

A randomized trial of acceptance and commitment therapy and traditional cognitive-behavioral
therapy self-help books for social anxiety

Jennifer Krafft ^{a*}, Michael P. Twohig ^a, and Michael E. Levin ^a

^a Utah State University, Department of Psychology, 2810 Old Main Hill, Logan, UT 84322.

* Corresponding author. Utah State University, 2810 Old Main Hill, Logan, UT 84322, United States. Phone: +001 (607) 592-5834; E-mail address: jennifer.krafft@aggiemail.usu.edu.

Declaration of Interest:

The authors declare that there are no conflicts of interest.

Funding:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Abstract

Background: Self-help resources such as books may help meet critical mental health needs in college students, but there is insufficient evidence on whether and how such books work. This randomized trial compared acceptance and commitment therapy (ACT) and traditional cognitive behavior therapy (tCBT) self-help books for social anxiety, a common concern with notable barriers to treatment seeking.

Methods: A sample of college students ($n = 102$) with social anxiety was randomly assigned to use one of the two self-help books over eight weeks.

Results: Improvements were observed in both conditions across all outcomes (social anxiety, general well-being, and social functioning) as well as potential processes of change (cognitive fusion, appraisals of social concerns, and progress toward personal values). Few differences were observed between conditions. Changes in general cognitive fusion consistently predicted outcomes at posttreatment, and anxiety-specific cognitive fusion and concern about negative social interactions also predicted some later outcomes.

Conclusions: Use of self-help books to address social anxiety in college students is promising, and addressing cognitive fusion appears to be important.

Keywords: *social phobia; bibliotherapy; mindfulness, psychological inflexibility, cognitive restructuring*

A randomized trial of acceptance and commitment therapy and traditional cognitive-behavioral therapy self-help books for social anxiety

Social anxiety disorder (SAD) has a high prevalence (Kessler, Chiu, Demler, & Walters, 2005) and is linked to serious impairment (Aderka et al., 2012). Effective treatments for social anxiety exist, including traditional cognitive-behavioral therapy (tCBT) using exposure, cognitive therapy, or both (Deacon & Abramowitz, 2004), and acceptance and commitment therapy (ACT; Bluett, Homan, Morrison, Levin, & Twohig, 2014). However, over 80% of those with SAD do not receive treatment, a notably higher rate than individuals with generalized anxiety disorder or major depressive disorder (Grant et al., 2005). Common barriers to treatment-seeking among those with social anxiety include fears about cost, long wait times to initial appointments, and concern about social stigma (Chartier-Otis, Perreault, & Bélanger, 2010).

Evidence-based self-help has the potential to connect more people who struggle with social anxiety to treatment by addressing these barriers. One population that may benefit especially from greater access to efficacious self-help resources is college students. Estimates of social anxiety in college students range from 3 to 10 percent (Blanco et al., 2008; Russell & Shaw, 2009). Despite the treatment resources available on college campuses, one study found only around 16 percent of students with anxiety disorders had utilized mental health treatment (Blanco et al., 2008). One potential route to address mental health needs without placing additional burden on already strained college counseling centers (Gallagher, 2015) would be to make easy-to-access, tested resources such as self-help books widely available to college students. If college libraries are willing to purchase self-help books, and college students can effectively use self-help books without therapist guidance, dissemination of self-help books

through university libraries could help meet campus mental health needs while minimizing barriers (e.g., stigma, waitlists).

Prior research indicates that traditional CBT protocols are effective as self-help bibliotherapy for SAD (Abramowitz, Moore, Braddock, & Harrington, 2009; Furmark et al., 2009). Initial research also supports the efficacy of ACT self-help bibliotherapy for social anxiety (Kocovski et al., 2019). Equivalent results have been found between ACT and CBT delivered in-person for social anxiety (Block & Wulfert, 2000; Craske et al., 2014; Kocovski, Fleming, Hawley, Huta, & Antony, 2013), although one recent trial found advantages for CBT over ACT in addressing social anxiety symptoms and functioning (Herbert et al., 2018). To our knowledge, no studies have yet tested if the two approaches are differentially or equally effective for social anxiety when delivered as self-help.

Although there are also notable areas of overlap, traditional CBT and ACT are theoretically distinct in their models of change. Social anxiety disorder is conceptualized from a tCBT perspective as being maintained by dysfunctional beliefs about social interaction, avoidance behavior, and attentional biases (Wong, Gordon, & Heimberg, 2014). In contrast, social anxiety disorder in ACT is conceptualized as being maintained by psychological inflexibility, an overarching and transdiagnostic pathological process in which rigid attention, experiential avoidance, and cognitive fusion (i.e., an overly literal relationship to thoughts) exert excessive control over behavior relative to direct experience and personal values (Dalrymple & Herbert, 2007). Both models are cognitive-behavioral in nature and target some shared processes such as behavioral avoidance and inflexible attention. The main contrast is that ACT is a contextual CBT (Hayes, Villatte, Levin, & Hildebrandt, 2011). As such, it focuses on changing how individuals relate to their fear and worries (i.e., teaching individuals to notice their thinking as an ongoing

process, rather than a literal description of the world), whereas tCBT focuses on identifying and changing dysfunctional cognitions such as overestimation of social risk.

These distinct processes may alter the comparative efficacy of tCBT and ACT in self-help formats. Processes specifically targeted by ACT could theoretically help with adherence and engagement in self-help for anxiety. For example, connecting with values could help individuals to develop consistent motivation to adhere to self-help, and cognitive defusion could help individuals independently engage in exposure even if they continue to experience worries about social situations. Alternatively, the core processes of CBT (e.g., changing thinking; exposure to avoided situations) could be easier to understand when delivered as self-help. Comparing the two treatments would help evaluate whether they differ in changing important outcomes given the unique constraints and affordances of self-help. Although tCBT for SAD has a larger body of empirical support (Deacon & Abramowitz, 2004), direct comparisons to-date have generally found tCBT and ACT equally effective (Block & Wulfert, 2000; Craske et al., 2014; Kocovski et al., 2013). Nonetheless, it is critical to evaluate the efficacy of both approaches when delivered in a novel self-help book format (Rosen & Lilienfeld, 2016).

In order to enhance self-help outcomes, it is important to understand not just if various treatments are effective, but how they work. Identifying specific processes of change could help refine treatments to maximize effectiveness and provide guidance on how to match individuals to appropriate treatments based on their specific goals. Studies have found cognitive change to mediate improvements in tCBT for social anxiety (Hofmann, 2004; Smits, Rosenfield, McDonald, & Telch, 2006), while changes in psychological inflexibility (Dalrymple & Herbert, 2007) and acceptance (Kocovski et al., 2019) predict improvements in ACT. One study testing both approaches found that outcomes in both tCBT and ACT are mediated by negative

cognitions, but psychological inflexibility uniquely mediates outcomes in ACT (Niles et al., 2014). Better understanding the mechanisms through with tCBT and ACT effect change in self-help for social anxiety could lead to more efficacious and efficient treatment design.

Therefore, this study sought to evaluate efficacy and processes of change in a randomized trial of tCBT and ACT self-help books for social anxiety. Participants were college students who accessed the self-help books for free online through their university library. We predicted that 1) both conditions would report improvements in social anxiety, well-being, and social functioning, 2) the ACT condition would report greater change in cognitive fusion and progress toward personal values relative to tCBT, 3) the tCBT condition would report greater change in beliefs about social situations relative to ACT, and 4) changes in cognitive fusion, progress toward personal values, and perceived likelihood and concern about about negative social experiences would all predict change on outcomes over time.

