the treatment was useful and acceptable. The total TEI-SF at post-treatment was 27.5 (*SD* = 4.2). At follow-up, individual item ratings ranged from 3.7 to 4.5, with a total score of 29.2 (*SD* = 5.0).

***Caretaker Rated Acceptability***

 Caretakers similarly rated the intervention as highly acceptability. At post-treatment, individual items on the TEI-SF, as rated by caretakers, ranged from 3.7 to 4.6. The total TEI-SF score at post-treatment was 30.1 (*SD* = 3.8). At follow-up, the items similarly ranged from 3.8 to 4.5. The total score at follow-up was 29.6 (*SD* = 2.8). Overall, these ratings indicate that the caretakers rated the intervention as highly acceptable for their child.

**Treatment Fidelity**

 Overall, sessions were rated as extremely adherent (*M* = 4.9, *SD* = 0.3). Across all sessions, each of the six ACT processes were rated as covered moderately in depth (*M*s ranging from 2.3 to 3.8), with the exception of self-as-context (*M* = 1.1, *SD* = .4). All ACT-inconsistent process were rated as never being explicitly covered: cognitive challenging (*M* = 1, *SD* = 0), experiential avoidance strategies (*M* = 1.1, *SD* = 0.3), and promotion of the idea that thoughts and feelings cause behaviors (*M* = 1.1, *SD* = 0.3). By individual sessions, the ratings were appropriate and as expected according to each session’s manualized agenda.

**Discussion**

 Overall, the present pilot study aimed to test preliminary effectiveness and acceptability of telehealth ACT for adolescents with transdiagnostic HA. As previously noted, adolescents and caretakers rated the intervention above the predicted “moderately acceptable” cut-off, indicating positive reception of the intervention and aligning with previous findings (e.g., Clery et al., 2021; Petersen et al., 2022a). Given that acceptability is considered an important outcome for developing interventions in pilot trials, the positive ratings and feedback from caregivers and adolescents are of special importance. Furthermore, because ACT is a developing intervention for adolescents (Petersen et al., 2022b), these pilot findings (both acceptability and symptom measures) provide important insight for researchers working to adapt and implement ACT with youth, particularly for HA. However, due to the pilot nature and small sample size of the current study, these findings must be interpreted with caution.

**Treatment Efficacy by Adolescent Report**

Adolescents in the ACT condition reported a significant decrease in HA as compared to the waitlist. However, the mean score of participants in both conditions remain above the established cut-off of 50 on the CIAS (see Table 3). The reported reductions in HA are broadly consistent with previous research looking at the use of ACT for anxiety, OCD, and related disorders in youth (e.g., Hancock et al., 2016, Petersen et al., 2022a, Shabani et al., 2019), as well as the one case study available on the treatment of HA in an adolescent (Roberts-Collins, 2016). This study is the first trial looking at the treatment of HA in adolescents using ACT. Past studies testing ACT for HA in adults have also found similar reductions in HA in both individual and group formats (Eilenberg et al., 2013, 2016, Khesmakhi et al., 2019).

***Secondary Outcomes***

 The adolescents in the ACT condition did not report significant differences in general anxiety or depression as compared to the waitlist group. The lack of a significant difference was generally unexpected, especially when accompanied by significant reductions in HA for the ACT group, because past studies of ACT for general anxiety in youth tend to find improvements in general anxiety symptoms (e.g., Hancock et al., 2016; Petersen et al., 2022a). Comparable results are not available on a larger scale—the available randomized controlled trials do not measure both general and HA (Eilenberg et al., 2013, 2016, Khesmakhi et al., 2019), rendering uncertainty about possible secondary general anxiety reductions in larger trial contexts. It is possible that HA responds to intervention differently especially because HA tends to have a more somatic presentation in youth (Haig-Ferguson et al., 2020). Given that this is a preliminary pilot trial, these results overall suggest that more research is needed on change in the treatment of both health-related and general anxiety in adolescents.