Methods

Participants

A sample of 108 participants was obtained that met a series of inclusion criteria: 1) being eighteen years or older, 2) being a student at the authors' university, 3) being interested in treatment for social anxiety, 4) meeting a cutoff of 6 or higher on the Mini-Social Phobia Inventory (Mini-SPIN; Connor, Kobak, Churchill, Katzelnick, & Davidson, 2001) and 5) not having previously participated in self-help studies conducted by the authors. Participants were recruited through a university research participation website, flyers, class announcements, and provider referrals. Recruitment materials described the study as "testing to see if self-help books can help with social anxiety," noted that all study procedures would be completed online, and mentioned that participants could receive research participation credit (for completing

assessments) if applicable. Recruitment took place from September 2017 to October 2018. Data were removed for six participants: five who indicated randomly responding to half or more of the survey questions in a self-report question, and one who requested data removal after withdrawing, leaving a sample of 102 individuals with baseline demographic information (see Figure 1). Most participants received research participation credit ($n = 83$).

Participants were young ($M = 20.51$ years of age, $SD = 3.79$) and mostly female (76.47%, compared to 22.55% male and 0.98% other; see Table 1 for participant demographics by group). Most participants were non-Hispanic/Latinx (96.08%, compared to 3.92% Hispanic/Latinx). Participants were predominantly White (95.10%, with 1.96% bi/multiracial, 0.98% Asian, 0.98% American Indian/Alaska Native, and 0.98% other). Most participants attended the university main campus in person (83.33%), while 9.80% attended a regional campus, and 6.87% combined in-person main/regional campus and online attendance. The median household income reported was \$20,000-40,000. Treatment utilization was not an exclusion criterion, and a minority of participants had accessed either medication (36.27%) or therapy (14.71%) for mental health in the past 5 weeks prior to entering the study.

Procedures

This trial was pre-registered at ClinicalTrials.gov (NCT03297619). All study procedures were completed online. Participants were automatically screened online prior to the completion of informed consent. The screening, consent form, and all surveys were hosted on the secure Qualtrics survey platform. Immediately following the online consent, participants were directed to complete a baseline survey. At the end of this survey, participants were automatically randomly assigned in blocks of two with a 1:1 allocation ratio to use one of two self-help books: *The Shyness and Social Anxiety Workbook, Second Edition* (Antony & Swinson, 2008) or the

Mindfulness and Acceptance Workbook for Social Anxiety and Shyness (Fleming & Kocovski, 2013). No masking to condition was employed given participants were implicitly aware of assignment to book condition and assessments were all completed through self-report without direct researcher administration. Participants were immediately provided with an 8-week reading schedule, developed by the researchers recommending participants read one chapter per week, and a link to access their assigned book. Participants were asked not to access other self-help books during the study duration. Each book includes a range of worksheets, written exercises, and practical exercises. The two books overlap in some components (e.g., psychoeducation, encouraging exposure to previously avoided situations and physical sensations), although each incorporates distinct components described below.

The *Shyness and Social Anxiety Workbook* uses a tCBT approach to social anxiety. Primary components include psychoeducation, identifying cognitive distortions, situational exposure, interoceptive exposure, and relapse prevention. In order to make the amount of reading approximately equivalent between the two conditions, participants were asked to skip three chapters that focused primarily on motivational enhancement (Ch. 4), medication usage (Ch. 5), and communication skills (Ch. 10). tCBT participants were asked to read eight chapters totaling 160 pages. This book has been tested in one randomized waitlist-controlled trial, combined with some therapist support (Abramowitz et al., 2009), and had large effects on social anxiety.

The *Mindfulness and Acceptance Workbook for Social Anxiety and Shyness* uses an ACT approach. Primary components include psychoeducation, values clarification, mindfulness, acceptance, cognitive defusion, and committed action. Participants were asked to read the introduction and eight chapters, totaling 162 pages. This book has also been tested in a

randomized waitlist-controlled trial (Kocovski et al., 2019), and had medium-to-large effects on social anxiety.

Participants were asked to complete a midtreatment survey 4 weeks after they were assigned to their condition, and a posttreatment survey 8 weeks after assignment to condition. Initially, this study also incorporated ecological momentary assessment (EMA), and participants were asked to respond to EMA questions over one week between baseline and beginning reading, one week at midtreatment, and one week after the posttreatment assessment. However, this EMA component was removed after the first 15 participants finished their participation as there were relatively high rates of nonresponse to key assessments (46.67% nonresponse for midtreatment survey and 60.00% for posttreatment survey) and it appeared that this component might be overly burdensome. As a result, a minority of participants completed the midtreatment and posttreatment assessments on a slightly delayed timeframe.

Researchers provided regular biweekly email reminders regarding the reading schedule, following a standardized template. In addition, research assistants sent a “troubleshooting” email to enhance participant support one week after assignment to condition, asking participants if they had been encountering any barriers to reading and offering to help problem-solve any concerns. This troubleshooting email was also added to the protocol after the first 15 participants finished participation. If participants reported any concerns in response to this email, a standardized procedure was followed in which the research assistant 1) reinforced any reading completed, 2) normalized barriers to engagement, 3) validated any concerns voiced, 4) provided one or two problem-solving ideas, and 5) emphasized participant autonomy in choosing how to proceed. About half of participants responded ($n = 47$ of 87 who were sent the troubleshooting email).

Researchers also sent participants up to four reminders to complete surveys. Data collection ended in January 2019 after the targeted sample size was obtained.

Measures

Liebowitz Social Anxiety Scale – Self Report (LSAS-SR; Fresco et al., 2001). The LSAS-SR is a 24-item measure of social anxiety and was used as the pre-specified primary outcome for this study. The LSAS-SR includes subscales that assess fear and avoidance of a range of social situations, which are summed to generate a total scale score. Items are rated on a 4-point scale from 0 (“None” or “Never”) to 3 (“Severe”). The self-report version of the LSAS has excellent internal consistency and good convergent validity (Fresco et al., 2001). The LSAS has also been sensitive to change in previous self-help research (Gershkovich, Herbert, Forman, & Glassman, 2015). Internal consistency was good to excellent in this sample (Cronbach’s $\alpha = .95$ for total, $.90$ for anxiety, and $.89$ for avoidance).

General Health Questionnaire-12 (Goldberg, 1978). The GHQ-12 is a 12-item measure of general psychological well-being and was used as a secondary outcome. Each item is rated on a 4-point scale, and items are summed to generate a total score. Higher scores indicate greater well-being. The GHQ-12 has good reliability and validity (Banks et al., 1980) and has support for treatment sensitivity in self-help research (Muto, Hayes, & Jeffcoat, 2011). Internal consistency was excellent ($\alpha = .90$) in this sample.

Patient-Reported Outcomes Measurement Information System (PROMIS) Satisfaction with Social Roles And Activities Short Form 8 v2.0 (SSRA-SF8; Hahn et al., 2014). The 8-item version of the PROMIS Satisfaction with Social Roles and Activities (SSRA) Short Form was used to assess social functioning in this study as a secondary outcome. This measure was developed using an item response theory approach and the items have demonstrated

good reliability and validity (Hahn et al., 2014). Internal consistency was excellent for the PROMIS SSRA in this sample ($\alpha = .90$).

Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014). The CFQ is a 7-item measure of general cognitive fusion (the tendency to view thoughts as literally true, rather than as an ongoing process of thinking distinct from the individual), a key process of change in ACT. The CFQ has support for internal consistency, test-retest reliability, criterion validity, and sensitivity to change (Gillanders et al., 2014). Its internal consistency was excellent ($\alpha = .92$) in this sample.

Believability of Anxious Feelings and Thoughts Questionnaire (Herzberg et al., 2012). The BAFT is a 16-item measure of anxiety-related cognitive fusion (for example, fusion with thoughts like “My anxious thoughts and feelings are not normal”), a targeted process of change for ACT. It has good internal consistency, test-retest reliability, and good criterion validity, and is sensitive to treatment (Herzberg et al., 2012). In the present sample internal consistency was good ($\alpha = .89$).

Valuing Questionnaire-Progress (VQ-Progress; Smout, Davies, Burns, & Christie, 2014). The 5-item VQ Progress subscale was used to measure progress towards personal values as another process of change measure for ACT. Each item is rated from 0 to 6, with higher scores indicating greater progress toward values. The VQ has support for validity and internal consistency in college students (Smout et al., 2014). Internal consistency was excellent ($\alpha = .91$) for VQ Progress in the current study.

Appraisal of Social Concerns Scale (Telch et al., 2004). The ASC is a 20-item measure of concern about negative social outcomes (e.g., trembling, being tense, people rejecting you), as a process of change for tCBT. In this study, the scale was adapted so that participants rated

perceived likelihood of negative social experiences in addition to concern (an adaptation used in prior research; e.g., Smits et al., 2006). Participants rated how likely and how concerning particular outcomes would be from 0 to 100, and total scores for likelihood and concern were calculated as averages of the individual responses. The ASC is sensitive to CBT interventions and has been validated in subclinical and clinical samples (Schultz, Heimberg, & Rodebaugh, 2006; Telch et al., 2004). Internal consistency was excellent for ASC Likelihood ($\alpha = .90$) and good for ASC Concern ($\alpha = .88$).

Adherence. Participants were asked at midtreatment and posttreatment which of the assigned chapters they had read. Participants were also asked to rate their adherence to the exercises in the book on a 7-point scale from “Did no recommended assignments” (1) to “Did all recommended assignments” (7) to at both midtreatment and posttreatment (Abramowitz et al., 2009). At posttreatment, participants were also asked to rate how often they intentionally exposed themselves to anxiety-provoking situations on a 7-point scale from “Never” (1) to “Every day” (7).

Satisfaction. At posttreatment, participants rated 7 items evaluating their satisfaction with the self-help book on a 6-point scale from “Strongly disagree” (1) to “Strongly agree” (6). These items have been used to assess program satisfaction in previous self-help research (Levin, Pierce, & Schoendorff, 2017).

Results

Preliminary analyses

Rates of completion for the midtreatment assessment and posttreatment assessment were 75.93% and 65.74%, respectively (see Figure 1). Rates of completion did not significantly differ across conditions ($p = .91$ for midtreatment, $p = .16$ for posttreatment) in chi square tests.

Potential failures of randomization were assessed by testing for differences on demographics, outcome, and process variables at baseline with *t*-tests and chi square tests. The two conditions did not differ significantly on age, gender, ethnicity, race, income, recent therapy use, recent medication use, or any outcome or process variable at baseline (all *ps* > .10; see Tables 1 and 2 for details).

Normality of dependent variables was inspected visually. The GHQ was leptokurtic at posttreatment (3.36), but approximated normality at all time points after squaring. The transformed GHQ was used for all further analyses. All other variables approximated normality without requiring transformation.

Satisfaction and adherence

Satisfaction with both books was generally high (see Table 3 for details). Participants reported a mean of 4.98 (with 5 = “Mostly agree”) on the 6-point item “Overall, I was satisfied with the quality of the book.” The average of 4.38 on the item “I felt this book was made for someone like me” fell between 4 (“Slightly agree”) and 5 (“Mostly agree”). The mean rating on the item “I would recommend this book to other college students with social anxiety,” was 5.14. Conditions did not significantly differ on any of these satisfaction items (*p* = .12, *p* = .19, and *p* = .53 respectively).

All participants who completed the posttreatment survey (*n* = 64) read at least one of the assigned chapters. Nearly half (43.75%) read all assigned chapters, with slightly more finishing the ACT (47.22%) book compared to the tCBT (39.29%) book. There was no significant difference between conditions on whether or not they finished the book in a chi square test ($\chi^2 = 0.40$, *p* = .53). The mean ACT participant read 81.48% of assigned chapters and the mean tCBT

participant read 76.79% of assigned chapters, which was not a significant difference in a *t*-test ($p = .46$).

On average, participants reported a 4.07 (between “About half of days” and “Most days”) when asked how often they intentionally exposed themselves to anxiety-provoking situations. The mean response regarding compliance with recommended exercises from the book was 3.22, between 3 (“Did some recommended exercises”) and 4 (“Did about half of recommended exercises.”) on a scale from 1 to 7. There was no significant difference between conditions on these measures of treatment compliance ($p = .62$ for exposure, $p = .56$ for exercises))

Outcome analyses

Pre-specified outcome analyses used mixed-effects models to test the impact of the interventions on outcomes using an intent-to-treat approach. To account for the longitudinal nature of the data, models included a random intercept at the participant level (modeling individual-level variation on outcome variables) as well as random slopes for participants over time (modeling individual-level variation in the slopes of dependent variables over time). In a series of time by condition models, the effects of time (i.e., change across both conditions) and the interaction of time and condition (i.e., differential change between the two conditions) were tested as fixed effects. Restricted maximum likelihood was used to estimate parameters, and can provide accurate estimates by using all available data even when some observations are missing (Enders, 2001). Analyses were conducted in R (R Core Team, 2015). Models were created using the `lmer()` function (Bates, Machler, Bolker, & Walker, 2015). *p*-values were obtained from the `summary()` function in the `lmerTest` package (Kuznetsova, Brockhoff, & Christensen, 2017), which uses the Satterthwaite approximation and has evidence of appropriate Type I error rates (Luke, 2017). In accordance with recommended methods for mixed-effects models (Lorah,

2018), regression coefficients were partially standardized (i.e., outcome variables were standardized but condition and time were left dummy coded) which aids interpretation and allows for an estimate of effect size.

There was a significant time by condition interaction for the GHQ, such that the ACT condition experienced greater improvement on well-being over time. However, the interaction of time and condition was not a significant predictor of improvement on the LSAS Total, LSAS Fear, LSAS Avoidance, or PROMIS SSRA (all $ps > .05$; see Table 4). In each case time was a significant predictor when combining across conditions ($ps < .05$; see Table 4), and the results indicated improvement over time. Overall social anxiety, fear, avoidance, and distress decreased, while well-being and satisfaction with social roles and activities increased. In a series of within-condition models with time as a fixed effect, time also predicted significant improvement on all outcomes within the ACT and tCBT conditions separately (see Table 5). Within ACT, outcomes were estimated to change by 0.46 to 0.70 standard deviations per time point (i.e., four-week period or half of the study duration). Within CBT, outcomes were estimated to change by 0.36 to 0.60 standard deviations per time point.