 There were also no significant differences in reported depression by the adolescents in the ACT and waitlist groups, although there were small between-group effect sizes. While ACT studies on youth with anxiety have not historically found changes in depression (Petersen et al., 2022a, Smith et al., 2020), there is evidence to suggest that ACT can be helpful for youth when targeting depression specifically (L. L. Hayes et al., 2011, Livheim et al., 2015). The present sample was also low on depression symptoms in general (see Table 3), with the exception of the 16.7% of participants diagnosed with MDD. The low depressive symptom scores suggest a possible floor effect. Because depression was not a major concern for the majority of the adolescents in the sample, it may have been more difficult to target indirectly. These null findings also bring to mind questions of how comorbidity can influence primary diagnostic presentations and symptom change. The large prevalence of diagnoses such as MDD and/or GAD may also have therefore played a role in these null findings; while HA showed some statistically significant movement, the clinical significance of these secondary diagnoses were not impacted for some other reason (e.g., unidentified moderator/mediator pathways, non-generalizability of skills) that future research should explore.

***Process Outcomes***

There were also no significant differences found between groups for both psychological inflexibility and anxiety sensitivity. ACT is intended to target psychological inflexibility, so these findings were not in line with the study predictions (S. C. Hayes et al., 2006). However, previous studies on ACT for youth have mixed findings on psychological inflexibility. It is possible that the AFQY8, the only measure of psychological inflexibility validated on youth, has reduced sensitivity and/or is not reliable for tracking change in psychological inflexibility over time. It may also be important to consider whether measuring psychological *inflexibility* (like the AFQY8) is an accurate form of measuring psychological flexibility; youth may report low psychological inflexibility, but this does not automatically indicate high psychological flexibility (Cherry et al., 2021). Additionally, similar to depression, these results may be hampered by floor effects.

For anxiety sensitivity, there were also no differences between groups. There is research supporting the importance of anxiety sensitivity as a relevant process for HA (Wright et al., 206) and general anxiety in adolescents (Qi et al., 2021); it was surprising to see a lack of significant difference in anxiety sensitivity between groups. On the other hand, there were also no differences in general anxiety, so this finding is arguably more consistent with the overall results. ACT does not specifically target anxiety sensitivity, even when tailored for HA, so it is possible that this process was not precisely targeted, despite the reported small within-group change. However, no current studies on ACT for HA measure anxiety sensisitivity change, so it is difficult to understand the basis of this finding (e.g., intervention, insufficient sample size).

**Treatment Efficacy by Caretaker Report**

Caretakers in the ACT condition reported significantly greater decreases in child general anxiety as compared to those in the waitlist group. On average, both groups began within the clinical range of the SCARED-parent (i.e., scores greater than 25), but the ACT condition reported falling below the clinical cut-off at post and follow-up while the waitlist condition remained within the clinical range. However, a reduction of at least 55% is required to be considered clinically significant (Caporino et al., 2017). This finding was especially interesting given that the adolescents did not report significant differences in general anxiety. There is one study suggesting that parent-child agreement on the SCARED is especially low, with children reporting more severe anxiety (Cosi et al., 2010). It is therefore possible that the parental report may be a better predictor for youth with HA, as HA is theoretically highly influenced by caretakers (Wright et al., 2017). In terms of previous intervention research, however, the only available study found comparable effects, suggesting that parents also notice decreases in anxiety after their child receives ACT (Hancock et al., 2016). Thus, this finding is highly valuable, suggesting that ACT can affect change notable to caretakers.

 Caretakers also reported significant improvements in parental psychological inflexibility as compared to the waitlist condition. The improvements in parental psychological inflexibility were especially interesting because most caretakers were not directly involved in sessions, although some parents reported learning concepts from their children and/or practicing newly acquired skills together. Looking to other studies, most intervention research using ACT has not explored the PAQ as a potential outcome with adolescents who have anxiety. In a study of acceptance-enhanced behavior therapy for adolescents with trichotillomania, there were no significant changes in the PAQ compared to the waitlist (Twohig et al., 2021). There is one case study supporting the idea that the PAQ can be targeted via an ACT-based parenting intervention for a child with oppositional defiant disorder (Flujas-Contreras et al., 2022). However, this is, to our knowledge, the first study indicating that parental psychological inflexibility may be impacted by an adolescent intervention. These results thereby provide important pilot evidence that parental psychological inflexibility may be influenced via ACT for adolescents, pointing towards the potential importance of involving parents more in adolescent therapy.

 In contrast with the other caretaker outcomes, total familial accommodation and distress associated with familial accommodation did not differ significantly between the ACT and waitlist conditions. Because the sessions only involved caretakers with adolescent consent, this finding was not necessarily unexpected. However, because of the other significant caretaker outcomes, we might expect to see decreases in accommodation and associated distress. One possible explanation is that the scores on the FAS and FAS distress scale were generally low to begin with (see Table 3), leaving less room for any significant change. Furthermore, the present sample was diagnostically diverse and familial accommodation was likely not a clinical issue for all participants. Other studies looking at ACT for youth anxiety and related problems do not measure familial accommodation (e.g., Shabani et al., 2019), so future research may clarify how ACT can influence familial accommodation.

**Limitations and Future Directions**

 Despite promising results, the present study has several significant limitations. The participants in this study were fairly homogenous: mostly White, non-Hispanic/Latine, female, and from financially privileged backgrounds. Although this is the first study of HA using ACT in the United States, further research with more racially and culturally diverse samples is needed. The present sample is also small (N = 30 dyads), and likely underpowered, despite the use of multilevel modeling, which is greater powered than standard approaches like ANOVAs because of its ability to use all available data rather than listwise deletion (Hox et al., 2017). Although research suggests that a sample of 15 per group is sufficient for a pilot study estimating standardized medium effect sizes (Whitehead et al., 2015), we recommend that future research acquire larger sample sizes for more precise and adequately powered efficacy trials. Lastly, this study relies on a waitlist control group, which is not as informative as an active comparison group would be (e.g., CBT).

Other limitations of this study are related to the implementation of the intervention. Ten sessions are a limited period, particularly for youth. Furthermore, these ten sessions were designed to follow a specific set of treatment themes (see Table 6) rather than a specific manualized structure; thus, sessions were highly personalized per patient, potentially impacting future generalization and replicability. Another limitation is that only one highly experienced ACT therapist saw all 15 participants in the active condition, making it difficult to generalize the results and may impact replicability. While treatment fidelity was rated highly, future studies should use a variety of therapists to assure that the outcomes are not due to a therapist effect. This study also utilized telehealth for both practical reasons (e.g., restrictions from COVID-19) and to increase access to care (e.g., reaching adolescents in rural areas of the state); while telehealth can provide many advantages clinically, there are possible disadvantages that were not measured or addressed in this study (e.g., families who did not want telehealth care, whether treatment is more effective in-person, distractibility related to online delivery). Future research should consider accounting for potential disadvantages of telehealth in order to discern the most advantageous delivery of treatment for adolescent HA. Further, the inclusion of caretakers was not formally tracked; some adolescents chose to include their caretaker, while some declined to do so. Because adolescents had to provide consent each session to include their caretaker, there was significant variability in how frequently caretakers participated both within and between participants. To best understand caretaker inclusion in ACT for HA, future researchers are advised to track these details and/or standardize caretaker involvement, especially to improve result generalizability and replicability, as well as to analyze if such involvement influences treatment outcome (e.g., mediation/moderation analyses with variables like familial accommodation and/or involvement).

Lastly, this study is limited by several measurement concerns. The CIAS was selected as the primary outcome measure in an effort to assess symptom change transdiagnostically, but the CIAS has not been validated with a clinical population (Wright & Asmundson, 2005). It is therefore possible that the CIAS does not function optimally within a clinical sample and may not be accurately capturing transdiagnostic symptom presentations. Because a validated clinical cut-off of the CIAS was not available at time of study design, participants were required to score above average on the CIAS to participate. It may be beneficial for future research to explore how to identify clinical levels of symptoms via the CIAS to better understand who may benefit from treatment of HA, and whether the CIAS can effectively be utilized transdiagnostically as compared to with a specific disorder. Previous research on school-aged children (9-12 years) has also suggested that the CIAS may function better when split into three subscales (fears, help-seeking, and symptom effects) while also removing six items (Thorisdottir et al., 2017). However, the present study utilized the total score and the original 29 items recommended by Wright and Asmundson (2005). Future research may benefit from exploring the three-factor framework to better understand which components of HA were best targeted by intervention. Next, caretaker general anxiety and HA were not measured. A better understanding of caretaker psychopathology may also be informative in understanding symptom change. Further, this study lacks a measure of daily functioning and/or well-being, which are the purported targets of ACT. Future research on ACT with youth should focus on measuring functioning, well-being, and/or other forms of overt behavioral change in one’s daily life in order to better understand how much of an impact ACT can make on a young person’s life and mental health. It also is a limitation that this study only measures one-month follow-up. Because adolescence is a period of development, longer follow-ups are imperative.