Rates of reliable change on the primary outcome (total LSAS score) were investigated among those who responded at posttreatment. Using the established cutoff for reliable change on the LSAS of at least 25.97 points (von Glischinski et al., 2018), 20 of 34 respondents (58.82%) in the ACT condition and 19 of 29 respondents (65.52%) in the tCBT condition achieved reliable change. A generalized linear mixed effects model with a logit link tested whether there was a difference in the probability of achieving reliable change across conditions, and found no difference ($p = .95$). Rates of remission (i.e., no longer meeting the diagnostic threshold) were further calculated based on the cutoff of 35 which is recommended to maximize sensitivity and

specificity (von Glischinski et al., 2008). In ACT condition, 10 of 34 respondents (29.41%) were in remission at post and in the CBT condition, 14 of 29 respondents (48.28%) had remitted. However, in a generalized linear mixed effects model with a logit link, there was no significant difference between conditions ($p = .85$).

Process of change analyses

Several steps were taken to assess potential processes of change. First, in another pre-specified series of analyses mixed-effects models tested the effects of the interventions on process variables, using the same methods described previously for outcome variables. As with most outcomes, there was no significant time by condition interaction (all $ps > .05$), but both conditions improved on each process variable over time ($ps < .05$; see Table 5). Anxiety-related cognitive fusion, generalized cognitive fusion, and perceived likelihood and concern about negative social experiences all decreased, while progress toward personal values increased. Fully standardized regression coefficients were computed for these models (i.e., both predictor and outcome were standardized).

Next, a series of exploratory linear regression models across both conditions investigated whether change on process variables predicted scores on the LSAS, GHQ, and PROMIS at posttreatment, controlling for baseline scores (Table 6). Changes on the CFQ from baseline to midtreatment significantly predicted social anxiety, well-being, and social functioning at posttreatment, with a one-standard deviation difference in change score linked to 0.23 to 0.35 standard deviation change on outcomes. Changes on the BAFT from baseline to midtreatment predicted social anxiety and social functioning at posttreatment, but not well-being. Changes on ASC Concern significantly predicted social anxiety and well-being at posttreatment, with a trend for predicting social functioning as well. Changes on ASC Likelihood were not predictive of any

outcome. There was also a trend ($p < .10$) for VQ Progress change to predict later social functioning, although it did not predict any outcome significantly ($ps > .05$).

These findings were further probed in a series of exploratory moderation analyses testing whether condition moderated the relationship between changes on process variables from baseline to posttreatment and each outcome controlling for baseline scores. This analysis served to test whether the relations between changes in processes and changes in outcomes differed by condition (i.e., whether any process variables are more strongly or weakly linked to outcomes depending on the condition). In each case, condition did not significantly moderate the effect of the process variable change score ($ps > .10$).

Discussion

This study evaluated the relative efficacy and processes of change of two theoretically distinct self-help books for social anxiety in a college student sample. Both books were viewed as broadly satisfactory, with no differences between the two. Slightly less than half of participants finished their assigned book, again with no difference between the two. Participants reported doing less than half of the exercises in the books on average, but also reported fairly regular intentional exposure to anxiety-provoking situations. In general, there was less consistent adherence to treatment than might be expected for in-person treatment of social anxiety (Issakidis & Andrews, 2004).

Despite limitations in dosage and support (i.e., minimal researcher contact), significant improvement was observed after assignment to use either book. Both conditions improved significantly over time on all outcomes (social anxiety, fear, avoidance, well-being, and social functioning), although the ACT condition improved at a greater rate on well-being relative to the tCBT condition. In each case, effect sizes were large. This suggests that this method of

delivering self-help books through university libraries may succeed in helping connect college students to treatments that work in an efficient manner. Although some researcher contact was included, it was very limited in terms of resources required. Reminder and troubleshooting emails were estimated to require no more than 45 minutes per participant over 8 weeks, and could potentially be largely automated or implemented by trained peers given the simplicity of the protocol used. Further research should first replicate that self-help books delivered in this manner can lead to substantial positive outcomes and then explore how such resources can best be disseminated and implemented based on stakeholder needs and university resources.

Contrary to expectations, the ACT and tCBT condition both improved significantly on all process variables (anxiety-related cognitive fusion, general cognitive fusion, progress toward personal values, perceived likelihood of and concern about negative social experiences). Although the ACT book did not specifically target appraisals of social experiences, and the tCBT book did not specifically target anxiety-related cognitive fusion, general cognitive fusion, or personal values, it appears that by the end of treatment, ACT and tCBT had approximately similar effects on these processes.

The results have implications for decision-making based on treatment goals. Given that both treatments have broadly similar impacts on outcomes and processes of change, it is reasonable to determine which book to recommend based on other factors (e.g., client's understanding of their problem, therapist orientation if using adjunctively in treatment). However, future studies should also test potential moderators of the effects of self-help book such as user characteristics. The equivalence found for these two books is consistent with several studies that have found broadly similar results for in-person ACT and tCBT, including on processes of change (Craske et al., 2014; Kocovski, Fleming, Hawley, Huta, & Antony, 2013),

although it contrasts with one study that suggested potential advantages for tCBT in addressing anxiety and ACT in increasing willingness (Block & Wulfert, 2000). It is interesting that the one area in which a difference was observed was the ACT book having an advantage in improving general psychological well-being. ACT uses a transdiagnostic rather than disorder-specific model, and it is possible that it was easier to apply skills learned from the ACT book to broad distress or comorbid symptomology, consistent with past research suggesting ACT may be particularly helpful when comorbidity is present (Wolitzky-Taylor, Arch, Rosenfield, & Craske, 2012). Future studies should specifically compare ACT and tCBT self-help in their impact on comorbid symptoms. It is also possible that methodological choices contributed to greater improvements in well-being in the ACT condition (e.g., not assigning the entire CBT book to control for dosage between conditions).

Beyond comparing the two conditions, process analyses suggested potential advantages for engaging specific processes of change. In the full sample, only changes in general cognitive fusion significantly predicted later change in all three outcomes of total social anxiety, well-being, and social functioning. Changes in concern about negative social experiences predicted later change on social anxiety and well-being, with a trend towards predicting social functioning, and changes in anxiety-related cognitive fusion predicted later change on social anxiety and social functioning. In contrast, changes in values progress and perceived likelihood of negative social experiences did not significantly predict later change on any outcome. Although this is not a direct comparison across processes, it suggests that targeting general cognitive fusion, and potentially concern about negative social experiences and anxiety-related cognitive fusion, may be particularly important in order to improve outcomes in social anxiety across treatment approaches.

These results should be interpreted cautiously given the large number of models and limited power for subgroup analyses, but broadly, it appears that targeting cognitive fusion may be particularly useful across treatments. Future research should test whether more directly targeting cognitive fusion in traditional CBT interventions, and/or increasing the dose of cognitive defusion in ACT, leads to more efficacious self-help treatment of social anxiety. Also, while we did not perform a direct comparison, our results suggest that concern about negative social experiences may be more important as a treatment target than estimated likelihood of these experiences. It is possible that concern is particularly important to or engaged by bibliotherapy given its self-guided nature. More broadly, it is possible that processes of change vary across individuals, and investigating processes at the group level may obscure idiographic processes (Hayes et al., 2018). Identifying processes of change at the individual level for various treatments would further help clarify the active processes of change that lead to individual change in social anxiety self-help treatment.

This study has limitations that should be considered in interpreting the results. Most important is the lack of a waitlist control. It is possible that some of the improvements observed were due to accessing other treatments, spontaneous remission, or other unmeasured variables. However, both books have been shown to be superior to waitlist in prior trials (Abramowitz et al., 2009; Kocovski et al., 2019), which suggests that they lead to improvement beyond the simple effects of time. In addition, while the sample in this study was not small, power was limited for moderation and subgroup analyses, which could have led some active processes to be overlooked. Comorbidity was also not measured directly, and is an important outcome in SAD treatment. Another considerable limitation is that follow-up results were not collected. It is possible that differences might emerge at follow-up, as has been observed in some comparisons

of tCBT and ACT (Arch et al., 2012; Forman et al., 2012), and maintenance of gains is important to assess.

Other limitations should be noted related to the self-help books. Participants were asked to follow an 8-week reading schedule, which differed from recommendations provided in the books, and omitted several chapters from the tCBT book, which could have led to different results compared to naturalistic use of the books. In addition, this study tested the second edition of the tCBT book (Antony & Swinson, 2008), but a substantially revised third edition is now available (Antony & Swinson, 2017). Results may have differed if using this updated version; however, the third edition integrates mindfulness and acceptance, which made using the second edition advantageous in providing a clearer comparison of tCBT and ACT as distinct models. Further, while accessing self-help books online has advantages for cost effective, convenient access to students, it should also be tested whether results generalize to readers using hard-copy versions of these books, which may be preferred by some readers and allows for directly writing in worksheets provided. It would also be valuable to test these questions in other forms of self-help (e.g., website, mobile app), which may have advantages such as interactivity and ease of use that could potentially support engagement.

As noted above, this study also had some procedural changes (i.e., removing EMA and increasing researcher contact), which could have impacted some results. However, these changes affected a small minority of participants and were consistent across conditions, and are therefore unlikely to have affected the main findings.

The use of a symptom cutoff for eligibility also means it will be necessary to test whether these results generalize to other populations, both more narrowly to individuals with a diagnosis of SAD and more broadly to the range of individuals interested in using these books. Most

participants received research credit, which might provide a means to increase engagement in self-help among college students that may benefit, but also shows a need for replication in samples that are purely help-seeking. Finally, this sample was homogeneous in race and ethnicity, largely female, and predominantly consisted of in-person students. Demographics of this sample may be related in part to broader trends of female (e.g., LeViness, Bershad, & Gorman, 2018) and White (e.g., De Luca et al., 2016) individuals being more likely to seek help. Replication in diverse samples is needed to know if these findings generalize to college students with different demographics or nontraditional college students (e.g., online-only).

In conclusion, it appears that ACT and CBT self-help books with minimal supportive contact are acceptable and efficacious to a similar degree in addressing social anxiety in college students. Such an approach has several advantages for possible dissemination, including scalability and low cost relative to in-person treatment. Connecting students to efficacious resources that they can access online and on their own schedule is particularly important given the rise in online-only students (National Center for Education Statistics, 2018). In addition, our findings support the importance of therapeutic processes of change such as changes in cognitive fusion in explaining how self-help books work. More research should be conducted in this area, including full-scale dissemination and implementation trials. In addition, future studies should be powered for more fine-grained analyses including person-level moderators and comparing processes of change by condition.

References

- Abramowitz, J. S., Moore, E. L., Braddock, A. E., & Harrington, D. L. (2009). Self-help cognitive-behavioral therapy with minimal therapist contact for social phobia: A controlled trial. *Journal of Behavior Therapy and Experimental Psychiatry, 40*, 98-105. doi:10.1016/j.jbtep.2008.04.004
- Aderka, I. M., Hofmann, S. G., Nickerson, A., Hermesh, H., Gilboa-Schechtman, E., & Marom, S. (2012). Functional impairment in social anxiety disorder. *Journal of Anxiety Disorders, 26*, 393-400. doi:10.1016/j.janxdis.2012.01.003
- Antony, M. M., & Swinson, R. P. (2008). *The shyness and social anxiety workbook: Proven, step-by-step techniques for overcoming your fear* (2nd ed.). Oakland, CA: New Harbinger Publications, Inc.
- Antony, M. M., & Swinson, R. P. (2017). *The shyness and social anxiety workbook: Proven, step-by-step techniques for overcoming your fear* (3rd ed.). Oakland, CA: New Harbinger Publications, Inc.
- Arch, J. J., Eifert, G. H., Davies, C., Vilardaga, J. C. P., Rose, R. D., & Craske, M. G. (2012). Randomized clinical trial of cognitive behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for mixed anxiety disorders. *Journal of Consulting and Clinical Psychology, 80*, 750–765. <https://doi.org/10.1037/a0028310>
- Banks, M. H., Clegg, C. W., Jackson, P. R., Kemp, N. J., Stafford, E. M., & Wall, T. D. (1980). The use of the General Health Questionnaire as an indicator of mental health in occupational studies. *Journal of Occupational Psychology, 53*, 187-194.
- Bates, D., Machler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67*. doi:10.18637/jss.v067.i01

- Blanco, C., Okuda, M., Wright, C., Hasin, D. S., Grant, B. F., Liu, S.-M., & Olfson, M. (2008). Mental health of college students and their non-college-attending peers: Results from the national epidemiologic study on alcohol and related conditions. *Archives of General Psychiatry, 65*, 1429-1437. doi:10.1001/archpsyc.65.12.1429
- Block, J. A., & Wulfert, E. (2000). Acceptance or change: Treating socially anxious college students with ACT or CBGT. *The Behavior Analyst Today, 1*, 3-10.
- Bluett, E. J., Homan, K. J., Morrison, K. L., Levin, M. E., & Twohig, M. P. (2014). Acceptance and commitment therapy for anxiety and OCD spectrum disorders: an empirical review. *Journal of Anxiety Disorders, 28*, 612-624. doi:10.1016/j.janxdis.2014.06.008
- Chartier-Otis, M., Perreault, M., & Bélanger, C. (2010). Determinants of barriers to treatment for anxiety disorders. *Psychiatric Quarterly, 81*, 127-138. doi:10.1007/s11126-010-9123-5
- Connor, K. M., Kobak, K. A., Churchill, L. E., Katzelnick, D., & Davidson, J. R. T. (2001). Mini-SPIN: A brief screening assessment for generalized social anxiety disorder. *Depression and Anxiety, 14*, 137-140. doi:10.1002/da.1055
- Craske, M. G., Niles, A. N., Burklund, L. J., Wolitzky-Taylor, K. B., Vilardaga, J. C., Arch, J. J., . . . Lieberman, M. D. (2014). Randomized controlled trial of cognitive behavioral therapy and acceptance and commitment therapy for social phobia: Outcomes and moderators. *Journal of Consulting and Clinical Psychology, 82*, 1034-1048. doi:10.1037/a0037212
- Dalrymple, K. L., & Herbert, J. D. (2007). Acceptance and commitment therapy for generalized social anxiety disorder: A pilot study. *Behavior Modification, 31*, 543-568. doi:10.1177/0145445507302037