**Conclusion**

 In sum, the results of this pilot trial suggest that telehealth ACT for HA in adolescents has potential as an acceptable and effective intervention. While further research is needed with larger and more diverse samples, as well as with more rigorous methodology and measurement, the positive reception and acceptability of the pilot intervention must be highlighted as an especially promising outcome. Additionally, this pilot trial has many other strengths, including high retention and completion rates during the COVID-19 pandemic and utilization of gold standard measures with adolescents and caregivers. Thus, the present pilot study adds to the growing research base supporting the use of ACT as a highly acceptable, evidence-based intervention for adolescents.

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**Table 1**

*Demographic information about adolescents*

|  |  |  |  |
| --- | --- | --- | --- |
|   | Full Sample(N = 30) | ACT(n = 15) | Waitlist(n = 15) |
| Age, M (SD) | 14.2 (1.6) | 14.5 (1.6) | 13.8 (1.5) |
| Gender Identity, n (%) |  |  |  |
|    Boy | 8 (26.7) | 4 (26.7) | 4 (26.7) |
|    Girl | 20 (66.7) | 10 (66.7) | 10 (66.7) |
|    Trans/Non-binary | 2 (6.7) | 1 (6.7) | 1 (6.7) |
| Race, n (%) |  |  |  |
|    White | 30 (100) | 15 (100) | 15 (100) |
| Ethnicity, n (%) |  |  |  |
|    Hispanic/Latine | 3 (10) | 2 (13.3) | 1 (6.7) |
|    Non-Hispanic/Latine | 27 (90) | 13 (86.7) | 14 (93.3) |
| Current psychotherapy at intake, n (%)\* |  |  |  |
|    Yes | 4 (13.3) | 4 (26.7) | 0 (0) |
|    No | 26 (86.7) | 11 (73.3) | 15 (100) |
| Current psychotherapy length at intake, n (%)\* |  |  |  |
|  Less than 1 month | 1 (3.3) | 1 (6.7) | 0 (0) |
|  1-3 months | 1 (3.3) | 1 (6.7) | 0 (0) |
|  3-6 months | 1 (3.3) | 1 (6.7) | 0 (0) |
|  6 months - 1 year | 1 (3.3) | 1 (6.7) | 0 (0) |
| Current psychotropic medication, n (%) |  |  |  |
|    Yes | 12 (40) | 6 (40) | 6 (40) |
|    No | 18 (60) | 9 (60) | 9 (60) |
| Length of medication, n (%) |  |  |  |
|  1-3 months | 3 (10) | 1 (6.7) | 2 (13.3) |
|  3-6 months | 2 (6.7) | 1 (6.7) | 1 (6.7) |
|  6 months - 1 year | 7 (23.3) | 4 (26.7) | 3 (20) |
| Current chronic health condition, n (%) |  |  |  |
|    Yes | 1 (3.3) | 0 (0) | 1 (6.7) |
|    No | 27 (90) | 13 (86.7) | 14 (93.3) |
|    Do Not Know | 2 (6.7) | 2 (13.3) | 0 (0) |
| Primary diagnosis, n (%) |  |  |  |
|  OCD | 8 (26.7) | 4 (26.7) | 4 (26.7) |
|  GAD | 13 (43.3) | 6 (40) | 7 (46.7) |
|  PD | 4 (13.3) | 3 (20) | 1 (6.6) |
|  IAD | 4 (13.3) | 1 (6.6) | 3 (20) |
|  Emetophobia | 1 (3.3) | 1 (6.6) | 0 (0) |
| Secondary diagnoses, n (%) |  |  |  |
|  ADHD – inattentive type | 3 (10) | 1 (6.6) | 2 (13.3) |
|  ADHD – combined type | 1 (3.3) | 1 (6.6) | 0 |
|  MDD | 5 (16.7) | 4 (26.7) | 1 (6.6) |
|  ASD1 | 2 (6.7) | 1 (6.6) | 1 (6.6) |
|  Trichotillomania | 1 (3.3) | 0 | 1 (6.6) |
|  Specific phobia | 1 (3.3) | 1 (6.6) | 0 |
| Number of comorbidities, n (%) |  |  |  |
|  0 | 19 (63.3) | 7 (46.7) | 12 (80) |
|  1 | 10 (33.3) | 8 (53.3) | 2 (13.3) |
|  2 | 0 (0) | 0 (0) | 0 (0) |
|  3 | 1 (3.3) | 0 (0) | 1 |