- De Luca, S. M., Blossnich, J. R., Hentschel, E. A. W., King, E., & Amen, S. (2016). Mental health care utilization: How race, ethnicity and veteran status are associated with seeking help. *Community Mental Health Journal, 52*, 174–179. <https://doi.org/10.1007/s10597-015-9964-3>
- Deacon, B. J., & Abramowitz, J. S. (2004). Cognitive and behavioral treatments for anxiety disorders: A review of meta-analytic findings. *Journal of Clinical Psychology, 60*, 429-441. doi:10.1002/jclp.10255
- Enders, C. K. (2001). A primer on maximum likelihood algorithms available for use with missing data. *Structural Equation Modeling, 8*, 128-141. doi:10.1207/S15328007SEM0801_7
- Fleming, J. E., & Kocovski, N. L. (2013). *The mindfulness and acceptance workbook for social anxiety and shyness*. Oakland, CA: New Harbinger Publications, Inc.
- Forman, E. M., Shaw, J. A., Goetter, E. M., Herbert, J. D., Park, J. A., & Yuen, E. K. (2012). Long-term follow-up of a randomized controlled trial comparing acceptance and commitment therapy and standard cognitive behavior therapy for anxiety and depression. *Behavior Therapy, 43*, 801–811. doi:10.1016/j.beth.2012.04.004
- Fresco, D. M., Coles, M. E., Liebowitz, M. R., Hami, S., Stein, M. B., & Goetz, D. (2001). The Liebowitz Social Anxiety Scale: A comparison of the psychometric properties of self-report and clinician-administered formats. *Psychological Medicine, 31*, 1025-1035. doi:10.1017/S0033291701004056
- Furmark, T., Carlbring, P., Hedman, E., Sonnenstein, A., Clevberger, P., Bohman, B., ... Andersson, G. (2009). Guided and unguided self-help for social anxiety disorder:

- Randomised controlled trial. *British Journal of Psychiatry*, 195, 440–447.
doi:10.1192/bjp.bp.108.060996
- Gallagher, R. P. (2015). *National Survey of College Counseling Centers 2014, Project Report*. Retrieved from http://d-scholarship.pitt.edu/28178/1/survey_2014.pdf
- Gershkovich, M., Herbert, J. D., Forman, E. M., & Glassman, L. (2015). Guided internet-based self-help intervention for social anxiety disorder with videoconferenced therapist support. *Cognitive and Behavioral Practice*, 23, 239-255. doi:10.1016/j.cbpra.2015.08.005
- Gillanders, D. T., Bolderston, H., Bond, F. W., Dempster, M., Flaxman, P. E., Campbell, L., . . . Remington, B. (2014). The development and initial validation of the Cognitive Fusion Questionnaire. *Behavior Therapy*, 45, 83-101. doi:10.1016/j.beth.2013.09.001
- Goldberg, D. (1978). *Manual of the GHQ*. Windsor: NFER.
- Grant, B. F., Hasin, D. S., Blanco, C., Stinson, F. S., Chou, S. P., Goldstein, R. B., . . . Huang, B. (2005). The epidemiology of social anxiety disorder in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *The Journal of Clinical Psychiatry*, 66, 1351-1361.
- Hahn, E. A., DeWalt, D. A., Bode, R. K., Garcia, S. F., DeVellis, R. F., Correia, H., & Cella, D. (2014). New English and Spanish social health measures will facilitate evaluating health determinants. *Health Psychology*, 33, 490-499. doi:10.1037/hea0000055
- Hayes, S. C., Hofmann, S. G., Stanton, C. E., Carpenter, J. K., Sanford, B. T., Curtiss, J. E., & Ciarrochi, J. (2018). The role of the individual in the coming era of process-based therapy. *Behaviour Research and Therapy*, 117, 40-53. doi:10.1016/j.brat.2018.10.005
- Hayes, S. C., Villatte, M., Levin, M., & Hildebrandt, M. (2011). Open, aware, and active: contextual approaches as an emerging trend in the behavioral and cognitive therapies.

- Annual Review of Clinical Psychology*, 7, 141-168. doi:10.1146/annurev-clinpsy-032210-104449
- Herbert, J. D., Forman, E. M., Kaye, J. L., Gershkovich, M., Goetter, E., Yuen, E. K., . . . Marando-Blanck, S. (2018). Randomized controlled trial of acceptance and commitment therapy versus traditional cognitive behavior therapy for social anxiety disorder: Symptomatic and behavioral outcomes. *Journal of Contextual Behavioral Science*, 9, 88-96. doi:10.1016/j.jcbs.2018.07.008
- Herzberg, K. N., Sheppard, S. C., Forsyth, J. P., Credé, M., Earleywine, M., & Eifert, G. H. (2012). The Believability of Anxious Feelings and Thoughts Questionnaire (BAFT): A psychometric evaluation of cognitive fusion in a nonclinical and highly anxious community sample. *Psychological Assessment*, 24, 877-891. doi:10.1037/a0027782
- Hofmann, S. G. (2004). Cognitive mediation of treatment change in social phobia. *Journal of Consulting and Clinical Psychology*, 72, 392-399. doi:10.1037/0022-006X.72.3.392
- Issakidis, C., & Andrews, G. (2004). Pretreatment attrition and dropout in an outpatient clinic for anxiety disorders. *Acta Psychiatrica Scandinavica*, 109, 426-433. doi:10.1111/j.1600-0047.2004.00264.x
- Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-Month DSM-IV Disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62, 617-627. doi:10.1001/archpsyc.62.6.617
- Kocovski, N. L., Fleming, J. E., Blackie, R. A., MacKenzie, M. B., & Rose, A. L. (2019). Self-help for social anxiety: Randomized controlled trial comparing a mindfulness and acceptance-based approach with a control group. *Behavior Therapy*, 50, 696-709. doi:10.1016/j.beth.2018.10.007

- Kocovski, N. L., Fleming, J. E., Hawley, L. L., Huta, V., & Antony, M. M. (2013). Mindfulness and acceptance-based group therapy versus traditional cognitive behavioral group therapy for social anxiety disorder: a randomized controlled trial. *Behaviour Research and Therapy, 51*, 889-898. doi:10.1016/j.brat.2013.10.007
- Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software, 82*, 1-26.
- Levin, M. E., Pierce, B., & Schoendorff, B. (2017). The acceptance and commitment therapy matrix mobile app: A pilot randomized trial on health behaviors. *Journal of Contextual Behavioral Science, 6*, 268-275. doi:10.1016/j.jcbs.2017.05.003
- LeViness, P., Bershada, C., & Gorman, K. (2018). *The association for university and college counseling center directors annual survey – Public version*. Retrieved from aucccd.org/assets/documents/Survey/2018%20AUCCCD%20Survey-Public-June%2012-FINAL.pdf
- Lorah, J. (2018). Effect size measures for multilevel models: Definition, interpretation, and TIMSS example. *Large-Scale Assessments in Education, 6*, 8.
- Luke, S. G. (2017). Evaluating significance in linear mixed-effects models in R. *Behavior Research Methods, 49*, 1494-1502.
- Muto, T., Hayes, S. C., & Jeffcoat, T. (2011). The effectiveness of acceptance and commitment therapy bibliotherapy for enhancing the psychological health of Japanese college students living abroad. *Behavior Therapy, 42*, 323-335. doi:10.1016/j.beth.2010.08.009
- National Center for Education Statistics. (2018). *Digest of Education Statistics, 2016 (NCES 2017-094)*.

Niles, A. N., Burklund, L. J., Arch, J. J., Lieberman, M. D., Saxbe, D., & Craske, M. G. (2014).

Cognitive mediators of treatment for social anxiety disorder: Comparing acceptance and commitment therapy and cognitive-behavioral therapy. *Behavior Therapy, 45*, 664-677.

doi:10.1016/j.beth.2014.04.006

R Core Team. (2015). *R: A language and environment for statistical computing*. Vienna, Austria:

R Foundation for Statistical Computing.

Rosen, G. M., & Lilienfeld, S. O. (2016). On the failure of psychology to advance self-help:

Acceptance and commitment therapy (ACT) as a case example. *Journal of Contemporary Psychotherapy, 46*, 71-77. doi:10.1007/s10879-015-9319-y

Russell, G., & Shaw, S. (2009). A study to investigate the prevalence of social anxiety in a

sample of higher education students in the United Kingdom. *Journal of Mental Health,*

18, 198-206. doi:10.1080/09638230802522494

Schultz, L. T., Heimberg, R. G., & Rodebaugh, T. L. (2006). The Appraisal of Social Concerns

Scale: Psychometric validation with a clinical sample of patients with social anxiety disorder. *Behavior Therapy, 37*, 392-405.

Smits, J. A. J., Rosenfield, D., McDonald, R., & Telch, M. J. (2006). Cognitive mechanisms of

social anxiety reduction: An examination of specificity and temporality. *Journal of*

Consulting and Clinical Psychology, 74, 1203-1212. doi:10.1037/0022-006X.74.6.1203

Smout, M., Davies, M., Burns, N., & Christie, A. (2014). Development of the Valuing

Questionnaire (VQ). *Journal of Contextual Behavioral Science, 3*, 164-172.

doi:10.1016/j.jcbs.2014.06.001

Telch, M. J., Lucas, R. A., Smits, J. A. J., Powers, M. B., Heimberg, R., & Hart, T. (2004).

Appraisal of social concerns: A cognitive assessment instrument for social phobia.

Depression and Anxiety, 19, 217-224. doi:10.1002/da.20004

von Glischinski, M., Willutzki, U., Stangier, U., Hiller, W., Hoyer, J., Leibing, E., . . .

Hirschfeld, G. (2018). Liebowitz Social Anxiety Scale (LSAS): Optimal cut points for remission and response in a German sample. *Clinical Psychology and Psychotherapy*, 25, 465-473. doi:10.1002/cpp.2179

Wolitzky-Taylor, K. B., Arch, J. J., Rosenfield, D., & Craske, M. G. (2012). Moderators and non-specific predictors of treatment outcome for anxiety disorders: a comparison of cognitive behavioral therapy to acceptance and commitment therapy. *Journal of Consulting and Clinical Psychology*, 80, 786-799. doi:10.1037/a0029418

Wong, J., Gordon, E. A., & Heimberg, R. G. (2014). Cognitive-behavioral models of social anxiety disorder. In *The Wiley-Blackwell handbook of social anxiety disorder* (pp. 3-23). Chichester, England: Wiley-Blackwell.

Table 1. Participant demographics and descriptive statistics by group at baseline

	ACT (<i>n</i> = 52) <i>M</i> (<i>SD</i>)/%	tCBT (<i>n</i> = 50) <i>M</i> (<i>SD</i>)/%	Group comparison at baseline
<i>Demographics</i>			
Age	20.40 (2.91)	20.62 (4.56)	$t(82.77) = -0.28, p = .78$
Gender	76.92 % female 23.08% male	76.00% female 22.00% male	$\chi^2 = 1.06, p = .59$
Ethnicity	0.0% other 96.15% non- Hispanic/Latinx	2.00% other 96.00% non- Hispanic/Latinx	$\chi^2 = 0.00, p = .97$
Race	3.85% Hispanic/Latinx 94.23% White 1.92% Asian 1.92% multiracial 1.92% other	4.00% Hispanic/Latinx 96.00% White 2.00% American Indian/Alaska Native 2.00% multiracial	$\chi^2 = 4.97, p = .42$
Student status	78.84% in-person only 13.46% regional campus only 7.69% partially or fully online	88.00% in-person only 6.00% regional campus only 6.00% partially or fully online	$\chi^2 = 2.67, p = .75$
Median household income	\$20,000-39,999	\$20,000-39,999	$\chi^2 = 8.73, p = .19$
Therapy utilization	15.38% yes 84.62% no	14.00% yes 86.00% no	$\chi^2 = 0.04, p = .84$
Medication utilization	34.62% yes 65.38% no	38.00% yes 62.00% no	$\chi^2 = 0.13, p = .72$

Table 2. Descriptive statistics by group at baseline, midtreatment and posttreatment

	Baseline		Group comparison at baseline	Midtreatment		Posttreatment	
	ACT (<i>n</i> = 52) <i>M</i> (<i>SD</i>)/%	tCBT (<i>n</i> = 50) <i>M</i> (<i>SD</i>)/%		ACT (<i>n</i> = 52) <i>M</i> (<i>SD</i>)/%	tCBT (<i>n</i> = 50) <i>M</i> (<i>SD</i>)/%	ACT (<i>n</i> = 52) <i>M</i> (<i>SD</i>)/%	tCBT (<i>n</i> = 50) <i>M</i> (<i>SD</i>)/%
LSAS Total	84.90 (21.78)	82.00 (23.46)	$t(98.80) = 0.97, p = .33$	60.57 (25.07)	59.42 (23.16)	48.40 (26.79)	43.64 (25.67)
LSAS Fear	44.44 (11.37)	43.82 (11.86)	$t(99.36) = 0.59, p = .55$	32.49 (13.20)	32.39 (12.01)	25.47 (13.64)	24.00 (14.08)
LSAS Avoidance	40.46 (11.13)	38.18 (12.04)	$t(98.71) = 1.30, p = .20$	28.09 (12.31)	27.03 (11.58)	22.93 (14.22)	19.64 (11.86)
GHQ	29.50 (7.03)	31.49 (6.40)	$t(99.59) = -1.58, p = .12$	36.46 (6.43)	36.61 (4.51)	39.40 (7.30)	38.64 (5.42)
PROMIS SSRA	22.52 (7.45)	24.12 (6.96)	$t(99.79) = -1.53, p = .13$	27.54 (7.49)	28.75 (6.03)	28.80 (8.00)	30.48 (6.46)
BAFT	76.35 (18.48)	74.22 (15.53)	$t(98.91) = 0.70, p = .49$	62.06 (19.49)	61.67 (16.57)	55.60 (24.45)	48.40 (18.51)
CFQ	35.02 (8.09)	33.39 (8.07)	$t(99.72) = 1.19, p = .24$	28.60 (9.71)	28.42 (8.23)	25.57 (10.62)	24.32 (8.71)
ASC Likelihood	47.75 (18.90)	46.91 (13.82)	$t(86.72) = 0.46, p = .64$	31.50 (17.76)	35.39 (13.81)	29.51 (14.92)	29.36 (15.68)
ASC Concern	59.80 (22.32)	59.24 (18.99)	$t(92.00) = 0.13, p = .89$	39.84 (25.72)	49.09 (21.94)	38.27 (25.24)	37.90 (25.47)
VQ-Progress	16.23 (7.44)	17.82 (7.21)	$t(100.00) = -1.44, p = .15$	19.69 (6.09)	20.81 (6.60)	21.93 (6.44)	21.96 (5.67)

Note. ACT = acceptance and commitment therapy; tCBT = traditional cognitive-behavioral therapy; LSAS = Liebowitz Social

Anxiety Scale; GHQ = General Health Questionnaire; PROMIS SSRA = Patient-Reported Outcomes Measurement Information

System, Satisfaction with Social Roles And Activities; BAFT = Believability of Anxious Thoughts and Feelings; CFQ = Cognitive Fusion Questionnaire; ASC = Appraisal of Social Concerns; VQ = Valuing Questionnaire.