*Note*. OCD = Obsessive-Compulsive Disorder; GAD = Generalized Anxiety Disorder; PD = Panic Disorder (with or without agoraphobia); IAD = Illness Anxiety Disorder; ADHD = Attention-Deficit/Hyperactivity Disorder; MDD = Major Depressive Disorder; ASD = Autism Spectrum Disorder.

1Autism Spectrum Disorder cannot be ruled out.

\* Participants were not permitted to continue external psychotherapy while participating in the research study (i.e., during treatment and the follow-up period or waitlist). This number represents who was receiving psychotherapy at time of enrollment.

**Table 2**

*Demographic information about caretakers*

|  |  |  |  |
| --- | --- | --- | --- |
|   | Full Sample(N=30) | ACT(n=15) | Waitlist(n=15) |
| Age, M (SD) | 43.4 (4.9) | 44.1 (4.4) | 42.8 (5.5) |
| Gender identity, n (%) |   |   |   |
|  Man | 4 (13.3) | 1 (6.7) | 3 (20) |
|  Woman | 26 (86.7) | 14 (93.3) | 12 (80) |
| Ethnicity, n (%) |   |   |   |
|    Hispanic/Latine | 5 (16.7) | 3 (20) | 2 (13.3) |
|    Non-Hispanic/Latine | 25 (83.3) | 12 (80) | 13 (86.7) |
| Race, n (%) |   |   |   |
|    White | 30 (100) | 15 (100) | 15 (100) |
| Education, n (%) |   |   |   |
|    High school or equivalent | 1 (3.3) | 0 (0) | 1 (6.7) |
|    Some college | 3 (10) | 2 (13.3) | 1 (6.7) |
|    College or technical degree | 2 (6.7) | 0 (0) | 2 (13.3) |
|    Bachelor's degree | 18 (60) | 11 (73.3) | 7 (46.7) |
|    Master's or specialist degree | 4 (13.3) | 1 (6.7) | 3 (20) |
|    Doctoral degree | 2 (6.7) | 1 (6.7) | 1 (6.7) |
| Marital status, n (%) |   |   |   |
|    Married | 25 (83.3) | 14 (93.3) | 11 (73.3) |
|    Widowed | 1 (3.3) | 0 (0) | 1 (6.7) |
|    Separated | 1 (3.3) | 0 (0) | 1 (6.7) |
|    Divorced or annulled | 3 (10) | 1 (6.7) | 2 (13.3) |
| Household income, n (%) |   |   |   |
|  $20,000 - $39,999 | 2 (6.7) | 2 (13.3) | 0 (0) |
|  $40,000 - $59,999 | 5 (16.7) | 1 (6.7) | 4 (26.7) |
|  $60,000 – $79,999 | 4 (13.3) | 3 (20) | 1 (6.7) |
|  $80,000 - $99,999 | 3 (10) | 0 (0) | 3 (20) |
|  $100,000 or more | 16 (53.3) | 9 (60) | 7 (46.7) |
| Employment status, n (%) |   |   |   |
|    Full Time | 13 (43.3) | 6 (40) | 7 (46.7) |
|    Part Time | 8 (26.7) | 3 (20) | 5 (33.3) |
|    Unemployed | 3 (10) | 2 (13.3) | 1 (6.7) |
|    Stay-at-home parent | 6 (20) | 4 (26.7) | 2 (13.3) |

**Table 3**

*Means and standard deviations over time for adolescent and caretaker outcomes*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Pre-treatmentWeek 0 | Mid-treatmentWeek 5 | Post-treatmentWeek 10 | 1-Month follow-upWeek 14 |
| Adolescent | ACT(n=15) | Waitlist(n=15) | ACT(n=14) | Waitlist(n=12) | ACT(n=14) | Waitlist(n=12) | ACT(n=12) | Waitlist(n=14) |
| CIAS | 67.5 (8.0) | 68.7 (11.4) | 65.5 (9.8) | 68.8 (12.3) | 64.1 (9.8) | 67.9 (8.2) | 64.2 (9.2) | 67.8 (8.9) |
| CASI | 36.7 (6.1) | 35.5 (7.0) | 36.3 (6.4) | 35.5 (7.0) | 34.2 (6.5) | 34.7 (6.5) | 34.9 (4.9) | 35.2 (8.2) |
| AFQY8 | 11.1 (6.7) | 12.6 (6.8) | 12.5 (6.1) | 16.0 (7.7) | 11.4 (6.5) | 14.5 (7.6) | 11.1 (5.1) | 13.8 (8.5) |
| SCARED | 40.4 (10.9) | 39.5 (12.2) | 39.7 (15.1) | 43.5 (12.5) | 36.4 (13.9) | 39.1 (10.9) | 38.2 (15.5) | 40.7 (13.6) |
| CESD | 23.9 (12.3) | 18.3 (11.6) | 23.9 (12.3) | 18.3 (11.6) | 23.5 (11.5) | 22.3 (12.2) | 22.8 (12.1) | 21.4 (12.4) |
| Caretaker | ACT(n=15) | Waitlist(n=15) | ACT(n=15) | Waitlist(n=14) | ACT(n=14) | Waitlist(n=12) | ACT(n=13) | Waitlist(n=14) |
| SCARED | 32.1 (10.1) | 35.3 (11.0) | 31.0 (13.2) | 37.5 (10.3) | 22.4 (11.0) | 34.5 (14.6) | 23.9 (13.5) | 34.9 (16.0) |
| PAQ | 34.3 (7.4) | 36.9 (7.1) | 35.4 (8.1) | 40.3 (5.5) | 33.2 (8.3) | 39.8 (7.7) | 33.9 (9.0) | 39.4 (8.6) |
| FAS Total | 11.3 (5.7) | 13.9 (5.5) | 10.9 (5.2) | 13.7 (7.5) | 9.7 (4.7) | 12.5 (8.9) | 9.8 (5.3) | 12.5 (7.8) |
| FAS Distress | 4.5 (3.2) | 4.2 (2.3) | 4.0 (3.6) | 3.6 (2.2) | 4.4 (3.7) | 4.4 (2.9) | 3.5 (4.0) | 3.7 (2.2) |

*Note.* CIAS = Childhood Illness Attitude Scale, CASI = Childhood Anxiety Sensitivity Index, AFQ-Y8 = Avoidance and Fusion Questionnaire for Youth, SCARED = Screen for Child Anxiety and Related Disorders – Child Report, CESD = Center for Epidemiologic Studies Depression Scale, FAS = Familial Accommodation Scale - Anxiety, PAQ = Parental Acceptance Questionnaire.

**Table 4**

*Estimated marginal means and 95% confidence intervals from best-fitting multilevel models for adolescent and caretaker outcomes*

|   | CIAS | CASI | AFQY8 | SCARED - Child | CESD | SCARED - Caretaker | FAS Total | FAS Distress | PAQ |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| (Intercept) | 67.29 [62.28; 72.30]\* | 36.89 [33.67; 40.12]\* | 11.74 [ 8.35; 15.13]\* | 40.61 [34.10; 47.11]\* | 24.25 [18.11; 30.39]\* | 32.35 [26.15; 38.54]\* | 11.42 [8.42; 14.42]\* | 4.63 [3.14; 6.12]\* | 34.46 [30.48; 38.44]\* |
| Weeks | -0.34 [-0.54; -0.13]\* | -0.23 [-0.41; -0.05]\* | -0.06 [-0.25; 0.13] | -0.38 [-0.71; -0.05]\* | -0.11 [-0.39; 0.17] | -0.69 [-0.95; -0.42]\* | -0.13 [-0.28; 0.03] | -0.06 [-0.15; 0.03] | -0.09 [-0.24; 0.07] |
| Condition | 2.01 [-5.09; 9.10] | -1.29 [-5.86; 3.28] | 1.79 [-3.01; 6.60] | -0.09 [-9.31; 9.12] | -5.00 [-13.69; 3.70] | 3.57 [-5.21; 12.34] | 2.68 [-1.57; 6.94] | -0.54 [-2.65; 1.58] | 2.73 [-2.91; 8.37] |
| Weeks x Condition | 0.33 [0.04; 0.62]\* | 0.19 [-0.07; 0.44] | 0.10 [-0.17; 0.37] | 0.36 [-0.10; 0.83] | 0.26 [-0.13; 0.65] | 0.59 [ 0.22; 0.97]\* | 0.02 [-0.20; 0.25] | 0.05 [-0.08; 0.18] | 0.24 [0.01; 0.46]\* |
| BIC | 731.43 | 678.35 | 696.51 | 818.89 | 789.53 | 771.52 | 652.60 | 526.06 | 668.87 |
| Number of observations | 110 | 109 | 110 | 110 | 110 | 108 | 108 | 108 | 108 |
| Number of participants | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