Table 3. Satisfaction and adherence by condition

	ACT (<i>n</i> = 52) <i>M</i> (<i>SD</i>)/%	tCBT (<i>n</i> = 50) <i>M</i> (<i>SD</i>)/%
“Overall, I was satisfied with the quality of the book”	5.11 (0.67)	4.82 (0.77)
“I felt this book was made for someone like me”	4.53 (0.91)	4.18 (1.12)
“I would recommend this book to other college students with social anxiety”	5.08 (0.81)	5.21 (0.83)
Compliance w/ exposure	4.17 (1.44)	3.96 (1.71)
Compliance w/ exercises	3.33 (1.62)	3.07 (1.84)
% finishing assigned chapters	47.22%	39.29%
% of assigned chapters read	81.48%	76.79

Note. Satisfaction items were measured on a scale of 1 = “Strongly disagree,” 2 = “Mostly disagree,” 3 = “Slightly disagree,” 4 = “Slightly agree,” 5 = “Mostly agree,” 6 = “Strongly agree.” Compliance with exposure was measured on a scale from 1 = “Never” to 7 = “Every day” and compliance with exercises was measured on a scale from 1 = “Did no recommended exercises to 7 = “Did all recommended exercises.”

Table 4. Time by condition models

	Time β	p	Time*Condition β	p
<i>Outcome</i>				
LSAS Total	-0.69	< .001	0.09	.38
LSAS Fear	-0.66	< .001	0.08	.44
LSAS	-0.69	< .001	0.09	.38
<i>Avoidance</i>				
GHQ	0.71	< .001	-0.25	.045
PROMIS SSRA	0.46	< .001	-0.10	.32
<i>Process</i>				
BAFT	-0.46	< .001	0.02	.87
CFQ	-0.48	< .001	0.13	.17
ASC Likelihood	-0.55	< .001	0.11	.32
ASC Concern	-0.47	< .001	0.14	.32
VQ-Progress	0.39	< .001	-0.15	.16

Note. Time is coded as 0 = Baseline, 1 = Midtreatment, 2 = Posttreatment. Condition is coded as 1 = ACT, 2 = tCBT. LSAS = Liebowitz Social Anxiety Scale; GHQ = General Health Questionnaire; PROMIS SSRA = Patient-Reported Outcomes Measurement Information System, Satisfaction with Social Roles And Activities; BAFT = Believability of Anxious Thoughts and Feelings; CFQ = Cognitive Fusion Questionnaire; ASC = Appraisal of Social Concerns; VQ = Valuing Questionnaire.

Table 5. Within-condition models testing the effect of time

	<u>ACT</u>		<u>tCBT</u>	
	<u>Time β</u>	<u><i>p</i></u>	<u>Time β</u>	<u><i>p</i></u>
<i>Outcome</i>				
LSAS Total	-0.69	< .001	-0.60	< .001
LSAS Fear	-0.66	< .001	-0.58	< .001
LSAS Avoidance	-0.69	< .001	-0.60	< .001
GHQ	0.70	< .001	0.50	< .001
PROMIS SSRA	0.46	< .001	0.36	< .001
<i>Process</i>				
BAFT	-0.47	< .001	-0.44	< .001
CFQ	-0.48	< .001	-0.34	< .001
ASC	-0.55	< .001	-0.43	< .001
<i>Likelihood</i>				
ASC Concern	-0.47	< .001	-0.32	< .001
VQ-Progress	0.40	< .001	0.23	.004

Note. ACT = acceptance and commitment therapy; tCBT = traditional cognitive-behavioral

therapy; LSAS = Liebowitz Social Anxiety Scale; GHQ = General Health Questionnaire;

PROMIS SSRA = Patient-Reported Outcomes Measurement Information System, Satisfaction

with Social Roles And Activities; BAFT = Believability of Anxious Thoughts and Feelings;

CFQ = Cognitive Fusion Questionnaire; ASC = Appraisal of Social Concerns; VQ = Valuing

Questionnaire.

Table 6. Process of change models

<i>Predicting post LSAS</i>								
	<u>Baseline</u> <u>LSAS β</u>	Baseline <i>p</i>	<u>BAFT β</u>	<u>CFQ β</u>	<u>VQ</u> <u>Progress</u> <u>β</u>	<u>ASC</u> <u>Likelihood</u> <u>$d\beta$</u>	<u>ASC</u> <u>Concern</u> <u>β</u>	<u>Process</u> <u>variable</u> <u><i>p</i></u>
Model 1	0.49	<.001	-0.28					.02
Model 2	0.47	<.001		-0.25				.04
Model 3	0.46	<.001			0.09			.47
Model 4	0.43	.001				-0.16		.23
Model 5	0.48	<.001					-0.27	.04
<i>Predicting post GHQ</i>								
	<u>Baseline</u> <u>GHQ β</u>	<i>p</i>	<u>BAFT β</u>	<u>CFQ β</u>	<u>VQ</u> <u>Progress</u> <u>β</u>	<u>ASC</u> <u>Likelihood</u> <u>$d\beta$</u>	<u>ASC</u> <u>Concern</u> <u>β</u>	
Model 1	0.40	.002	0.18					.13
Model 2	0.45	<.001		0.35				.003
Model 3	0.41	.002			-0.08			.51
Model 4	0.43	.001				0.12		.33
Model 5	0.51	<.001					0.35	.005
<i>Predicting post PROMIS</i>								
	<u>Baseline</u> <u>PROMIS</u> <u>β</u>	<i>p</i>	<u>BAFT β</u>	<u>CFQ β</u>	<u>VQ</u> <u>Progress</u> <u>β</u>	<u>ASC</u> <u>Likelihood</u> <u>$d\beta$</u>	<u>ASC</u> <u>Concern</u> <u>β</u>	
Model 1	0.63	<.001	0.29					.004
Model 2	0.60	<.001		0.23				.03
Model 3	0.66	<.001			-0.19			.08
Model 4	0.64	<.001				0.06		.57
Model 5	0.64	<.001					0.18	.08

Note. Each model tested if change on one process variable predicted posttreatment outcomes controlling for baseline scores. Change scores were calculated as baseline score minus midtreatment score (i.e., higher change score = more improvement). In these models, standardized regression coefficients are used such that coefficients indicate how many standard deviations the outcome would be predicted to change based on a one-standard deviation change in the predictor. LSAS = Liebowitz Social Anxiety Scale; BAFT = Believability of Anxious Thoughts and Feelings; CFQ = Cognitive Fusion Questionnaire; VQ = Valuing Questionnaire;

ASC = Appraisal of Social Concerns; GHQ = General Health Questionnaire; PROMIS SSRA = Patient-Reported Outcomes Measurement Information System, Satisfaction with Social Roles And Activities.

Figure 1. *Flow of participants*