\* 0 outside the confidence interval.

1 Relative to waitlist condition.

2 Best-fitting model at *p* < .05.

*Note.* CIAS = Childhood Illness Attitude Scale, CASI = Childhood Anxiety Sensitivity Index, AFQ-Y8 = Avoidance and Fusion Questionnaire for Youth, SCARED = Screen for Child Anxiety and Related Disorders – Child Report, CES-D = Center for Epidemiologic Studies Depression Scale, FAS = Familial Accommodation Scale - Anxiety, PAQ = Parental Acceptance Questionnaire.

**Table 5**

*Hedges’ g effect sizes and 95% confidence intervals within the ACT condition and between groups across timepoints for all outcomes*

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pre- to mid-treatment | Pre- to post-treatment | Pre-treatment to one month follow-up |
|   | Within-groupa | Between-groups | Within-groupa | Between-groups | Within-groupa | Between-groups |
| CIAS | 0.22 [-0.53; 0.96] | -0.22 [-0.75; 0.31] | 0.37 [-0.40; 1.14] | -0.27 [-0.81; 0.28] | 0.38 [-0.41; 1.16] | -0.25 [-0.78; 0.29] |
| CASI | 0.06 b [-0.68; 0.81] | 0.15 b [-0.37; 0.68] | 0.39 [-0.37; 1.17] | 0.05 b [-0.49; 0.59] | 0.32 [-0.45; 1.11] | 0.08 b [-0.45; 0.62] |
| AFQ-Y8 | -0.22 [-0.97; 0.53] | -0.34 [-0.87; 0.19] | -0.04 b [-0.81; 0.72] | -0.31 [-0.86; 0.23] | -0.01 b [-0.77; 0.79] | -0.30 [-0.83; 0.23] |
| SCARED-Child | 0.05 b[-0.70; 0.80] | -0.09 b[-0.62; 0.42] | 0.32[-0.44; 1.09] | -0.07 b[-0.61; 0.47] | 0.16 b[-0.61; 0.94] | -0.05 b[-0.58; 0.47] |
| CESD | -0.06 b[-0.80; 0.69] | 0.31[-0.22; 0.84] | 0.03 b[-0.73; 0.79] | 0.32[-0.23; 0.86] | 0.09 b[-0.69; 0.87] | 0.30[-0.23; 0.83] |
| SCARED-Caretaker | 0.09 b[-0.67; 0.86] | -0.43[-0.97; 0.12] | 0.93[0.12; 1.73] | -0.64[-1.20; -0.08] | 0.70[-0.08; 1.49] | -0.54[-1.07; -0.005] |
| PAQ | -0.14b[-0.90; 0.62] | -0.49[-1.05; 0.05] | 0.14 b[-0.62; 0.90] | -0.56[-1.12; -0.003] | -0.05 b[-0.71; 0.81] | -0.50[-1.03; 0.03] |
| FAS Total | 0.07 b[-0.69; 0.84] | -0.47[-1.01; 0.07] | 0.30[-0.47; 1.06] | -0.47[-1.02; 0.08] | 0.27[-0.49; 1.04] | -0.44[-0.98; 0.09] |
| FAS Distress | 0.14 b[-0.62; 0.90] | 0.11 b[-0.42; 0.65] | 0.03 b[-0.73; 0.79] | .04 b[-0.50; 0.59] | 0.27[-0.50; 1.03] | -0.01 b[-0.51; 0.54] |

a Within treatment group

b Negligible

*Note.* CIAS = Childhood Illness Attitude Scale, CASI = Childhood Anxiety Sensitivity Index, AFQ-Y8 = Avoidance and Fusion Questionnaire for Youth, SCARED = Screen for Child Anxiety and Related Disorders – Child Report, CES-D = Center for Epidemiologic Studies Depression Scale, FAS = Familial Accommodation Scale - Anxiety, PAQ = Parental Acceptance Questionnaire.

**Table 6**

*A brief overview of the 10-session treatment*

|  |  |  |  |
| --- | --- | --- | --- |
| Session number | Focus of session | ACT process/concept | Examples |
| 1 | Building rapport, providing treatment rationale, understanding participant clinical presentation | n/a | Get-to-know-you game (e.g., playing Uno online or Pictionary via Zoom whiteboard)Metaphor directly connected to adolescent’s hobbies regarding learning something new in therapy (e.g., building a new muscle, learning to paint for the first time) |
| 2 | Identifying where anxiety occurs and stepping back from the fight against HA | Creative hopelessnessControl as the problemAcceptancePresent moment awareness | Drawing a self-portrait on paper/whiteboard, marking where HA usually shows up, describing what this looks like non-judgmentallyTug of war or quicksand metaphor using videos or interactive activities (e.g., drawing, connecting to an adolescent’s favorite fantasy series) |
| 3-5 | Observing and creating mental distance from HA | Present moment awareness Cognitive defusionAcceptance | Passengers on the bus metaphor via the “Choose your own adventure” video (UCD CBS Lab, 2021)Drawing anxiety on a piece of paper, trying to keep it off one’s lap versus holding it lightly (Turrell & Bell, 2016)Balloon breathing (L. L. Hayes & Ciarrochi, 2015) while watching thoughts on a movie screen as a mindfulness meditation (Twohig et al., 2021) |
| 6-7 | Personal value exploration and brainstorming/identifying engagement with meaning in life | ValuesCommitted action | Using “conversation cards” to take turns sharing stories and/or responses to broad, values-oriented discussion questions (L. L. Hayes & Ciarrochi, 2015)Teaching BOLD: Breathing deeply, Observing, Listening to Values, Deciding on actions and doing it (L. L. Hayes, 2015) |
| 8-9 | Exposures/experiential exercises with HA | Varied depending on practice and adolescent | Build a values-based “exposure menu” (Zurita Ona, 2019)Engage in exposure practices structured similarly to ACT for OCD (Twohig et al., 2010) |
| 10 | Review, relapse prevention, goal-setting | ValuesCommitted actionVaried depending on adolescent | List all skills/concept that teen has learned, identify favorites/least favorites, review as neededMaking a concrete plan for continued skill engagement and set values-based goals for the future |

**Figure 1**

*CONSORT diagram for participant flow in the full sample*

Completed both caretaker and adolescent consent (n=70)

Did not respond to contact / did not leave contact info (n = 20)

Assessed for eligibility via Qualtrics screener (n=50)

**Figure 2**

14 weeks / 1 month follow-up

Caretaker N = 14

Adolescent N = 14

14 weeks / 1 month follow-up

Caretaker N = 14

Adolescent N = 14

10 weeks / post-treatment

Caretaker N = 12

Adolescent N = 12

Waitlist

Caretaker N = 15

Adolescent N = 15

ACT

Caretaker N = 15

Adolescent N = 15

10 weeks / post-treatment

Caretaker N = 14

Adolescent N = 14

5 weeks / mid-treatment

Caretaker N = 14

Teen N = 15

5 weeks / mid-treatment

Caretaker N = 12

Adolescent N = 14

Randomized (N=30)

Anxiety below clinical cutoff (n=2)

Adolescent withdrew consent (n=3)

Did not respond to schedule (n=5)

Did not complete screener (n=10)

*Estimated marginal means and standard error ribbons from best-fitting models for adolescent health-related and general anxiety at p < .05*

**

**Figure 3**

*Estimated marginal means and standard error ribbons from best-fitting models for adolescent depression at p < .05*

**

**Figure 4**

*Estimated marginal means and standard error ribbons from best-fitting models for process outcomes in adolescent participants at p < .05*



**Figure 5**

*Estimated marginal means and standard error ribbons from best-fitting models for caretaker outcomes at p < .05*

